INSTITUTE OF AGRICULTURAL ECONOMICS, BELGRADE, SERBIA

International Scientific Conference

# SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION

## - rural development and (un)limited resources -

*Thematic Proceedings*

June, 5-6th 2014
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**International Scientific Conference**

## *„SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION“*

***- rural development and (un)limited resources -***

# THEMATIC PROCEEDINGS

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***- rural development and (un)limited resources -***


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# F O R E W O R D

International Scientific Conference *„SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION - rural development and (un)limited resources"*, which was held in period 5-6th June 2014 in Belgrade, the Republic of Serbia, through number of presented papers mainly provides an overview of results of scientific research on the integrated and interdisciplinary project No. III 46006 *„SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION"*.

Carrier of the Project, where is engaged *68 scientific-educational workers*, is the *Institute of Agricultural Economics Belgrade*, which collaborates in realization of this project with *8 scientific-educational institutions*. Project realization involves following Institutions: *Faculty of Agriculture - University of Belgrade; Faculty of Agriculture - University of Novi Sad; Faculty of Economics - University of Belgrade; Faculty of Economics Subotica - University of Novi Sad; Faculty of Biofarming Bačka Topola - Megatrend University, Belgrade; Institute for Science Appliance in Agriculture, Belgrade; Institute of Medicinal Plants Research Dr Josif Pančić, Belgrade; Center for Small Grains, Kragujevac.*

Mentioned Project is implementing within the period 2011-2014, and funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia. Realization of project is carried out through *3 sub-projects*, having in mind regional specificities of agriculture and rural/peri-urban areas within the Danube Region:

*(1) Sustainable agriculture and rural development in the Upper Danube Region;*

*(2) Urban and peri-urban agriculture in the Metropolitan area of Belgrade - Novi Sad;*

*(3) Sustainable agriculture and rural development in the Carpathians (mountain area within the National Park Đerdap and its protected zone).*

International Scientific Conference *„SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION - rural development and (un)limited resources“*, gathered number of scientific workers and experts from many countries. Besides the authors from *Serbia* in *Thematic Proceedings* are also presented the papers of authors from *Bosnia and Herzegovina, Macedonia, Albania, Romania, Russia, Belarus, Poland, Austria and USA.*

After all *67 papers* were positively reviewed by the reviewers and presented on the *International Scientific Conference*, they were published in the *Thematic Proceedings*. Proceedings publisher was *Institute of Agricultural Economics Belgrade*, together with *35 eminent scientific-educational institutions* from Serbia and abroad. In the *Plenary Section* were presented *4 papers* which gave significant contributions to *International Scientific Conference*.

Rest of the papers are systematized in *3 thematic sections*:

I *RURAL ECONOMY IN THE FUNCTION OF INTEGRAL LOCAL DEVELOPMENT (section was represented by 30 papers);*

*II ALLOCATION AND VALORIZATION OF RESOURCE POTENTIALS OF RURAL AREAS (section was represented by 26 papers);*

*III THE REFORM OF THE EU COMMON AGRICULTURAL POLICY - A NEW DEVELOPMENT FRAMEWORK FOR THE PERIOD 2014-2020 (section was represented by 7 papers).*

**Belgrade,**

*June, 2014*

**Editors:**

*Prof. Drago Cvijanović, Ph.D.*
*Jonel Subić, Ph.D.*
*Andrei Jean Vasile, Ph.D.*

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## III SECTION

### *THE REFORM OF THE EU COMMON AGRICULTURAL POLICY - A NEW DEVELOPMENT FRAMEWORK FOR THE PERIOD 2014-2020*

# PLENARY SECTION

## *PAPER BY INVITATION*

# EXPECTATIONS AND BENEFITS FROM THE MEMBERSHIP IN THE EUROPEAN UNION FOR POLISH AGRICULTURE

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## Abstract

*The study broadly characterises the changes occurred in the Polish food sector after the integration with the EU and an implementation of the CAP in domestic agriculture. It was emphasized that in relation to a baseline situation, after the accession, Polish farmers received the significant financial benefits ensuring the stable conditions of production in long term. As a result, the structural changes have been accelerated. Moreover, the processes of concentration in agriculture were intensified and the agricultural income increased dynamically. Extremely rapid growth of food exports was observed. Consequently, the economic recovery resulting from European integration had a positive impact on food quality and nutrition.*

**Key words:** *Polish agri-food sector, integration with the EU, effect of the CAP, agricultural incomes, export and import of agri-food products*

## Introduction

Public opinion surveys show that after ten years of membership, more than 60% of the farmers accept the membership in the EU. The attempt to perform an in-depth assessment of the macroeconomic impact of the Polish membership in the EU is far more difficult. The source of concern of the farming population originated from the specificity of this sector of the economy. Rural areas and agriculture exhibit less adaptability to the requirements of the market economy than other areas. The underdevelopment of the technical and social infrastructure, low levels of qualifications, underdevelopment of business support in rural areas, all this discourages spontaneous flow of private capital. For this reason, agriculture is one of the branches most sensitive to the situation of the state budget.

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High burden on the budget of the public debt service and the high deficit of insurance limited the increase of funds for agricultural restructuring, necessary to improve the competitiveness of the food sector [Kowalski 2011].

Supporters of the integration emphasized the high probability of accelerating the economic growth. Economic growth, generating an increase and qualitative change in the demand for food is a prerequisite of the long-term sustainable development of agriculture and the entire food sector. The Polish membership in the European Union was undoubtedly a factor in accelerating the growth of new members, including Poland. In the years 2003-2013, the GDP growth rate allowed for the acceleration of the domestic consumption and investment demand as well as the exporters' demand.

During this period, they increased in total respectively: individual consumption by 22.5%, investments by 66%, exports of goods by 141%. These are the indicators of economic development, resulting in an increase in the domestic demand for food (about 14%) and very high recovery in the trade in agri-food products, whose turnover increased threefold. Rapid economic growth and the income of the population promoted the improvement of the quality of food, i.e. improvement of the structure of food consumption and increase in the food processing and trade services.

**Table 1.** *Amount of transfers of the cap funds, which poured to Poland (data in euros)*

| Year | Direct payments | RDP | Market interventions | Other CAP transfers | In total |
|---|---|---|---|---|---|
| **2004** | 0 | 286 640 000 | 10 786 208 | 0 | 297 428 212 |
| **2005** | 702 674 035 | 662 100 658 | 166 668 009 | 10 638 946 | 1 542 083 653 |
| **2006** | 811 580 923 | 1 149 555 478 | 181 896 135 | 11 100 858 | 2 154 135 400 |
| **2007** | 935 100 872 | 1 550 886 535 | 62 431 005 | 5 264 141 | 2 553 684 560 |
| **2008** | 1 037 600 783 | 846 530 427 | 134 629 217 | 12 400 573 | 2 031 163 008 |
| **2009** | 1 446 164 527 | 1 043 825 682 | 409 081 057 | 14 860 428 | 2 913 933 703 |
| **2010** | 1 827 719 773 | 1 571 940 488 | 66 374 780 | 12 586 168 | 3 478 623 219 |
| **2011** | 2 395 415 615 | 1 706 015 707 | 142 161 865 | 11 632 309 | 4 255 227 507 |
| **2012** | 2 702 781 649 | 2 024 767 952 | 129 330 008 | 11 376 612 | 4 868 258 233 |
| **2013** | 3 065 995 810 | 96 830 252 | 1 695 969 389 | 24 234 865 | 4 883 032 330 |
| **2004-2013** | 14 925 033 987 | 10 939 093 179 | 2 999 327 673 | 114 094 900 | 28 977 549 740 |

**Source:** *Eurostat data*.

Among the benefits, emphasis was mainly put on the financial benefits associated with accession. It seems that the amount of financial resources was a decisive argument for hesitating farmers to vote in the referendum for EU membership. After the Polish accession to the European Union already in the years 2004-2006 we were to receive around 20 billion euros from the EU for various types of Community policies [Kowalski, 2013]. The agricultural sector during the period of the membership was supported from the budget of the EU-27 with the amount of nearly 30 billion euros (more than 120 billion zł). (Table 1)

## Economic and natural determinants of the Polish food sector

In Poland in 2013, in the use of farms exceeding 1 ha of agricultural land, there was more than 15.2 million ha of agricultural land[2], there was more than 15.2 million ha of agricultural land, and the majority (94.7%, or 14.4 million hectares) was maintained in good condition and accounted for approximately 9% of all agricultural land of this kind, available to the EU-27 agriculture. However, these were the lands of relatively low quality for use from the point of view of the conducted farming activity. According to specialists of IUNG, taking into account the entirety of natural and climatic relations, their conditioning in respect of agricultural production in Poland is about 25-30% worse than in the Western European countries.

In the last decade in Polish agriculture, the concentration processes that became strengthened after the entry of our country into the EU, are becoming increasingly distinguished. In the period 2002-2013 the average area of the majority of farms above 1 ha of agricultural land in Poland increased by 15.6%). Over 80% of the growth occurred in the period 2003-2013. The scale of the pro-effective structural transformations is best illustrated by the changes in the size of the group of farms with opportunities for growth and withstanding the competition, which in Polish conditions includes the farms of 30 ha and larger [Poczta, 2012]. In the years 2002-2013, their share in the total number of farms with more than 1 ha increased from 6 to 9%, and the area of land at their disposal - from 26.5% in 2002 to 44.3% in 2013 [Wigier, 2014]. In 2013, the population contributing labour input in agricultural activities conducted by individual farms and not receiving remuneration for it amounted

[2] Agricultural land in Poland accounted for approximately 8.8% of the agricultural land of the EU-27. A higher percentage of agricultural land existed in: France (16.1%), Spain (13.6%), United Kingdom (9.6%) and Germany (9.3%).

to 3 669.4 thousand people[3], while it was a population 8.9% smaller than 10 years earlier [4]. Expressing their work in full-time equivalent, namely the fully employed[5], in the years 2003-2013, this population decreased from 2 044,7 to 1 769,9, therefore by 13.4%. The empirical research conducted by the Institute shows an increasing number of people from families with a user of a farm over 1 ha, who work exclusively outside agriculture. Their numbers were estimated in 2013 at about 460 thousand people, while in 2003 there were around 305 thousand.

It is estimated that in 1999, 83-139 thousand farms (5,2-8,7% of the total) expanded the value of their assets. In 2013, in turn, such characteristic distinguished as many as 290-300 thousand households (about 17% of the total), which generated approximately 69% of the national agricultural production value. Favourable changes also concerned the technologies used in agricultural production. In the years 2002-2010, the share of farms with tractors increased from 35.9 to 44.6%; with combine harvesters from 4 to 6.5%, with sprayers from 15.8 to 21.5% [Józwiak, 2012].

Changes also occurred in the livestock, counted both in the physical and measurement units. In contrast to the periods earlier than 2002, the livestock population in measurement units was increasing and in 2013 it was about 38% higher than eight years earlier. The stocking density per 100 ha of agricultural land in 2012 was 67.4 LU, while in 2002 it was 45 LU. The increase in livestock was a favourable situation, since it contributed to the improvement of soil fertilization with organic fertilizers. In recent years, also expenditure of chemical pesticides, mineral fertilizers was also increasing, and this means that there was an increase in crop production intensity. Consumption of mineral fertilizers calculated in kilograms of NPK in 2013 was approximately 130% of the level in 2000, and the corresponding indicator relating to the chemical plant protection products accounted for approximately 217%.

[3] All data for the year 2013 is based on the PSR results from 2002 and 2011, the results of the sample survey "The structure of agricultural farms" conducted by the CSO in 2005 and 2007, and the panel field studies carried out by the IAFE-NRI in 2005 and 2011.

[4] The information cited for the year 2003 was determined on the basis of the results of the PSR 2002 sample survey "The structure of farms" conducted by the CSO in 2005 and panel field studies carried out by the IAFE-NRI in 2000 and 2005.

[5] This means that one person works on a farm 2 120 hours per year, which means working 265 days in a year, 8 hours a day. The full-time equivalent calculated in this way constitutes a unit of work AWU, and for the other members of the farm family it is signified as FWU.

Increasing the intensity of crop production was accompanied by an increase in crop yield. Only in 2004-2013 the yields of rape and turnip rape increased by about 48%, sugar beet by 37%, wheat by 21% and forage legumes grown for seed by 15%. In animal production an increase in productivity per unit was also reported. The average annual rate of increase in milk yield was close to 82 litres per cow throughout this period, and the production of live pigs per piece of an average balance grew at the average annual rate of about 2 kg. As a result, the average annual milk yield per cow amounted to 1 4618 l, and the production of pork in live weight - 155.8 kg per 1 ha. This was a consequence of the genetic progress in livestock farming and change in the way of feeding them, improving the quality of own and purchased feeds.

It should be noted that in the period 2004-2013 the volume of agricultural production increased. The CSO data shows that the value of global production of Polish agriculture, at prices current in 2013, amounted to PLN 100,671.7 million . When calculated in constant prices, it was 16.2% higher than in 2000, but about 9.8% higher compared to 2005, thus an average annual real increase in the production in the years 2005 to 2013 was 1.63%, while in 2000 -2010 it was 1.47%. Poland produces about 12.7 million tons of milk and is the fourth producer in the EU. Production is stable, as the increasing milk yield is compensated by the decline in livestock. Milk is increasingly processed into products with a high share of added value (ripened cheeses, yogurt, etc.). Net exports of dairy products is about 1.3 million tons in terms of milk, and a value of EUR 950 million [Seremak-Bulge, 2014]. Poland has become a major exporter of cheese - around 185 thousand tons. In the same time Poland is the third producer of sugar in the EU. The production potential of the sector after restructuring decreased slightly to the about 1900 thousand tons, but far exceeds the demand of the internal market of 1600 thousand tons. The decrease in the cultivation area of the sugar beet down to 185 thousand ha compensated by higher yields, up to 630 dt/ha. The modernization of the sugar industry and its raw material base contributed to the efficiency of the production and processing of the sugar beet. The industry is a net exporter of about 200-300 thousand tons [Szajner, 2013].

Since the beginning of the twenty-first century, poultry production in Poland has tripled to about 1,600 thousand tons. Consumption has doubled to more than 26 kg / person / year. This represents 37% of the total meat consumption. Exports are up to eleven times greater than in 2000 and exceeds 530 thousand tons, representing 33% of the production.

Currently, Poland is the fourth producer of poultry meat in the EU and its third exporter. In 2013 the value of exports amounted to around 1.2 billion euros. We are gaining new markets in Asia and Africa [Dybowski, 2013].

Poland is the 3rd largest producer of cereals in the EU. In the last decade the average size of the harvest was 27 million tons. Nevertheless, there were variations in their size 21,7-29,7 million tons, which resulted from random factors. For many years, Poland has been a net importer of cereals and, in principle, not counting individual years, it still remains one. However, after joining the EU the situation has changed considerably in this respect. Prior to the accession, small quantities of cereals were exported, and larger only in case of a large harvest. At the same time imports also were subject to fluctuations depending on the market situation. However, after the accession to the EU, regardless of the size of the harvest, at least 1 million tons are exported in season, and often more than 2 million tons (4.5 million tons in the season 2012/13). At the same time imports are stabilized in the range of 1.5-2.5 million tons [Łopaciuk, 2013].

Poland is one of Europe's largest producers, processors and exporters of rape. With production exceeding 2 million tons Poland has a 11% share in the production of rapeseed in the EU and together with the UK the third place in production. Poland lost the position of the major manufacturer and exporter of rapeseed in the 90s, and regained it after joining the EU. EU policy on biofuels gave a strong impetus for the development of the crops. In the years 2004-2013 harvest increased from 1 million tons in 2000-03 to 2.1 million tons in the last five years. Rapeseed production has become the fastest growing plant production branch. With increased production and slow-growing domestic demand for canola oil, Poland has emerged as a formidable exporter of rapeseed. Export of rapeseed oil is still developing and the export of rapeseed meal and margarine is also increasing. The value of exports of oil increased in the period 2004-2013 6-fold and the value of imports 4-fold . Despite the development of exports, Poland, like the rest of the EU, remains a lasting net importer of oil , and the negative trade balance is deepening. This is due to the limited development opportunities of oilseed production, with rapidly growing domestic demand for biofuels and high-protein feed [Rosiak, 2013]. Poland is the fourth, after Spain, Italy and France, manufacturer of fresh horticultural products in the countries of the extended Community [Nosecka, 2013]. Poland is the largest producer of : apples, cherries, currants, gooseberries, raspberries, as well as cabbage, carrots and red beets in the EU and the second producer of strawberries, cucumbers and onions in the Community.

The participation in the EU's harvest of the majority of vegetables less esteemed in domestic production is increasing, i.e.: broccoli, pumpkin vegetables, leeks and salad vegetables. Polish participation still does not exceed 5% of the EU harvest of these vegetables.

With stable production, the participation of our country in the EU production of concentrated apple juice does not change and fluctuates around 45-50%. With the participation of more than 50%, we are a leading producer of frozen fruit (strawberries, cherries, raspberries, currants, gooseberries, plums) and concentrated juices of soft fruit in the EU. Already in the second year of our presence in the EU, we became the largest, after Belgium, manufacturer of frozen vegetables in the Community. We are also, with little change in the share of EU production, the biggest in the Community and one of Europe's largest producers of sauerkraut, pickled cucumbers and dried carrots. In the total production of processed fruit and vegetables in the EU, Polish participation increased from about 5% before the accession to around 10% on average in 2010-2012. After the accession, Poland has strengthened its position as the largest provider of concentrated juices, frozen fruit for processing and soft fruits (mainly strawberries, cherries, raspberries and currants) among the Community countries for the EU market, and the second after Belgium supplier of frozen vegetables.

Poland is the world's largest producer of currants and gooseberries, and in recent years also raspberries. We fourth in the world in the production of apples and fifth in the production of strawberries, cherries and carrots. Poland is the second in the world (after China) producer of concentrated apple juice and third in the world (after the U.S. and China), producer of frozen fruit and concentrated juices made from soft fruit. We belong to the group of the 5 world's largest producers of frozen vegetables. We are the world's first exporter of frozen fruit, concentrated juice from soft fruits and the second in the world exporter of apple juice concentrate. In recent years, we have become the second (after China) exporter of apples (in the season of 2012/13 Polish exports of these fruit exceeded the exports from China).

## The income situation of agriculture

Agricultural support of public funds (EU and national) have improved the financial situation of Polish farmers, mainly due to direct payments. Supporting the farms in LFA areas was beneficial for farmers and the environment. The "agri-environment" actions should be assessed positively, among which the measures to protect water and soil had the largest range.

In contrast, the extent of the impact of the "early retirement", the program of afforestation and measures to adapt to EU standards, and above all, the program supporting semi-subsistence farms was considered as negligible.

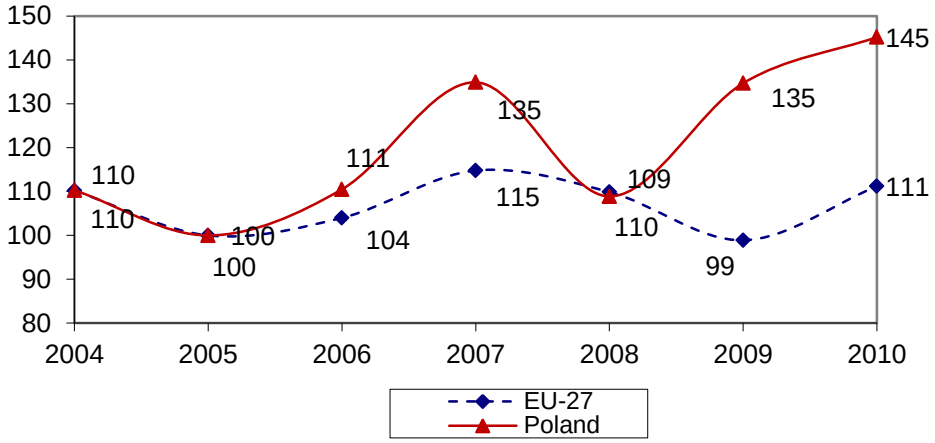
Agricultural incomes are highly volatile [Floriańczyk, 2013]. This variation is directly related to the fluctuations in the price of products, means of production and volume production. In the context of the increasing integration of agricultural markets, the observed fluctuations in prices of agricultural products are subordinated to the changes in the volume of production in the global market. Consequently, it is possible to increase the prices paid to agricultural producers on the local market, accompanied by an increase in the volume of domestic agricultural production. In this case, we observe a strong increase in agricultural income. Conversely, a strong decline in the world and local prices, in the event of a decrease in the volume of the domestic production leads to rapid deterioration of the financial situation of farmers.

Fluctuations in agricultural incomes, especially in the second of the discussed cases are stabilized through direct payments. These payments may be of a long-term - planned character, as well as in the form of a temporary income support. This first form of support may be questionable in terms of growth in agricultural income resulting from the simultaneous improvement of the terms of trade and the volume of agricultural production. In this case, the support is an additional factor leading to an increase in the amplitude of the fluctuations in agricultural income.

Polish integration with the EU stopped the downward trend in the share of agricultural income in the total income. In the period 2004-2013, the share of agricultural income increased by 5.4 percentage points (pp) and the income from employment by 2.6 percentage points within the total disposable income; while the income from social benefits and welfare decreased by 6.0 p.p. and from self-employment by 0.8 p.p. decreased[6]. Also, the difference between the income from agriculture in Poland in relation to farmers in the EU-27 decreased, although the differences are still very significant. (Figure 1)

[6] Household budgets, CSO.

**Figure 1.** *The dynamics of the income of the production factors per full-time employee in agriculture in constant prices (2005 = 100)*



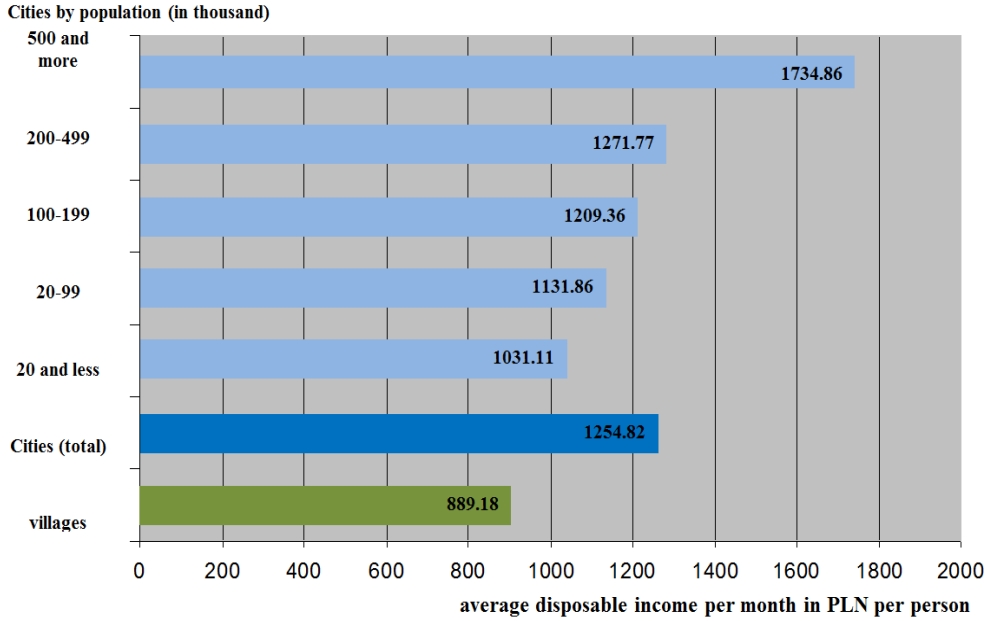

**Source:** *Eurostat, Economic Accounts for Agriculture.*

Household Budget Surveys show slow decrease in income disparities between urban and rural population. In 2004-2009 the advantage of the urban population revenues in comparison to rural one decreased from 51.4% to 41.1%; similarly: in cities with a population of 20 thousand and less from 24.6% to 16.0%, and in the cities 500 thousand and more from 105.7% to 95.1%[7]. The higher growth in incomes of the population living in rural areas (an increase of 58.8%) compared to urban residents (an increase of 48.0%), and almost two times lower number of long-term unemployed, i.e., people seeking jobs for a period longer than 12 months, in rural areas, had an effect on these changes.

Despite the decline, still a high dominance of income, particularly among the residents of metropolitan cities, over the incomes of the rural population persists [Kowalski, Wigier, Chmieliński, 2009]. This is due, inter alia, to the fact that the best-paid jobs are located in large cities. The income differences between the inhabitants of cities and villages is also affected by the number of people in the family and the education level of the household. People living in the countryside have a lower level of education than people in the city; also a greater proportion of large families resides in the rural areas than in the city, especially compared to the large agglomerations.

[7] The results of the CSO household budgets surveys.

**Figure 2.** *The level of disposable income of households in rural and urban areas*




**Source:** *Own elaboration based on the results of household budget surveys, CSO.*

In the farmers' households in 2013, further reduction of the risk of economic poverty, including extreme poverty, was recorded. In the years 2004-2013 in farmers' households the decrease of percentage of people living below: subsistence minimum from 19.9% to 8.9%, the relative poverty from 32.3% to 25.9%, the legal poverty line of 31, 6% to 12.1%, was recorded. In the case of legal poverty, since 2005, a permanent decrease in the proportion of expenditure below this threshold occurs. This is the result of the adopted mechanism for determining the threshold amounts entitling to benefit from the social assistance system.

In the sphere of supplying agriculture with the means of production, primarily a large increase in the prices of means of production, goods and services purchased by farmers were the effect of integration [Zalewski, 2014]. The prices of these products in 2013 were about 40% higher than the state from 2000-2002 and 33% higher than in 2003. In the post-accession period a steady increase in purchases (and consumption) of mineral fertilizers, plant protection products, animal feed and industrial services, with a relative stabilization of the supply of seed material, energy factors or fuel, were recorded.

The development of the real demand for current capital goods, as well as intermediate consumption, was, therefore, moderate and slightly lower than the growth in agricultural production. Whereas, a clear, and even a large increase in demand for agricultural machinery and other capital goods occurred. On average, in this period, a twofold increase in sales of main agricultural machinery and other capital expenditures occurred. In the years 2003-2013 the value of investment in agriculture has increased in current prices by twofold (from PLN 2.0 to 4.0 billion), and in constant prices by about 38%. Thus, an important result of the increase of farmers' income, mainly as a result of direct payments, was a significant revival of investment in agriculture, moderate development of the current means of production, and capturing a substantial part of the additional income of this social group by the suppliers and manufacturers of those means.

In the period 2004-2013, the average rate of development of food industry production, as measured by its value in constant prices, was 5.2% per year. In this period the rate of growth of the sector was similar to the growth of gross domestic product, but about two fifths lower than in the previous boom (1993-1998) and a third slower than the production of the whole Polish industry. In this respect, the effect of integration has in the food industry been smaller than the effects of the transformation processes performed in the previous decade. In the period of the EU integration, also the share of the production of food, beverages and tobacco in the whole Polish industry was reduced. At the same time the development of this production was more than twice faster than agricultural production (approximately 1.8-2.6% per year) and 2.4 times faster than the increase in domestic consumption of these products (2.25% annually). This means that after the Polish accession to the EU, the share of the food industry in the management of agricultural production and national coverage of consumer demand increased.

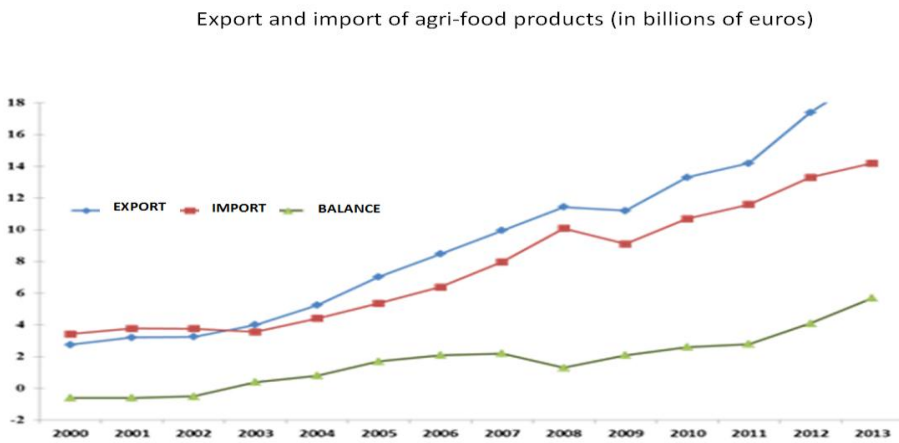
Rapid development of export of products of the food industry (at a rate of 22.5% per year) has been an important source of growth in this sector, which resulted in the fact that in the years 2003 to 2013 approximately 55% increase in sales (in constant prices) was placed on the foreign markets, and the share of exports in the food industry revenues increased twofold (from 11% in 2000-2002 to 31% in 2012). Another very important source of growth in this sector was the maintenance of a high growth rate of secondary processing, i.e., the production of highly processed foods, soft drinks, snacks and desserts, which – similarly to the past two decades - increased at a rate of about 7% per year. In the period of integration with the European Union, there was similarly high production growth of stimulants (6.7% annually).

## Foreign trade in agri-food products

The most important factor in the development of agri-food sector in Poland was extremely rapid growth of food exports. The period of Polish membership in the European Union was characterized by the systematic growth and improvement of the results of trade in agri-food products. Positive changes were already evident in the year 2003, when Poland for the first time became a net exporter of agri-food products, obtaining a positive balance in the amount of 454 million euros and achieving double-digit growth in exports and imports.

In the year of accession, foreign trade turnover of Polish agri-food products was nearly 30% higher than in the year 2003. Due to the continuing growth of both exports and imports, Poland's turnover with agri-food products also increased in subsequent years. Only the year 2009 was an exception, when sales declined by more than 5% in comparison with the previous year.

**Figure 3.** *Export and import of agri-food products*




**Source:** *Own elaboration.*

Since Polish accession to the EU the positive balance of trade in agri-food products steadily increased. The year 2008, when the surplus was significantly reduced, was an exception. (Figure 3) For the years 2003 to 2013 exports of the agri-food products increased more than fivefold, import four and a half times, and the balance of foreign trade in these products more than fourteen times. In the same period, the cumulative growth rate of GDP, expressed in constant prices, amounted to 146.9%. The dynamics of exports and the balance of foreign trade in agri-food has, therefore, exceeded the GDP growth rate, giving evidence of a pro-export development of this sector in Poland.

Business connections of the Polish agri-food sector with foreign countries for years are asymmetric, i.e., the Member States remain dominant partners in this exchange. It is a consequence of full integration with the European Union and the introduction of the Common Agricultural Policy and Trade. Economic regional integration is both a stage of involvement in the processes of globalization, and a form of strengthening internal forces, so that it was possible to cope with global competition and protect oneself against the negative effects of global changes[8]. European economic integration implies the free movement of goods, services, capital and persons within the Community. Domestic food producers who meet certain sanitary, veterinary, phytosanitary, animal welfare, and environmental protection standards have been granted unlimited access to a huge market, characterized by high purchasing power of consumers. In 2013, the share of the EU-27 countries in the Polish agri-food exports amounted to 76.9%, including the countries of the EU-15 with 57.5% (Table 3). The positive balance of trade with the EU countries amounted to almost 4.5 billion euros. Such a high share of the European Union in the geographical structure of exports, and such a high value of the balance of trade with the countries of the Community are other arguments proving the thesis that the Polish food sector is competitive and successful in the common market.

An important market for Polish foods are also the CIS countries, whose share in the Polish agri-food exports in 2012 amounted to 11.3%. The share of the CIS countries in particular years was subject to large fluctuations, resulting from the variable trade policy of Russia (which played a leading economic role in this group of countries). Russia quite often introduced various restrictions on access to its market, which negatively affected the results in exports and economic situation of the market and some industries (e.g., meat, fruit and vegetables sector). But maybe in the next few years, Russia will be more predictable trade partner, because since 2012 it is a member of the World Trade Organization (WTO) and should respect the foreign trade rules set by the organization. However, this does not mean an easy success in this market for Poland, because the Russian market is increasingly demanding and characterized by stronger and stronger competition, and in addition, it is influenced by political considerations. The Russian food sector undergoes dynamic structural changes that are the result of the influx of large, both domestic and foreign, investments.

[8] W. Szymański, *Globalizacja. Wyzwania i zagrożenia*, DIFIN, Warszawa 2002.

**Table 3.** *The results of foreign trade in agri-food products (in millions of euros)*

| Trade stream | Direction | 2003 | 2005 | 2007 | 2009 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|
| Export | **In total** | **4 010,4** | **7 028,0** | **9 942,5** | **11 277,6** | **15 227,6** | **17 893,2** | **19 956,9** |
| | EU-27[a] | 2 616,7 | 5 190,8 | 8 001,4 | 9 066,9 | 11 911,0 | 13 763,8 | 15 556,7 |
| | *EU -15* | 2 041,6 | 4 063,0 | 5 941,2 | 6 698,8 | 8 793,4 | 10 295,2 | 11 596,0 |
| | *EU -12[a]* | 575,1 | 1 127,8 | 2 060,2 | 2 368,1 | 3 117,6 | 3 468,6 | 3 960,7 |
| | From beyond EU -27 | 1 393,7 | 1 837,2 | 1 941,1 | 2 210,7 | 3 316,6 | 4 129,4 | 4 400,2 |
| Import | **In total** | **3 556,9** | **5 373,5** | **7 972,3** | **9 111,0** | **12 628,4** | **13 557,4** | **14 219,0** |
| | EU-27[a] | 2 175,9 | 3 388,2 | 5 347,4 | 6 320,4 | 8 822,2 | 9 284,3 | 9 792,6 |
| | *EU -15* | 1 848,5 | 2 938,0 | 4 484,6 | 5 448,9 | 7 520,2 | 7 802,1 | 8 335,0 |
| | *EU -12[a]* | 327,4 | 450,2 | 862,8 | 871,5 | 1 302,0 | 1 482,2 | 1 457,6 |
| | From beyond EU -27 | 1 381,0 | 1 985,3 | 2 624,9 | 2 790,6 | 3 806,2 | 4 273,1 | 4 426,4 |
| Balance | **In total** | **453,5** | **1 654,5** | **1 970,2** | **2 166,6** | **2 599,2** | **4 335,8** | **5 737,9** |
| | EU-27[a] | 440,8 | 1 802,6 | 2 654,0 | 2 746,6 | 3 088,8 | 4 479,5 | 5 764,1 |
| | *EU -15* | 193,1 | 1 125,0 | 1 456,6 | 1 249,9 | 1 273,2 | 2 493,1 | 3 261,0 |
| | *EU -12[a]* | 247,7 | 677,6 | 1 197,4 | 1 496,7 | 1 815,6 | 1 986,4 | 2 503,1 |
| | From beyond EU -27 | 12,7 | -148,1 | -683,8 | -580,0 | -489,6 | -143,7 | -26,2 |

**Source:** *own elaboration based on: „Handel zagraniczny produktami rolno-spożywczymi. Stan i perspektywy", nr 21-38, seria „Analizy rynkowe" z lat 2005-2013, IERiGŻ-PIB, ARR, MRiRW, Warszawa.*

In other countries a significant position in the export of food is occupied by economically developing countries (6.8%). Economically developed countries have, however, relatively small share in exports (3.1%), which is primarily due to their protectionist trade policy, which consists of high tariff rates, and non- and para-tariff barriers.

## Conclusions

The analyses of the potential benefits and risks associated with the integration process stressed the fact that the Common Agricultural Policy provides stable production conditions for the producers in the long term. For the Polish farmers exposed to frequent changes in agricultural policy, the consequences of changes in the economic situation in the agricultural sector, ensuring stable production conditions, according to many opinions was to become an achievement of equal importance as financial aid.

The continuing agrarian fragmentation, despite the favourable trends, is the consequence of the earlier developmental delays, the elimination of which does not depend on the changes in the agricultural sector. Further progress in the diversification of economic activity of people from families with a user an individual agricultural holding largely lies outside agriculture. The preparation for work in non-agricultural sectors is steadily improving, as evidenced by changes in the level of general education of the population aged 15 and over from families with a user from an individual agricultural holding[9]. In the years 2003-2013, progress was made in the number of graduates of secondary and post-secondary schools (18 to 34%) and higher (from 3 to 13%). Moreover, at the same time, the percentage of people who had non-agricultural school qualifications increased from 44 to 57%.

After the accession to the European Union, the growth rate of household income of farmers was higher than in other socio-economic groups. In the period 2004-2013, the nominal disposable income of farmers increased by 89.7% (real income by 64.3%), and in other farm groups as follows: in total by 62.2% (38.7%), employees by 61.5% (39.3%), the self-employed (entrepreneurs) by 57.0% (37.2%) and pensioners by 51.5% (26.2%). During the accession, the factors favouring the growth of agricultural incomes prevailed, among which a prominent position was taken by various forms of financial support under the CAP, addressed to the agri-food sector, households of farmers and rural areas

After joining the European Union the economic and financial situation of agricultural enterprises, both manufacturing and service companies, was well and stable. In the period 2004-2013, manufacturing companies had stable ability to generate profits of around 5-10% of the value of turnover, service 3-6% (ROE 6-15%), revenues and productivity were steadily increased, financial liquidity and high rate of investment were achieved. Indicators of the current financial liquidity, remaining within the range of 1.5-2.2, indicate even the presence of available equity resources in some of these companies, and the investment rate above 1.5 means a rapid process of modernization of the fixed assets of agricultural enterprises. Acceleration of the Polish economic growth, on which accession to the EU had a great influence, influenced the revival of production in the food industry, improvement of the economic condition of this department of food economy, and an increase in investment activity.

[9] Changes in the level of education determined on the basis of population and housing census in 2002 and 2011, and the panel field research carried out by the IAFE-NRI in 2000, 2005 and 2011.

Development of the Polish food economy has solid basis. It consist of a large domestic market, which still shows the development trends, and the economic recovery, which is the result of integration, has strengthened these trends. The economic development of the country has improved the structure of consumption and quality of human nutrition. This results not in the improvement of the sustenance measured with the nutritional quality of the consumed food, which in the developed countries is rather stable, but in the improvement of nutrition, which occurs as a result of changes in the structure of consumption and an increase of packaging of foodstuffs with various types of services, facilitating an access to food, convenience of using the food, or an increase in satisfaction of its consumption.

**References**


1. Dybowski G. (ed.) (2013): *Rynek drobiu*, IERiGŻ-PIB, Warsaw, Poland, Nr 44/2013, pp. 4-6.

2. Kowalski A. (2013): *The new financial perspective – the perspective of choice* [in]: Growth factors and competitiveness of the agri-food sector in Poland and Ukraine on the worldwide tendencies, (Ed.) T. Mostenska, A. Kowalski, I. Fedulova, M. Wigier, I. Szczepaniak, Y. Bilan, Kyiv, Ukraina 2013, pp. 27-35.

3. Kowalski A. (2011): *Conditions of the development and global challenges for the agri-food sector in Poland* [in]: European Union Food Sector after the last enlargements – conclusions for the future CAP. IERiGŻ PIB Warsaw, Poland, pp. 9-29.

4. Kowalski A., Wigier M., Chmieliński P. (2009): *Poland's adjustment to challenges of changing agricultural policy of the European Union*, paper for the 113th, Seminar of the European Association of Agricultural Economists, Belgrade, Serbia, pp. 201-211.

5. Floriańczyk, Z. (2013): *Dochód polskiego sektora rolnego w roku 2012 na tle lat poprzednich*, IAFE-NRI, Warsaw, Typescript, pp. 7-9.

6. Józwiak W. (2012): *Polskie rolnictwo i gospodarstwa rolne w pierwszej i drugiej dekadzie XXI wieku*, Multi-annual programme Report No. 53, IAFE-NRI, Warsaw.

7. Łopaciuk W. (ed.) (2013): *Rynek zbóż,* IERiGŻ-PIB, Warsaw, Poland, Nr 45/2013, pp. 4-6.

8. Nosecka B. (ed.) (2013): *Rynek owoców i warzyw,* IERiGŻ-PIB, Warsaw, Poland, Nr 43/2013, pp. 4-6.

9. Poczta W. (2012): *Przemiany w rolnictwie ze szczególnym uwzględnieniem przemian strukturalnych*, In: Raport o stanie wsi. Polska wieś 2012, (Ed.) Wilkin J. Nurzyńska I., Wydawnictwo Naukowe SCHOLAR, FDPA, Warsaw, pp. 72-77.

10. Rosiak E. (ed.) (2013): *Rynek rzepaku,* IERiGŻ-PIB, Warsaw, Poland, Nr 44/2013, pp. 4-6.

11. Seremak-Bulge J. (ed.) (2013): *Rynek mleka,* IERiGŻ-PIB, Warsaw, Poland, Nr 46/2013, pp. 4-6.

12. Szajner P. (ed.) (2013): *Rynek cukru,* IERiGŻ-PIB, Warsaw, Poland, Nr 40/2013, pp. 4-6.

13. Wigier M. (2014): *The competitiveness of Polish agriculture after accession to the EU*, Economics of Agriculture, Vol LXI, nr 1 (1-268), Beograd, Serbia, pp. 87-102.

14. Zalewski A. (ed.) (2014): *Rynek środków produkcji dla rolnictwa,* IERiGŻ-PIB, Warsaw, Poland, Nr 41/2013, pp. 5-7.

# INCREASE OF EMPLOYMENT AND INCOME OF RURAL POPULATION AS A FACTOR OF SUSTAINABLE DEVELOPMENT OF REGIONAL RECREATIONAL SECTOR

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## Abstract

*Theoretical, methodological and practical basic principles for the assessment and analysis of sustainable development of rural areas of the Stavropol region are substantiated in the article, including recreational sphere and tourism cluster of region, on basis of which the proposals on sustainable development of regional recreational sector are developed. Indexical, correlation and regression, monographic, logical and constructional analyses are used as the main research methods. Data of Federal State Statistics Service of Russian Federation (Rosstat) are used as information base for the research. Also, in our analysis, we used methodical and analytical materials of the Ministry of Agriculture of Russian Federation and the Stavropol region. Results of scientific research are implemented by Ministry of Agriculture of the Stavropol region, as part of the project of target complex program "Sustainable development of rural areas in the region in 2014-2017". The results of research can be used as methodological tool for the typology of rural areas, according to the conditions of sustainable development of recreational complex. They can be applied both for other Russian regions, as well as other areas with similar characteristics as Stavropol region.*

**Key words:** *sustainable development, rural territories, recreational sphere, diversification of employment, rural tourism*

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## Introduction

Employment as advantageous activity is a fundamental category of productive labour relations. Employment issues are very important for the rural areas of the region of Stavropol, since it has been characterized by significant unemployment rate, noticeable outflow of workforce, income decrease and also level of professional competence of rural staff.

Formation and development of the rural economy at early stage requires analysis of development of labour relations system by monitoring labour provision, unemployment, labour market pressure, as well as the effectiveness of its reproduction in general, including the aspects of training, distribution and use of human capital. Initial phase in the evaluation system of labour relations is examination of employment which is a fundamental element of organizational and economic mechanism for agricultural market management. Issues of employment and labour activity, as well as the problems of optimal control of human resources (in terms of increasing employment) have always been in the center of attention of scientists and philosophers, economists and political leaders. However, from a scientific point of view, employment is rather complex and multifaceted category. It reflects in different aspects of economic, social, political, demographic and even domestic nature. From the economic point of view, employment is the combination of relations between labor market agents relating their participation in production. It expresses the way of involvement of the employable workforce in the process of wealth creation. Applied aspect of the employment research addresses the identification of this economic term from the point of view of Federal State Statistics Service. In this regard, employment can be viewed through the prism of such basic concepts as: workers employed in the economy, helping in the family business, hired workforce, employed in the informal sector workers, etc.

Ensurance of sustainable employment in rural areas is vitally relevant for Russia in general and for Stavropol Region in particular, since over 40% of population of Stavropol Region live in rural areas. Transition period, experienced by Russian economic during 1990s, caused depopulation of rural areas and active migration outflow. Total unemployment was the major driver for rural people to move to cities. Untill now lower employment opportunities in rural areas in comparison with urban territories is one of the main threats to sustainable rural development, as it brings about the loss of historically developed areas, degradation of small

rural settlements, and depletion of the rural economy. Moreover, it threatens regional and national food security because of agricultural land withdrawal. That is why elaboration of employment opportunities and promotion of income sources are considered as vital issues of sustainable development of rural areas in Russia.

## The main issues of employment and sustainable production in Russian rural regions

The analysis of data Russian Federal State Statistics Service 2012 reveals that the majority of regions in the North Caucasus Federal District should be considered as rural since the average share of rural population for the district is 49.8% (25.8% is the average indicator for the RF, and 17.9% is the average indicator for the Central Federal District). That also includes: 55.1% in the Republic of Dagestan, 56.4% in the Republic of Ingushetia, 55.5% in Karachaevo-Cherkesia and 64.5% in the Chechen Republic. It is not by chance that in these regions of the Russian Federation, economically active population have the the higher level of unemployment (2,5 – 4 times higher than in the other Russian territories). Certainly, presented situation clearly has a negative impact on labor efficiency in companies and enterprises of the stated regions. Also, it reflects negatively on results of operational and financial activities, in general.

On the other hand, the population in the above mentioned republics of the North Caucasus have the highest share of agricultural workforce. For instance, 26.4%, 20.9% and 21.9% of the total number of employed in the region industries are registered in the Republic of Dagestan, Kabardino-Balkarian and Karachaevo-Cherkess Republics, respectively. At the same time, the Republic of North Ossetia-Alania, the Chechen Republic and the Stavropol region have lower indicators 15.4%, 17.0% and 17.6% (7.0% for the Russian Federation, in general). This is the evidence of significancy status of the agricultural regions in relation to the considered regions of the South of Russia.

The results of the employment sampling survey made by territorial agency of Federal State Statistics Service of Stavropol region show that the index of employment of economically active population in Russia (2010 – 2012) increased from 58.7% to 62.3%, including the increase in rural areas from 56.7% to 58.5%. In the same period, the unemployment rate of economically active population aged 15 -72 years decreased from 9.8% to 8.2%. In the rural areas, it remained the same (10.5%). As

regards the employment level of economically active working-age population, it decreased from 68.2% (2010) to 66.9% (2012). It is considered as a negative effect.

Undoubtedly, relative decrease of the employment ratio influenced the amount of income of working-age population. In this particular case, we found inverse correlation between the rural unemployment ratio and the level of income of rural population. Thus, the correlation ratio between these two indexes in 13 regions of the South of Russia was equal -0.721 and – 0.642 between the unemployment ratio and share of rural population in total population of region. This supposes development of measures to ease rural unemployment and increase the employment in rural regions and agricultural enterprises.

The analysis has shown that in the modern conditions of growing urbanization, an increasing number of countries confront the problems of social and economic development of rural areas. The specifics of agricultural production cause the main difficulty: the possibility of substitution of labor and land for capital is restricted. It is for that reason that sustainability of rural development is mainly considered as retaining rural population in their traditional environment by providing them with constant employment and source of income (Kiseleva N. N. 2013).

Rural areas have unique natural, demographical, economic and cultural potentials. Rational use of these resources could ensure their diversified development, full employment, improved quality of life of rural population, etc. However, contemporary social circumstances differ from the perfect picture, especially in developing countries where agriculture makes a significant part of the GDP and $^1/_3$ of total population lives in rural areas.

Russia is considered as a developed country, but nevertheless Russian rural areas face serious problems regarding economic and social development. Total state territory is more than 17 million $km^2$, including 4 million $km^2$ of agricultural land (23.4%). More than 27% of Russian population (38 million people) lives in rural areas. There are about 155.3 thousand rural settlements in Russia. However, the majority (72%) are extremely small with population less than 200 people. Rural settlements with population more than 2 thousand people constitute only 2% of its total number. Life quality in rural area is very low and the gap of income between urban and rural population is still increasing. The average salary

in agriculture in 2012 was equal to 52% of national average of other industries (Kiseleva N. N. 2013).

Above mentioned problems are especially urgent for industrially weak south parts of Russia, where agriculture prevails in the structure of gross regional products and rural life is still traditional. During the period of Russian economy transition in 1990`s, agriculture became one of the most unattractive investments sectors because of the long asset turnover, low return rate, obsolete infrastructure and natural peculiarities of production.

The reduced value of investments decreased the level of income of rural population, caused unemployment and stimulated migration of workforce to the cities. As a result, traditionally agrarian regions of South Russia faced capital and workforce deficit. It caused degradation of agricultural production and rural infrastructure. Also, it reflected in growth of social tension in rural areas.

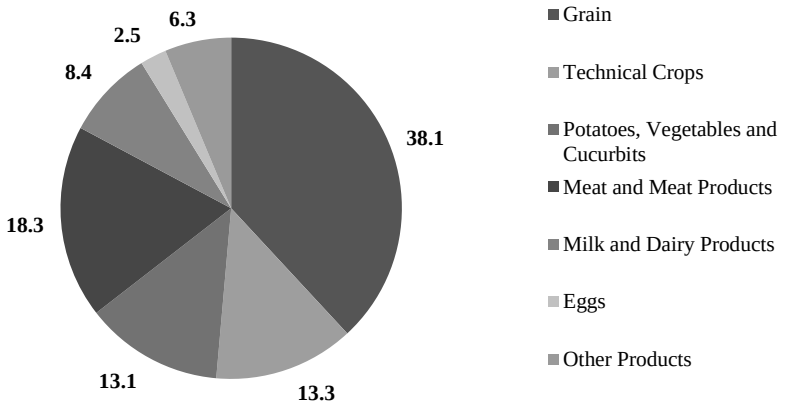
## The Stavropol region in the structure of Russian regions

The Stavropol region is one of the southern regions of Russia with strong agrarian profile. Recent years were beneficial for the Stavropol region in terms of economic development, growth of income *per capita*, sales turnover and gross regional product. Almost half of the main social and economic indicators of the Stavropol region exceeded the national level (2003 – 2012) and the rate of economic growth was higher than the national average level of 1.7% (Kiseleva N. N., Orlyanskaya A. A. 2012).

The Stavropol region was ranked seventh by the volume of agricultural production among the Russian regions in 2012. Share of agribusiness in GRP constituted 24.8%. The total volume of agricultural production increased by 15.4% (2010 – 2012), by 20.2% (when includes horticulture) and by 5.9% (cattle breeding). The main agricultural crop cultivated in the Stavropol region is wheat. Crops prevail in the regional agricultural production (more than 38% in 2012). The crop yield increases year by year, but still remains extremely low comparing to the leading developed countries[3].

[3] 3900 kilograms per hectare in the Stavropol region, 5300 kilograms per hectare in EU countries, 7400 kilograms per hectare in the USA.

**Figure 1.** *The structure of agricultural production in the Stavropol region in 2012, %*




**Source:** *Ministry of Economic Development of Stavropol Region (2012): Investment Memorandum of Stavropol Region. Available at*: http://stavinvest.ru/upload/file/the_investment_memorandum.pdf (addressed on December 24, 2013).

Correlation between effective demand and supply on the regional market must be emphasized as one of the most important social and economic indicators of regional economic development. The level of effective demand is determined by the amount of gross regional product and income *per capita*. Both indicators for the Stavropol region are substantially below the national average.

Despite more than tree-times growth in 2003-2012, the level of regional GRP per capita remains lower than the national average (11,920 euro in 2012). Herewith, the average income in rural areas of the Stavropol region is 68.9% of the national average level. Also, labor efficiency in the region is lower than the average at the national level. It is caused by the lack of skilled labor http://www.multitran.ru/c/m.exe?t=94738_1_2&s1=%EA%E2%E0%EB%E8%F4%E8%F6%E8%F0%EE%E2%E0%ED%ED%FB%E9%20%F2%F0%F3%E4in rural area which, in return, decreases its outputs and the total efficiency of use of agricultural resources.

Thus, increasing the level of sustainable rural development in the Stavropol region is rather urgent issue. It is more related to the fact that

over 43% of regional population is rural (at the national level, rural population ratio is 26.3%) rather than to the prevalence of agricultural production in GRP structure. In 1990`s, the Stavropol region was characterized by depopulation but it affected cities more than villages. Since 2008, acceleration of rural depopulation and active rural population migration is present. Depopulation is one of the main dangers in sustainable rural development. It leads to the loss of historically populated territories, degradation of small rural settlements and depressed rural economy (Kiseleva N. N. 2013). Moreover, it threatens regional and national food supply security as a result of withdrawal of land from agriculture (Kovalenko E. G. 2012).

During the 1990-2010, the share of rural population in the total population of the Stavropol region decreased by 2.9% (from 45.7% to 42.8%). The dynamics of the main social and economic indicators of rural development of the Stavropol region (Tab. 1) confirms the decrease of population of small rural settlements while population concentrates in bigger urban agglomerations.

**Table 1.** *Dynamics of social and demographic indicators of rural development of the Stavropol region in 2009-2012*

| Indicators | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|
| **Average size of a settlement, person** | 1636 | 1654 | 1662 | 1675 |
| **Share of population under active working age, %** | 21,7 | 21,4 | 21,3 | 21,3 |
| **Share of population over active working age, %** | 21,4 | 21,0 | 21,1 | 21,0 |
| **Average size of a household, person** | 3,2 | 3,2 | 3,2 | 3,2 |
| **Average duration of life, years** | 66,6 | 66,8 | 66,7 | 66,8 |
| **Share of population with higher and secondary education, %** | 31,2 | 33,4 | 33,8 | 34,3 |

**Source:** *Kiseleva, N., Orlyanskaya, A., Sulimanov A. (2013): Adaptive Management of Social and Economic Development of Rural Areas of North Caucasus Federal District. Academy of Natural Sciences*. Available at: http://www.rae.ru/monographs/197 (addressed on December 23, 2013).

According to the analysis results, the labor market of the Stavropol region is characterized by two differently directed trends: a) decrease of

population and b) increase of share of working-age population. However, the rate of growth of active working age population is higher than the rate of economic growth. That results in unemployment of rural population. Despite the slow-growing employment rate, the level of unemployment in rural areas of the Stavropol region is still very high (above 10% in several rural districts, in 2012). Moreover, rates of employment growth are lower than the rates of working-age population growth. In consequence, people have to migrate from rural to urban areas in search of employment.

**Labour market of the Stavropol region and the sustainability of ~~its~~ rural areas**

There are four main reasons of relatively high rural unemployment rate in Russia in general. Those reasons refer to the Stavropol region, as well. In the first place, unemployment is caused by a structural disbalance between demand and supply in the rural labor market. Such disbalance is determined by a discrepancy between labor force quality (professionalism) and the demands of employers in rural sphere. The percentage of prural opulation with secondary or higher education is gradually growing, but it is still lower than the national average. Employers have specific demands regarding qualifications and skills, but the labour market is not ready to provide an adequate response. This situation has negative influence on technological and innovative development of regional economy. It also poses a threat to the sustainable rural development.

Secondly, the level of income in rural areas is very low in general, especially in terms of salary offered on job vacancies. Agricultural production *per capita* in the Stavropol region in 2012 exceeded the corresponding national indicator of 61%, but at the same time, the level of income *per capita* in the region amounted only 69% of the Russian level.

Third threat to the sustainable rural development is demographic ageing of population. Natural population decline is not offset by natural growth. Therefore, recovery of workforce potential occurs due to the migration flows. However, skills of upcoming workers are often insufficient for high-paying job.

That causes increased competition within local workforce for vacancies with low skill requirements and, therefore, the growth of social strain in the countryside.

Fourthly, as the analysis has shown, underdevelopment of nonfarm activities and alternative sources of income for rural households is a serious obstacle to sustainable rural development in the Stavropol region. Technology development in agriculture and increasing labor productivity leads to employment reduction. Therefore, it is necessary to diversify the rural economy through the development of non-agricultural activities. Many of developed countries have practiced such activities in order to preserve the rural areas as active social and productive subsystems. In particular, the programs of development of non-agricultural activities in rural areas are actively and successfully implemented in the EU, USA, China and some other countries (Bondarenko L. V. 2011). Identified threats of the sustainable economic development are not exclusive to the Stavropol region. The similar trends are observed in other Russian regions, especially in those which are as much involved in agricultural production (Rusinova O.S. 2011). Various specific programs are developed and adopted to create prerequisites for sustainable development of rural areas[4]. However, according to relevant indicators, one of latest programs even though intented to promote a sustainable growth of socio-economic indicators and welfare of the rural population, did not provide a significant increase of nominal income of the rural inhabitants which are engaged in agricultural production (Tab. 2). Taking into account expected levels of inflation in 2014-2015, the real incomes of the rural population are expected to decline.

**Table 2.** *Several target indicators of Federal Target Programme "Sustainable development of rural areas for 2014-2017 and for the period up to 2020."*

| Target indicators | 2013 | 2014 | 2015 |
|---|---|---|---|
| **Profitability of agricultural production, % to previous year** | 11,0 | 12,0 | 14,0 |
| **The average nominal salary of workers engaged in agriculture, rubles / month** | 15388,0 | 16927,0 | 16927,0 |
| **Expected inflation rate, % *** | 6,5 | 4,8 | 4,9 |
| **Exprected actual salary of workers engaged in agriculture, rubles / month** | 14382,7 | 15099,48 | 14395,9 |

**Source:** *According to Federal State Statistics Service of Russian Federation* (http://www.vedomosti.ru/finance/news/21100711/rosstat-podtverdil-ocenku-po-inflyacii-za-2013-god-na-urovne) *and Ministry for Economic Development of Russian Federation* (http://top.rbc.ru/economics/24/09/2013/878630.shtml)

[4]One of the last is Federal Target Programme "*Sustainable development of rural areas for 2014-2017 and for the period up to 2020*".

Due to the above mentioned targets, we consider that diversification of rural economy is the key factor in providing sustainable rural development and improvement of living standards of rural population.

For rural economy diversification is a way to go beyond the traditional forms of agricultural activities that seems vitally necessary in current economic conditions. (Zykova N. V., Ikonnikova O. V., Kononov O. D. 2011)

Summarizing the researches, it should be noted that Stavropol region, being one of the most developed agricultural regions of Russia, demonstrates the positive dynamics of the major industrial and economic indicators during 2003-2012. Growth rates often exceed the national average, but despite the positive dynamics of GRP, number of negative trends still remains in the development of rural areas of the region. According to the research, this includes:

1. rural depopulation (partial recovery of population is provided by immigration flows from neighboring regions and countries);
2. disbalanced structure of the regional economy (predominance of agriculture);
3. increasing disparities of income level;
4. reduction of the number and increase of the average size of rural settlements;
5. environmental degradation and inefficient use of natural resources.

Paradoxical situation is evidenced at the regional labour market, when the labour demand and supply do not match each other because of low qualification of workers. Growth of working age population in the Stavropol region is higher than rates of economic growth that leads to unemployment.

High unemployment in rural areas of the region (more than 10% - Arzgirsky, Andropovsky, Kursky, Stepnovsky, Trunovsky municipal districts) becomes strained by low incomes and low wages, demographic ageing and migration of rural residents to the economic centers - Stavropol and Caucasian Mineral Waters.

Classification of rural areas of the Stavropol region in terms of socio-economic development allowed us to estimate their resource potential and the nature of the industrial, agricultural and rural development (Erokhin V. L. 2009, Zhuravel V. F. 2011). The very few of the rural areas in the region effectively use the available limited resources and create conditions for the further sustainable economic development by diversification of local industry and agriculture. The rest of the rural regions have only raw specialization, lack of resources and stand in need of regional and federal budgets support.

Researches of similar international experience show that traditional employment opportunities in rural areas will be more and more reduced (Erokhin V. L. 2007). Only the parallel development of non-agricultural sector can increase Russian rural employment chances, improve quality of life of rural population, provide them with alternative sources of income and preserve rural communities (Erokhin V. L. 2011). For each rural settlement, it is necessary to identify points of growth which make possible to increase competitive advantages and attract additional incomings from both traditional and alternative activities.

Taking into consideration the unique natural and climatic resources of the Stavropol Region, we believe in the priority of development of regional recreational sector as one of the most prospective tools for attraction of additional income in the countryside and sustainable economic development.

The development of health-related, ethnographic and gastronomic types of tourism in rural areas may become key trends. The most important expected effects of rural tourism development are increasing the degree of involvement of the rural population in new employment opportunities, improving the rural quality of life, rural areas development, and as a consequence, the sustainable growth of agricultural production and the economy of the region, in general (Ivolga A. G., Erokhin V. L. 2013).

At the same time, there are some organizational problems in tourism cluster development within the region. In the first place, there is no effective coordination activity of state authorities on the tourism sector, including the regional Ministry of Agriculture. Legal framework and economic mechanism of relationship of administrative bodies and economic entities with organizations involved in recreational sphere is insufficiently developed.

Secondly, at the moment, recreational infrastructure and touristic/excursion activities are underdeveloped. Low domestic and foreign investment in tourism industry development are fixed. Thirdly, there is no educational center for training and retraining specialists in the sphere of recreational and tourism enterpreneurship, international tourism relations and marketing that provide recreational services to the population, including those living in rural areas are not well developed.

## Main directions of sustainable development of recreational sector in the Stavropol region

For the revival of recreational clusters and particularly the rural tourism, we need an effective mechanism throughout which an active development of recreational services will happen. It would also facilitate the interest of local authorities in improving the quality of tourism activity, increase their role in such processes, enhance development of social infrastructure, transport and communications, telecommunication systems, culture, sports, folk art and crafts [Erokhin V. L. 2009].

In our opinion, as the main directions of sustainable development of the rural recreational sector and rural tourism market in the region should be recognized:

- the formation of optimal socio-ecological-economic policy of municipalities with regard to the type and level of their development;
- the creation of municipal databases on sustainable tourism development and employment;
- the priority development of processing industries of regional and municipal economy, construction and trade industry;
- the formation of sustainable system of small and private entrepreneurship in the rural areas;
- the formation of stable employment system in the field of agro-tourism, recreational and environmental activities [Bournaris, T., Moulogianni, C., Manos, B. 2014].

Creation of regional municipal rural centers regarding rural employment and sustainable development, design and usage of socio-economic maps of tourism clusters sustainability and employment can have positive role. Management of recreational activity and sustainable development of local tourism markets and employment involves implementation of a set of measures of organizational and economic, social and labor, environmental and legal and socio-psychological nature (Zhuravel V. F. 2011). Long term basic principles of a strategic approach to the sustainable development of recreational complex and regional tourism market are:

- the priority of its organizational and economic, social and labor development, including improvement of employment system in the countruside, modernizing social and labor sphere of rural area,
- creation of conditions for the commodity-product self-sustainment of territory and development of rural self-government,
- smoothing socio-economic differentiation of rural subnational entities taking into account risks of sustainable development and work procurement.

Regard to these activities, we can also speak of:

- the optimal combination of management forms in agriculture,
- environmentally compatible and harmonic development of agriculture,
- polyfunctionality and multifunctionality of the agricultural sector,
- the priority of development of employment system in the recreational and environmental sphere,
- balanced diversification of industries and the development of non-farm employment,
- improvement of human potential, employment sustainable system and material incentives for workers of tourism cluster [Shuvaev, A. V. 2011].

As an example of aforementioned statements, we have participated in the development of the principal measures for the implementation of innovative projects that provide employment increase in the recreational and tourist complex in the region. Such projects have been developed in

cooperation with specialists of Department of sustainable development of rural areas of the regional Ministry of Agriculture. In this particular case, project subject was implementation of innovative projects providing the expansion of employment in non-agricultural area in accordance with the project of the regional target program "*Sustainable development of rural areas for 2014-2017*". Herewith, the objects included: special economic zone of tourist-recreational type "Grand SpaYutsa" in Predgorny municipal district, Pelagiadsky sports complex and recreation base "Lost Paradise" in Shpakovsky district, therapeutic mud-baths "Salt Lake" in Petrovsky district, cultural and recreational complex "Golden Sands" on the shores of the reservoir "Wolf's Gate" in Novoselitsky district, the base of agricultural tourism (private farm of Vasyutov N.I.) in Levokumsky district, hunting tourist complex in Apanasenkovsky municipal district. According to preliminary calculations, only on the basis of the listed facilities, it is planned to create more than 163 new vacancies in the region in 2014-2015, primarily in the field of recreation and tourism. Expected growth of the gross regional product will exceed 49 million rubles.

## Conclusion

Sustainable development of the recreational sector and tourism market in the Stavropol region is the strategic goal of a stable, effective and optimal functioning of the socio-economic sphere of this territory. Developed system of touristic service, with its ability to adapt to constant external and internal influences, should enable employment in tourism. Therefore, development of recreational sector and tourism is the imperative for positive transformations procurement.

Appropriate and well-timed assessment of the conditions and dynamics of socio-economic development of the recreational sphere and tourism market should be based on the system of researches. Such system should be analyzing occurring processes taking into account key factors of activation of the opportunities in the regional economy improvement and enhancement of living standard.

The following measures are recommended to government agencies at the regional and municipal level in order to improve the validity of administrative decisions on the sustainable development of recreational sector and local tourism markets:

- to form socio-economic policy of municipalities with regard to the type of development, including the tourism sector,
- to diagnose the potential opportunities for sustainable development of recreational areas through the use of techniques of determination of potential reserves of the tourism market development,
- to develop target programs for the adaptation of rural and urban population to rapidly changing conditions of the tourism market in order to increase employment and sustainable development in the region.

The abovementioned areas measures will contribute to the further sustainable development of the recreational and tourism cluster in the system of agrarian and natural complex of the region on the basis of socio-economic improvement of rural areas and increasing of non-farm employment level in the municipal units.

## References


1. Bondarenko L. V. (2011). *Employment in Rural Areas and Diversification of Rural Economics* // Economics of Agriculture of Russia. № 1. P. 71 – 76.

2. Bournaris, T., Moulogianni, C., Manos, B. (2014). *A multicriteria model for the assessment of rural development plans in Greece* // Land Use Policy. Volume 38. P. 1-8.

3. Erokhin V. L. (2007). *Contemporary development of foreign trade in agricultural commodities within the WTO framework* // International agricultural journal. № 5. P. 3 – 5.

4. Erokhin V. L. (2007). *International trade integration as a basis of interaction between international and regional entrepreneurial systems* // Russian entrepreneurship. № 11 (1). P. 3 – 7.

5. Erokhin V. L. (2009). *About cluster development of regional production integration on the basis of cooperative interaction of agricultural enterprises* // Almanac of modern science and education. № 3 (22). P. 60 – 62.

6. Erokhin V. L. (2011). *Specifics of agricultural entrepreneurship in the conditions of trade and economic integration* // Agricultural Bulletin of Stavropol Region. № 1 (1). P. 69 – 72.

7. Ivolga A. G., Erokhin V. L. (2013). *Tourism as an Approach to Sustainable Rural Development: Case of Southern Russia* // Journal Economics of Agriculture. № 4 (689 – 950). P. 789 – 800.

8. Kiseleva N. N. (2013) *Adaptive Management of Social and Economic Development of Rural Areas of North Caucasus Federal District. Monograph* / N. N. Kiseleva, A. A. Orlyanskaya, A. R. Sulimanov. – Moscow: Academy of Natural Scoences. URL: http://www.rae.ru/monographs/197 (date of request: 14.02.2014).

9. Kiseleva N. N., Orlyanskaya A. A. (2012). *Assessment of Level of Social and Economic Rural Development (Case of Stavropol Region)* // Fundamental researches. № 11. P. 1266 – 1270.

10. Kovalenko E. G. (2012). *Mechanism of Sustainable Development of Regional Rural Territories* // Contemporary Problems of Science and Education. № 2. URL: www.science-education.ru/102-5823 (date of request: 14.02.2014).

11. Rusinova O. S. (2011). *The Efficiency Rating for the Use of Resource Potential of Social and Economic Development as to Rural Territories of an Agrarian Region* // Bulletin of the Udmurtia University. № 3. P. 48 – 52.

12. Shuvaev, A. V. (2011). *Management of economic systems with regard to environmental factors* / A. V. Shuvaev // University Bulletin (The State University of Management.). - № 23. - P. 235-237.

13. Zhuravel V. F. (2011). *Specifics of Management of Sustainable Development of Agricultural and Natural Resources in Stavropol Region* // Sustainable development and civil society. № 56. P. 76 – 79.

14. Zykova N. V., Ikonnikova O. V., Kononov O. D. (2011). *Diversification of Rural Economics: Problems and Perspectives* // Russian entrepreneurship. № 11 (196). P. 151 – 155.

# EXPORT-ORIENTED GROWTH AND DEVELOPMENT OF SERBIAN AGRICULTURE[1]

*Vojislav Stanković[2], Drago Cvijanović[3]*

**Abstract**

*The production of food, food safety of a country, production of raw materials (for other branches), exchange with the world, social, demographic and other aspects determine, among other things, multiple significance of agriculture in social-economic development of the Republic of Serbia. The significance of agriculture reflects in its participation in GDP realization of the Republic of Serbia, which was 18-21% in the period 2001-2008; however, if observed entire contribution of agriculture to other economy sectors, this participation is around 40% of the total GDP. The basic problems Serbia is facing with are a consequence of limits emerged in a central planning conditions, difficulties in development in past twenty years and obstacles in adjustment to the market economy. The changes in agricultural policy reflect in redirecting of resources, from a direct support to the market towards the investment support and support to the rural development. There are also necessary the changes regarding the budgetary resources orientation from big agricultural entities (enterprises, cooperatives and agro-combines) to a family commercial husbandry (a basic cell of future development). The goal of these changes is increase of competitiveness. Transition from agriculture to the market business conditions has been followed by a significant trade development. In the transitional period, by a permanent export increase and besides very stable import, the exchange balance improves systematically. The exchange balance of agriculture and the industry of Serbia with the foreign countries, in 2013, was shown that there was realized import of 2.800 million USD, i.e. there was evaluated that was realized, by export, around 40% of gross value of the realized agricultural production.*

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*Only sustainable development of agricultural production and trade, as a modern organized and integrated sector of economy, provides a success of industrialization process and the total economic development, in short- and long-term, and it significantly contributes to reduction of the existing disproportions in the regional development, especially in rural areas.*

**Key words:** *agriculture, gross domestic product, production, foreign trade, export, import, rural development, competitiveness, regional development.*

## Introductory notes

The production of food, food safety of a country, production of raw materials (for other branches), exchange with the world, social, demographic and other aspects determinate, among other things, a multiple significance of agriculture in social-economic development of the Republic of Serbia. The agricultural activity, according to the available significant natural and human resources and the achieved production and processing level, represents one of the most important economic activities in Serbia. The share of the primary agriculture in realization of GDP of the Republic of Serbia, in the period 2001-2012, was ranged from 18% to 21%, however, if there observes the entire contribution of agriculture to other economy sectors, food industry and producers/processors of inputs and raw materials, this share is around 40% of the total GDP. Also, around 42% of population in Serbia is settled in rural areas (with population density under 150 inhabitants per km)[4]. This all points out to a special importance of agriculture for stability of the total economic and social development, for permanent food safety, social and political stability.[5]

The agriculture of Serbia is characterized by fragmentation of agricultural husbandries and their great sub-division (average size under 4.5 ha and 7 slots), relatively good equipment with agricultural mechanization and besides the fact it is technologically overcome and obsolete (average age over 200 years), poor utilization of fertilizers and extremely low productivity in all production fields (average yields under the EU level). In the mentioned conditions for agriculture, due to achievement of productivity level, which can guarantee decent incomes to labour-engaged population, then, owing to achievement of competitiveness in additional sectors of economy (which lean upon agriculture), as well as the increased pressure of more competitive

[4] Data of SORS.

[5] Jevtic, S., Stankovic V., Vuckovic, S: „Export performances of Serbian agriculture since the year 2000“, Market, Money, Capital, no. 2, April-June 2007, Belgrade.

imported goods on domestic market, there is inevitably needed the adequate agricultural policy, as an integral part of the total development policy of Serbia. With its natural, optimal soil characteristics, temperate-continental climate and water resources, the Republic of Serbia have a great potential in agricultural sector, which is not completely used. However, along with the adequate agricultural policy, the agriculture can give a significant contribution to economic development of a country. Directly or indirectly (in other industry sectors), the agriculture engages a significant number of labour-engaged population, significantly participates in foreign trade (in the total foreign trade, the agriculture participates with almost 13%, while in Serbian export, its share, in some years, has been up to 28%)[6], provides food safety of population, contributes to rural development and ecological balance.

## Basic elements of agricultural policy

The main problems the Serbian agriculture is facing with are the limitation results, emerged in conditions of a central planning, difficulties in development in past 15 years and also difficulties in adjustment to the market economy. Encumbered by the consequences of the central planned economy, especially regarding the ownership relations and utilization of land, the agriculture for its development needs a policy which will contribute to productivity increase, by its production restructuring, with significant investment, which implies building the efficient market of land, credit and inputs.[7]

Lack of clear visions in the sector of agriculture causes the agricultural policy inherited from the previous period, which does not contribute to more significant structural changes. The changes in agricultural policy reflect in redirecting resources from a direct support to the market (prices of agricultural products) towards the investment support and support to rural development, as well as the changes regarding the budgetary resources orientation from big agricultural subjects/entities (enterprises, cooperatives and agro-combines) with different ownership structure, to a family commercial husbandry (basic cell of future development) and are directed primarily to increase of competitiveness.[8]

[6] Data of SORS, Foreign Trade Statistics.

[7] Jevtić, S., Stanković, V.: "Characteristics of Serbian agriculture in 2006 with possibilities for improvement in the future period", Market, Money, Capital, no. 2, SCC, April - June 2006 Belgrade.

[8] Jevtić, S, Stanković, V.: „Competitiveness of Serbian agriculture in terms of export increase and sustainable development", Market, Money, Capital, no. 4, SCC, October - December 2009 Belgrade.

Financing the agriculture by the budgetary resources, the agrarian budget, represents slightly less than 5% of the national budget and with such modest assets tends to improve the domestic production, to increase competitiveness on the domestic and foreign market, to establish the institutions necessary for functioning of the basic subjects of agriculture and to set up the domestic production and processing compatibility, with the EU standards. Funding the agriculture by the agrarian budget resources is done in two ways: the first are production-oriented subsidies directed to the specific crops or livestock species, and non-production subsidies, which refer to stimulation of agricultural production and rural development.

*Distribution and use of the National Budget assets for 2014 is regulated by the Budget Law of the Republic of Serbia for the year 2014.*

By the mentioned law, aiming to conduct the activities from its authority domain, to the Ministry of Agriculture, Forestry, Water Management and Domestic Trade was made available the budget in amount of 41.598,665,000 RSD, which made 3.81% of the total national budget. Including expenditures from the extra incomes, the total budget amounts 45.394,698,000 RSD, i.e. 4.16% of the national budget. The assets meant for subsidies in agriculture amount 34.952,136,000 RSD, and will be allocated in accordance to the Law on Incentives in Agriculture and Rural Development[9] for agricultural production in 2014.

*The incentive measures for the agriculture sector are harmonized with the applicable Law on Agriculture and Rural Development of the Republic of Serbia („Official Gazette of RS", no. 41/09).*

The incentives in agriculture and rural development for the year 2014 are outlined in a way to support, in optimal way, insufficiently developed fields of agricultural production, through direct and indirect stimulating of the production competitiveness. For the year 2014 are expected direct payments measures, incentives to the rural development measures and the special incentives. During the incentives realization, a special attention was paid to the areas with difficult working conditions in agriculture, which realize the incentives according to the conditions and size of adjusted business conditions in these areas.

[9] Official Gazette of RS, no. 10/13.

## Foreign trade, markets and regulations

The foreign trade activity in exchange of agro-food products in the period before the transitional reforms, had realized in the conditions of disturbed macro-economic balance, as a consequence of many factors, of which the most important are: a secession and market disintegration, decrease of production in traditionally export-oriented agriculture sectors, loss of the existing status on some markets (the status of the most privileged nation-the WTO, the preferential status in the EU and in non-existence of numerous bilateral and multilateral agreements), rapid and too wide liberalization of economic relations with the foreign countries, etc.

However, in these circumstances, which evaluate as the most difficult, in which the economy has done business, in this economic area, in recent history, thanks to its potentials, the agriculture and food industry have produced sufficient food, above own needs, and some significant part of it has exported. Entering the reform process, there was achieved macro-economic stability, by adding the systematic regulations in the economy domain, as well as by the privatization process, were made more favourable business conditions, in which affirm significantly also the export opportunities of agriculture.

Starting from a fact that the domestic market is a limiting factor (due to low level of domestic consumption) for rational use of significant agro-ecological, production and human resources, long-term export orientation of agriculture is a basic condition for increase of the total efficiency of agro-industrial production and its faster matching in the world market and the European integration processes.

Serbia has net exporting potential in agricultural production and processing, which has not been sufficiently valorised, owing to non-existence of development-export strategy and worked-out system of stimulating measures of the economic policy. A high level of harmonization between the domestic agricultural policy and the EU policy (in past), as well as the started reform processes, have enabled long-term profiling of certain export structure, which had contributed to relatively favourable export results in past years, and to a surplus realization in goods exchange of agro-food products.

The foreign trade balance of Serbia with the agro-food products in the pre-entering transitional period, is characterized by average realized export value in amount of around 400 million USD, with the achieved share in export of the economy to 25%, the import in amount of 460 million USD, with the share of around 10% in the total goods import of the economy. The realized results of foreign trade exchange with the agro-food products, in this period, were characterized also by a deficit of 60 million USD, with import-export coverage rate of 87%.

The Serbian agriculture had no concept of export-oriented economy sector in ex-Yu. Over 50% of its production has placed on the ex-Yu republics' market. In the transitional period, by a permanent growth of export and besides very stable import, the exchange balance systematically improves. In the year 2013, the agriculture with the food industry, had the export value of 2.799 million USD, which is a growth of 3.5% in regard to the results from 2012, with the share in the total goods export of 19.2%. At the same time, the import value in amount of 1.562 million USD is for 5.2% higher that the realized in 2012, with the share in the total goods import of 7.6%. The surplus in foreign trade exchange of agro-food products in 2013 had increased for 1.5% and it had amounted 1.237,2 million USD, while the import coverage with export rate was 179.2%[10].

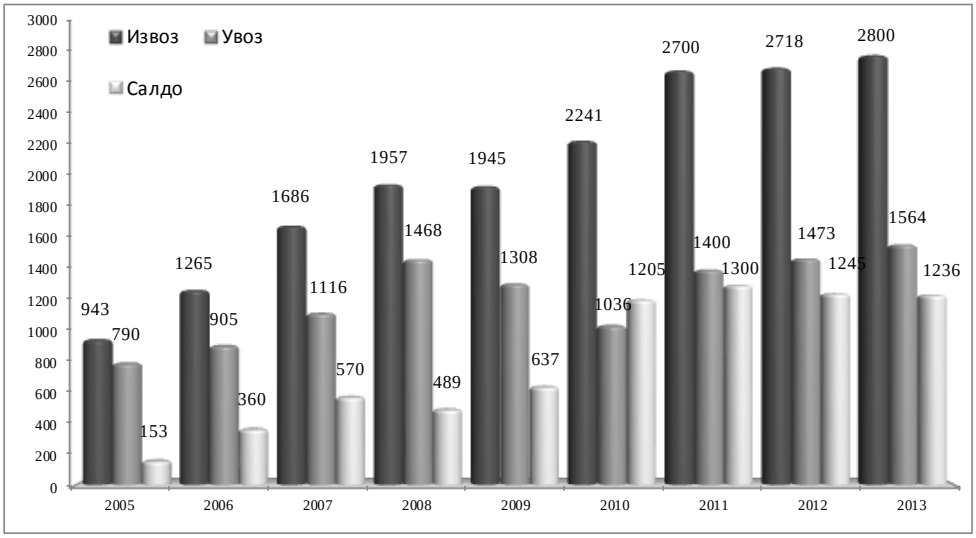
Besides all the problems which the Serbian agriculture has faced with in 2013, there was realized the export value of 2.799 million USD, which was a worthy result. As it is well known, drought in the last year and occurrence of afla-toxin has significantly limited the export results in the first half of the year 2013.

That is all compensated by a dynamic growth of export in the second half of the year. The results of foreign trade exchange of agriculture and food industry have represented also in 2013 the most important segment in the total agribusiness. The agricultural production has realized, in 2013, a growth of around 30%, which gives a base to enter 2014 with optimism. Available, greater commodity funds, meant for export, should enable to the agriculture and food industry, in 2014, more favourable results in foreign trade exchange.

[10] Data of SORS, Foreign Trade Statistics.

**Graph 1.** *Foreign trade exchange of agro-food products of Serbia in the period 2005-2013*

(value in million USD)




**Source:** *SORS, Foreign Trade Statistics*

The most significant agrarian products in export, during the year 2013, were: wheat, mercantile, in value of 196.9 million USD, raspberry frozen in value of 187.4 million USD, beet sugar refined in value of 170.9 million USD, maize mercantile in value of 158.9 million USD, sunflower oil refined in value of 90.8 million USD, cigarettes which contain tobacco in value of 75.6 million USD, malt beer in value of 74.8 million USD, and sweet biscuits, waffles and wafers, in amount of 64.3 million USD. Observed by sections of the SITC, in export dominates the commodity groups: fruits and vegetables, with realized export in value of 669.9 million USD and with the share of 4.6% in the total goods export of wheat and wheat products, in value of 663.3 million USD, with the share of 4.5% in the total exports.

On import side, among the agrarian products, dominates traditionally a group of „non-competitive" products – raw coffee in value of 80 million USD, bananas fresh in value of 35.7 million USD, oranges, fresh or dried in value of 27 million USD, and tangerines, Clementine and other citrus fruits in value of 9 million USD. Of other products in import is necessary to point out the cigarettes, which contain tobacco in value of 56 million USD, tobacco partly threshed, in value of 38 million USD and soy oilcakes in value of 34.4 million USD. After the realized value in import are the most represented the sections: fruits and vegetables with import value of 302.6 million USD, with

the realized surplus of 367.3 million USD and with the share in the total import of 1.5% and coffee, tea, cocoa and spices in value of 204.9 million USD, deficit of 124.9 million USD and with the share in the total import of 1%. The favourable results of Serbian agriculture in foreign trade exchange, realized thanks to conveniences it has in the preferential status on the EU market, then the achieved liberalization in exchange with the West Balkan countries (CEFTA), the Russian Federation, Turkey, Belarus, as well as in conjuncture, which improves on the world market (growth of demand and significant prices recovery). Development of the international economic cooperation is a base of export-oriented concept of agriculture and food industry of Serbia. The strongest approach on the world market implies a strategic concept of development-export-oriented agriculture, improvement of agrarian products' competitiveness, increasing the level of products quality and commitment for further liberalization of the international trade. The concept for export increase of agriculture and food industry, besides a stable and sustainable production growth, implies the adjustment of export structure to the requirements of import demand and improvement of export competitiveness, by using comparative advantages in export, based, besides the agro-ecological potentials also on technological modernization, improvement of education concept, managerial and organizational skills and experiences.

In long-term development of agricultural production in Serbia, the priority should have the production of biologically high-quality food. These products' demand increases permanently on the world market, especially on developed countries' markets. Organization of production, processing, packing and marketing, make conditions for full valorisation of agricultural resources by export of biologically high-value food on the world market. Serbia should be turned into the area of traditionally-conventional agricultural production. The most of Serbian territory is ecologically clean, especially hilly-mountain areas. The agricultural land of Serbia belongs to unpolluted or low contaminated land in regard to Europe and it is favourable to production of biologically top-quality food. It is a comparative advantage of Serbia in regard to Europe, where over 95% of agricultural land does not fulfil the conditions for production of biologically high-quality food. The hilly-mountain and some lowland regions, especially in the territory of Central Serbia, fulfil the conditions for production of biologically high-quality food. In order for Serbia to use the comparative advantages in the production of biologically high-quality food is needed also a consistent harmonization of agricultural production standards with the standards of high-developed countries, schemes of the EU.

The application of modern agro-technique, from the basic processing, crop rotation, nutrition, selection of assortment, use of bacterial and bio-preparations in repression of diseases, regular use of agricultural technique, standardization of organic fertilizers' use and other agro-technology measures, are the condition for preservation of ecological terms in the production of biologically high-quality food.

For strategic development planning of biologically high-quality production and seizing the market is necessary to set up a harmonious relation between the quality and the environment preservation (the quality management and the environment management), along with clear posting up of ecological quality mark of the products. Starting from the marketing concept of the production of high-quality food for a familiar buyer and available conditions for such type of production, it is necessary to define the production of biologically high-value food, and the direct realization could carry out in two phases:

- *In the first phase would be represented the products which can quickly prepare for export (significant part of agricultural production of Central Serbia (around two-third) can transform in biologically high-quality food), and*
- *In the second phase is necessary to build a long-term program of biologically high-quality production.*

Among the products which can immediately place in export are forest plants: mushrooms, blueberries, snails, medicinal herbs and others. Regarding the forest fruits and medicinal herbs is necessary to define a product in marketing way and to solve a problem of purchase, storing and packing. Some programs of the high quality production in Serbia have affirmed on the world market (besides they still have not been branded and have no protected geographical indication) those are, first of all: berries (raspberry, blackberry and strawberry), baby beef and lamb meat, prunes (with manufactured products) and other dried fruits, specific wines and fruit rakia (brandy), prosciutto from Uzice, kashkaval from Pirot, cheese and kaymak from Sjenica and Homolje, etc. At the same time, it is necessary to bring the programs of plantation production of scarce, protected sorts of medicinal herbs in mountain areas.

In the development program of biologically high-quality production, there is necessary to define a base of up-to-date demand, the production program and to define the products in compliance with the comparative advantages, a potential profit, future development of these group of products' market,

diversification of production (quantity, quality and competitiveness with certain production technologies), ecological marketing (with the quality standards and ecological mark noted at a prominent place), aiming to satisfy the needs of choosey consumers of eco-food. Therefore is necessary to define and make a selection of developmental programs, by the specific production types and to regulate the application of agro-technology in the production of biologically high-value food.[11]

## Markets and regulations

*Interim Agreement on Trade and Trade Issues with the European Union (Interim Trade Agreement-ITA)*

With signing the Stabilization and Association Agreement with the EU, on April 29th 2008, was signed also the ITA. Ratification has ensued at the end of 2008, and Serbia has started, on January 30th 2009, a unilateral application of Interim Trade Agreement, while full (reciprocal) apply of the agreement has been in effect since February 1st 2010.

With this agreement, in compliance with the title II Free Circulation of Goods, chapter II Agriculture and Fishery and by the adequate annexes and protocols, was enabled to Serbia a duty-free access to the market of EU member-countries, for all agricultural products, except few exceptions for which were approved the preferential quotas:

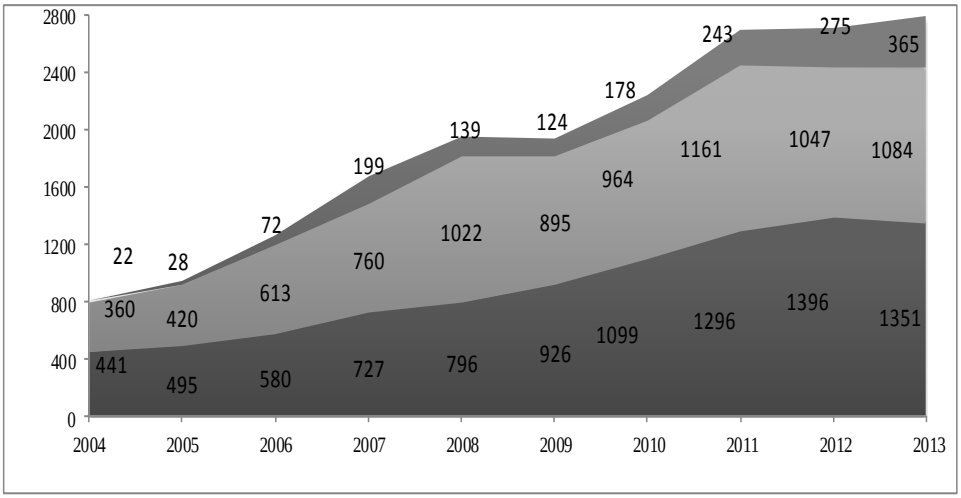
- young cattle and baby beef 8.700 tons
- Fish and fish products 15 tons of trouts and 60 tons of carps
- Sugar 180.000 tons
- Wine 63.000 hectoliters

Opening the Serbian market for the products of agriculture and fishery, originated from the EU, is realizing gradually during the interim period of six years. During this period gradually reduce customs to import of agricultural products from the EU and finally they reduce to 0. Several products: sunflower oil, sugar, tobacco and cigarettes are excluded from the liberalization, i.e. they keep the current tariff protection.

[11] John Wainio, Shahla Shapouri, Michael Trueblood, and Paul Gibson: "Agriculture Trade Preferences and Developing Countries", ERS, USDA, May 2005.

**Graph 2.** *Regional distribution of agriculture and food industry export of Serbia, described according to the European integrations*

(value in million USD)

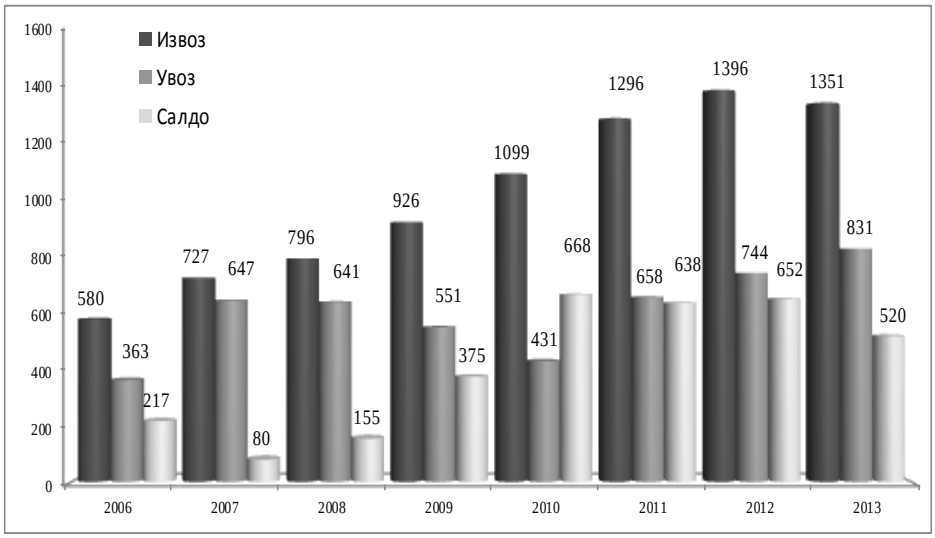



**Source:** *SORS, processed in SCC*

A small number of the most sensitive products, after the interim period duration is over, keeps a certain level of tariff protection– from 20% to 80% of MFN customs: young cattle and baby beef, live pigs and pork, live carp, mutton and poultry, pigs fat and bacon, powder milk, yoghurt, butter, milk spread, cheeses, eggs and honey, mercantile potato, roses, cucumbers and pickles, lettuce, beans, peas, peppers for processing, sugar maize and other vegetables which grow, prunes, grounded dry pepper, maize hybrid seed and mercantile, wheat and maize flour, soy refined oil, sausages and other meat products, pasta stuffed with meat and fish, conserved vegetables, jams, jellies and marmalades from domestic fruits, tomato juices and other domestic fruits juices, ciders, pear brandy and wine vinegar. Some sorts of fruits and vegetables during the transitional period and after its expiry keep seasonal tariffs of 20%: tomato, sweet pepper, fresh grapes, apples, sour cherries, plums and strawberries. For the wine import from the EU, Serbia had approved a concession in form of duty-free quota for 25.000 hl. After the utilization of the preferential quota of 25.000 hl to the wine import from the EU, pays the full customs. The EU countries are the most important partner of Serbia in trade with agricultural products. The exchange of goods is characterized by a permanent increase of export from Serbia (after the average rate of 18%), which has not been stopped even by the world economic crisis. The most significant foreign trade partners of Serbia within the EU are Romania, Germany, Italy, Hungary, Greece and Austria (the exchange value exceeds 100 million USD), with which realizes a surplus.

**Graph 3.** *Foreign trade exchange of agro-food products of Serbia in the EU, 2006-2013*

(value in million USD)




**Source:** *SORS, Foreign Trade Statistics*

## Priorities in the EU accession process

Taking into consideration commitment of the parties and the significance of the Stabilization and Association Agreement (hereinafter: Agreement), within the Stabilization and Association Process, also in accordance to rights and obligations which come out from the membership in the World Trade Organization, as well as readiness of the EU to contribute to economic reforms in Serbia and improvement of the regional cooperation, there show the priorities and obligations which have domestic economy, i.e. agriculture.

The goal is to stimulate own development, along with simultaneous contribution to the European space enlargement. The motives for such orientation origin not only from common orientation that the whole domestic economy engage more directly in the international goods flows, but from the circumstances that, through more intensive approach and presence on the international market, check own competitiveness, as well as technological and organizational level of competence, in regard to the modern tendencies and courses in the world.

From Serbia, by signing the Agreement, but within the ratified international contract, is expected to respect the set criteria, primarily „Copenhagen criteria" and *acquis communautaire* (the EU acquis). Serbia has to define a goal, in institutional and in functional sense, in order to become a full member of the EU in the shortest time. Nevertheless, it is not realistic to expect the full membership of Serbia in the EU, if there does not organize the national strategy of social-economic development, by which would define direction of active social-economic reforms. The upcoming political and economic changes should be directed toward a successful finish of the started transitional process and harmonization of regulations with the set requirements of the EU.

**Table 1.** *Foreign trade exchange of agro-food products of Serbia and the EU* member-countries, 2010-2013*

(value in million USD)

| | 2010 | | | 2011 | | | 2012 | | | 2013 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exp. | Imp. | Balan. | Exp. | Imp. | Balan. | Exp. | Imp. | Balan. | Exp. | Imp. | Balan. |
| Austria | 70.1 | 21.4 | 48.7 | 87.5 | 30.4 | 57.1 | 66.8 | 37.7 | 29.1 | 107,0 | 43,3 | 63,7 |
| Belgium | 41.1 | 11.4 | 29.7 | 50.4 | 31.3 | 19.1 | 48.8 | 47.5 | 1.3 | 60,9 | 47,0 | 13,9 |
| Bulgaria | 57.8 | 18.0 | 39.8 | 47.4 | 27.5 | 19.9 | 46.9 | 35.1 | 11.8 | 32,9 | 49,0 | -16,1 |
| Cyprus | 3.8 | 0.6 | 3.2 | 4.1 | 0.6 | 3.5 | 3.2 | 1.0 | 2.1 | 2,0 | 1,2 | 0,8 |
| Czech | 15.2 | 9.9 | 5.3 | 12.7 | 12.4 | 0.3 | 16.1 | 11.1 | 5.0 | 16,2 | 15,0 | 1,2 |
| Germany | 136.1 | 84.5 | 51.6 | 195.5 | 104.0 | 94.5 | 155.4 | 110.8 | 44.6 | 192,1 | 108,4 | 83,7 |
| Denmark | 4.6 | 6.4 | -1.8 | 5.0 | 9.5 | -4.5 | 2.2 | 9.7 | -7.5 | 2,9 | 6,3 | -3,4 |
| Estonia | 0.1 | 1.7 | -1.6 | 0.1 | 2.9 | -2.8 | 0.1 | 2.8 | -2.7 | 0,2 | 2,2 | -2,0 |
| Spain | 2.8 | 20.6 | -17,8 | 2.8 | 33.9 | -31.1 | 4.1 | 82.2 | -78.1 | 5,9 | 45,4 | -39,5 |
| Finland | 1.2 | 0,3 | 0.9 | 1.3 | 0.3 | 1.0 | 1.3 | 0.2 | 1.1 | 1,5 | 0,3 | 1,2 |
| France | 60.7 | 15.6 | 45.1 | 65.6 | 26.1 | 39.5 | 60.0 | 35.7 | 24.3 | 73,5 | 45,5 | 28,0 |
| G.Britain | 29.6 | 5.1 | 24.5 | 29.5 | 7.9 | 21.6 | 18.7 | 8.4 | 10.3 | 23,2 | 8,0 | 15,2 |
| Greece | 90.0 | 43.9 | 46.1 | 93.2 | 56.2 | 37.0 | 75.9 | 57.2 | 18.7 | 100,3 | 72,6 | 27,7 |
| Hungary | 67.8 | 23.6 | 44.2 | 99.6 | 57.4 | 42.2 | 97.7 | 53.5 | 44.2 | 112,3 | 93,4 | 18,9 |
| Ireland | 0.1 | 2.6 | -2.5 | 0.1 | 2.3 | -2.2 | 0.1 | 3.9 | -3.8 | 0,2 | 2,9 | -2,7 |
| Italy | 106.1 | 60.5 | 45.6 | 151,..2 | 80.0 | 71.2 | 131.7 | 92.0 | 39.7 | 166,6 | 97,9 | 68,7 |
| Lithuania | 0.2 | 0.4 | -0.2 | 0.7 | 0.9 | -0.2 | 1.0 | 1.0 | 0 | 0,8 | 1,9 | -1,1 |
| Luxemburg | 0.1 | 0 | 0.1 | 0.4 | 0.2 | 0.2 | 0.3 | 0.1 | 0.2 | 0,8 | 1,0 | -0,2 |
| Latvia | 0.5 | 0 | 0.5 | 0.7 | 0.1 | 0.6 | 0.4 | 0.2 | 0.2 | 0,6 | 0,2 | 0,4 |
| Malta | 0.1 | 0 | 0.1 | 0.1 | - | - | 0.1 | - | 0.1 | 0,1 | - | 0,1 |
| Holland | 41.3 | 34.9 | 6.4 | 25.9 | 47.2 | 21.3 | 37.9 | 56.0 | -18.1 | 45,4 | 61,1 | -15,7 |
| Poland | 14.2 | 24.8 | 10.6 | 16.2 | 44.7 | -28.5 | 14.7 | 54.5 | -39.8 | 22,7 | 62,5 | 39,8 |
| Portugal | 0.2 | 0.5 | -0.3 | 0.6 | 0.4 | 0.2 | 0.7 | 0.5 | 0.2 | 0,7 | 0,7 | 0 |
| Romania | 286.0 | 16.0 | 270.0 | 354.8 | 20.3 | 334.5 | 518.4 | 37.8 | 480.6 | 278.3 | 23,4 | 254,9 |
| Sweden | 9.9 | 4.5 | 5.4 | 9.0 | 6.0 | 3.0 | 9.5 | 4.6 | 4.9 | 12.8 | 4,1 | 8,7 |
| Slovenia | 52.1 | 17.9 | 34.2 | 59.4 | 24.9 | 34.5 | 46.5 | 24.7 | 21.8 | 56.8 | 23,8 | 33,0 |
| Slovakia | 7.5 | 6.2 | 1.3 | 32.5 | 9.3 | 23.2 | 38.3 | 10.1 | 28.2 | 34.3 | 11,8 | 22,5 |
| Total EU | **1,099** | **431.3** | **668** | **1.296** | **658** | **638** | **1.396** | **744** | **652** | **1351** | **831** | **520** |

**Source:** *SORS, Foreign Trade Statistics, processed in SCC*

An optimal variant of the national strategy of social-economic development is to make more dynamic the economic development and trade by designing the sector strategies.

Development direction of the domestic agriculture, in sense of maximal use of all its complementary advantages, is necessary to present in the Development Strategy of Agriculture and Rural development. There puts a question, in which extent the domestic agriculture, according to organization and orientation concept, is in position to show competitively on the EU market. The cooperation and exchange in the field of agriculture cannot be observed out of a context of total relations, trends and tendencies, which represents the obligation of agricultural producers, but also the challenge.

**What are the benefits?**

Serbian integration into the EU and its agriculture should aim to increase the total efficiency along with mutual benefits. There expects that Serbia will also have great benefits from accession to the EU, in a way it will:

1. *To enable free and unlimited approach to the unique agricultural market,*
2. *To set up the system of veterinarian, phyto-sanitary and sanitary measures, through respecting and implementation of standards on health safety and food quality, and which provide comparably safety to consumers and domestic producers on the domestic market and on the foreign markets, whether it is about the EU or non-EU countries, and*
3. *To provide significant financing resources, this will be directed from the EU budget via the harmonized Common Agricultural Policy and Rural Development Program.*

## Agreement on alteration and accession of the Free Trade Agreement in the Central Europe – CEFTA 2006

The CEFTA 2006 is a modern and overall agreement on free trade in the region of South-East Europe, which has replaced, in 2007, a net of bilateral agreements between Albania, Bosnia and Herzegovina, Montenegro, Macedonia, Moldova, Croatia, Serbia and UNMIK/Kosovo and has made a unique market of 30 million consumers. The agreement was signed on

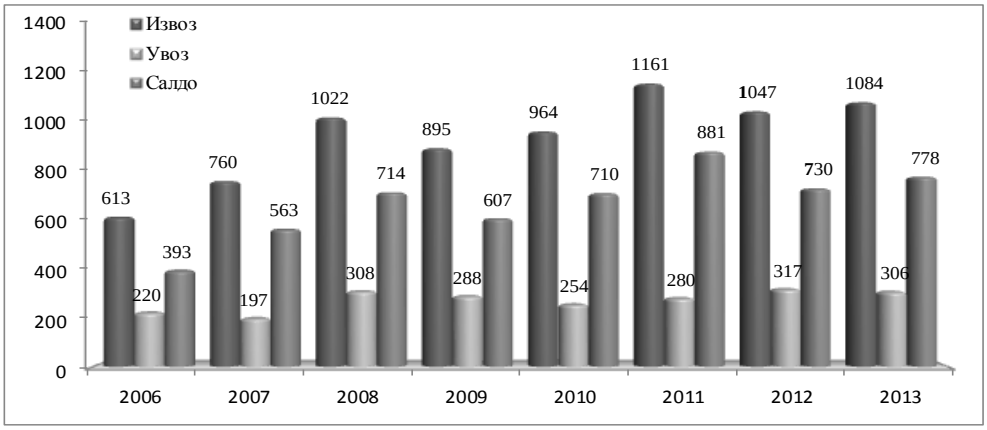
December 19th 2006, and for Serbia the application has started on October 24th 2007. At the end of 2011 was ratified the additional Protocol on further liberalization of trade in agricultural products between the CEFTA members, which had no completely liberalized trade with agricultural products with all CEFTA 2006 members, except with Croatia.

The trade with agricultural products of Serbia and Croatia was liberalized for major of agricultural products. From the total liberalization were excluded the most sensitive products, by which Serbia and Croatia had traded after the principle of a symmetric quota with preferential tariffs or by the principle of the symmetric preferential tariffs, without adequate limitations.

The CEFTA region has been, along with the EU member-countries, the most significant partner of Serbia in trade with agricultural products. The goods exchange has been characterized by a high surplus on Serbian side. A share of trade with the CEFTA members in the total trade with agricultural products in 2013 was amounted around 32%. In the foreign trade exchange of agricultural products, Serbia realizes the highest profit exactly in exchange with the CEFTA region. In the year 2013 was realized a volume of agricultural products' exchange with the CEFTA members – 1.390 milliards USD. Of that refers to export 1.084 milliards USD, and to import around 303 million USD, where the surplus has achieved a level of 778 million USD.

**Graph 4.** *Foreign trade of agro-food products of Serbia and the region CEFTA Agreement in the period 2006-2013*

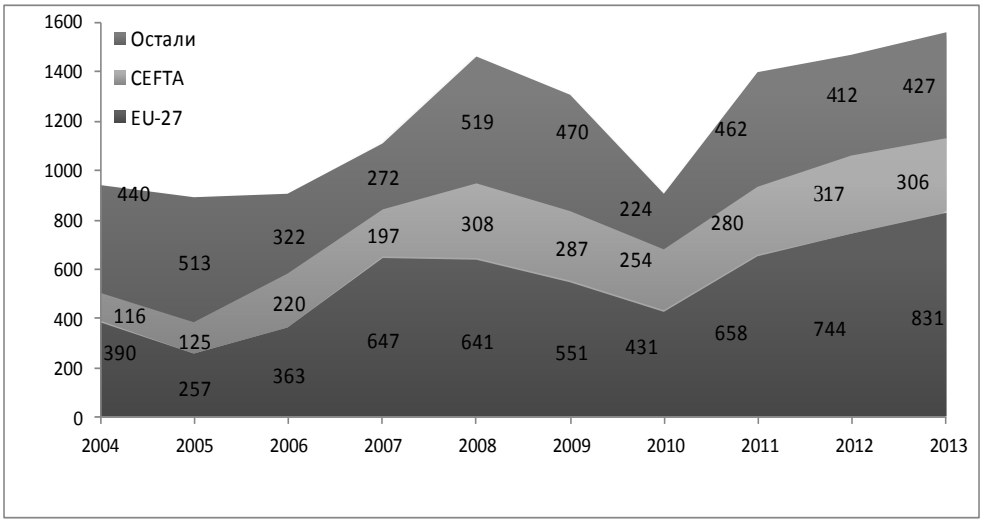
(value in million USD)




**Source:** *SORS, Foreign Trade Statistics*

**Graph 5.** *Regional distribution of Serbian agriculture and food industry import according to the European integrations*

(value in million USD)



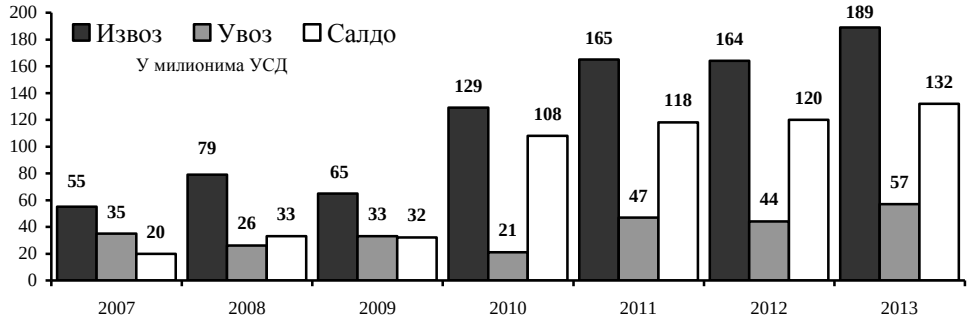

**Source:** *SORS, processed in SCC*

## The Free Trade Agreements with the countries of the Customs Union of Belarus, Kazakhstan and Russia

The Free Trade Agreement with the Russian Federation was signed on August 28th 2000, and it has been applied since May 17th 2001 and was the only agreement of such type which the Russian Federation had signed with some country out of ex-USSR members. The free trade agreement with Belarus has been applied since March 31st 2009, while the free trade agreement with Kazakhstan has been ratified on November 30th 2010 and is still in effect since December 8th 2010. The trade with agricultural products generally is completely liberalized, except a small number of goods which are on the free trade exceptions lists. There are three identical lists of the free trade exception regarding import on the territory of the Customs Union and three different free trade exceptions lists, when it is about import on the Serbian territory. In harmonization with the protocols on the free trade exceptions, Serbia cannot sell duty-free the following agricultural products on the territory of the Customs Union: poultry, some types of cheeses, inulin, white sugar, sparkling wine, ethyl alcohol and some alcoholic beverages and cigarettes, cigars and cigarillos.

When it is about the import in the territory of the Republic of Serbia, there is a different situation from country to country of the Customs Union. For import from the Russian Federation there is no limits, i.e. all agricultural and food products import freely, duty-free. For import from Belarus, of the free trade are excluded only white sugar, ethyl alcohol and some alcoholic beverages and cigarettes, cigars and cigarillos. The list of the free trade exceptions in Serbia from Kazakhstan is the widest and it comprises: some types of cheeses, white sugar, sparkling wine, ethyl alcohol and some alcoholic beverages and cigarettes, cigars and cigarillos. The free trade agreements with the Customs Union's countries contribute to the attractiveness of Serbia for foreign investors, by which open the preferential approach to the market of around 170 million consumers. Within the Customs Union is dominant the foreign trade market of agricultural products with the Russian Federation (97% of the total exchange), 96% of export and 99% of import. The goods exchange with agricultural products is characterized by a significant increase of export and surplus on the Serbian side.

**Graph 6.** *Foreign trade exchange of agro-food products between Serbia and the Russian Federation, 2007-2013*




**Source:** *SORS, processed in SCC*

On the Russian Federation market Serbia sells the most fruits and vegetables in value of 129 million USD, dairy products in value of 20 million USD, wine in value of 5 million USD, meat and meat products in value of 4.7 million USD and fodder in value of 4 million USD. Individually observed, the most represented products in export are: fresh apples in value of 71 million USD, plums in value of 17 million USD, fresh strawberries in value of 8.2 million USD, fresh peaches in value of 6.8 million USD and nectarines in value of 6 million USD. On import side, more than half of value from the realized import refers to cigarettes in value 36.2 million USD, then fodder in value of 6.2 million USD and vegetable fats in value of 4.6 million USD.

## The Free Trade Agreement with Turkey

The free trade agreement with Turkey has been applied since September 1st 2010. The trade liberalization of agricultural products, unlike the industrial products, is not comprehensive and refers only to the plant origin products. Asymmetric quotas in favour of the Turkish side are arranged for totally 14 products: sea fish; chickpeas, hazelnuts, pistachios; figs, dried; oranges, tangerines; grapefruits; lemon; raisins; apricots, dried; olive oil; tomato conserved. The asymmetry in the favour of the Serbian side has been arranged for 38 products, i.e. the group of products: wheat; maize, flour and soy grouts; strawberries; raspberries and blackberries, frozen; roses, grafted and ungrafted; forest trees for planting; field plants; seed potato; cabbage; peas, fresh or cooled down; beans and green beans, fresh; frozen peas, green beans and sugar maize; vegetables, leguminous, dried; fruits: cherries and sour cherries, sugar added; prunes; fennel seed; juniper berries; other spices; seeds for birds; sugar beet seed; fodder crops seed; vegetable seeds; forest trees seeds; evaporable non-ether vegetable oils, unprocessed; products for children's nutrition; conserved cucumbers and pickles; sugar maize, conserved; fruit juices; soups and thick soups; ice-cream; protein concentrates and textured albuminous without milk fats, products for nutrition, unmentioned and others; wine. The symmetric preferential quotas with the preferential levels on the approximately same level have been arranged for eight products, i.e. the group of products: tomato; leek and other onions; pepper; margarine; sugar products, products based on cocoa, pastas, baked products and fine bakery products. The goods exchange of agricultural and food products between Serbia and Turkey have been characterized by a permanent deficit on the Serbian side, in average, annually, around 30 million USD.

## The Free Trade Agreement of Serbia with the EFTA countries

The free trade agreement with the EFTA countries (Iceland, Norway and Switzerland, including Lichtenstein) was signed on December 17th 2009, and the beginning of its application has started in October 1st 2010, when has started its application with Switzerland. The basic agricultural products were a subject of separate bilateral negotiations with every EFTA country, since the EFTA states do not have a mutual agricultural policy. With Iceland, Norway and Switzerland were signed separately the agreements on agricultural products and were an integral part of the Free Trade Agreement. Each of these agreements has two lists, which contain mutually approved concessions for agricultural products between the Republic of Serbia and the EFTA countries. As a rule, the mutually approved concessions are asymmetric in favour of

Serbia. The mutual concessions for trade with treated agricultural products are immanent in the Protocol A:

- *EFTA countries have enabled Serbia the same approach to the market as the EU members countries, which is the most favourable approach approved to the third countries, which they sign the free trade agreements with. The concessions for the treated agricultural products on our side were approved by each signatory-country individually.*
- *On the other hand, the approach of the EFTA countries to our market of treated agricultural products was approved through a unique list, which is common for all four EFTA countries. The concessions of Serbia were given in form of elimination of customs duties for some of the treated products and application of reduced tariff rates for some treated products originating from the EFTA countries.*

In accordance with decrees of the WTO Agreement on Agriculture, the concessions for fishes and fish products were negotiated within the industrial products in the Annex II. The EFTA Agreement countries have approved to Serbia a duty-free access for import of fish and fish products, while Serbia has approved the concessions for import of products from the chapter 3 (unique list for all EFTA countries) in form of customs reduction in the period 2010-2014, when the customs reduce to a zero, except for import of carps, where will apply the preferential tariffs of 18% in 2014 and after. The trade with agricultural products between Serbia and the EFTA countries is very modest and the total exchange value ranges around 20 million USD. In the foreign trade exchange of agriculture, Serbia realizes a positive balance. Dominant share in the total agricultural exchange of Serbia with the EFTA countries has Switzerland.

## Instead of conclusion

### Development directions of Serbian agriculture and the expected results

A basic direction of agriculture and food industry's future development is an optimal use and preservation of available production capacities, increase of agricultural production size, change of production structure in favour of intensive forms of production meant for export, the production of top-final and top-quality products. The goal of such developmental direction is to settle the domestic demand and a significant increase of top-quality agro-food products' export. Development of agriculture in Serbia will be directed to modernization and change of the production structure in direction of greater market orientation and improvement of the total agriculture efficiency. The production and technological restructuring and productivity growth in agriculture, as well as the

greater competitiveness on the domestic and the world market should be based on ecological, energetic and economic criteria. Serbia should be turned into the area of traditional-conventional agricultural production. At the same time, development of scientific-research work and application of the existing and new knowledge and technologies will provide a significant increase of size and efficiency of agricultural production.

Rapid changes of production structure, for objective reasons, are not possible to carry out in short-term, but gradually, depending on how would be a recovery process of Serbian agriculture and its, first of all, financial consolidation. That is why suggests a step by step establishment of desired production structure, due to increased proportion of livestock production, fruit growing, vegetable growing and industrial plants[12]. By strict execution of the development program of agriculture, food industry and overall rural development, the modern and industrialized agriculture and food industry would represent a base for accelerated development of the total economy and would significantly contribute to faster development of other industry branches and infrastructure. Income, especially of the market producer in agriculture, should be above the average income in other economy (which is characteristic for the EU), while work in agriculture is much harder and more complex than the work in industry. Around the year 2020, the agriculture in Serbia should satisfy the domestic demand on higher and high-quality level and to ensure a foreign exchange income of around 6 milliards USD, and around 2025, the foreign exchange income of 9-10 milliards USD.[13]A significant part of the foreign exchange income would engage for further modernization of agricultural production, processing industry, irrigation, drainage, strengthening of a husbandry and education of producers. Instead of the current 629.000 small agricultural husbandries, in Serbia, around the year 2025, would be approximately 400.000 of commercialized husbandries, with the average size of 20 ha. Others would be farmsteads and small husbandries, which would be important for natural consumption and market. There is especially necessary to define the programs of specific production of flowers, young plants, production of vegetables in plastic foil houses, poultry production (eggs and broilers), some sorts of fruits, mushrooms, etc. In the structure of agricultural production, the livestock breeding should have a dominant role, and the plant production would base on utilization of newly-made high-yielding varieties, hybrids and grown

[12] Jevtić, S., Stanković, V., Vučković, S.: "Export Growth of Agricultural Products as Factor of Agriculrtural and Rural Development in Serbia", Development of Agriculture and Rural Areas in Central and Eastern Europe, 100th Jubilee Seminar of the European Association of Agricultural Economists, June, 21st-23rd 2007, Novi Sad, Serbia.

[13] Stanković, V.: „Competitiveness of Serbian agriculture export in terms of economic growth and sustainable development", Market, Money, Capital, no. 1, SCC, JanuaryMarch 2007, Belgrade.

plants' genetic potential. In rural areas could be located around 35-40 industrial activities connected to agriculture, where new work places for numerous available labour from rural areas, and towns would stop to be over-populated, with social problems. On the activities of export-oriented production of high-value food, the production of baby beef, the large-scale (plantation) production of medicinal herbs, the production of vegetables in plastic foil houses, then, in rural tourism, as well as in stock market operations in sale of flowers and vegetables, is possible to employ 200.000 of labour-engaged population, until 2020. At the same time, in other activities of industry, health care, education and service sector (trade and rural tourism) would be engaged a part of the labour-engaged population. In that way, life conditions would significantly become equal with life conditions in town, and the orientation to a village and agriculture would be more attractive to young, educated personnel.

## References


1. John Wainio, Shahla Shapouri, Michael Trueblood, and Paul Gibson (2005): *„Agriculture Trade Preferences and Developing Countries"*, ERS, USAD.

2. Jevtić, S., Stanković, V. (2006): *"Karakteristike poljoprivrede Srbije u 2006. godini sa mogućnostima unapređenja u narednom periodu"*, Tržište, Novac, Kapital, br. 2, PKS, Beograd.

3. Jevtić, S., Stanković, V., Vučković, S. (2007): *"Export Growth of Agricultural Products as Factor of Agriculrtural and Rural Development in Serbia"*, Development of Agriculture and Rural Areas in Central and Eastern Europe, 100th Jubilee Seminar of the European Association of Agricultural Economists, June, 21st-23rd 2007, Novi Sad, Serbia.

4. Jevtić, S., Stanković, V., Vučković, S. (2007): *"Izvozne performanse poljoprivrede Srbije u periodu od 2000. godine do danas"*, Tržište, Novac, Kapital, br. 2, PKS, Beograd.

5. Jevtić, S, Stanković, V. (2009): *„Konkurentnost poljoprivrede Srbije u funkciji rasta izvoza i održivog razvoja"*, Tržište, Novac, Kapital, br. 4, PKS, Beograd.

6. *Republički Zavod za statistiku Srbije: Statistika spoljne trgovine.*

7. Stanković, V. (2007): *"Konkurentnost izvoza poljoprivrede Srbije u funkciji ekonomskog rasta i održivog razvoja"*, Tržište, Novac, Kapital, br. 1, PKS, Beograd.

# GLOBAL MARKETS TO 2020: FAPRI-MU OUTLOOK AND POLICY IMPLICATIONS

*William H. Meyers*[1], *Kateryna G. Schoeder*[2]

## Abstract

*Agricultural market conditions have changed significantly in the last decade. Two recent price spikes in 2007/08 and 2010/11 to 2012/13 began an era of somewhat higher and more volatile commodity prices that is expected to continue in the foreseeable future. In our paper we analyze how such changes in market conditions have affected agricultural policy developments in both European Union (EU) and United States (US). We begin with a review of past policy evolution that took place in these countries, and then look at recent reforms and prospects for policy changes in the context of likely changes in the global market and policy environment over the next decade. Since agricultural policies generally evolve in response to internal and external pressures in a political economy context, we provide insights on how the outlook for commodity markets may influence the directions of policies in the EU and US.*

**Key words:** *European Union, United States, agricultural policy, CAP, commodity markets outlook*

## Introduction

The policies of the EU and US have both evolved significantly over time and were influenced by many domestic political, economic and cultural factors as well as by international agreements such as the Uruguay Round Agreement on Agriculture (URAA).

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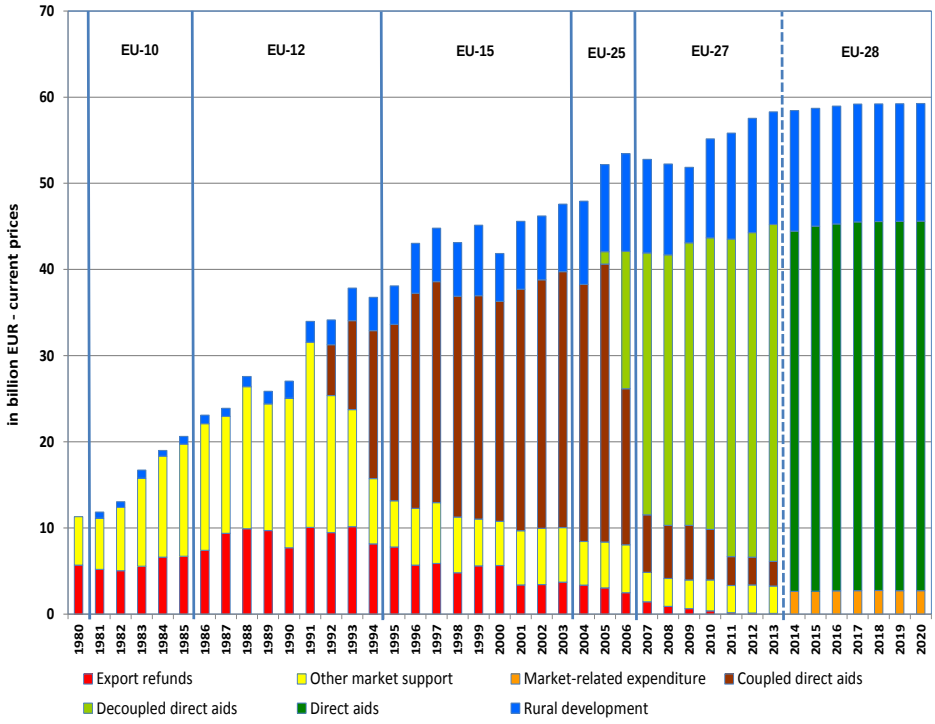
The URAA and subsequent implementation of WTO disciplines encouraged countries to convert support programs to less distorting measures and to reduce the levels of support by some measurable amounts. We will look first at evolving EU policies and then at those in the US.

It is no longer easy to remember the days when there was little challenge in conducting price analysis in EU markets, since prices were mostly determined by government policy. Research in the EU might have focused on why market prices in France and Germany deviated from the policy prices, while those in the US studied the impact of EU policies on US and world prices. That day is long gone, but for many of us it was challenging to evaluate the effects of this policy on the external markets. It is amazing today to look back on early work, for example, on price transmission (Bredahl *et al*. 1979) and realize how much of the world market was isolated from external price movements and how much of that has changed over the last 30 years.

The EU was often the target of US and other exporter criticism during the Uruguay Round trade negotiations because aside from destabilizing world markets, the success of its domestic support had generated large surpluses and growing export subsidies. Awareness of the growing costs and trade concerns led to the first major EU-funded policy reform analysis (Commission of the European Communities 1988) and many other studies of the global impacts of changing these policies (Westhoff *et al.* 1992, Meyers *et al*. 1998). Meanwhile, decoupled support policies were gaining ground on both sides of the Atlantic (Phipps *et al*. 1990) and became an integral part of the URAA. Continued enlargement of the EU as well as growing production put increasing pressures on the EU budget and stimulated further policy reforms.

In the case of the EU, the most distorting measures were the domestic price supports and export subsidies. These have been reduced to almost insignificant shares of the total expenditure (figure 1) and were largely replaced by direct payments and more recently by decoupled direct payments based on historical support levels and programs. Meanwhile, expenditures on rural development programs have been gradually increasing over time and stabilized at about 20 percent of total expenditures. Total expenditures have also increased over time, partly due to enlargement of the EU, and reached close to 60 billion Euro by 2013.

**Figure 1.** *Historical and projected evolution of CAP measures and expenditures*



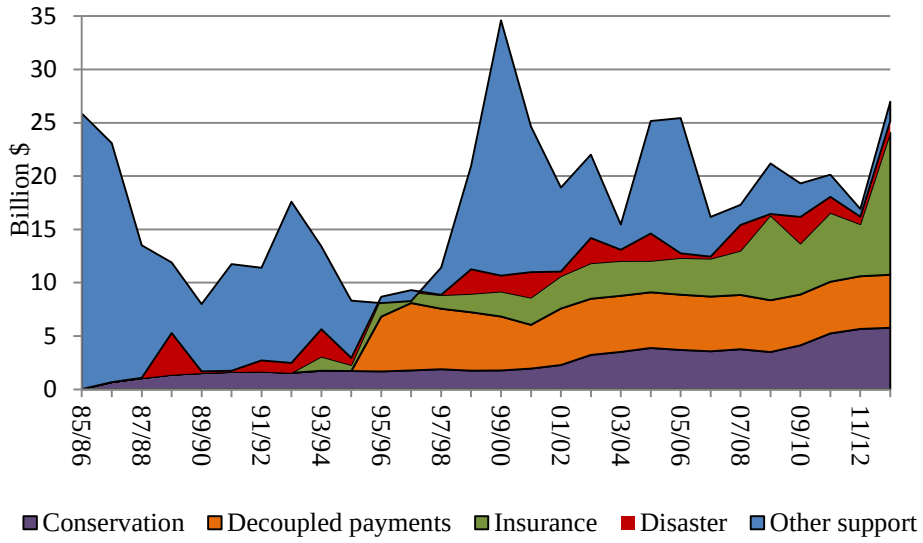

**Source:** *EU Commission (2013)*

The pattern of change in US policy measures is different but also shows significant change since the early 1990s (figure 2). First of all, costs of US programs are substantially lower but vary much more widely than the EU costs, because the EU operates with a fixed budget, while the US has had several programs that cost much more when prices are low and much less or nothing at all when prices are high.

The largest shift in program design and cost came with the introduction of decoupled direct payments in 1996, but insurance programs were introduced about the same time and their growth has been another major change in expenditures.

Conservation programs, which are dominated by the long term conservation reserve program, have also been growing gradually, but they are more likely to decline than to grow in the high price situation that currently exists. The number of programs with highly volatile costs is decreasing and, except for insurance programs, will be almost irrelevant as long as prices remain high.

**Figure 2.** *Evolution of the US policy measures and expenditures*

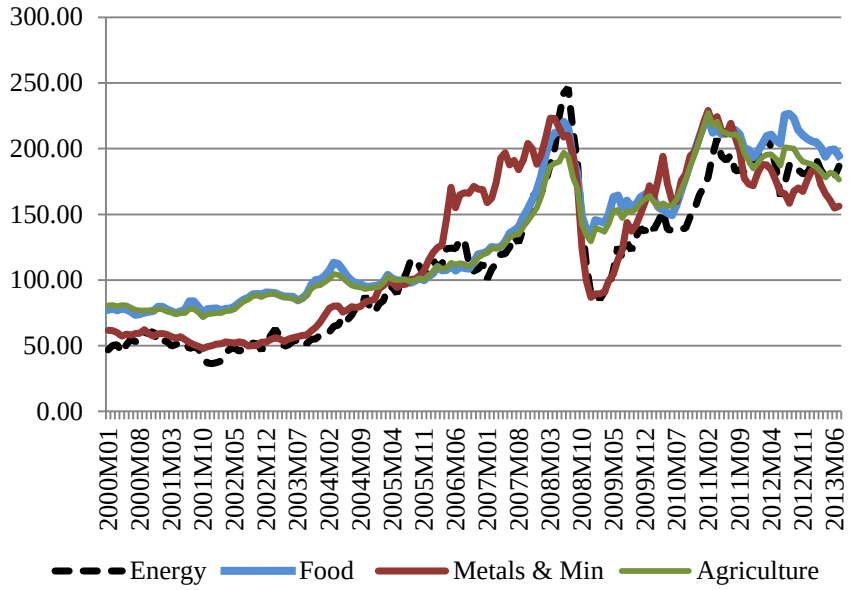



**Source:** *Calculated by authors from USDA data (2013)*

## Analytical approach and methods

We employ market analysis and quantitative assessment to look at the global market prospects that have affected or can affect the evolution of US and EU policies. The likely market context in which post-2013 US and EU policies will be implemented is important. Ever since the price surges of 2007/08, there has been a growing consensus among analysts that price levels and price volatility will be quite different in the future than in the last decade or so before this price surge. Except for the late 2008 prices plunge that proved to be transitory, market prices have continued to be high and volatile compared with pre-2005 behaviors (figure 3), and most projections of market prices indicate a continuation of this picture. It is instructive at the beginning to look at the causes of the sharp grain price increase in the 2012-13 crop year and the price decline in the current marketing year. The primary cause of the increase in prices in 2012/13 was a historically deep drought in the Midwest that saw average U.S. corn yields fall by 16 percent (with expectations of an even greater fall at some points in the year). This contributed to a large decline in global grain supplies (table 1), at a time when global stocks were already very low. Stock levels were low in part as a result of the fact that the 2012 was the third consecutive year that corn yields in the U.S. had been below trend.

**Figure 3.** *World Bank food, energy, metals price indices, 1/00 to 7/13, 2005=100*




**Source:** *Food, energy, metals and minerals price indices, pink data (World Bank 2013)*

In the current crop year (2013/14) grain production had the largest increase in recent memory, led by the recovery of corn production in the U.S. In response, grain prices have declined dramatically. It is clear that much of the price gyration was caused by simple supply and demand factors driven by weather shocks. The fall in prices from the 2012/13 peak was not just predicted by modeling institutions such as FAPRI-MU or the OECD, but also by the markets themselves where futures markets have been anticipating a similar fall in prices. Given the market fluctuations and uncertainties, policymakers and a wide range of stakeholders in the food and agricultural sector need timely, reliable, and research-based analysis to support improved policy decision making. The approach taken by the Food and Agricultural Policy Research Institute (FAPRI) to modeling and delivery of objective analytical results grew out of this information need. The approach has evolved over time, constantly being improved and refined. In fact, 2014 marks the 30$^{th}$ anniversary of FAPRI's founding. The FAPRI approach to such analysis and dissemination of results has evolved in a number of ways during these years, including the application and further development of the analytic approach in a wide variety of countries and organizations and within FAPRI itself (Meyers *et al*. 2010).

The analysis conducted by FAPRI evaluates the fundamental factors driving demand, supply and prices in the future but also provides an estimate of possible variances of these results.

**Table 1.** *Grain production decline and rise, million metric tons*

| Coarse Grains | 2011/12 | 2012/13 | absolute change | 2012/13 | 2013/14 (proj.) | absolute change |
|---|---|---|---|---|---|---|
| World | 1154.0 | 1136.3 | -17.7 | 1136.3 | 1264.0 | 127.7 |
| USA | 323.7 | 286.0 | -37.7 | 286.0 | 369.4 | 83.4 |
| FSU-12 | 78.7 | 69.2 | -9.5 | 69.2 | 89.0 | 19.8 |
| EU 27 | 150.0 | 145.8 | -4.2 | 145.8 | 158.8 | 13.0 |
| **Wheat** | | | | | | |
| World | 697.2 | 656.5 | -40.7 | 656.5 | 712.5 | 56.0 |
| FSU-12 | 115.0 | 77.4 | -37.6 | 77.4 | 103.8 | 26.4 |
| EU 27 and Aus | 168.0 | 156.3 | -11.7 | 156.3 | 169.9 | 13.6 |
| USA | 54.4 | 61.7 | 7.3 | 61.7 | 57.9 | -3.8 |

**Source:** *USDA WASDE (April 9, 2014)*

Across the different countries where these methods were applied, there are common elements in the analytical approach but also differences in application. The common elements of FAPRI models are:

1. Analysts use models as a tool to generate estimates of agricultural commodity production, consumption, trade and prices, as well as the corresponding farm income and taxpayer cost figures that policy makers and stakeholders want. The projections typically span a ten year period.
2. Domestic and trade policies are modeled in explicit detail so that realistic policy impact analyses can be conducted using variables that represent actual policy instruments.
3. National prices of other country or regional models are linked to world prices generated in the annual FAPRI world market outlook analysis.
4. The models are dynamic, partial equilibrium, multi-product, non-spatial, econometric-based systems. That goal is to develop results that realistically reflect how markets evolve over time and how markets are interrelated.
5. Results undergo an interactive review process between modelers and industry and/or government practitioners that improves the quality and usefulness of the analyses, and
6. Major results are delivered in government briefings, academic conferences as well as public venues.

One of the approach's strengths is that it is flexible enough to address regional differences or the alternate policy objectives that clients might have for the model. Partners have different requirements in terms of commodity coverage, exposure to world markets, regional disaggregation or scale of model. The FAPRI approach is very pragmatic. Statistical and econometric methods are used where possible, but in many emerging market countries the data is not sufficiently complete or available for enough years to do sophisticated econometric estimations. In these cases we rely more on theory and research results in other countries to determine behavioral parameters. What is important is the capacity to correctly link commodity markets and policies so that any impact of policy or external factor, such a yield change or a world market shock can be traced though the different commodity markets and through time to see the effects on all main markets, not just on the one where the shock occurred. Once the analytical system is operational various analyses and scenarios can be conducted. These follow a consistent procedure. The baseline analysis has four main steps:

1. Economic models are used to capture the basic economic, policy and technical factors that determine supply, demand, prices and trade of commodities and their interactions;
2. Assumptions are made about the likely future paths of demographic and economic factors, technology and agricultural policies;
3. Models are simulated over ten years to generate a baseline of market outcomes;
4. If stochastic results are needed, a simplified system is simulated 500 times with random selections of stochastic variables such as yields, energy prices, macroeconomic variables;
5. The result of these analytical steps is a baseline for the next five or ten years that has a mean and also a distribution of the price and quantity outcomes.

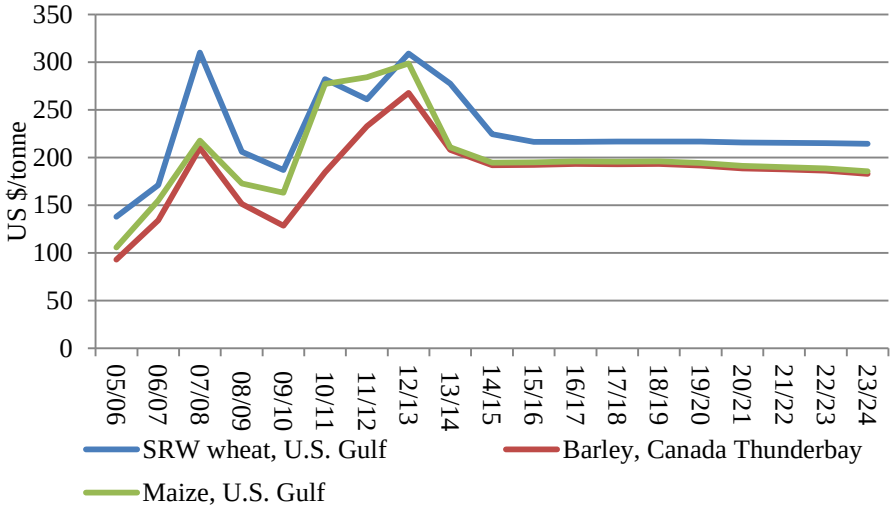
Policies are assumed to remain the same as in the current period, and crop and livestock productivity are assumed to grow in line with historical trends. The macroeconomic assumptions are taken from other sources or national projections are used.

## Market context for policy in the next decade

The FAPRI (2014) average wheat and corn price projections for the next decade, as an example, hover around levels that are 50 to 100 percent higher than they were before the 2007/08 price spike but also about $100/mt lower than in 2012/13 crop year (figure 4). The pattern is somewhat similar for EU

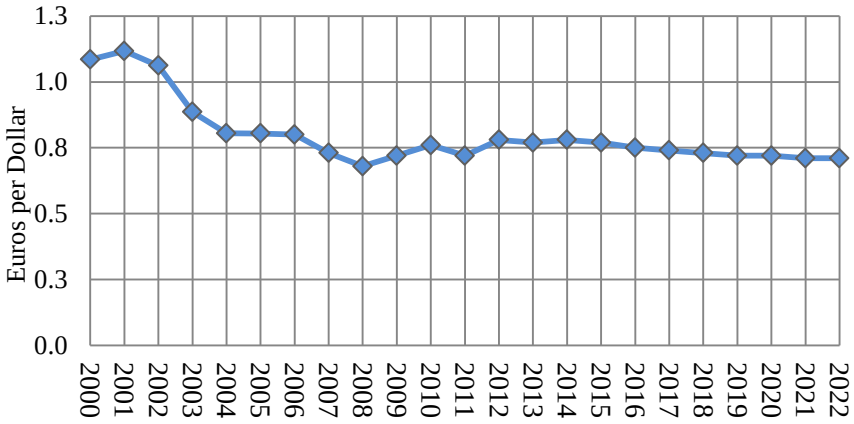
prices, but the path is dramatically impacted by the fact that the Euro has appreciated by more than 20 percent since it was introduced in 2000 (figure 5), so the price path from 2000 to the present in Euro (figure 6) is substantially moderated by that change as well as increases in transport differentials between Gulf Port and EU ports. Nevertheless, projected grain prices in the EU remain well above pre-price spike levels throughout the projection period. The same holds for projected oilseed prices (figure 4).

**Figure 4.** *FAPRI projections of US FOB corn, wheat and barley prices*



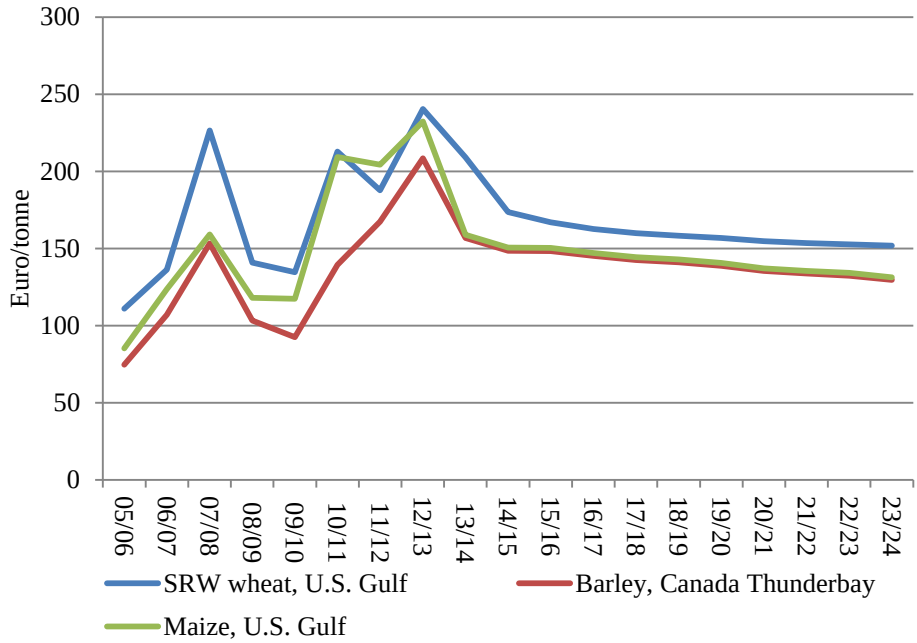

**Source:** *calculated from the FAPRI-MU March 2014 baseline*

**Figure 5.** *The Euro appreciated and is expected to remain strong against the dollar*



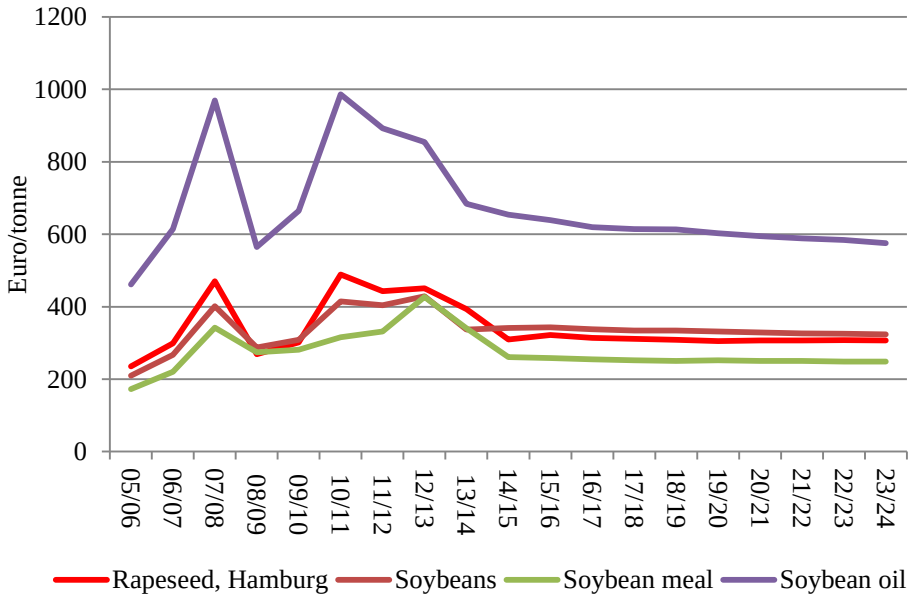

**Source:** *IHS Global Insight (January 2014)*

**Figure 6.** *FAPRI projections of average corn and wheat prices in Euro*




**Source:** *calculated from the FAPRI-MU March 2014 baseline*

**Figure 7.** *FAPRI projections of average oilseeds prices in Euro*




**Source:** *calculated from the FAPRI-MU March 2014 baseline*

It would, however, be a mistake to think that prices will not fall lower or go higher in some years. A good example is what happened to corn price futures as soon as the Ukraine – Russia crisis on Crimea occurred (figure 8).

**Figure 8.** *Prices of corn daily quotes*

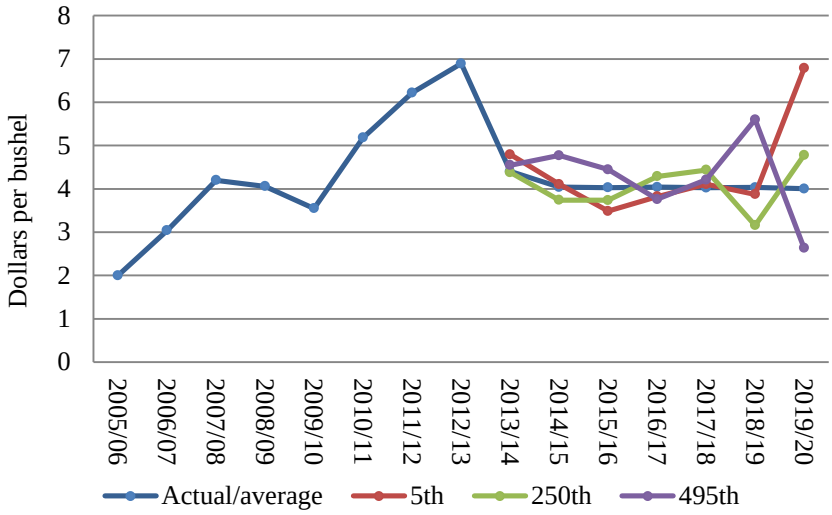

**Source:** *Great Pacific Trading Company (March 12, 2014)*

FAPRI analyzes such possible shocks by doing stochastic analysis that allows a number of important factors to randomly vary from their means, and in this case generate prices that are sometimes much higher or lower than seen in the smooth average[3] price projections. This is illustrated by

[3] The reported average projected price is the average of the 500 stochastic runs.

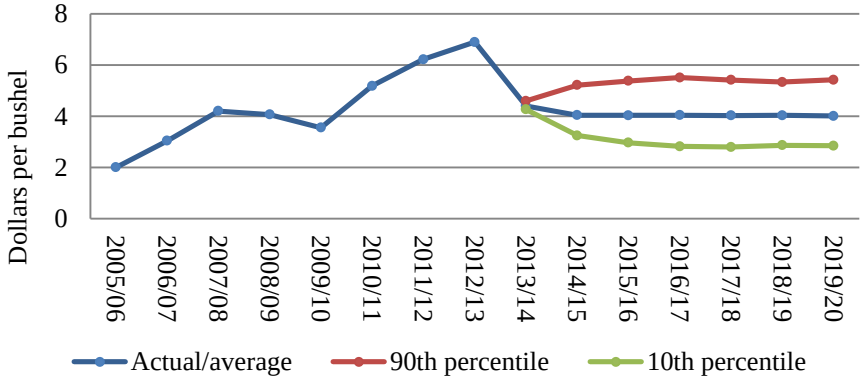
using FAPRI projection of US corn prices. Picking a few of the 500 draws shows they can deviate substantially from the average based on yield or other exogenous variables that impact price. A few examples of stochastic draws and the results are shown as an example (figure 9). When all 500 draws are assessed, there is a range of possible outcomes illustrated for US farm price of corn in figure 10, where the price is expected to be between the higher and lower bounds 80 percent of the time.

**Figure 9.** *FAPRI projection of US corn farm price in 3 of the 500 outcomes*




**Source:** *Calculations based on FAPRI-MU projections March 2014 stochastic baseline*

**Figure 10.** *Range of stochastic outcomes for US farm price of corn*




**Source:** *Calculations based on FAPRI-MU projections March 2014 stochastic baseline*

This is not the time or place to do a detailed market outlook discussion, but the fact is that FAPRI-MU, USDA (Westcott and Trostle 2013), and OECD-FAO (2013) all concur that we should expect the relatively higher average price levels and higher price volatility we have experienced since 2007/08 to continue in the near to medium term. These assessments also agree that there are two important new factors that will continue to influence the direction and variance of commodity prices. These are the closer linkage to energy prices through the growing influence of bioenergy in crop demand and the higher frequency and severity of weather events due to climate change. Though studies differ on the size of impacts, the financialization of commodity markets may also increase the short-term volatility of agricultural prices.

The issue of the Euro crisis is closely linked to the market price outlook but also to the issue of budget constraints. Of course, as the Euro has weakened by about 15 percent in the last year, largely due to the Eurozone crisis, it has also impacted commodity prices. Essentially, the volatile exchange rates add another layer of commodity price risk to the already volatile market price situation. At the same time, the pressures to devote increased resources to the Eurozone financial crisis may exacerbate budget constraints both in the EU and in national budgets of EU members.

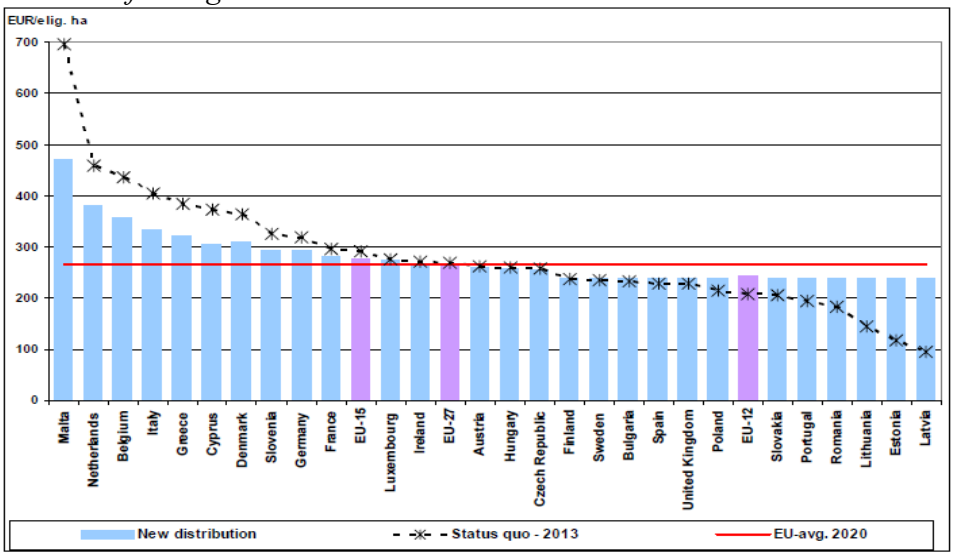
## Results and conclusions

The pressures to change EU policy in the next financial framework (from 2014-2020) included budget constraints, interests in strengthening environmental measures, and desires to reduce the disparity between payment levels of new member states and the pre-2004 membership of the EU-15 and to enhance the flexibility of member states to tailor programs to their differing conditions. Changes in decision making procedures with the enhanced role of the EU Parliament, the full participation of the Post-2004 new member states and a Commissioner of Agriculture coming from one of the new member states (Romania) were also factors influencing the outcome. The impacts of the Eurozone crisis and increased price volatility in global markets may be important as well. Budgetary pressures were stronger than in the past, in part because the CAP budget was decided in concert with the overall EU budget rather than being set before the overall budget was decided, as has often been done in the past. Not permitting the sequential "CAP first" budget process is possibly a sign of weakening of the agricultural/rural interests relative to other claimants to the EU budget (Meyers and Ziolkowska 2012).

Several measures have been undertaken in the process of 'greening the CAP', among others, cross-compliance, modulation, direct support for bioenergy with rural development programs. However, the Common Agricultural Policy is facing new challenges and the following measures will be given more importance in the new post-2013 policy:
a) Extending biodiversity protection and reducing GHG emissions,
b) Supporting crop rotation as a way to reduce pesticide and fertilizer use,
c) Preserving at least 7% of the land for focus areas (buffer zones, permanent grassland) to reduce GHG emissions.

A more notable pressure in this reform arises from the differences in the direct payments across countries, which now range from €100 per hectare in Latvia to €466 in Netherlands, disregarding the even more obvious outlier Malta (figure 11). Despite the fact that these payments have historic roots that reflect land quality, commodity mix, land use intensity, production value and whether the historic or regional payment model was used, there is still a perception of inequity in such large differences. Different options for modifying these were considered, including setting a minimum payment of 80 percent of the average, but a smaller change to 90 percent was the final result. As in many other examples, small changes are more common than large ones.

**Figure 11.** *Difference of direct payments across countries and the '90% method' of realignment*




**Source:** *EU Commission (2011)*

Pressures for change in US policy also have a strong budgetary aspect, because of the high priority to reduce the growing budget deficit. There is also interest in Congress and among some farm lobby groups to shift emphasis from decoupled payments to risk management programs if there is any flexibility to increase any program at all. Finally, the political gridlock in Washington, DC, has made it difficult to pass any new legislation, so expectations for change are low. Both the US Senate and US House of Representatives passed their own versions of new farm legislation (FAPRI 2013), and these differences were finally resolved in early 2014 in a Farm Bill that included provisions from each of those proposals.

The new measures save money by eliminating the decoupled payments that were a fixed annual expenditure, and replacing them with new risk management tools that may cost quite a bit in a very bad disaster year, but on average are less costly than the direct payments. Neither the US nor the EU are strongly pressured by WTO negotiations at the moment, partly because negotiations are stalled and also because prices are so high that it would be relatively easy to comply with the proposed cuts in support and protection that are in the latest proposals for discussion.

So it is most likely that changes in both the US and EU policies in the next few years will be relatively gradual and driven mainly by projected market conditions and budgetary constraints rather than by any bold vision or any international agreements or disciplines. It is also not clear if the tendency will continue to be toward less distorting support but the budget expenditures are likely to be lower.

We can conclude that the kinds of reforms being introduced by the EU for the next financial framework are not likely to have large price or trade impacts in either direction. The measures that increase production cost or slow the rate of technology adoption, such as increased environmental conditionality in the CAP, can be expected to slow the growth of exports and/or increase the growth of imports. The magnitude of these impacts, of course, will depend on how soft or hard these environmental constraints would be. In the case of the US, there are also relatively small market impacts implied by FAPRI analysis. It seems likely that trade growth will be more significantly influenced by world demand growth and new or expanded bilateral or multilateral trade agreements than by changes that occur in the CAP or US policy.

For the future, the continuation of relatively high and volatile prices gives the signal to government policy makers and farm lobby groups that price support is less important than in the past, and measures to manage risk are likely to be more important. A more subtle change in emphasis in both the EU and US policy is moving away from decoupled income support payments that are based only on historical entitlements and toward measures that relate somehow to production practices, such as greening measures and discretionary coupled payments in the EU and risk management in the case of the US that depends to some degree on price or production.

Swinnen (2009) reviewed studies of the political economy of agricultural protection in the 1980s and 1990s and the question still remains as to what are the factors behind these observed patterns. The political economy approach views decisions as rational responses to all the pressures from an array of interests in society, given the way institutions of government and of stakeholders are organized at that time in that country. Some of the main factors identified by political economy theory and public choice models are:

a) Individual preferences of the citizenry
b) Differing ability of stakeholder groups to organize effectively
c) Collective action by lobby groups
d) Preferences of politicians or interaction of lobbies and politicians
e) Political institutions and ideology (e.g. US Congress vs European Commission as decision maker).

The many factors that combine to influence the path of policy evolution over time and space are much more complex and interconnected then we have elaborated here. The important lesson is that different policies in different countries and in different time periods are the consequence of numerous economic, political, social, institutional and cultural factors that interact with each other. There are also factors external to every country that usually play a role, and these include trade, trade agreements and international institutions and, as we have emphasized here, the current market conditions and expected market developments in the future.

## References

1. Bredahl, M.E., Meyers, W.H., and Collins, K.J. (1979). *The Elasticity of Foreign Demand for U.S. Agricultural Products: The Importance of the Price Transmission Elasticity*. In: American Journal of Agricultural Economics 61(1), p. 58-63.

2. Commission of the European Communities. (1988). *Disharmonies in EC and U.S. Agricultural Policy Measures*. ECSE-EEC-EAEC: Brussels.

3. EU Commission. (2011). *Impact Assessment: Common Agricultural Policy towards 2020*. Commission Staff Working Paper. SEC: Brussels.

4. EU Commission. (2013). *The CAP towards 2020. Political Agreement*. Paper presented at the Agricultural and Applied Economics Association annual meeting, Washington, D.C.

5. FAPRI-MU. (2014). *FAPRI US Baseline Briefing Book*. FAPRI-MU Report #02-14, Columbia, MO, USA.

6. FAPRI-MU. (2013). *Impacts of Selected Provisions of the House and Senate Farm Bills*. FAPRI-MU Report #06-13, Columbia, MO, USA.

7. Great Pacific Trading Company, http://www.gptc.com/ (March 12, 2014).

8. IHS Global Insight (2013). Online database, http://www.ihs.com/products/index.aspx (04/09/2014).

9. Meyers, W.H., Helmar, M., and Hart, C. (1998). *Modeling the Outcomes of CAP Reform*. In: Ingersent, K.A.; Rayner, A.J.; Hine, R.C. (eds.): The Reform of the Common Agricultural Policy, Macmillan Press: London.

10. Meyers, W.H., Westhoff, P., Fabiosa, J.F. and D.J. Hayes. (2010). *The FAPRI Global Modelling System and Outlook Process*. Journal of International Agricultural Trade and Development, 6(1).

11. Meyers W. H. and Ziolkowska, J. R. (2012). *The CAP from a Global Perspective*. In: Proposals for CAP 2013+ and Competitiveness of Food Sector and Rural Areas. Program Report *61*(1), p. 27-37. Warsaw: Institute of Agricultural and Food Economics, National Research Institute.

12. Phipps, T.T., Rossmiller, G.E., and Meyers, W.H. (1990). *Decoupling and Related Farm Policy Options*. In: Allen, K. Agricultural Policy in a New Decade. Resources for the Future: Washington, DC, p. 101-123.

13. OECD-FAO. (2013). Agricultural Outlook 2013-2022, http://www.oecd.org/site/oecd-faoagriculturaloutlook/ (04/09/2014).

14. Swinnen, J. F.M. (2009). *Political Economy of Agricultural Distortions: the Literature to Date*. Agricultural Distortions Working Paper #94, World Bank, Washington D.C.

15. USDA. (2013). World Agricultural Supply and Demand Estimates, http://www.usda.gov/oce/commodity/wasde/latest.pdf (04/09/2013).

16. Westcott, P. and Trostle, R. (2013). *USDA Agricultural Projections to 2022*. Outlook No. (OCE-131), http://www.ers.usda.gov/publications/oce-usda-agricultural-projections/oce131.aspx (04/09/2013).

17. Westhoff, P., Hayes, D.J., Meyers, W.H., and Helmar, M.D. (1992). *An Analysis of the European Community Commission Plan for Common Agricultural Policy Reform*. In: Becker, T.; Gray, R.; Schmiz, A. (eds): Improving Agricultural Trade Performance Under the GATT, Wissenschaftsverlag Vauk, Kiel, p. 288-307.

18. World Bank. (2013). Commodity Price Data (Pink Sheet), World Bank Publications, Washington, D.C.

# I SECTION

# *RURAL ECONOMY IN THE FUNCTION OF INTEGRAL LOCAL DEVELOPMENT*

# WINE TOURISM ROLE IN THE REGIONAL DEVELOPMENT - PRAHOVA COUNTY CASE STUDY

*Adrian Nedelcu*[1], *Tatjana Papic Brankov*[2]

## Abstract

*The prior European experiences in the regional development field have proven that the integrated approach of economical, social and environmental problems of the hill regions represents a successful method in solving these problems, in perfect harmony with a sustainable development. In the case of Dealu Mare region, the development was represented by the support of the Romanian wine heritage reorganisation activity, which has an impressive history, rich cultural traditions related to wine, for the purpose to highlight the important potential regarding the wine-growing tourism development in Prahova County, factors which enhance and motivate this new type of tourism. The study considers also the planning of a theme roads circuit in the Dealu Mare region, emphasizing the parameters analysis necessary for the successful organisation of a circuit. Prahova County has a big potential regarding the wine-growing tourism development, but the absence of a specific brand and a modernised infrastructure in the last five years hinder the capitalisation of these factors.*

**Key words:** *tourism, wine tourism, wine growing potential, sustainable development, wine growing centre, wine cellar.*

## Introduction

A national importance field, a priority in the Romanian agriculture sustainable development strategy, mainly hill and sandy areas, is represented by the wine sector, which can contribute to the rediscovery of Romania, as a potential touristic destination which offers by means of

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wine growing tourism a large range of experiences, quality holidays and also business opportunities (Government Decision no. 1432 regarding the measures and regulation instruments of the wine growing department, published in the Official Gazette, Part I, no. 1059/November 26th 2005). On the territory of Romania the wine growing is an activity practiced ever since the beginning of time. The material evidence found in Dobrogea and exhibited in the Vineyard and Wine Museum from Murfatlar, but also the written evidence left by Ovidiu, the Roman poet (exiled in 8 A.D. at Tomis – Constanta), where he has written in runes different aspects related to the wine culture, attest the culture practice age, ever since two and a half millenniums. Herodot evokes the presence of this wine culture in the Intra-Carpathian region ever since VI B.C., and later, Strabo said about the Gaeto-Dacians that they were great growers, a proof being the resistance in time of vine growing terms of Dacian origin (grape, grape wine, free run grape juice).

Wine culture and wine production continued to exist even after the Roman troupes and administration have left Dacia (in 271, during Aurelian emperor) when all this time the vine culture has become the main occupation, representing the fundament of the Dacian-Roman existence in the Carpathian regions. During the period when the space at the north of the Danube was crossed by migrating people, the attachment to this miraculous plant by its capacity to survive harsh conditions, has grown even more, becoming for its inhabitants a symbol of constancy and continuity.

In the course of time, the wine culture in the Carpatho-Danubiano-Pontic area has accentuated its particular features, differentiated on vineyards, types of the grape wines well adapted to the local conditions, culture practices for different regions were set up (especially for types of cuts and the guidance of grape vines), the specific qualities of wines were accentuated. The introduction of hybrid direct producer (HDP), resistant at diseases and pests, represented one of the measures taken at the phylloxera attack, identified for the first time in Romania in 1880, at Arad and officially chronicled in 1884, at la Chițorani (Prahova County), flagellum which has destroyed almost entirely the wine culture heritage, besides the plantations which were on sandy areas.

After December 1989, the viniculture and the wine production industry suffered important changes: the wine cultures have become almost totally the property of grape growers; in order to obtain quality wines accepted un the EU, the hybrid varieties of wines were replaced by noble varieties

(France has turned operational these provisions for the replacement of hybrid varieties of wines by noble grape wine ever since 1935); The start of new wine plantations with noble recommended varieties, which capitalise best the environment conditions and valorise at the highest degree the quality and production potential in the culture limits set by the national law up to the regional administrative town.

In the first international viniculture statistic, Romania hold in 1876 a surface of 97.386 ha and a wine production of 946.347 hl, and in 1982 the surface was increased up to 299.872 ha, and after the integration of Romania in the European Union (January 1st 2007) the viniculture surface has decreased up to 183.200 ha (2012), but it sensed a great series of adjustment and reorganisation actions which lead to structure and quality changes for the purpose of creating a better and sustainable viniculture by means of: introducing domestic varieties (50% of the total viniculture surface); increasing the number of wines with controlled designation of origin (DOC); increasing the number of red and aromatic wines in the total of viniculture production; the promotion of wine consumption; the consolidation of wine producers association in order to create viable viticulture exploitations, eligible for the communitarian financial support.

Prahova county is an important wine-growing area (8,400 hectares, 4.6% of the total area of vines plantations in Romania, 13.9% of the Muntenia-Oltenia wine growing region) with a noble wine production of 208.157 hl, in 2012 (10,4% of the noble wine production of Romania), with an impressive historical background and rich cultural traditions.

Prahova County is part of the South-Muntenia Region, economical development region situated in the south of the country, which surrounds Bucharest-Ilfov region. In the south of the region, the Danube River is a natural border with Bulgaria, offering the opportunity to communicate with the eight riparian countries, and through the Danube-Black Sea channel to exit towards the Black Sea and have therefore access to Constanta Port - main maritime gate of the country (the most important port in the Black Sea and the fourth largest in Europe). The South-Muntenia Region covers an area of 34,489 square kilometres (the third largest regions out of the eight development regions of Romania) and has a recorded population of 3,379,406 inhabitants (the second largest population, after the North-East Development Region).

By its geographical position, Prahova County plays an important role in the economical and territorial cohesion at regional and national level and may become part of an economical development axis at the national level consisting of urban areas like Bucharest, Ploiesti and Brasov. In this context, tourism is the glue that connects the economy, urban and rural civilization, a huge potential which does not only challenge the development of urban space, but also the countryside. For Prahova County, the wine tourism can bring significant benefits to local communities in the Dealu Mare vineyard area by improving business competitiveness/companies by responding to social needs and the preservation of cultural and natural environment.

This geographical configuration, plus the existence and specific manifestation of an amount of socio-historical and economic conditions has facilitated the insertion and adaptation of the active human element, with direct involvement and at varying degrees in the offer and the tourism phenomenon characteristics present in the Dealu Mare region.

## Methodology

The study herein tries to emphasize the role of wine tourism in the sustainable regional development of the hill area in Prahova, where the two traditional activities (viniculture and wines production) can offer a better balance of the economical, social and cultural development, by the special diffusion of growing impulses generated by the important viniculture centres of Dealu Mare vineyard (Valea Călugărească, Urlați, Ceptura, Tohani), as long as these accomplishments are correlated with real development opportunities, respectively the attenuation of causes which are part of the different dysfunctions observed. In order for the capitalization of the attractive resources of Dealu Mare wine region and their integration into tourist circuits to have a logical motivation and a genuine support base it requires that the inventory process of attractive resource in the analyzed area to be doubled, which represents a necessity and an objective in order to have a radiography of weaknesses and strengths that can guide the regional development strategies in full correlation with actual needs and possibilities of the local communities and concrete ways to support the wine tourism at different levels of decision.

Qualitative methods were used, the observation method, analysis of documents, bibliographic sources consultation, of the law. In order to

obtain data about the viniculture heritage of Prahova County and Romania, or in regards of the wine tourism we have used the exploratory research method. The processed data coming from the Ministry of Agriculture and Rural Development (MARD), the Association of Wines Producers and Exporters of Romania (WEPA), National Inter-professional Wine Organization (ONIV), the National Vine and Wine products (ONVPV) plus the bibliographic resources.

## Wine tourism development

Currently, wine tourism is one of the tourism forms which quickly integrated and adapted to the global tourism market requirements. The need for knowledge and analysis of this tourism form has emerged as a result of tourism demand change in favour of the tourism in nature and discovering local traditions, along with wine tasting and knowledge regarding the wine production technologies. The dynamism of this tourism form is supported by the wider spread at international level, both in the Old World, and especially in the New World, out of which the wine regions have substantial benefits.

The wine tourism focused on local wines, traditional food and different tastes of tourists, is associated with the concept of holiday, leisure and at it forms its shape according to the wine quality of the wine region, service quality and good infrastructure in the field. The new concept of wine tourism includes the direct experience of travelling to wine regions, guided tastings, vineyards, cellars and wineries visiting, or deeper knowledge of production techniques.

The wine tourism includes a wide range of activities: day trips or longer stays, relaxing in a picturesque natural landscape and visiting vineyards and cellars, wine tasting, wine purchase, traditional products consumption and sale, culinary combination with gastronomy, attending wine seminars, vineyard collection, attending wine events (holidays, festivals, etc..), other complementary cultural and ecotourism activities or familiarity with rural lifestyle and history of the local community.

The history of wine tourism marks as a starting point the beginning of the nineteenth century when visiting vineyards becomes a part of the travel destinations enjoyed by the aristocracy and nobility of the century. Later, somewhere in the middle of the nineteenth century, the wine starts to become a primary motivator for organized travel packages and thus the

wine producing regions become important tourist attractions, where an outstanding contribution has had also the legal protection of wine from certain appellations, conferring wines identity and especially uniqueness. In Europe, the wine tourism was often associated with official wine routes and roads (Hall et al, 2000). Wine Routes were a significant tourism activity since 1920 in Germany (Rhine valley with spectacular views from the boats, of the vineyards and winegrowers villages with wonderful medieval architecture), Alsace, Burgundy (where the first Grands Crus wine road was inaugurated in the Côte de Nuits wine region, in 1934) and Champagne in France, and later to the New World in California - The Napa Valley Wine Train, South Africa - Stellenbosch Wine Routes, Australia - Tamar Valley Wine Route (Mănilă, 2013). The share of wine routes increased once the wine producers have facilitated the access to their properties to tourists through mutual cooperation with hoteliers, restaurant owners and local authorities. In Romania, where vines, wine production and consumption are directly related to the history and cultural traditions of its people, this form of travel is launched in 1999 by Halewood Romania[3] group the group which owns six modern wineries with special reception areas for tourists, for wine tasting, restaurants, some with accommodation, wine museum or winery outlet (Cellars[4] and Rhein Azuga Guesthouse), visited annually by about 15,000 tourists (out of which about 40% are foreign tourists arrive in organized groups from Germany, Great Britain, China, Russia, Japan, USA, Israel).

Most definitions of wine tourism refer to the motivation to go on vacation, to make a journey, to experience and learn new things. Hall and Macionis (1998) defines wine tourism as "*visitation to vineyards, wineries, wine festivals and wine shows for which grape wine tasting and/or experiencing the attributes of a grape wine region are the prime motivating factors for visitors*". Other authors argue that wine tourism development involves a marketing development and strategy planning

[3] The Halewood International Ltd Group, the biggest independent house which produces and exports wines and alcoholic drinks from Great Britain, undertakes in 1999 Prahova Cellars and sets up Halewood Romania with three subsidiaries: *Halewood Domains*, with activity based on viniculture (administrating over 400 hectares of wine grapes plantations in three regions – Dealu Mare, Murfatlar and Ciumbrud-Aiud; *Wine cellars Halewood* with activity based on premium wines production with a capacity of approximately 42.000 hl and *Halewood Romania*, specialised in the sales of Romanian wines in over 40 countries in the entire world.

[4] Rhein Cellars represent the oldest location in which sparkling wine is produce ever since 1892, without interruption according to a traditional method, presently, as in the interbelic period, „The Supplier of the Royal Court of Romania" for still and sparkling wines.

(Getz et al., 1999). Getz et al. defines wine tourism from three perspectives: the strategy of attracting visitors, the consumption form and the opportunity for cellars to educate customers and sell wine directly from the manufacturer. In the "Strategy of Western Australia wine tourism strategy" launched in 2000, wine tourism is defined as *„…travel for the purpose of experiencing wineries and wine region and their links to lifestyle. Wine tourism encompasses both service provision and destination marketing"*. Considered as one of rural tourism forms the wine tourism has experienced valuable initiatives, including environmental protection measures, the creation of wine routes circuit, tourism wineries and wine development centres.

Analyzing all these definitions, we can say that wine tourism includes three components: visiting vineyards by the connoisseurs for scientific purposes and wine buyers come to transact business (business travel); vineyards visiting in order to understand the wine preparation process for its guided tasting, perceived as a promotional activity, by means of wine growers funding to encourage sales and increase customer loyalty potential on a long-term; wine road - the road circuit with a well-defined topic and attractive geographic dimension and a remarkable cultural heritage.

## Wine road

The interest for thematic routes feels an accentuated increase marked in Western European developed countries, after 1970. The period coincides with the "tourism boom" and the development of mass tourism, becoming more specialized and better developed to meet a very diverse clientele. Also there is the need to customize the tourist offer according to the social group preferences and tastes, which led to the definition of themed roads as attractions with "thematic" character. Together with the increase of their importance for tourism activities, they were treated with more and more attention at the international, national, regional and local level.

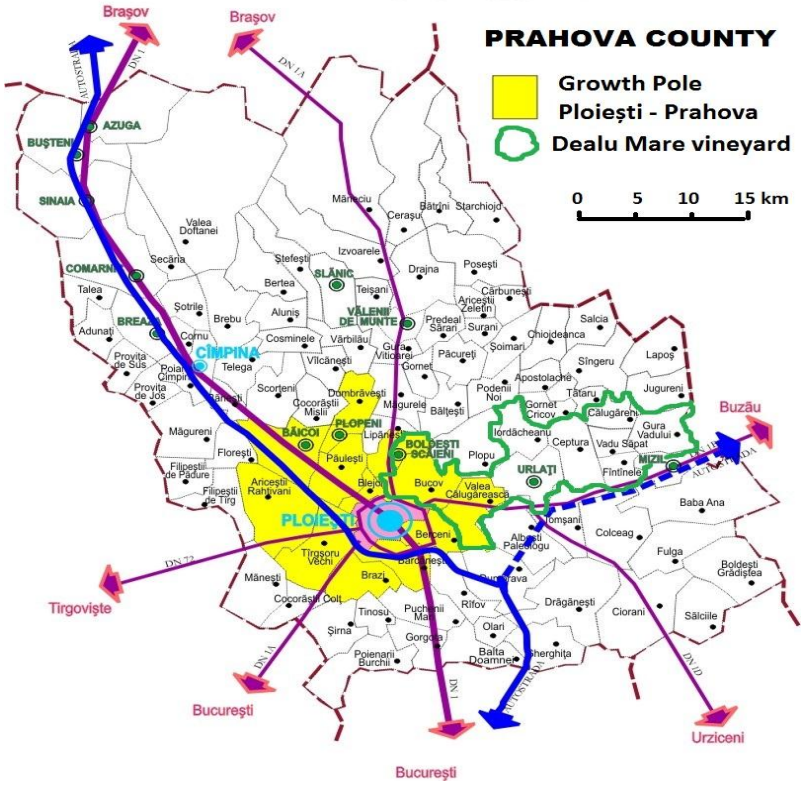
The themed tourist routes are developed in countries with well-developed tourism, known by international performances and which have agreed to speculate the presence of natural and human resources in order to diversify the tourism offer. They can offer development models for other countries that have similar resources. Thus, France is internationally recognized for Wine Road in Champagne-Ardenne and Alsatian Wine Road, the latter being considered a model for planning a wine route in Dealu Mare vineyard.

Wine Road project initiated and conducted in 2004 by the Prahova County Council, as a pilot project within the National Programme "Romania – The Country of Wines" reissuing a segment of an old wine route used by the Romans. This theme route has a length of about 58 km, which has absorbed 100 million euros in the ten years of operation, throughput 14 localities: Tohani, Mizil Ceptura, Urlati, Jercalai, Varbila, Valea Calugareasca, Bucov, Boldesti-Scaieni, Zamfira, Plopeni, Baicoi, Floresti, Filipestii de Padure. The Wine Road in Prahova highlights a multitude of regional features and a distinctive touch by combining the natural, cultural and social factors, something that makes it unique.

A Trip on the Wine Road in Prahova offers the tourist a lot of new and unexpected experiences, and allows tourists to explore a wealth of natural and cultural aspects of the landscape wine. The basis of a brand in the Dealu Mare region, of a successful wine cellar (Budureasca, Halewood, SERVE, Rotenberg, Basilescu) is to promote the wine region and Romania as the country of wine origin.

The criteria which were the basis for achieving the Wine Road in Prahova as a touristic theme pilot road were:
- the balanced spatial distribution of viticulture lands in the area, based on existing wine centres (Valea Calugareasca, Urlati, Ceptura, Tohani), covering functional an extended area of influence;
- the strategic position near Bucharest (60-90 km) and easy access to the region from Otopeni and Baneasa airports;
-the location in the proximity of European and national roads, providing relationships with other major touristic poles (Transylvania and Danube Delta) favourable positioning to A3 highway, E60 - artery considered as having the densest traffic in Romania, especially on Bucharest-Ploiesti-Brasov segment, where annually the traffic varies between 6,000,000 and 10,000,000 vehicle passages, E577 and E85, providing an economic development „engine" (fig. 1);
- the recognized wine traditions and tourism resources diversity;
- the strong potential to attract investors in developing centres;
- the strong research, development and innovation capacity (Research & Development Institute for Viticulture and Winemaking Valea Calugareasca, Petroleum-Gas University of Ploiesti);
- the co-existence of local partnerships (GAL) in rural counties wine and grapes growing between Prahova and Buzau.

**Figure 1.** *Geographic position of Dealu Mare vineyard*




**Source:** *CJ Prahova, Available from: http://www.cjph.ro/index.php?_init=global.pol_crestere& (Accessed at 26 Feb 2014).*

The Subcarpathian territory of Prahova region has the specific feature of vines and fruit trees growing, due to the geographic feature of the area, the climatic conditions, terrain and old traditions in the field. The tourism potential of the region is exploited also by another road theme – The Fruit Road, complementary to the Wine Road, an ambitious project launched by Prahova County Council in 2010. The Fruit Road, as The Wine Road promotes the agro tourism practiced and developed with specific products and traditions of the area. This tourist road is 64 km long, where the beauty of the natural, historic and architecture heritage blends harmoniously connecting 18 towns of Prahova: Starchiojd, Batrani, Posesti, Drajna, Vălenii de Munte, Teisani, Slanic, Alunis, Varbilau, Dumbravesti, Brebu, Scorteni, Telega, Campina, Poiana Campina and Breaza, located in the Carpathian foothills, north of the wine belt and has 28 tourist stops.

## Romania's wine and grapes growing heritage

Wine tourism in Romania is based on vines cultures, a traditional activity of great economic importance, harmoniously developed as a result of favourable natural conditions which are present throughout the country, especially in the hills area in the eastern and southern Carpathians.

The viticulture has been practiced in Romania ever since the earliest times, in almost the entire country, from the Danube, in the south, up to Botosani and Maramures Counties in the north. Romania is today among the wine producing countries in the world, with a surface that rose in 2012 up to 183,200 ha, out of which 96,225 ha with noble varieties and 86,975 ha hybrid varieties. On an international scale Romania stands after countries which cultivate 400,000 hectares in countries like: Spain, Italy, France, Turkey, China (Table 1).

**Table 1.** *Main wine growing countries of the worlds*

| No. | Country | Cultivated surface (ha) | |
|---|---|---|---|
| | | Average 1996-2000 | 2010 |
| 1 | Spain | 1,184,000 | 1,165,000 |
| 2 | France | 915,000 | 852,000 |
| 3 | Italy | 909,000 | 840,000 |
| 4 | Turkey | 584,000 | 517,000 |
| 5 | China | 376,000 | 470,000 |
| 6 | U.S.A. | 218,000 | 398,000 |
| 7 | Iran | 274,000 | 330,000 |
| 8 | Portugal | 257,000 | 246,000 |
| 9 | Argentina | 253,000 | 227,000 |
| 10 | Romania | 208,000 | 207,000 |

**Source:** *OIV – International Organisation of Vine and Wine, Available from: http://www.oiv.int/oiv/info/enstatoivextracts2 (Accessed at 15 Mar 2014).*

Romania, wine growing country, member of the International Organisation of Vine and Wine (OIV) ever since 1927, it has an extensive wine heritage on 183,200 ha in 2012[5] (1.4% of agricultural land), ranking 5th in Europe, after Italy, France, Spain and Portugal.

[5] In the first international wine statistics, Romania had in 1876 a vines area of 97,386 ha and 946,347 hl wine production, and in 1982 it increased to 299,872 ha, since 1989 an ample recovery and structure reorganization but also qualitative mutations took place in order to develop an efficient and sustainable viticulture by: the introduction of indigenous varieties cultures (50% of total area), increasing the number of wines with designation of origin (DOC), increasing the number of red and aromatic wines and the

The viticulture has developed continuously, becoming one of the major branches of agricultural production. Vines are grown, especially in areas traditionally devoted to this activity, especially in the hills area situated on sands, and on other lands with favorable conditions, known viticulture areas which are subject to territoriality. Counties with higher share in the country's vineyard area planted with noble vines like: Vrancea, Buzau, Galati, Constanta, Prahova and Iasi (Table 2).

**Table 2.** *Main counties with noble viticulture cultivated surfaces (2012)*

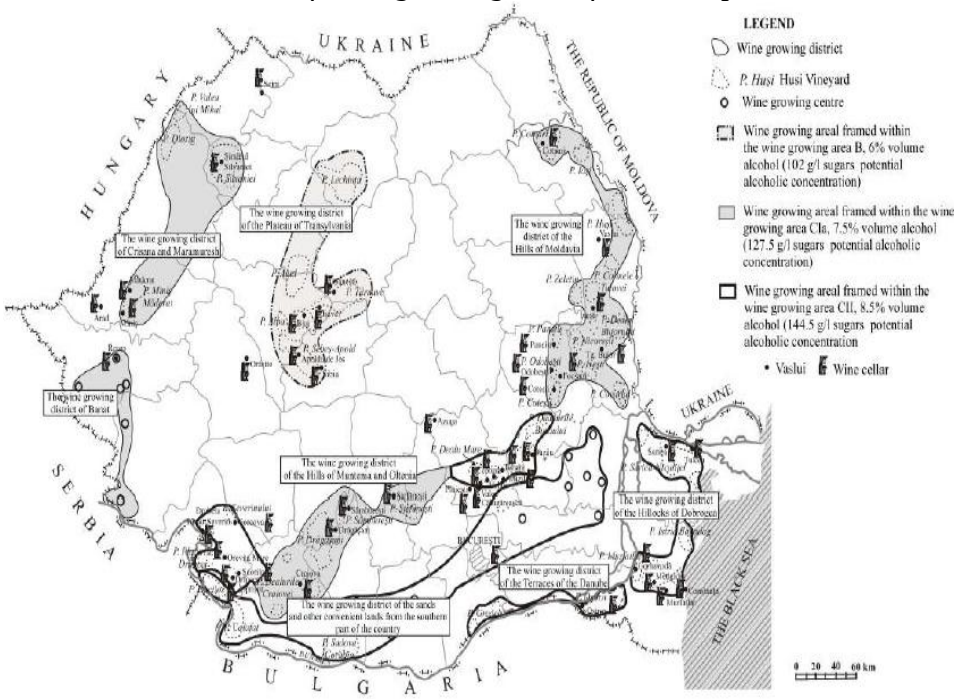
| No. | County | Surface (ha) | Grapes production (t) | Wine production (hl) |
|---|---|---|---|---|
| 1. | Vrancea | 17,020 | 100,500 | 414,590 |
| 2. | Buzau | 8,312 | 58,184 | 351,853 |
| 3. | Galati | 8,233 | 22,943 | 145,368 |
| 4. | Constanta | 7,502 | 41,274 | 191,749 |
| 5. | Prahova | 6,867 | 19,694 | 208,157 |
| 6. | Iasi | 5,750 | 29,900 | 191,360 |
| 7. | Vaslui | 3,676 | 19,116 | 60,220 |
| 8. | Dolj | 3,592 | 4,900 | 25,970 |
| 9. | Tulcea | 3,478 | 8,241 | 34,584 |
| 10. | Timis | 3,376 | 34,422 | 66,452 |

**Source:** *Ministry of Agriculture and Rural Development, Available from: http://www.madr.ro/ro/horticultura/viticultura-vinificatie.html (Accessed at 12 Feb 2014)*

The vine plantations according to the Law no. 244/2003 (revised in 2007) of vineyard and wine are grouped according to the region in: wine areas, wine regions, vineyards, wine centres and wine lands. In Romania viticulture focuses on 8 wine regions (Fig. 2): the Transylvanian plateau, the hills of Moldavia, of Muntenia and Oltenia, Banat, Maramures and Crisana hills, Dobrogea Hills, and Danube terraces and sands regions, also other favourable lands in the south of the country. These regions include 37 wineries and vineyards about 171 centres which produce a full range of wines (Oslobeanu M. et al., 1991).

total wine production, promoting the consumption of wine, strengthening the association of wine producers to create viable farms eligible for community financial support.

**Figure 2.** *The geographical distribution of the wine growing districts from Romania and their framing among those from European Union*




**Source:** *Soare Ionica et al, Viticultural potential and wine tourism in Romania – Journal of tourism, Suceava, no. 10, 2010, page 69.*

Romania has a varied wine selection, out of which over 100 are old varieties, native, known for their quality also at international level. Out of the old varieties, 60% are white wine varieties Feteasca alba, Feteasca regala, Tamaioasa romaneasca, Grasa de Cotnari, Galbena de Odobesti, Busuioaca de Moldova etc.), and 40% red wine varieties (Feteasca neagra - considered the pearl of Romanian viticulture, Babeasca neagra, Cadarca).

Regarding the assortment of wine grapes, in 2009, the first 12 varieties grown were Feteasca regala – 7,4%, Fetească alba – 7,3%, Merlot – 6,4%, Riesling – 4,2%, Aligoté – 3,9%, Sauvignon – 2,3%, Cabernet Sauvignon 2,2%, Muscat Ottonel – 2,0%, Babeasca neagra – 1,8%, Roaioara – 1,6%, Fetească neagra – 1,0% and Tamaioasa romanească 0,7%.

**Table 3.** *Noble Vines cultivated surface with fruit, for wine grapes varieties, in Prahova County, in 2012*

| No. | Noble wine grapes varieties | Surface (ha) | % |
|---|---|---|---|
| 1 | Merlot | 2.315 | 33,7 |
| 2 | Feteasca alba | 724 | 10,5 |
| 3 | Cabernet Sauvignon | 676 | 9,8 |
| 4 | Feteasca regala | 628 | 9,1 |
| 5 | Feteasca neagra | 557 | 8,1 |
| 6 | Sauvignon | 339 | 4,9 |
| 7 | Burgund mare | 288 | 4,2 |
| 8 | Muscat | 263 | 3,8 |
| 9 | Riesling italian | 260 | 3,8 |
| 10 | Pinot noir | 173 | 2,5 |
| 11 | Tamaioasa romaneasca | 122 | 1,8 |
| 12 | Muscat Ottonel | 82 | 1,2 |
| 13 | Chardonnay | 78 | 1,1 |
| 14 | Syrah | 50 | 0,7 |
| 15 | Pinot gris | 41 | 0,6 |
| 16 | Busuioaca de Bohotin | 21 | 0,3 |
| 17 | Aligoté | 21 | 0,3 |

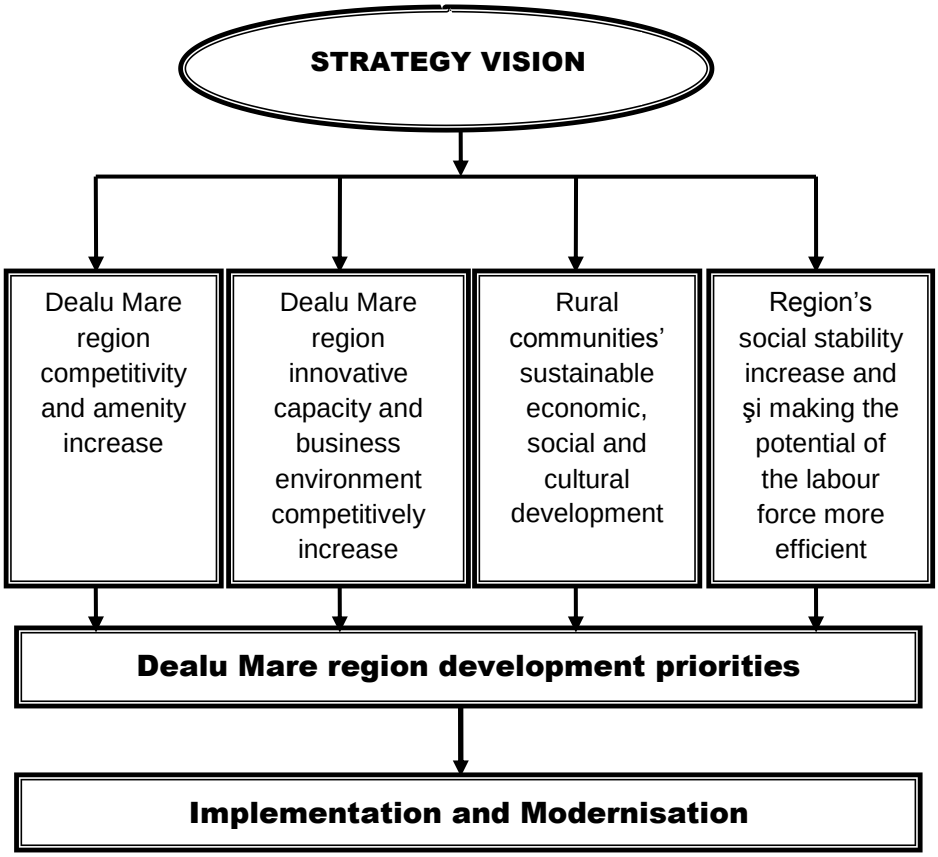
**Source:** *Ministry Of Agriculture and Rural Development, Available from: http://www.madr.ro/ro/horticultura/viticultura-vinificatie.html (Accesed at 12 Feb 2014).*

The favourable soil and climate conditions have allowed since the nineteenth century the introduction of grafted vines imported cultures, especially noble varieties like: Merlot, Cabernet Sauvignon, Pinot Noir, Chardonnay, Sauvignon blanc, Pinot gris, Italian Riesling, Muscat Ottonel and since 2006, in Dealul Mare vineyard the Syrah variety is introduced (originally from France, marked by a strong taste, fragrant and aging potential) today extended over an area of 50 ha (Table 3).

Prahova County, a member of AREV (Assembly of European Wine Regions) together with three counties in Romania (Alba, Arad and Vrancea), can claim that it has a great potential to become a leading wine tourism region in Eastern Europe; If we consider also the fact that Dealu Mare region is on the same parallel as Tuscany and Bordeaux wine regions, it has all the natural factors to approach the best practice for this type of tourism, an average term perspective, and in the past seven years it has become a name in the wine sector both at national and international level. Prahova county vines planted area represents a true heritage of great value if we consider that 1 ha of vines is economically equivalent of

8 ha grain crop. Prahova wine region consists of three cities (Mizil, Urlati Boldesti- Scaieni) and 8 villages (Gura Vadului, Calugareni, Vadu Sapat, Fantanele, Ceptura, Iordacheanu, Valea Calugareasca, Bucov) we wish to achieve the territorial development by a strategic view conceived on a large scale (including also the Growth Pole Ploiesti- Prahova), integrating the three dimensions - economic, social, cultural, recognizing that this development is based on people and communities (figure 3).

**Figure 3.** *Strategy vision of development of Dealu Mare region*




The main objective of development is to strengthen the unity and efficiency of the rural economy, ensuring the harmonious development by reducing disparities between different communities and in particular to support the most disadvantaged, viability of regional development projects is reflected primarily by their ability to attract and fix resources, especially financial ones, but also human and technological, etc. An example is the two themed roads the Fruit and Wine Road - Prahova

which have polarized more investment (photovoltaic parks, area replanted with vines, modern European wineries equipped with the latest equipment, refurbishment of monasteries, mansions and old wineries XVI -XVIII centuries, tourist accommodation structures boutique type hotel, hostels, rural catering specific cellar type etc.) totalling more than 100 million euro. On the other hand, the projects are viable to the extent that it involves local resources and energies so that the long-term development to be endogenous and answer the third principle, namely the principle of sustainability (durability).

The rural communities in the region have several factors that may be conducive to the further development of this wine region in Prahova. One of them is agriculture, mainly in combination with related economic activities or tourism (agro tourism) remains the main economic activity, the "engine" that enables the development of all local communities, and the crystallization of a cohesive economic region more competitive and balanced that can make a major contribution to sustainable regional future development. The Prahova County territory of Dealu Mare vineyard is least developed in comparison to rural tourism and agro tourism, two alternative income generating activities, which provide opportunities for rural areas development, because of the single vineyard landscapes, areas of semi-extensive hospitality of rural inhabitants. But one of the most important elements that can be a factor in the development of tourism in the region Dealu Mare area is precisely this divine drink, which occupies an important place in the local economy and generate indirect effects in other sectors of the local economy, stimulating profitable activities (hotels, restaurants, transportation network, craft activities, service guides etc.).

## Conclusions

The wine tourism, seen as a traditional form of tourism, while dynamic and alternative can make a major contribution to local and regional development. This is why the rural area is considered, rightly, as the depository of resources for a new beginning of a new economic thinking. In this sense, the viniculture sector is an area of national importance, a priority in the sustainable development strategy of the Romanian agriculture sector, which can contribute to the rediscovery of Romania as a possible tourist destination, and the multiplication of interest in the Carpatho-Danubian-Pontic space. The same viniculture sector offers a wide range of experiences through cultural, rural and wine tourism, active holidays and even business opportunities. Tourism creates locally, a better

use of the natural and cultural heritage, contributing to the number of jobs increase in both tourism sector and in other auxiliary sectors, services and management of local resources. The position of wine tourism as one of the forms of tourism with broad prospects for development in Dealu Mare region is thoroughly supported by the presence of a background picturesque landscape with a variety of cultural-historical values, folklore art, ethnography, folklore, traditions or archaeological remains.

## References


1. Getz, D., Dowling, R., Carlsen, J., Anderson, D. (1999): *Critical success factors for wine tourism*, International Journal of Wine Marketing, 11, pp. 20-43.

2. Hall, C.M. and Macionis, N. (1998): *Wine tourism in Australia and New Zealand.* Tourism and Recreation in Rural Areas, Sydney: JohnWiley and Sons, pp. 267-298.

3. Hall, C.M., Sharples, L., Cambourne, B., Macionis, N. (2000): *Wine tourism around the world*, Oxford: Butterworth-Heinemann.

4. MADR (Ministerul Agriculturii și Dezvoltării Rurale), http://www.madr.ro/docs/dezvoltare-rurala/programare-2014-2020/programe/Programul-National-de-Dezvoltare-Rurala-2014-2020.pdf(Accessed at 12 February 2014).

5. Mănilă, M. (2012): *Wine tourism – a great tourism offer face to new challenges*, Journal of tourism, no. 13, pp. 54-60.

6. OIV, http://www.oiv.int/oiv/info/enstatoivextracts2 (Accesed at 15 March 2014).

7. ONIV, http://www.oniv.ro/pagein.php?id=31 (Accesed at 2 martie 2014).Wineromania, *http://www.wineromania.com/index.jsp?pag* (Accessed at 22 February 2014).

8. Oșlobeanu, M., Macici, M., Georgescu, M., Stoian, V. (1991): *Zoning vine varieties in Romania,* Ceres Publishing House, Bucharest.

9. Soare, I., Man, O., Costachie, S., Nedelcu, A. (2010): *Viticultural potential and wine tourism in Romania* – Journal of tourism, Suceava, no. 10, pp. 68-74.

# ROMANIAN BALNEARY TOURISM PROSPECTS IN THE CONTEXT OF SERVICES GLOBALIZATION

*Adrian Ungureanu*[1], *Aleksandra Tešić*[2]

## Abstract

*The balneary tourism is the only form of tourism in our country based on a permanent potential, a very complex and practically endless one. Romania is among the European countries with an outstanding spa background. It is possible that a third of the thermal and mineral waters on the continent should be on the territory of our country. This value is stressed by the complexity of natural factors, namely the existence in the same resort of the main environment factors, together with a wide range of medical mineral substances, with beneficial poly-factorial effects and by the existence in Romania of all types of spa mineral substances that can be used in the whole range of spa treatments.*

**Key words:** *tourism, balneary tourism, health resorts*

## Introduction

As the tourist services are concerned, Romania has a good ground for development, both in the domestic market and for the export of such services. Having an outstanding natural potential, Romania must become a country which exports tourist services. The service export can bring a positive contribution to the commercial balance and the current account, but also to the rise of GDP and, implicitly, to the increase of income for the population. It is difficult to measure the total volume, as the public statistic analysis refer especially to the export of such services, namely the consumption generated by foreign tourists in Romania. In 2008, Romania's GDP reached the value of 137 billion Euros, whereas in 2009 and 2010, because of the collapse of the national economy, the GDP fell to 116.3, respectively 119.8 billion Euros. Not

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until 2011 could Romania's GDP have a slight rise, as compared to the previous years, being of 122.7 billion Euros, which does not reach yet the GDP of 2008. The increase of the international tourism is based both on the increase of the population income and on the easiness of access in the entertainment locations (both the travel duration between the country of origin to the country of destination and also the duration of travel within the destination country, between the main tourist areas). We must not forget about the safety perception, the hospitality or the service quality – the comfort of the accommodation units and the readiness in the food units.

Being the last among the 27 member states of the European Union, with 2.5 million night stays and with returns of $1.3 million, respectively $ 61 / inhabitant, according to a Eurostat report, Romania is beyond its neighbour, Bulgaria, which has returns of $2.6 billion, respectively $345 / inhabitant, but also smaller countries with a better tourist tradition, such as Cyprus with $2.2 billion and Slovenia with $1.8 billion.

Having these modest results, in comparison with its neighbours, in Romania the export of services represents only one percent of the GDP, being thus lower than the import (expenses of Romanian tourists in other countries are smaller than expenses from foreign tourists coming to Romania). The situation is unusual if we take into account the resources available to Romania – natural potential for the summer, winter, balneary, ecological and also cultural tourism. In order to overcome this situation, it is imperiously necessary for the authorities to have the entertainment areas in full light, but also to modernise the infrastructure.

Romania can become attractive when the tourists can travel easily in the country between the main tourist areas, and the development of Romania will impact important countries as the tourist services are concerned, such as Germany, Austria, Russia or Hungary. In the central and eastern Europe there are states in which the volume of tourist services weights a lot in their GDP: for example in Croatia, these categories of services generate 25.6% of the GDP, in Turkey 17.3% of the GDP, and in Slovenia 15.7% of the GDP.

In conclusion, the volume of the tourist performance in Romania is situated far below the potential justified by the geographical position and the condition of a member of the European Union. For a superior efficiency of this potential, it is necessary to modernise the infrastructure and to assign fiscal incentives. Without such measures, Romania cannot hope to become in the future an important player in the field of export of tourist services.

The evolution of balneary tourism reflects an extensive development, a technical and material basis, recording, especially after 1970, a permanent ascending evolution, which was connected in size and structure to the dynamics of consumer requirement, but also a decline that has been caused by economic and social changes that took place in Romania after 1989.

The research process indicators meet the measurement functions, comparison, analysis, synthesis, estimation, testing hypotheses and testing the significance of measurements determined by a computational model. Since balneary tourism can be practiced all year round and has the highest average length of stay of all forms of tourism, we can say that its development will significantly increase its share in the Romanian tourism. This increase would result in the development of health tourism and therefore an increase of the tourism industry in the Romanian GDP. Simultaneously, all the measures should be ensured that may cause the development of the sector and measures to fight tax evasion in tourism.

**The evolution of the material and technical basis in the Romanian health resorts**

Turistic patrimony recovery of the balneary resorts in Romania involves, besides natural and human resources, adequate materials capable of satisfying tourists needs throughout their stay. These methods are known as material and technical basis, which take a number of different structures: accommodation units and catering, transport, leisure facilities and treatment facilities.

Until 1989, national balneary tourism has benefited from extensive development focused only on providing a number of places increasingly higher, priced as affordable as it can be, thus transforming Romanian balneary tourism into a social type tourism in the last decades, especially in the resorts included in the international circuit, investments were made in an attempt made by authorities to increase the quality of local balneary tourism products offered mainly to foreign tourists. Due to its mass characteristics, implemented in 1989, investments were targeted most often only to satisfy the demand in terms of the number of romanian accommodation places in health resorts they offer romanian tourists and foreign ones.

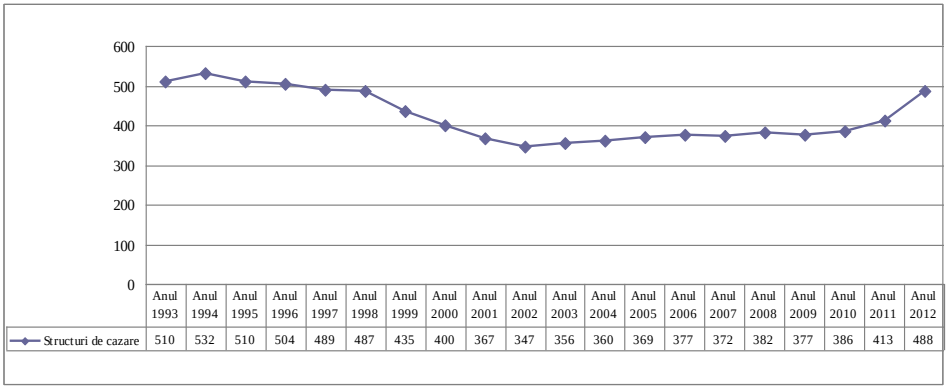
In the early phase of romanian balneary tourism, simple accommodation establishments and food were preferred. After, due to demand, large accommodation units were constructed that could allow the use of balneary treatment resources throughout the year, reducing thus, the seasonality index.

According to statistics, in Romania balneary tourism has become an important component during 1980-1989 in Romanian tourism, recording in the years 1988 and 1989 a glut in demand. Prior to the year 1989, approximately 50% of the population were spending their holidays in a tourist resort.

**Evolution of accommodation structures in the Romanian balneary resorts, 1993-2012**

The year 1989 brings important changes in Romanian balneary tourism specific to a period characterized by a tortuous and contradictory evolution of tourism in Romania. Decrease of the economic performance recorded by all the sectors of the national economy has affected the performance of Romanian's balneary tourism, which resulted in a decreasing evolution of Romanian balneary offer. To highlight the current state of the accommodation capacity of resorts it is shown its evolution during 1993-2012. Reducing the balneary tourism income and maintaining or increasing expenses affected the possibility of self-financing. In this context, the lack of own financial resources, to which is added a decline in demand, investing in Romanian's balneary tourism has experienced a major setback.

**Graph 1.** *Evolution of accommodation structures in the Romanian balneal resorts, 1993-2012*




| | Anul 1993 | Anul 1994 | Anul 1995 | Anul 1996 | Anul 1997 | Anul 1998 | Anul 1999 | Anul 2000 | Anul 2001 | Anul 2002 | Anul 2003 | Anul 2004 | Anul 2005 | Anul 2006 | Anul 2007 | Anul 2008 | Anul 2009 | Anul 2010 | Anul 2011 | Anul 2012 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Structuri de cazare | 510 | 532 | 510 | 504 | 489 | 487 | 435 | 400 | 367 | 347 | 356 | 360 | 369 | 377 | 372 | 382 | 377 | 386 | 413 | 488 |

**Source:** *Own calculations based on* *https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B*

Underinvestment effects are seen in 1993-2012, when the number of tourist reception establishments from balneal resorts have experienced a slow downward trend from 510 in 1993 to 347 in 2002, following a slow increase until 2012, when it reaches the value of 488. (see Graph.1.)

**Table 1.** *Evolution of accommodation structures in the Romanian balneal resorts, 1994-2012*

| Year | Absolute indicators | | | Relative indicators | | | | Annual average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Level indicators | Absolute changes | | Index dynamics | | Growth rate | | | | | |
| | Accommodation structures in the Romanian balneal resorts | $\Delta_{i/1}$ | $\Delta_{i/i-1}$ | $I_{i/1}$ | $I_{i/i-1}$ | $R_{i/1}$ | $R_{i/i-1}$ | $\bar{Y}$ | $\Delta$ | $\bar{I}$ | $\bar{R}$ |
| **1994** | 532 | 0 | | | | 0 | | 418.4736842 | -2.45 | 0.99 | -0.01 |
| **1995** | 510 | -22 | -22 | 0.96 | 0.96 | -0.04 | -0.04 | | | | |
| **1996** | 504 | -28 | -6 | 0.95 | 0.99 | -0.05 | -0.01 | | | | |
| **1997** | 489 | -43 | -15 | 0.92 | 0.97 | -0.08 | -0.03 | | | | |
| **1998** | 487 | -45 | -2 | 0.92 | 1.00 | -0.08 | 0.00 | | | | |
| **1999** | 435 | -97 | -52 | 0.82 | 0.89 | -0.18 | -0.11 | | | | |
| **2000** | 400 | -132 | -35 | 0.75 | 0.92 | -0.25 | -0.08 | | | | |
| **2001** | 367 | -165 | -33 | 0.69 | 0.92 | -0.31 | -0.08 | | | | |
| **2002** | 347 | -185 | -20 | 0.65 | 0.95 | -0.35 | -0.05 | | | | |
| **2003** | 356 | -176 | 9 | 0.67 | 1.03 | -0.33 | 0.03 | | | | |
| **2004** | 360 | -172 | 4 | 0.68 | 1.01 | -0.32 | 0.01 | | | | |
| **2005** | 369 | -163 | 9 | 0.69 | 1.03 | -0.31 | 0.02 | | | | |
| **2006** | 377 | -155 | 8 | 0.71 | 1.02 | -0.29 | 0.02 | | | | |
| **2007** | 372 | -160 | -5 | 0.70 | 0.99 | -0.30 | -0.01 | | | | |
| **2008** | 382 | -150 | 10 | 0.72 | 1.03 | -0.28 | 0.03 | | | | |
| **2009** | 377 | -155 | -5 | 0.71 | 0.99 | -0.29 | -0.01 | | | | |
| **2010** | 386 | -146 | 9 | 0.73 | 1.02 | -0.27 | 0.02 | | | | |
| **2011** | 413 | -119 | 27 | 0.78 | 1.07 | -0.22 | 0.07 | | | | |
| **2012** | 488 | -44 | 75 | 0.92 | 1.18 | -0.08 | 0.18 | | | | |

**Source:** *Own calculations based on* *https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B*

The number of balneal resorts accommodation units has experienced a constant decline until 2002 by 35%, compared to 1994, after which there has been an almost continuous growth, reaching in 2012 a value 27% higher compared to the situation in 2002.

Although in 2002-2012 there was an increase in the number of tourist accommodation structures in balneal resorts, the dynamic growth is still negative, compared to the base year 1994 in which the negative growth was -8%.

In order to make an assessment of the evolution trend in the following perspective of the accommodation structures, we used the criterion based on the average change:

**Table 2.** *The calculation algorithm needed to adjust the number of accommodation units through the average growth method ($y_t$), 1994-2012*

| Year | $y_t$ | $\Delta_{t/t-1}$ | t-1 | $Y_t = y_1 + (t-1)\Delta$ | $(y_t - Y_t)^2$ |
|---|---|---|---|---|---|
| **1994** | 532 | 0 | 0 | 532 | 0 |
| **1995** | 510 | -22 | 1 | 529,5555556 | 382,4197531 |
| **1996** | 504 | -6 | 2 | 527,1111111 | 534,1234568 |
| **1997** | 489 | -15 | 3 | 524,6666667 | 1272,111111 |
| **1998** | 487 | -2 | 4 | 522,2222222 | 1240,604938 |
| **1999** | 435 | -52 | 5 | 519,7777778 | 7187,271605 |
| **2000** | 400 | -35 | 6 | 517,3333333 | 13767,11111 |
| **2001** | 367 | -33 | 7 | 514,8888889 | 21871,12346 |
| **2002** | 347 | -20 | 8 | 512,4444444 | 27371,8642 |
| **2003** | 356 | 9 | 9 | 510 | 23716 |
| **2004** | 360 | 4 | 10 | 507,5555556 | 21772,64198 |
| **2005** | 369 | 9 | 11 | 505,1111111 | 18526,23457 |
| **2006** | 377 | 8 | 12 | 502,6666667 | 15792,11111 |
| **2007** | 372 | -5 | 13 | 500,2222222 | 16440,93827 |
| **2008** | 382 | 10 | 14 | 497,7777778 | 13404,49383 |
| **2009** | 377 | -5 | 15 | 495,3333333 | 14002,77778 |
| **2010** | 386 | 9 | 16 | 492,8888889 | 11425,23457 |
| **2011** | 413 | 27 | 17 | 490,4444444 | 5997,641975 |
| **2012** | 488 | 75 | 18 | 488 | 0 |
| **Total** | **7951** | | | | **214704,7037** |

**Source:** *Own calculations based on* *https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B*

| | |
|---|---|
| $\Delta$ | -2,444444444 |
| $\bar{y}$ | 418,4736842 |
| Standard deviation $\sigma$ | 106,3026226 |
| Coefficient of variation $\upsilon$ | 25,40% |

The value of 25.40% of the coefficient of variation suggests that the arithmetic average ($\bar{y}$) of the cronologic series - tourists reception structures for tourists accommodation, has a high degree of interest.

**Table 3.** *Previsions of the number of accommodation units in balneal resorts in 2013-2015*

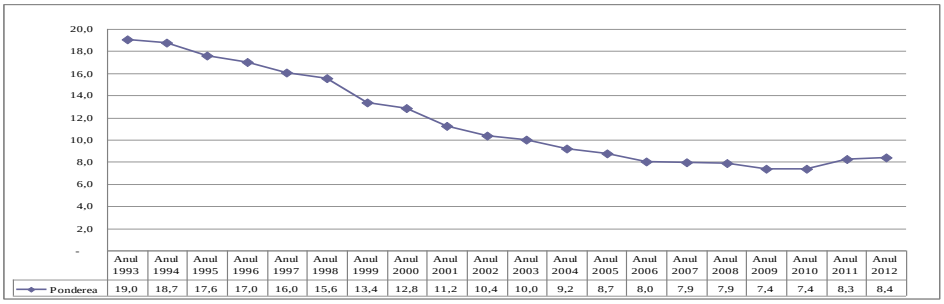
| Year | t-1 | $Y_t = y_1 + (t-1)\Delta$ |
|---|---|---|
| 2013 | 19 | 486 |
| 2014 | 20 | 483 |
| 2015 | 21 | 481 |

**Source:** *Own calculations based on* https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B

Previsions in the dynamics of the number of establishments regarding tourists accommodation in balneal resorts in 2013-2015, shows a steady downward

trend. The resulting trend does not show a favorable overall situation for balneal tourism and is due to lack of investment and insignificant exploitation of Romania's balneary tourism potential.

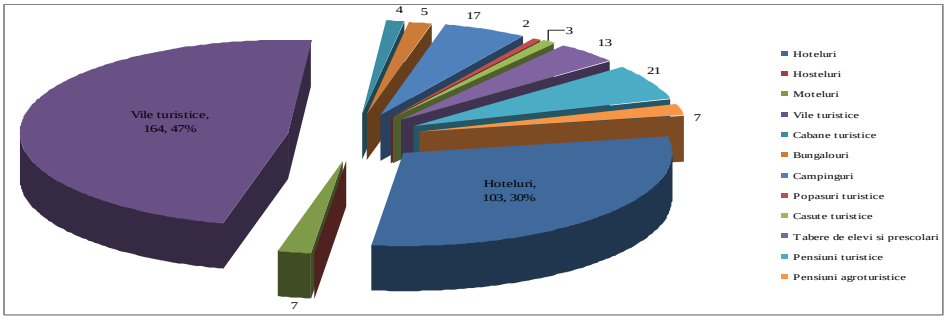
**Graph 2.** *The evolution of accommodation units in balneal resortsin in all accommodation units, 1993-2012*




**Source:** *Own calculations based on*
*https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B*

The decreased number of accommodation units in Romanian balneal resorts determined a decrease of their share in the total accommodation structures. Analyzing the data from the Graph above, we can see that the share of accommodation structures in the balneal resorts in all accommodation structures had a steady and accentuated decrease. While in 1993 the share reached a value of 19% in 2010, it reaches a minimal value of only 7,4%, afterwords increaseing slightly with only one percentage point (8.4% in 2012).

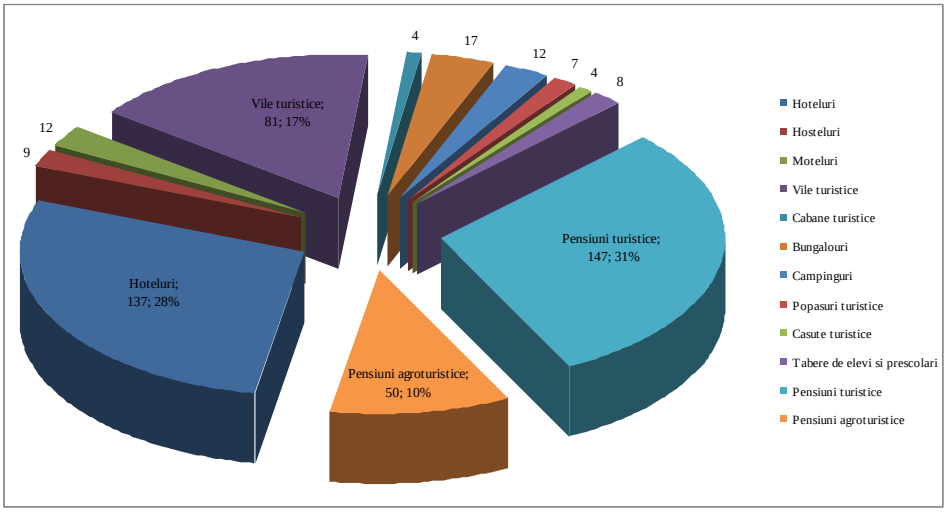
**Graph 3.** *The share of tourist reception establishments, by type of structures in 2002 - (%)*




**Source:** *Own calculations based on*
*https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B*

Regarding the share of tourist reception establishments, by type of structures, in balneal resorts, the first position is held by the boarding houses which alongside the agritourism accommodation structures totals 41% in 2012.

**Graph 4.** *The share of tourist reception establishments, by type of structures in 2012 - (%)*



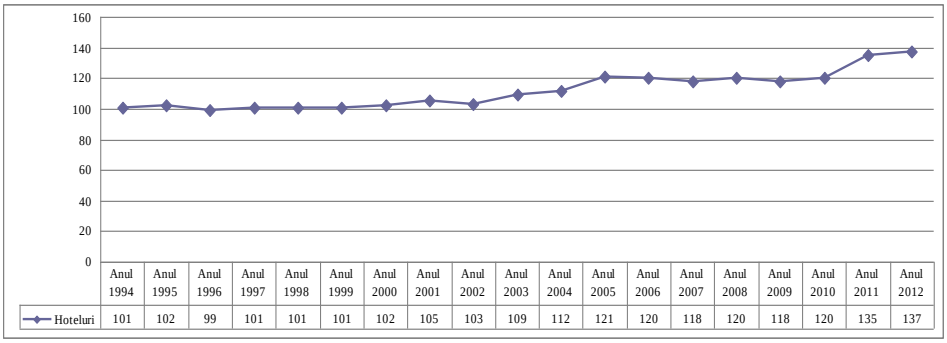

**Source:** *Own calculations based on* *https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B*

The evolution of accommodation units numbers proves that lately, particulary between 2002 and 2012, the number of tourism and agritourism hostels increased significantly, from 28 (approximately 8%) in the year 2002 to 197 (approximately 40%) - see Graph 6 -.

Although the number of hotels increased from 103 in 2002 to 137 in 2012, their share in the total tourist accommodation structures in balneal resorts, decreased from 30% to 28%. Another noticeable change that the tourist villas record, is that their share decreased from 47% in 2002 to 17% in 2012. The high percentage owned by tourist villas is due to the fact that investment and maintenance costs are smaller.

The decreased proportion of tourist villas in the total of tourist accommodation resorts, is determined primarily by their decreasing number, from 164, recorded in 2002, to 81, more than half in 2012. (see graph 3., and 4.).

**Graph 5.** *The evolution trend of the number of hotels in the balneal resorts, 1994-2012*




**Source:** *Own calculations based on* *https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B*

To properly perform the tourist activity in general, but especially for the balneary area, the most important are the hotels that give tourists the safety they need along with the appropriate price for their services. In order to assess the evolution trend of the number of hotels in the balneal resorts for the period 2013-2015 we used the criterion based on the average change obtaining a value of 7.58% from the coefficient of variation, suggesting that the arithmetic average ($\bar{y}$) of the time series, has a high degree of representativeness.

**Table 4.** *The calculation algorithm needed to adjust the evolution trend of the number of hotels through the average growth method($y_t$), 1994-2012*

| Year | $y_t$ | $\Delta_{t/t-1}$ | t-1 | $Y_t = y_1 + (t-1)\Delta$ | $(y_t - Y_t)^2$ |
|---|---|---|---|---|---|
| **1994** | 101 | 0 | 0 | 101 | 0 |
| **1995** | 102 | 1 | 1 | 103 | 1 |
| **1996** | 99 | -3 | 2 | 105 | 36 |
| **1997** | 101 | 2 | 3 | 107 | 36 |
| **1998** | 101 | 0 | 4 | 109 | 64 |
| **1999** | 101 | 0 | 5 | 111 | 100 |
| **2000** | 102 | 1 | 6 | 113 | 121 |
| **2001** | 105 | 3 | 7 | 115 | 100 |
| **2002** | 103 | -2 | 8 | 117 | 196 |
| **2003** | 109 | 6 | 9 | 119 | 100 |
| **2004** | 112 | 3 | 10 | 121 | 81 |
| **2005** | 121 | 9 | 11 | 123 | 4 |
| **2006** | 120 | -1 | 12 | 125 | 25 |
| **2007** | 118 | -2 | | 127 | 81 |
| **2008** | 120 | 2 | 14 | 129 | 81 |
| **2009** | 118 | -2 | 15 | 131 | 169 |
| **2010** | 120 | 2 | 16 | 133 | 169 |
| **2011** | 135 | 15 | 17 | 135 | 0 |
| **2012** | 137 | 2 | 18 | 137 | 0 |
| **Total** | **2125** | | | | **1364** |

| | |
|---|---|
| Δ | 2 |
| $\bar{y}$ | 111,8421053 |
| Standard deviation σ | 8,472866911 |
| Coefficient of variation υ | 7,58% |

**Source:** *Own calculations based on* https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B

According to the forecast in the table below, for the period 2013-2015, there is an upward trend in the dynamics of the hotel numbers, a totally different trend of accommodation in Romanian balneal resorts.

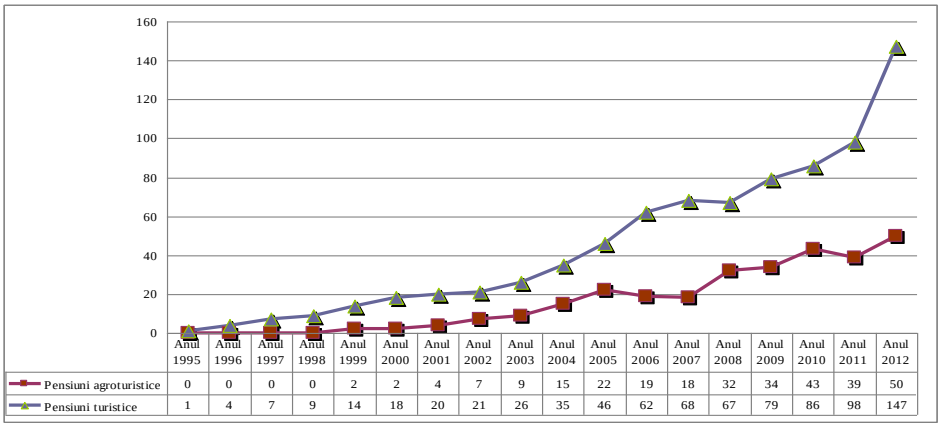
**Table 5.** *Previsions of the number of hotels in balneal resorts, 2013-2015*

| Year | t-1 | $Y_t = y_1 + (t-1)\Delta$ |
|---|---|---|
| 2013 | 19 | 139 |
| 2014 | 20 | 141 |
| 2015 | 21 | 143 |

**Source:** *Own calculations based on* https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B

The number of hotels will increase in the coming years, which is a favorable situation for Romanian balneal tourism. This increase can be attributed to people's desire to feel the comfort of a hotel with all the facilities they need, refurbishment of material and technical base of tourism and diversification of the Romanian's balneal tourism offer.

**Graph 6.** *The evolution trend of the number of guesthouses and agrotouristic hotels in the balneal resorts, 1995-2012*

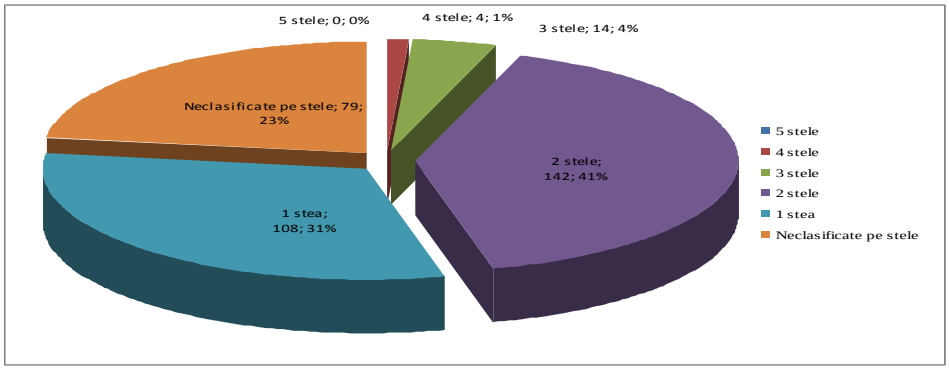



| | Anul 1995 | Anul 1996 | Anul 1997 | Anul 1998 | Anul 1999 | Anul 2000 | Anul 2001 | Anul 2002 | Anul 2003 | Anul 2004 | Anul 2005 | Anul 2006 | Anul 2007 | Anul 2008 | Anul 2009 | Anul 2010 | Anul 2011 | Anul 2012 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pensiuni agroturistice | 0 | 0 | 0 | 0 | 2 | 2 | 4 | 7 | 9 | 15 | 22 | 19 | 18 | 32 | 34 | 43 | 39 | 50 |
| Pensiuni turistice | 1 | 4 | 7 | 9 | 14 | 18 | 20 | 21 | 26 | 35 | 46 | 62 | 68 | 67 | 79 | 86 | 98 | 147 |

**Source:** *Own calculations based on* https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B

The increasing number of accommodation units recorded in the period under review, is due to, on the one hand the emergence of new types of tourism accommodation structures (guesthouses and agrotouristic hotels, youth hotels and hostels) and on the other hand due to the increased number of structures classified in higher categories (3-5 stars).

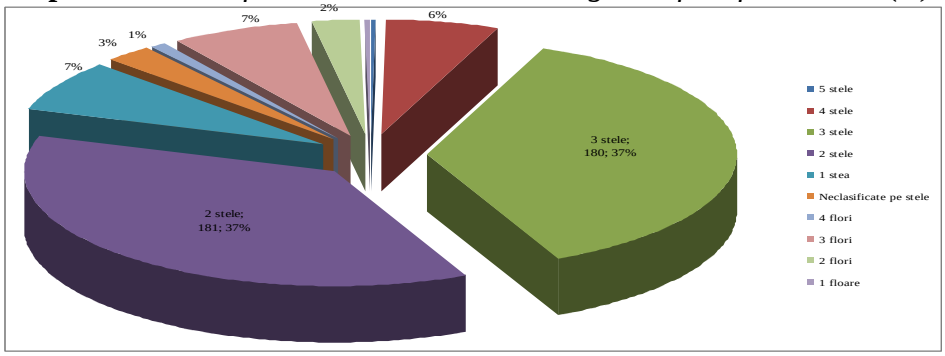
**Graph 7.** *The share of accommodation units on categories of comfort in 2002 - (%)*




**Source:** *Own calculations based on* https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B

The current image of Romania's balneal tourism is privided by the capacity to accommodate tourists on categories of comfort. Conceived as a mass tourism, a form of social tourism, without the presence of luxury units, the balneal tourism remained trapped, still being used by low-income or middle-income social categories of people. While Europe focuses on 4 or 5 star accommodation units, in 2012 Romanian tourists still prefer the low categories.

**Graph 8.** *The share of accommodation units on categories of comfort in 2002 - (%)*




**Source:** *Own calculations based on* https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR101B

Regarding comfort, in 2012 there is a sharp increase in the number of units and places in lower categories, namely 2 star units and less (see Graph 4.7., And 4.8.). This can be explained by the age of the units and their degree of wear. These drawbacks are associated with poor quality services and the absence of modernization works and maintenance. The balneal tourism records an increase in 2002-2012 in the higher categories. For example, a 3 star hotel, registered the biggest increase, from 4% in 2002 to 37% in 2012. For 4 and 5 star categories we can see a share increase in both the number of units and the number of vacancies. Analyzing the available data, the most significant proportion in the accommodation structures on confort categories, in the balneal resorts, in 2012, is owned by the 2 and 3 stars units, which together cover 74% of the total. The share of each category of tourist accommodation units is presented in Graph 8.

The situation is presented slightly different if we analize the working accommodation capacity. Thus the period 2000-2012 was marked by the alternating increases and decreases, from an accommodation capacity of 11,326,969 in 2000 to 10,392,482 in 2012, as shown in the following table.

**Table 6.** *The evolution of accommodation capacity in use, 2000-2012 - (mii locuri-zile)*

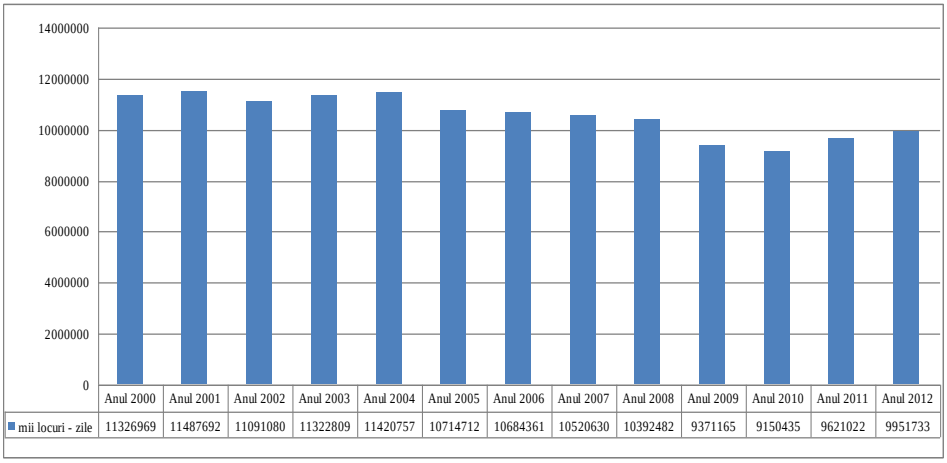
| Year | Absolute indicators | | | Relative indicators | | | | Annual average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Level indicators | Absolute changes | | Index dynamics | | Growth rate | | | | | |
| | Accommodation capacity in use in Romanian balneal resorts (mii locuri - zile) | $\Delta_{i/1}$ | $\Delta_{i/i-1}$ | $I_{i/1}$ | $I_{i/i-1}$ | $R_{i/1}$ | $R_{i/i-1}$ | $\bar{Y}$ | $\Delta$ | $\bar{I}$ | $\bar{R}$ |
| **2000** | 11326969 | 0 | | | | 0 | | 10542757.46 | -114603 | 0.98 | -0.02 |
| **2001** | 11487692 | 160723 | 160723 | 1.01 | 1.01 | 0.01 | 0.01 | | | | |
| **2002** | 11091080 | -235889 | -396612 | 0.98 | 0.97 | -0.02 | -0.03 | | | | |
| **2003** | 11322809 | -4160 | 231729 | 1.00 | 1.02 | 0.00 | 0.02 | | | | |
| **2004** | 11420757 | 93788 | 97948 | 1.01 | 1.01 | 0.01 | 0.01 | | | | |
| **2005** | 10714712 | -612257 | -706045 | 0.95 | 0.94 | -0.05 | -0.06 | | | | |
| **2006** | 10684361 | -642608 | -30351 | 0.94 | 1.00 | -0.06 | 0.00 | | | | |
| **2007** | 10520630 | -806339 | -163731 | 0.93 | 0.98 | -0.07 | -0.02 | | | | |
| **2008** | 10392482 | -934487 | -128148 | 0.92 | 0.99 | -0.08 | -0.01 | | | | |
| **2009** | 9371165 | -1955804 | -1021317 | 0.83 | 0.90 | -0.17 | -0.10 | | | | |
| **2010** | 9150435 | -2176534 | -220730 | 0.81 | 0.98 | -0.19 | -0.02 | | | | |
| **2011** | 9621022 | -1705947 | 470587 | 0.85 | 1.05 | -0.15 | 0.05 | | | | |
| **2012** | 9951733 | -1375236 | 330711 | 0.88 | 1.03 | -0.12 | 0.03 | | | | |

**Source:** *Own calculations based on* https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR103C

To characterize the accommodation capacity at country level, we can use the accommodation capacity operation indicator, expressed in vacancies-days. The dynamic average index below 100%, reveals the decline of tourist accommodation capacity in Romanian balneal resorts. The dynamic number of vacancies-days of the tourists accommodation units in Romanian balneal resorts can be considered an oscillating one, recording in 2004 a maximum of 101% compared to 2000 and in 2010 a minumum value of 81% compared to 2000.

On average, between 2000 and 2012, tourist accommodation capacity in operation, in Romanian balneal resorts, recorded a total of 10.542.757 vacancies-days/year, a negative average gain of -114.603 vacancies-days/year, which means a relative anual decline of 2%.

**Graph 9.** *The evolution of accommodation capacity in use, 2000-2012 - (mii locuri-zile)*




| | Anul 2000 | Anul 2001 | Anul 2002 | Anul 2003 | Anul 2004 | Anul 2005 | Anul 2006 | Anul 2007 | Anul 2008 | Anul 2009 | Anul 2010 | Anul 2011 | Anul 2012 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mii locuri - zile | 11326969 | 11487692 | 11091080 | 11322809 | 11420757 | 10714712 | 10684361 | 10520630 | 10392482 | 9371165 | 9150435 | 9621022 | 9951733 |

**Source:** *Own calculations based on* https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=TUR103C

## Conclusions

The analysis has observed that the Romanian balneal tourism is exceeded on the European market, being in a slight decline. The figures given by the INS and analysed in this paper indicate a decline of visitor traffic, the offer failing to rise at the tourists expectations. Romanian balneal tourism has to face the competition from both inside and outside the country. Among the most important factors that determine this situation we identified: social change,

economic competition, technological inovation and political factors. These factors can join a number of tourism "enemies" as ignorance and arrogance.

The powerful competition on the external market pushes Romanian balneal tourism managers to provide increasingly competitive services. Resolving the modernization problem in the Romanian balneal tourism involves huge funds and political, economical and social factors alike. In an effort to bring as soon as posible a significant part of the Romanian balneal tourism offer, in the current requierments of domestic and foreing customers, firstly we must enroll – at least for a few years – external financial resources.

Given the Romanian balneal tourism situation, for the hotel capacities, the necessary adjustment can be accomplished by upgrading hotels that have been built in the 80s and by building new hotels, mainly for confort. The number of hotels in balneal resorts requiring renewal is very high. Modernization must ensure alignment to the international standards and the only way to do this, in a short period of time, is only possible through the paricipation of foreign investments. For hotels intended for accommodationg people who come for balneal treatment, is recomended the use of foreign capital. This version deserves to be considered both for balneal resorts hotels of national interest and international interest. In Romanian balneal resorts, in addition to upgrading the existant accommodation units, it is required to built new ones. For this purpose, foreign investment contribution deserves to enjoy full attention.

In the touristic material basis in which the foreign capital can find a financial source fall some catering establishments, treatment bases from balneal resorts and leisure-entertainment resources. The foreign companies participation in the process of adapting public catering to the requirements of today’s tourism is especialy needed in specific restaurants (french, english, italian, russian, arabic, japanese cuisine and so on). Such restaurants can be created mainly by leasing some of the current existing premises in all balneal resorts to some foreign companies. In our opinion, the development of Romanian balneal tourism is as important as the upgrade of medical equipment in balneal resorts.

This involves funds and requires the purchase of new technology. Because these investments require large sums, in order to act quickly it requires collaboration with foreign companies or a stronger involvment of the state authorities who stand idly and watch as this touristic sector deteriorates. In most balneal resorts, treatment consulting rooms are integrated in the hotels, thus the companies that will exploit these hotels have to equip them with

modern medical appliances. From our point of view, foreign capital may contribute to the enhancement of the full potential of domestic tourism by undertaking actions to promote the Romanian balneal touristic „product" on the market, mainly on foreign markets.

There are many possibilities to promote Romanian balneal tourism; some come from the prestige of the foreing company among customers from different countries, others from the very intrest that the company has to suport, using advertisement, the Romanian touristic „product" on one market or another. Late tourism privatization, worsens the quality of tourism services. Along with the privatization, owners have realized that this is perhaps the most important part in tourism marketing, with important consequences in customer loyalty. Tourism experts say that loyalty to a client / tourist costs 5 times less than attracting a new customer. These efficiency calculations should be carefully learned. According to the data in the National Institute of Statistics and analyzed in this paper, by 2003, they lost those foreign tourists, classic amateurs of the attractions offered by our country. Resorts of the future in Romania will be successful if they manage to be transformed into modern health and welfare centers to harness the tremendous potential of the natural healing factors.

To meet the requirements on the balneal touristic market, it's necesary to create polyvalent resorts by expanding and diversifying the basic profile of the resort along with the apparance of new resorts: removing stress, beauty, thalassotherapy, prophylaxis.

Modern balneal resorts, which will contain complex products, will offer therapeutic, tourism recovery and well-being coures, health tourism, focusing on the quality of life which is tightly blend with health care, are the winning solutions for balneal tourism. These resorts can become reference centers for the people's welfare needs.

Among the general problems of the balneal resorts we include:

- thorough analysis to establish the register of natural cure factors, reserves of useful mineral substances and the level of their use;
- establishing the profile and optimal specialization of the resort as a basic element regarding the extent and the modernization structure of equipment and / or creating welfare centers;
- outlining the best solution for functional zoning and general and specific infrastructure elements.

A strategic recovery of Romanian's balneary tourism potential will allow it to be repositioned on the national and international market. The success of this action depends on the determined involvment of the macro and microeconomic factors whose economic and social effects will be important for Romania.

To conclude, the balneal tourism offers a series of advantages: even distribution of tourism activity in different areas of the country, providing medium stays relatively constant and slightly longer than those at national level, attracting a stable clientele, balneal treatments and cures results being often conditioned by repeating them over a period of several years, achieving increased average revenues per day / tourist, upon a request of a specific range of balneal treatments more expensive compared to those required for other forms of tourism and raising the capacity usage coefficients of the tourist material basis.

## References


1. Bobircă Ana, *Assessing the international competitiveness of tourism services trade*, Romanian Economic Journal, Year X, nr. 23, 2007.

2. Moraru Andreea Daniela, *Development and diversification of services – an approach at tourism services level in Romania*, Annales Universitatis Apulensis Series Oeconomica, 13(1), 2011.

3. Marin-Pantelescu Andreea, *Diversificarea şi personalizarea serviciilor turistice în contextul globalizării*, Editura, ASE, 2009.

4. Ion Atanasiu, 1939, *Distribuţia regională şi geneza apelor minerale din România,* Institutul de Arte Grafice BRAWO, Iaşi.

5. Berbescu Elena, *Enciclopedia de balneoclimatologie a României,* ediţia a-2-a, Edit. All, Bucureşti, 1998.

6. Berbescu Elena, *Enciclopedia de balneologie a României,* Bucureşti, 1998.

7. Cociaşu E., 1970, *Tratamentul hidromineral în bolile interne,* Edit. Medicală, Bucureşti Dezvoltare, Editura Economică, Bucureşti, 2005.

8. Firu L., *Diagnosticul şi strategia de dezvoltare a turismului balnear în România,* Editura Mirton, Timişoara, 2006.

9. Gan, L.L., Frederick, J.R., „Medical tourism facilitators: Patterns of service differentiation", *Journal of Vacation Marketing*, 17(3), pp. 165-183, 2011.

10. Hapenciuc C. V., *Cercetarea statistică în turism*, Ed. Didactică şi Pedagogică, Bucureşti, 2003.

11. Ianc, T.P., *Strategii de dezvoltare a turismului balnear în România în perspectiva integrării europene,* Teză de doctorat, ASE Bucureşti, 2006.

12. Lee Timothy, Stănciulescu Gabriela, *Special interest tourism for community benefits*, Editura. ASE, Bucharest, 2011.

13. Lee Timothy, Stănciulescu Gabriela, *Tourism Challenges for new enlarged Europe*, Editura. ASE, Bucharest, 2011.

14. Munteanu L., Dr. Stoicescu C., Grigore L., *Ghidul staţiunilor balneoclimaterice din România*, Ed. Sport-Turism, Bucuresti, 1978.

15. Peter Hill, *On goods and services*, Review of Income and Wealth, nr. 23(4)p. 315-338, articol publicat on-line: http://onlinelibrary.wiley.com/doi/10.1111/j.1475-4991.1977.tb00021.x/pdf

16. Smith, M., Puczko, L. *Health and Wellness Tourism*, Elsevier, 2009.

17. Snak Oscar, Neagu Vasile, Stănescu Denisa, Done Ioan, *Mic tratat de economia turismului*, Editura Performantica, Iaşi, 2011.

18. Ştefănescu C., *Staţiuni balneare şi climaterice din România*, Editura. Meridiane, Bucureşti, 1967.

19. Teleki N., Munteanu L., Stoicescu C., Teodoreanu Elena, Grigore L., *Cura balneoclimatică în România,* Editura. Sport-Turism, Bucureşti, 1984.

20. Teleki N., Muntele L., Bibicioiu S., *România balneară,* O.P.T.B.R., Bucureşti, 2004.

21. Ungureanu Adrian, *Strategii de amenajare turistică a staţiunilor balneoclimaterice*, Buletinul UPG Ploieşti, vol. LVII, Seria Stiinte Economice, nr. 4,/2005.

22. Ungureanu Adrian, *Health Tourism in Romania and its Resuscitation Attempts, Buletinul UPG Ploieşti, vol. LXII/5B,* Seria Științe Economice, *Ploieşti , noiembrie 2010,* DOAJ: http://www.doaj.org/doaj?func=byTitle&p=2&hybrid=&query=P&uiLanguage=en

23. *Anuarele statistice al României*, Institutul Naţional de Statistică Bucureşti, 1990-2012.

24. http://mkt.unwto.org/en/publication/unwto-tourism-highlights-2013-edition

25. https://statistici.insse.ro/shop/?lang=ro

26. http://spas.ro/

27. http://turism.gov.ro/

28. http://www.balneoturism.ro/www/index/balnear

# THE APPLICATION OF E-COMMERCE AND WEB TECHNOLOGY IN AGRICULTURE[1]

*Aleksandra Bradić-Martinović[2], Vedran Tomić[3]*

## Abstract

*The application of the latest information and telecommunication technologies is becoming inevitable in business development. Modern information technologies have been widely used in all stages of trading, from procuring, storing and handling goods, through selling and collection, to post-selling activities and costumer services, both in the wholesale and retail sector. Agriculture is an industry that, among others, has a large potential in the area of electronic commerce, and especially in the segment of web technology. In this paper we analysed several categories of web presentations – web sites that provide transaction cost savings, intermediaries on the electronic market, integrated services of electronic commerce and electronic commerce support service providers. We also systematised the benefits of using web technology. In the last section of this paper we gave the analysis of the current situation and potentials in the Republic of Serbia, giving an overview of introducing a new mobile phone technology for informing participants in the agricultural value chain.*

**Key words:** *agriculture, electronic commerce, web technology, web presentation, web portal, mobile services*

## Introduction

Modern business conditions, in all segments of the economy, are characterised by financial instability, market uncertainty and increased competition. In that environment, every company is trying to find sources

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of comparative advantage and to create added value. Greater competitiveness can be achieved by introducing quality systems and reengineering the business processes, with the inevitable application of technological innovation and information and communication technology (ICT). The application of the ICT has become inevitable to the extent that they make an integral segment of each company. Competitive business can no longer be imagined without the application of ICT. Companies have long been aware that successful business must rely on technology, which is one of the main sources of growth and development (Becchetti et.al. 2003; Keramati, 2007). As a result, this area attracts large investments, to the point that it is possible to study the impact of ICT investments on economic development of some countries (Vu, 2002).

The area with a significant potential for increasing the competitive advantage is also a global network – the Internet. The Internet can be characterised as an "information network" because it eliminates the distance and increases the possibilities of communication, both within and outside countries. Thus, the Internet has a direct and distinctive impact on business organisations. New organisational structures now also appear in the form of *dot.com*, transforming the existing market (Beurskens, 2003).

Agriculture is a specific economic sector, characterised by fragmented production with no substantial communication between farmers, processors and consumers. It is the application of communication models developed for using on the Internet that can bridge this gap.

This paper consists of four parts. The first part presents the concept of electronic commerce (*e*-commerce), its development and categories. The second part gives the overview of the benefits provided by the concept of *e*-commerce, while the third part describes in detail specific benefits of web technology. The third part is a central part of the paper and describes different forms and structures of web sites about agriculture: websites that provide transaction cost savings, intermediaries on the electronic market, integrated *e*-commerce services and *e*-commerce support service providers.

## E-commerce

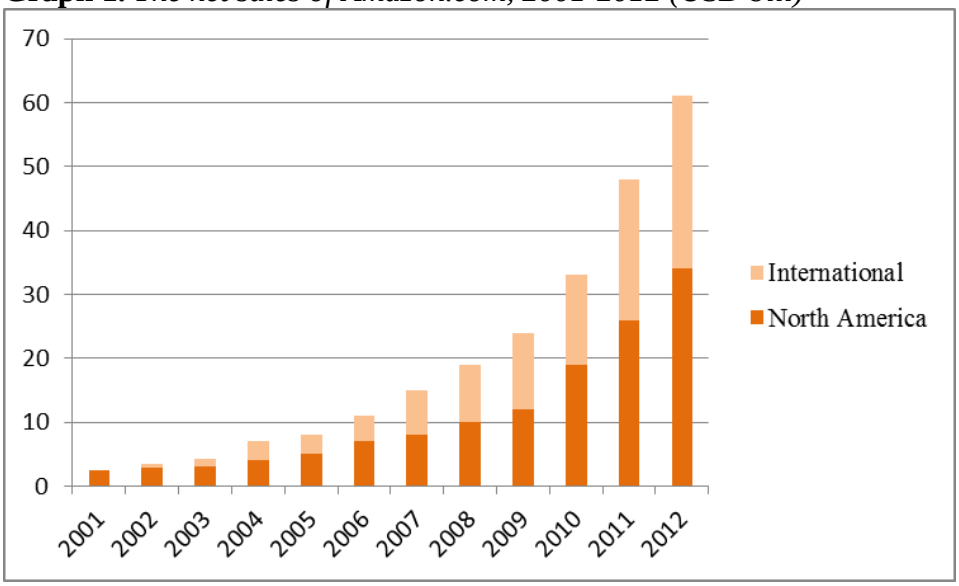
The systems of *e*–commerce and *e*-business have experienced explosive growth in recent years due to the development of Internet technologies, associated services and applied encryption mechanisms (protection). Modern information technologies have widely used in all stages of

trading, from procuring, storing and handling goods through selling and payments to post-selling activities and costumer services, both in the wholesale and retail sector. According to the definition given by OECD (2001) 'An electronic transaction is the sale or purchase of goods or services conducted over computer-mediated networks (broad definition) or over the Internet (narrow definition)'. Of course, the payment and the ultimate delivery of the good or service may not necessarily be conducted on the Internet but also off-line. Telephone, facsimile or regular mail orders are not considered *e*-commerce. *E*-commerce is often regarded as online shopping. However, online shopping is a narrower term, because *e*-commerce implies 'any virtual electronic commerce and support to such business activities'.

Although such systems as EDI (Electronic Data Interchange) and EFT (Electronic Funds Transfer) have been used since the early '70s, the explosion of E-commerce took place in the early '90s, when the rapid diffusion of the Internet and the World Wide Web made the business management much cheaper and easier. The Internet is now considered a well-established channel for commercial transactions. It represents a global market with hundreds of millions of buyers and sellers, a place for all types of transactions, and any forms of business. *E*-commerce enables reducing transaction costs and saving time. In order to take advantage of all the benefits and opportunities it provides, companies (and individuals) have to be ready to accept and develop appropriate *e*–business strategies, thereby changing or abandoning their traditional business. *E*–business strategies must comply with the specific industry and have to be constantly innovated in order to create competitive advantages and new values. When it comes to agricultural products, the Internet could be an important market tool that would complement commercial activities. Large companies are usually the first ones to use new technologies and accept *e*-business philosophy, but this should not be an obstacle to small companies, since entry barriers are negligible (Baourakis, 2002).

The best illustration of *e*-commerce explosive growth is the example of one of probably the most famous companies that conducts its business on the Internet - Amazon.com. From 2001 to 2012 the company recorded remarkable growth in net sales. In those ten years, the sales grew from $2.5 billion to $61 billion, nearly half of which was conducted on the territory of the North America. Picture 1 shows the sales growth of Amazon.com.

**Graph 1.** *The net sales of Amazon.com, 2001-2012 (USD bill)*




**Source:** *Frederiksson (2013).*

Besides in the USA, the growth of E-commerce was also recorded in other countries. Thus, the E- commerce in China recorded the growth of 120% when compared to 2003, and in 2013 the Chinese market surpassed the US market. The market of South America also recorded a remarkable growth in the last decade, from $1.6 billion to today's $43 billion, whereas Brazil has the largest market share of nearly 60% (WTO, 2013).

Apart from all the opportunities and expansion, it is necessary to point out the fact that e-commerce is facing some very serious problems that slow down its development. These are problems related to product quality assessments when there is no direct insight, as it is in traditional trade. Ways of payments were an issue for a long time and they have been constantly improved, particularly in technologically developed countries. Goods and service delivery is a special challenge in case of limited understanding of legal issues that are the basis for safe *e*-commerce. International expansion of this type of trade is limited by the inconsistency of regulations, resources and capacities among countries as well as existing regional agreements.

*E*-commerce has found its way to agriculture. Since the Internet is becoming increasingly popular among people involved in different stages of agricultural production, we can expect further application of *e*-

commerce in this area. Ferentinos et al. (2006) have concluded that so far *e*-commerce has been implemented in agriculture within three categories: a) *e*–marketplaces, where buyers and sellers meet, expecting that they will manage to adjust their expectations, b) *e*-distribution sites, which complement or replace standard distribution channels and c) *e*-procurement sites, designed to provide their customers with aggregated online information helping them to depreciate prices (increase price transparency).

As in the case of other common business processes that benefit from the *e*-commerce, agriculture has some specific and additional benefits from this type of business. Bearing in mind that one of the key elements of successful business in agriculture is timely information (e.g. weather forecasts, market supply/demand, etc.), *e*-commerce introduces some significant changes and benefits.

**Benefits from the transition to electronic market**

Potential advantages and benefits from the transition to electronic market (very often as an additional form of trade) are reflected primarily in reduction of costs, as well as in the fact that participants in the trade business are easier to find (their offer, price, ways of ordering, all contacts) and much easier and cheaper to contact. Bearing in mind the current situation on the electronic market and the Internet, we can conclude that the competition is getting fierce since all participants are equal on the network, at least when it comes to the way of accessing and using websites. All of the above causes a decline in direct costs, and modern computers and creating a website are so cheap nowadays that they do not represent a significant cost.

Training and learning costs practically no longer exist, since computer literacy is now seen as part of general education, starting at lower grades of primary school, if not earlier, and the Internet being used for a variety of purposes. On the other hand, a number of user-friendly applications are increasing, so users also find them easier to use.

There are two basic costs that users have to pay: the cost of internet connection and subscription fees. If we extend these costs, they would also include the purchase of a computer and the cost of training, but for the reasons mentioned in the previous paragraph, it is not necessary.

Possible benefits and income acquired when shifting to electronic market are not easily defined. It is necessary to compare the income before joining the electronic market with the current income, taking into account all other parameters that potentially could lead to change. Although they have been partially discussed, it is useful to make a brief summary of potential benefits (Petnek, 2009), such as:

- Using accurate and timely information, like information about goods, prices, etc.;
- Eliminating the distance between producers and consumers;
- A much more efficient procurement process through electronic ordering and online payments;
- Better information on supply and demand that results in forming more favourable prices;
- Excluding commercial agents that leads to cost reduction;
- Improving product quality;
- Reducing costs due to online marketing and online sales;
- Increased market availability of products.

Theoretically defined benefits of electronic markets are difficult to find objections on, but it is necessary to achieve those benefits through profits.

## Advantages of using web technology

As we have already pointed out, the existence and the use of the Internet is essential for E-commerce. The Internet as a global network, however, implies the use of different services, the most popular of which is the World Wide Web, or just the Web. The Netcraft company research showed there were 919,533,715 registered websites in March 2014.

The Web is a way to access information through the Internet. It is a model for information exchange that uses the HTTP protocol as one of the languages used for data transfer within the network. Web services that use the HTTP protocol to exchange business logic use the Web to exchange and share information. In order to browse the web effectively, it is necessary to use search engines, such as Google Chrome, Internet Explorer, Mozilla Firefox and others. Without search engines it is not possible to access Web contents, which can vary from text, images and sounds, to videos.

The main advantages of using web technology in trading, regardless the kind of goods, are cost reduction and enabling a large number of users to

connect in different ways. Moreover, data presentation can be static or animated, searching for a specific product can include additional help functions, sound can be added, and credit card payments may be provided, while the encryption system increases the security of the overall system.

The analysis of existing web sites related to agriculture shows that all of them can be divided into four categories (Mueler, 2009):

- Websites that provide the transaction cost savings;
- Intermediaries on the electronic market
- Integrated *e*-commerce services;
- *E*-commerce support service providers.

This classification, however, should be considered as general, since hardly any website has an interest to cover a single aspect, i.e. their business includes all of the above mentioned aspects.

1. Websites that provide transaction cost savings

Transactions, in this context, include the flow of information, goods and money. Such transactions are significant different than conventional, since in traditional trade goods can be seen (touched), contracts between stakeholders (a quote, dispatch note, receipt, invoice) are in a form of a hard copy and payments are in cash or cashless.

When it comes to *e*-commerce, all information, money, and sometimes even goods must be transformed into a binary format and thus transported across the network at a high speed, with practically zero marginal cost.

The Internet can therefore reduce transaction costs by reducing trading costs or transfer fees, or both at the same time. Trading costs decrease since searching for necessary goods is free of charge, establishing communication with the seller/buyer via *e*-mail does not require additional costs and it is practically carried out without any delay or waiting, which is extremely important when stakeholders are geographically separated.

**Image 1.** *Home page of the web site "Agriculture"*

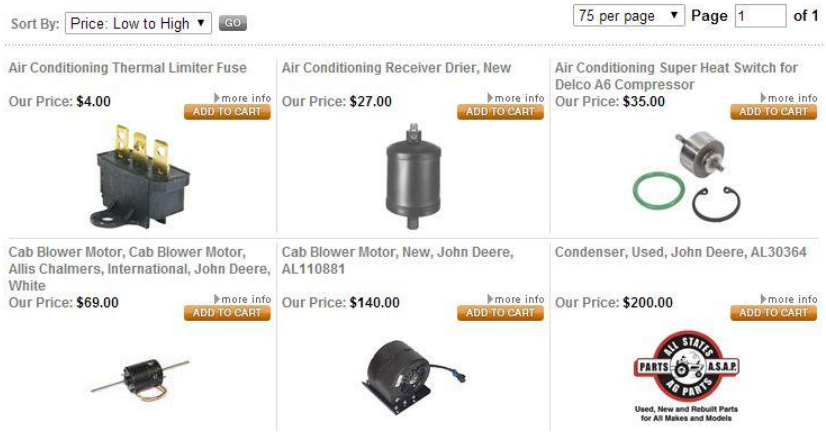

**Source:** *www.agriculture.com*

An example of this type of websites is certainly www.agriculture.com. On this website it is possible to find a number of information related to agriculture and farmers. The site has news feed, which covers the following categories: Crops, Livestock, Policy, Business and Technology. It also includes markets (Markets Analysis, One's World in Agriculture, Markets Newswire, Commodity Prices), with mandatory directories like Weather Reports, Forums, and finally News, Reviews, Classified and AG directories about products. A separate link is dedicated to successful farming. The presentation also offers the possibility of sending free newsletters.

2. Intermediaries on the electronic market

Having achieved cost reduction, due to application of the *e*-commerce, some of the activities previously carried out by companies can now be coordinated through the market. The reduction in transaction costs eliminates market mediators, but, on the other hand, it leads to the development of completely new and different intermediary activities on the market. This primarily refers to providers who classify supply/demand on the market, often specialised for a particular type of goods (grain, livestock, etc.); mediators that quickly link buyers and sellers; market space providers and auctioneers who make the negotiation on prices be public, in accordance with clearly defined rules.

**Image 2.** *Search result for tractor spare parts, John Deere, model no. 2250, air conditioning spare parts*




**Source:** *[www.tractorpartsasap.com/John-Deere-2250-air-conditioning-parts-s/39070.htm](www.tractorpartsasap.com/John-Deere-2250-air-conditioning-parts-s/39070.htm)*

An example of this kind of websites could certainly be www.tractorpartsasap.com. It is a website that offers spare parts for agricultural machinery, harvesters, tractors, etc. It is possible to find new, used or repaired parts, all in one place, with a complete specification, price and possibility to order right on the spot. Time saving is significant when using these types of sites.

3. Integrated *e*–commerce services

Some web sites are designed as agricultural portals, aimed to provide a wide range of information and play a mediating role. It is possible to set a broader picture, taking into account that users easily jump from one site to another if they are connected by hyperlinks. The various portals are thus linked to form a kind of web community.

Given the fact that most of agricultural products cannot be converted into a digital form, it is necessary to integrate with storages, transporters, and control and insurance bodies to achieve a full advantage of E-commerce.

An example of this type of website is the portal Farms.com. It is a comprehensive website that, among other information, provides detailed information on agricultural auctions that take place in the United States.

**Image 3.** *Example of searching agricultural auctions*


**Source:** *www.auctionhopper.com/cobrand/farms/location*

4. *E*-commerce support service providers

Participants in *e*-commerce expect from companies that opted for this type of business to have their own website. Often it is not profitable for farmers and people who run small business to invest in this kind of promotion since the costs of having a website are relatively high, since a modern website, besides advertising, also includes software tools for database searching, query systems, interactive work and a protection system of an entire website. Such participants are left to use services of internet providers specialised for agriculture.

## *E*-commerce in agriculture on Serbian market

To develop *e*-commerce, certain conditions need to be achieved, above all, the diffusion of the network and a number and the structure of active users, as well as their geographical dispersion. If we analyse the situation in Serbia, we can come to a conclusion that the percentage of the population who use the internet has still been low, although constantly growing.

According to the Statistical Office of the Republic of Serbia (2013), 31.6% of households own a laptop, which is an increase of 10.2% when compared to 2012, and 16.1% when compared to 2011.

As for personal computers, 59.9% of households own a personal computer, which is an increase of 4.7% when compared to 2012 and 7.8% when compared to 2011.

Some differences can be seen when compared the presence of computers in urban and rural parts of Serbia: 66.3% vs. 50.9%. Since 2012, this gap has been reduced. The growth rate of computer presence in urban and rural parts of Serbia supports this fact. In urban parts, it amounts to 3.3%, while the growth rate in rural parts amounts to 7%, when compared to 2012.

The computer presence in households varies depending on the territory: it is 67.1% in Belgrade, 64% in Vojvodina and 55.1% in Central Serbia.

In the Republic of Serbia, 55.8% of households own an internet connection, which accounted for an increase of 8.3% when compared to 2012, and 14.6% when compared to 2011. Internet connection is mostly present in Belgrade and it amounts to 65.8%. In Vojvodina it amounts to 58.3%, and in Central Serbia 49%.

The situation is the business sector is much better. In the Republic of Serbia, 99.6% of companies have an internet connection, which is 1.9% more than in 2012 and 2.4% more than in 2011.

An unavoidable gadget that has to be mentioned here is the mobile phone. The research has shown that 87% of the population uses the mobile phone, and in 2012 it was 85.8%. When compared to 2012, a number of people who use the mobile phone have increased by more than 30,000.

Bearing in mind the above mentioned data, we can conclude that there is a good basis for introducing *e*-commerce in agriculture, although households have not been following enough modern electronic trends. Nevertheless, one cannot forget the fact that the percentage of the population who use the Internet to receive information about goods and services is considerably high (60.8%), while the percentage of the population who use web portals to buy and sell goods and services amounts to 29.3%, which implies highly pronounced growth of this sector.

## Development of .rs domain web portals

In the area of web portals particularly, as a way of *e*-commerce on the national market, we need to mention the web portal www.agroponuda.com, the first B2C[4] internet project for promoting the agricultural products from Serbia, funded by the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia (MAFWM) with the help of USAID. It was designed to develop the trade of products between Serbian farmers and interested buyers who look for quality Serbian products.

The supply data are entered by agricultural extension agents who receive them directly from farmers, which ease and speed up the process of product placement and keep costs on minimum. Besides this portal, we can also mention the first internet market of agricultural products - www.agrora.com, which enables people to use it in six languages.

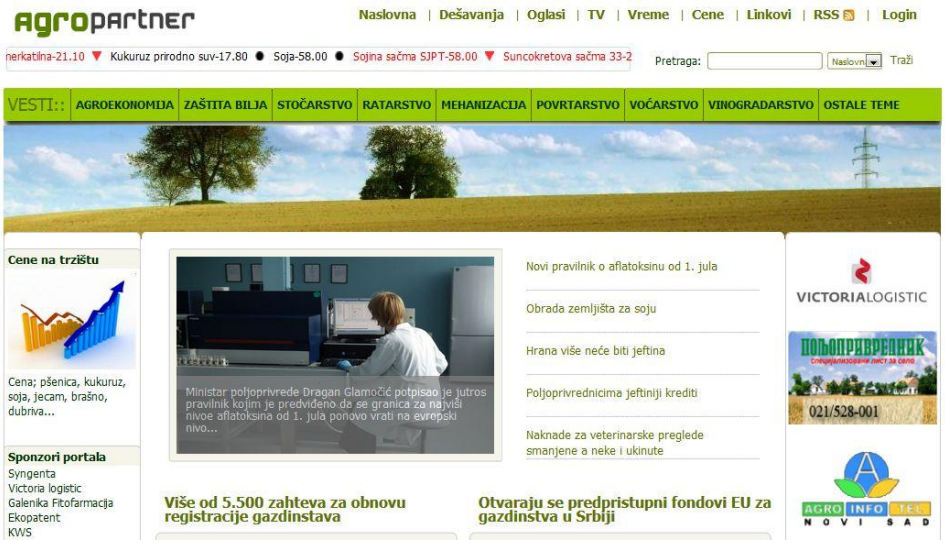
A portal also funded by MAFWM is the "Marketing Information System of the Republic of Serbia – STIPS" (www.stips.minpolj.gov.rs). This portal is the result of the project initiated by MAFWM with the help of the United States Embassy in Belgrade and USAID. It is a project that still provides users with information on the prices from green markets in Serbia, i.e. from locations taken in the sample.

Agricultural extension agents are also responsible for this information they collect on markets located on the territory covered by the agricultural extension office they work for. On the portal there are prices of fruit and vegetables, live animals, grains, milk and dairy products, eggs, poultry and inputs (pesticides, fertilisers and seed). National reports and bulletins are generated based on price movements on markets on chosen locations.

A portal completely dedicated to agriculture is www.agropartner.rs. It is a comprehensive portal that offers various pieces of information (news, contacts, address books, forum, marketing, credits). A portal similar to this is www.mojafarma.rs.

[4] B2C – Business To Consumer

**Image 4.** *View of the "Agropartner" web presentation*




**Source:** *www.agropartner.rs*

On the portal www.produktnaberza.co.rs users can follow price movements of all products offered on the commodity market (wheat, soybean, soybean meal, etc.). Although this web presentation is not interactive, it provides much information very useful to farmers. "Produktna berza" works as a company for product mediations and informing. The company was organized as a non-public, one-member limited state-owned company. The issue related to the active participation of individual farmers (natural persons) in the commodity market was solved in 2003, when a company called "Agrar produkt" was founded, now located in the premises of its founder - "Produktna berza". The main reason for founding "Agrar produkt" was to have a link between individual farmers and the commodity market, which has been succeeded. "Agrar produkt" is now a representative of individual farmers for selling agricultural products via "Produktna berza", practically operating as a broker. "Agrar produkt" does not gain profits through the price difference between offered and final prices. It is financed exclusively through the broker's commission that amounts to 1% of the final transaction. Therefore, the above mentioned limiting factor of being legal entity to be allowed to trade was skipped, enabling individual farmers to sell their products for the prices that are on the commodity market. Finally, we have also to mention a portal for selling and purchasing farm machinery and its components - www.poljomasine.net.

## Development of mobile ICT in agriculture

As it can be seen from the section dedicated to *e*-commerce in Serbian agriculture, the use of mobile phones is on a very high level.

One of the available services that are being more and more initiated is, primarily, sending information via SMS (*Short Message Service*) – mobile phone messages. "Produktna berza" uses this service to provide market information on the prices of agricultural products formed just after transaction on the commodity market finishes.

Some useful information that could be received via SMS may also be pieces of advice, contributing to a decrease in uncontrolled use of plant protection products as well as to a reduction of costs of production.

The European Union finances a project called "The Agriculture Forecast-Reporting System in the Cross-Border Region" that is being implemented within the second call for the Cross-Border Programme Serbia - Bosnia and Herzegovina. The project is being implemented by the Agricultural Extension Office of Užice in cooperation with the Federal Office for Agriculture from Sarajevo.

The project has resulted in twenty agro-meteorological stations set on the territory of eight local governments. Moreover, software has been developed for processing data and sending them to farmers via SMS, with crop protection recommendations.

The project "The Agriculture Forecast-Reporting System in the Cross-Border Region" has been one of the seven projects from whole Europe awarded the "Sail of Papenburg". This award has been given since 2002 for a special contribution to cross-border cooperation, and this year it has also been focused on a special contribution to the area of agriculture. The EU recognised the value of this project that has set an innovative approach never seen before in Serbia or Bosnia and Herzegovina, and significantly contributed to agricultural development. The Agricultural Extension Office of Užice is the first Serbian institution that received such award. Farmers should start receiving first text messages with recommendations on crop protection at the beginning of next vegetation period, i.e. in March 2014. This service will be free of charge for farmers.

## Conclusion

The topic that refers to *e*-commerce in agriculture is very wide and it needs some analyses from the aspect of companies, small entrepreneurs and individuals who entering this segment of trade. Then, it is necessary to identify direct benefits from using new technologies that reflect in higher profits of participants.

The aim of this paper is to indicate the importance of this topic and to generally identify key points of *e*-commerce, and especially of web technology with their application in agriculture, practically introducing the reader with the problem.

New internet-based technologies make a significant difference in the way of connecting people, sharing information, negotiating prices and payments, etc. In next couple of years, it is expected to have an expansion of *online* trading, new providers and better integration of food producers.

The Republic of Serbia has made significant steps in this sector. However, people need more time to accept *e*-commerce as a standard way of trading, especially when it comes to farms.

## References


1. Baourakis, G, Kourgiantakis M, Migdalas, A. (2002): The Impact Of E-Commerce On Agro-Food Marketing, *British Food Journal*, Vol. 104.

2. Becchetti, L, Bedoy, D.A.L, Paganetto, L. (2003): ICT investment, productivity and efficiency: evidence at firm level using a stochastic frontier approach, CEIS Tor Verata – Research Paper Series, Vol. 10, No. 29

3. Beurskens, F. (2003): The Economics of Dot.coms and E-Commerce in the Agrifood Sector, Review of Agricultural Economics, Vol. 25, No. 1 (Spring - Summer, 2003), pp. 22-28

4. Ferentinos,K.P, Arvanitis, K.G, Sigrimis, N.A. (2006): Internet Use in Agriculture, Remote Service, and Maintenance: E - Commerce, E - Business, E - Consulting, E - Support, Handbook of Agricultural Engineering, Volume 7, Section 7, American Society of Agricultural Engineers, pp. 453-464.

5. Frederiksson, T. (2013): E-commerce and Development – Key Trends and Issues, WTO, www.wto.org/english/tratop_e/devel_e/wkshop_apr13_e/frederiksson_ecommerce_e.pdf

6. Keramati, A. (2007): Assessing the Effects of Information Technology on Firm Performance Using Canonical Correlation Analysis: A Survey in Iran Car Part Suppliers Sector, pp.11-18.

7. Mueller, R. (2000): *Emergent E-Commerce in Agriculture*, AIC Issues Brief, Ney York.

8. OECD (2001): Electronic Commerce, Policy Brief, http://www.oecd.org/sti/consumer/2346217.pdf

9. Pentek, A. (2007): Public E-market System for Agriculture Sector, AVA3 International Conference on Agricultural Economics, Rural Development and Informatics Debreceni Egyetem, p. 10

10. Pentek, A, (2009), *Public E-Market Systems For The Agriculture Sector*, Univeristy od Debrecen Department of Business and Agricultural Informatics.

11. Upotreba informaciono – komunikacionih tehnologija u Republici Srbiji, Republički zavod za statistiku, 2013.

12. Vu, K. (2005), Measuring the Impact of ICT Investments on Economic Growth, *Journal of Economic Growth*, October 2005.

# INTERDEPENDENCE OF RURAL DEVELOPMENT AND RURAL ECONOMY LOCAL COMMUNITIES IN SERBIA[1]

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## Abstract

*The work includes the analysis of different opinions and views on rural development and rural economy, both at the general level, and the level of Serbia. The first part of the paper, which analyzes the rural development at the community level, refers to the neglect of rural areas, and emphasizes the importance of the formation of local action groups (LAGs). Also mentioned are two conditions that Serbia needs to fulfill in order to improve the situation in the economy and society, which has a direct impact on rural community development. The second part of the paper highlights the importance of diversification of the rural economy of local communities in Serbia with respect to the diversity of local communities. Analysis of the structure of employment of rural labor force by sectors in Serbia (October 2013) indicates that only agriculture employs 21.8% of the population.*

**Key words:** *rural economy, diversification, local action group, local communities*

## Introduction

*The concept of rural development* can be found in economic theory and practice in recent decades. The methodological and analytical framework for scientific study and implementation of rural development can be reduced in several dimensions: regional (spatial), social and economic. There are several valid definitions of rural areas: according to the OECD typology, applied by the EU and EUROSTAT. The European Union

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applies OECD definition of rural. The purpose of rural development is the construction of an appropriate economic capacity of rural areas in order to improve the quality of residents life.

The most important mechanism for the implementation of LEADER at the local level is what is called Local Action Group (LAG). LAG is composed of representatives of different social, economic and political sectors that exist in the community, and their work is overseen by a Board *(Bogdanov, N., 2007)*. The rural areas of Serbia swept the depopulation and aging. The decrease in the demographic vitality of rural areas is affected by emigration, especially of younger women (*(Executive Summary first national report on social inclusion and poverty reduction in the Republic of Serbia - the role of local Government, 2011).*

*The rural economy* is territorially completed complex of economic activity in a particular area. In Serbia, this area includes 86% of the territory, and their lives more than half of the population. It should be borne in mind that the rural areas in our country are many times neglected. For example, the rural economy achieves almost 30% lower GDP per capita than the national average and is based on the significant role of the primary sector, especially agriculture (*Stojanović, Ognjanov, 2012*).

According to *Labour Force Survey* and author's calculations the dominant part of the rural labor force in Serbia is involved in agriculture, which puts Serbia among leading agrarian European countries. In addition to agriculture (21.8%), rural workforce is engaged in food processing industries (17%), wholesale and retail trade (12.1%), education (6.6%) and health and social care (5.70%).

## Categorization of rural local communities in Serbia

*The concept* of rural development can be found in economic theory and economic practice in recent decades. Rural Development was created as a response to problems related to *intra* and *inter* regional disparities in economic development and serve as a (suitable) complex analysis of the development potential of rural areas. The methodological and analytical framework for scientific study and implementation of rural development can be reduced in several dimensions: regional (spatial), social and economic. All three aspects of rural development are conceptually and fundamentally very complex, and hence the definition of universal

development model and policy, which would be acceptable for the majority of regions or countries, is impossible.

There are several definitions of rural that might be applied:

1. *according to the OECD typology;*
2. *definition of rural applied by EU;*
3. *EUROSTAT approach to defining rural regions* .

According to the *OECD* typology rural regions are divided into three groups:

1. *regions where over 50 % of the population lives in rural communities* - mostly rural regions;
2. *regions in which 15 to 50 % of the population lives in rural communities* - significantly rural regions and transition regions;
3. *regions where less than 15 % of the population lives in rural communities* - mostly urban regions.

According to the definition of rural which applies *EU* rural areas are divided into:

1. *integrated rural areas* - areas with the highest employment in the secondary and tertiary sector , the growing population and a potential danger to the environment , social and cultural heritage;
2. *transitional rural areas* - areas relatively distant from urban centers with different mixtures of primary and secondary sectors;
3. *distant ( remote ) rural areas* - areas with low population density , highly dependent on agriculture , isolated due to geographical characteristics which provide only the most essential services.

*EUROSTAT* approach to defining rural regions is based on the degree of urbanization:

1. *Densely populated area* - the group of municipalities, each of which has a population density and total population greater than 50,000;
2. *Medium populated areas* - the group of municipalities, each of which has a population density greater than 500 inhabitants / km more than 100 inhabitants / km (which is not part of a densely populated area). The total population of the zone must be at least 50,000, or sea border with densely populated zone;
3. *Sparsely populated areas* - the group of municipalities that are placed even in densely populated areas or in the middle.

The European Union applies OECD definition of rural. The rural development strategies are theoretically formulated as three conceptual approaches:

1. *Strategies focused on particular sectors (sectorial approach*) - the basic principles related to economies of scale (productivity) and concentration of resources. Development concepts that period pushed the expansion of the urban economy, the rural sector was a "supplier" of food and raw materials. The objectives of rural development policies were modernization and specialization of agriculture, and promotion of the mobility of agricultural labor and capital;
2. *strategies focused on the rural environment (physical access)* - rural development policy is based on the spatial approach is justified by the heterogeneity of the area and its potential links between the metropolis and the provinces, unwanted consequences of economic growth and changes in certain areas . A key principle of these models is the reliance on local development potential and their innovative parts - local structures and community members;
3. *Strategies focused on people* - scholars generally agree that the concept of rural development based on human potential are not suitable, due to the high mobility of the educated and well-qualified workforce.

According to *Spalević A. (2009)* the potentials and limitations are defined (from an economic point of observation) for the development of rural areas in Serbia. *Potentials* from the economic point of observation are:

1. Reserves of labor in agriculture as well as working potential in other sectors;
2. Proximity to markets (in the village with a relatively small distance from urban settlements).

*Constraints* from the economic point of observation are:

1. Human resources (unfavorable age and educational structure and lack of motivation);
2. Physical capital and finance (underdeveloped economic structure, market structure and credit system);
3. Lack of market institutions;
4. Political environment (lack of political will and conflicts).

**Priority users, aims and objectives of the rural development policy.** American experts believe that *the priority beneficiaries of rural*

*development policy* must be residents of poor rural areas, where it is estimated that one third equity position of the population has a low priority. Policy priority users in European theoretic are seen as farmers. It is obvious that both the low priority given to nature lovers and future generations in rural areas. Among American specialists *priority objectives of rural development are focused* on high quality of life for rural communities and the full employment of the rural population. The importance of preserving the rural environment and biodiversity has to be noted. In Europe, the heterogeneity of response is much larger - equal importance are the high quality of the rural environment and the lives of rural communities. In addition to these two goals high conservation of the rural landscape was also ranked *(Bogdanov, 2007).*

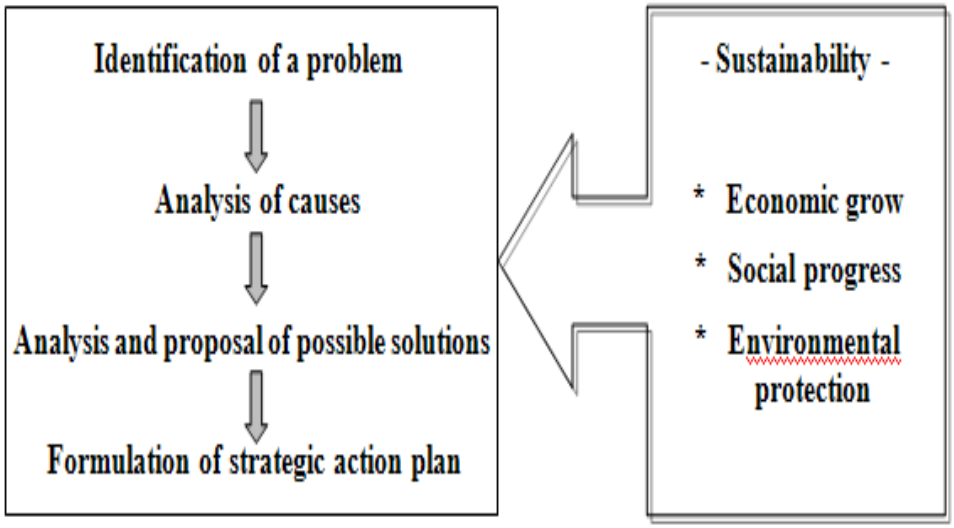
According to *Bogdanov , N. (2007),* every program will contain LEADER axis to finance and implement:

1. *Strategy LAG ( Local Action Group ) for local development , which are built on one or more of the three thematic axes;*
2. *operating costs of the LAG;*
3. *cooperation projects between LAGs;*
4. *experimental and pilot approaches;*
5. *capacity building and support necessary for the preparation of local development strategies.*

An effective method to implement the main objectives of pre-defined *axes 1, 2 and 3* is the *LEADER approach (bottom-up)* use, through the *local development strategies* that must be innovative, integrated and participatory. This is undoubtedly approach for sustainable local economic development, and the main concept behind is that development strategies are more effective and more successful if they are made and implemented at the local level by local actors, accompanied by a clear and transparent procedures, supported by relevant public administration and with the necessary technical assistance for the transfer of good practice. The difference between the Leader and the other, more traditional rural policy, it states that the "how" to act, rather than the "what" to do [3]. The main result of this attitude is to create a starting point for formulating an action plan *(Figure 1)* which will be, of course, strategically oriented, simultaneously taking into account the categories of sustainable development, namely *economic growth, social progress* and *environmental protection.*

[3] Available at *http://www.seerural.org/wp-content/uploads/2009/05/05_LIDER-PRISTUP.pdf*

**Figure 1.** *The stages in the formulation of a strategic-oriented action plan, taking into account the sustainable development category*




**Source:** *Sarić, R., Grujić, B., Roljević, S. (2011): „Rural development as the backbone of sustainable local economic development", Thematic Proceedings "Rural development policies from the EU enlargement perspective", Institute of Agricultural Economics Belgrade, Serbia, p. 69.*

**Local action groups.** The most important mechanism for the implementation of LEADER at the local level is what is so called Local Action Group (LAG). LAG is composed of representatives of different social, economic and political sectors that exist in the community. According to *COUNCIL REGULATION (EC) No 1698/2005*, LEADER program management at the local level, by local action groups, is characterized by several elements:

1. *each LAG must define their own geographic area , which covers the region with between 5,000 to 150,000 inhabitants , which is in charge;*
2. *LAGs operate to a pre -approved strategic plan appointed for the area. These multi - sector plans must be developed locally, and then submitted for approval to the institution at the national level;*
3. *LAGs are then responsible for the implementation of these plans over the LEADER program.*

Work LAG overseen by a Board composed must be expressed in a partnership of community, government and the private sector (ie., must be composed of representatives from the local and business communities,

local authorities, social partners, government agencies, etc.). LAGs in different countries are involved into different organizational forms – with limited liability in Ireland, as a non-profit consortium of Italy, as municipal associations and national parks in France, as well as cooperatives, associations and joint stock companies in other parts of Europe.

**Strategic measures for rural development in Serbia.** According to *Spalević A. (2009),* the main aspects in the development of rural Serbia are:

1. *integral development;*
2. *cooperative enterprise;*
3. *models of agro -rural economy.*

Method of polycentric economic development is suitable for the realization of the policy of integrated rural development. This secondary development centers in rural areas should have: a minimum of labor to organize activities, utilities, cooperatives, and so on. For the further development of agriculture training of family farms and their better organization to participate in the competition is essential. In order to strengthen the economic power of rural areas some requirements needs to be met: *Competitive economy in the organized system of settlements and centers; Comasation; The role of government* (*Spalević, 2009).*

*Competitive economy in the organized system of settlements and centers.* The concept of rural development is based on the principle of the multifunctional development. By this a combined agricultural and other activities are covered. The realization of this concept is based on linking villages in the settlement system and communication with the centers of a higher order. This connection involves the formation of secondary centers at the municipal and village community centers. The community center of the village covers the catchment area from 3,000 to 10,000 residents. Small villages under 300 people should not keep from closing unless at strategic locations, or in areas with specific natural resources.

*Comasation.* The private sector of agriculture is typical for the petty possession - to 5 ha. Such a farm in Serbia represents approximately 80%. The average size of holdings used is 3.59 ha of arable land, which represents a major obstacle in the application of modern technology and machinery. Besides, the problem of small parcels, followed by increase of fallow and arable land for stick-in-the-mud uneconomic production. For the above plots it is impossible to build the necessary drainage systems. Such households do not have a real chance in agriculture, so it is

necessary to enlarge of either rapidly reorient activities in the non-agricultural sector.

*The role of government* is reduced to help in terms of funding and in the form of subsidies and loan approval for raising social standards and public utilities in the country and improvement of infrastructure, investment in human resources, the development of half/processing facilities in the villages, and so on (*Spalević, 2009).*

The rural areas of Serbia swept the depopulation and aging. The decrease in the demographic vitality of rural areas is affected and emigration, especially of the younger female population, further worsens the imbalance between male and female population in the country. Given the lack of a clear definition of rural areas in the official statistics, it is more difficult to adopt precise assess to the situation happening in the rural areas and with the rural population. Population in rural areas is poor and the overall growth of poverty during the crisis is the result of deterioration in the living standards of the population outside urban centers. The disadvantaged are especially households where agriculture is the only source of income.

Underdevelopment of municipal infrastructure and services sector adversely affects the quality of life of the rural population and encourage permanent migration. In the rural areas are less accessible health and education services, the share of people without health insurance is twice that of the total population, the small number of households paid pension and disability insurance, a very low number and proportion of social assistance and social protection services. There is a distinct gap in access to information - telecommunication technologies. Population in rural areas has poor access to key markets - goods, information and financial capital. The financial market is not structured according to the needs of farms and specificities of agriculture and farmers' awareness of the lowest among the farms of southeastern Serbia.

Support for rural development financed by the agricultural budget is focused on the growth of competitiveness of the agricultural sector, improving rural infrastructure and diversification of the income holdings. In the previous period (2008-2010) the various programs of the Government and donor funds are the most supported programs for water supply, development of local infrastructure and the development of rural tourism *(Executive Summary first national report on social inclusion and poverty reduction in the Republic of Serbia - the role of local Government, 2011).*

**Serbia to the 2020th.** Until 2013 Serbia decreased total imports, exports, gross domestic product (GDP), which creates the basic structural problems of Serbian economy and society. In order to improve the situation in the economy and society, it is crucial meeting two conditions *(Serbia 2020, 2010):*

1. *Institutional Reforms (Serbia to become a stable country);*
2. *Construction of infrastructure and defining the spatial development of Serbia (creating the preconditions for sustainable economic growth and development).*

*Institutional reforms* should define the framework and content of the basic institutional and regulatory changes that will lead to raising the responsibility of public officials. This includes harmonization of legislation with European principles and values. Upon completion of the *construction of infrastructure and defining the spatial development* provides the foundation for faster growth and development of the 2020th year. Designed multi-stage production of the entire work.

## Diversification of the rural economy of local communities in Serbia

The rural economy is territorially completed complex of economic activity in a particular area. Subject of Rural Development treats territorial entities with a coherent economic and social structure. In Serbia, this area includes 86% of the territory, covered by more than a half of the population. It should be borne in mind that the rural areas in our country were neglected for many times. For example, the rural economy achieves almost 30% lower GDP per capita than the national average and is based on the significant role of the primary sector, especially agriculture (*Stojanović, Ognjanov, 2012*). When analyzing the diversification of the rural economy in Serbia, it is necessary to bear in mind the diversity of local communities Serbia (*Table 1*).

**Table 1.** *General characteristic of the rural areas in Serbia economies*

| Economy characteristics | Rural area | Features of agriculture |
|---|---|---|
| High agricultural productivity and integrated economy | Vojvodina and northern parts of central Serbia around the rivers Sava and Danube | High productivity, better the structure of agricultural holdings, the vertical connection to the processing facilities |
| Male urban economy with agriculture, which depends on labor | These areas are located along rivers, on the main roads in central Serbia, and/or around urban centers | Agricultural production is intensive and market-oriented, while the environment is threatened in some areas due to the existence of outdated industries |
| Economy based on natural resources | The mountainous regions in the southeastern part of Serbia | Extensive agriculture, light industry, dependence on natural resources |

**Source:** *Rural Development in the Republic of Serbia, http://www.exchange.org.rs/*

According to *National Rural Development Programme from 2011 to 2013,* The economic structure of rural areas in Serbia reflects the development of primary sector of the local communities, especially agriculture, which is still based on exploitation of natural resources. At least diversified income has households in Vojvodina, with 61% of farm income coming from agricultural products sales, of which 70% is made up of grain. The greatest degree of diversification among agricultural households has incomes in Western Serbia, with a significant income in the diversified farming and cattle breeding *(Cvejić S., Babović M., Petrović M., Bogdanov N., Vuković O., 2010).*

Nevertheless, the newly adopted strategic documents *Serbia 2020* predicts new solutions starting from the point of view that the rural areas are distinguished by unique economic and social characteristics specifically reflecting the existence of certain traditional activities.

The extent to which the strategy of *Serbia 2020* will be applicable in the rural sector of the economy is determined by the adopted priorities for rural development *(National Rural Development Program 2011–2013, 2010).*

Programming increase the development potential of rural areas, inter alia, for the first time based on an integral view of potential food processing and marketing. The vision for the food industry is based on the target consumer orientation, standardization and innovation. In particular, it was pointed out that we should encourage the development of small and medium-sized enterprises that produce and market products with protected designation of origin and products with protected geographical indications, as well as products based on traditional recipes. In addition to this vision defined the *vision for agriculture* and *vision for rural Serbia*. *Vision for Agriculture* refers to the production of the concept of dynamic development and builds a competitive family agriculture and agribusiness. Thus understood agriculture should be integrated with the wider food processing industry and be able to contribute to sustainable development through protection of environmental and few natural resources. *The vision for rural Serbia* aims to create a demographically balanced picture of rural regions to the same level as urban areas and thus contribute to income growth. According to *Stojanović, Ognjanov (2012)* programmed measures should contribute to the implementation of the following strategic objectives:

1. *Sustainable improvement of agricultural and food sector through investments in enhancing competitiveness;*

2. *To develop standards of food safety , veterinary and phytosanitary standards, environmental standards and other ones in accordance with the legal framework of the EU (EU Acquis Communautaire);*
3. *Sustainable development of the rural economy and rural areas - even encouraging expansion of agricultural activities in the countryside. From all the above it can be concluded that the standardization and increase of the production of traditional food on the territory of Serbia is clearly indicated as important strategic directions for the development of agro - rural economy in the future.*

**Factors that influence the diversification of the rural economy**. Factors that influences the diversifications of the rural economy are numerous and very complex, so there are a large number of their divisions. *Bogdanov, N. (2007)* means that the most general separation factors influencing the distribution of labor households in *internal* (starting from the household/entrepreneurs) and those more general level, *external* (resulting from the local environment - the village/region). The main factors influencing the diversification activities of *households/entrepreneurs/individuals are:*

1. *Motivation* - commitment of individuals or households to diversify activities;
2. *Higher initial capital* - the loans may encourage specialization in more productive activities;
3. *Access to the market* - this factor does not include just the market for the product, but also the availability of factors such as transport, infrastructure and telecommunications, information sources and so on;
4. *Human resources* - better indicators of human capital (age, skills, education) provides a broad set of labor and entrepreneurial options for individuals and households;
5. *Gender equality* - the marginalization of women could be due to their reduced economic opportunities; is sensitive to the position of young people migrate to urban centers seasonally or permanently;
6. *Social capital* - the presence of adequate social resources, the network also increases possibilities for individuals and businesses.

The main factors influencing the diversification of activities at the *local/regional level are:*

1. *Increased proportion of out -farm activities (growth of the service sector, the processing of the product, etc.);*

2. *Increased diversification of sources of farm income (employment growth, the reduction of hidden unemployment, production diversification including new products, product specialization and increasing the standard and quality of products, etc.);*
3. *Changes in the distribution of income generated by diversification (increase in demand, investments, savings).*

All these factors lead to a higher or lower income inequality among community members, depending on the ability of individuals and households to engage in these processes. Apart from these, there are *factors that are particularly relevant* and important in relation to the previously mentioned:

1. *Local physical and natural resources* - the way in which productive resources used affect local economic growth;
2. *The quality of local government* - local government knows about specific rural resources and is more efficient in the operationalization of the program that it created itself;
3. *Local physical and communal infrastructure* - including a network of roads, telephone lines, social services and so on;
4. *strength of connections with the city* - the strength of this relationship is reflected in the supply of inputs, consumer goods, income population employed in urban centers or income from the sale of products in the city;
5. *Trade and transport* - an important indicator of the level of development of the local economy. Some authors believe that the development of productive chains and production partnership has long-term nature;
6. *social capital* - deciding on important aspects that determine the overall economic growth must be designed at the local level (including cooperatives and producer associations).

The dominant part of the rural labor force in Serbia work is in agriculture, which puts Serbia in most agrarian European countries. The current structure of employment is the result of insufficiently diversified economic structure. The economic structure of rural areas is still largely dependent on agriculture and food industry. The following is a tabular view (*Table 2*) of employment structure of rural labor force by sectors in Serbia as of October 2013.

**Table 2.** *Structure of employed persons by sections of activities in the Republic of Serbia, October 2013*

| Section of Activities | October 2013 | Structure of employed persons (%) |
|---|---|---|
| Agriculture, forestry and fishing | 522,084 | 21,8 |
| Mining and quarrying | 23,065 | 1,0 |
| Manufacturing | 399,654 | 16,7 |
| Electricity and gas supply | 37,206 | 1,6 |
| Water supply; waste management | 36,866 | 1,5 |
| Construction | 126,620 | 5,3 |
| Retail and wholesale trade; repair of motor vehicles | 288,606 | 12,1 |
| Transportation and storage | 130,882 | 5,5 |
| Accommodation and food service activities | 61,973 | 2,6 |
| Information and communication | 50,140 | 2,1 |
| Financial and insurance activities | 44,566 | 1,9 |
| Real estate activities | 2,028 | 0,1 |
| Professional, scientific and technical activities | 63,185 | 2,6 |
| Administrative and support service activities | 49,175 | 2,1 |
| Public administration and defence; compulsory social security | 132,950 | 5,6 |
| Education | 156,867 | 6,6 |
| Human health and social work | 136,455 | 5,7 |
| Art, entertainment and recreation | 44,823 | 1,9 |
| Other service activities | 45,177 | 1,9 |
| Goods and services producing activities of households for own use | 41,003 | 1,7 |
| Activities of extraterritorial organizations and bodies | 680 | - |
| **Total** | **2,394,004** | **100.00** |

**Source:** *Labour Force Survey, Statistical Office of the Republic of Serbia, October 2013, Belgrade*

Apart from agriculture (21.8%), rural workforce is engaged in manufacturing (17%), wholesale and retail trade (12.1%), education (6.6%) and human health and social work (5.70%). Sections in which the share of rural employment is also higher than 5% are public administration and defence (5.6%), transport and storage (5,5%) and construction (5.3%). Insufficient development of public services and the services sector in rural areas are the reason for the small number of jobs in these industries, and their low representation in the total employment expected.

**Economic growth in Serbia to 2020$^{th}$**. There are a large variety of options to stimulate economic growth in Serbia in the future. According

to the document *Serbia 2020 (2010)* some of the options would be *(Serbia 2020, 2010)*:

- *regulatory reform, which will reduce administrative pressure on the economy;*
- *establishment of a new industrial policy which will encourage exports, to save resources and increase energy efficacy;*
- *definition of strategic sectors that need to be carriers of economic growth and exports.*

As one of the strategic sectors that should be the bearer of economic development is agricultural production. This primarily refers to the yield increase in agricultural production using modern technology, which would establish a leading position in this sector in the regional market. Taking into account the global market, Serbia needs to work on standardizing and increasing the agricultural production of the final products, with special emphasis on traditional products and products with protected geographic origin. These products can easily find its place in the global food market. This type of production can only create value-added producers in rural and underdeveloped areas, with the possibility of the development of cooperative systems association.

## Conclusion

Based on the research it can be concluded that there are many ways that Serbia can improve the situation of rural communities. Some of them will be enumerated:

- *Economic Recovery and Development of Serbia is based on a strong private sector;*
- *Privacy reliance on agriculture and the rural economy should be a permanent commitment of our country and as such is based on decentralization and balanced economic development;*
- *the realization of the concept of the rural economy, it is necessary to include direct and mixed farming households;*
- *emphasis should be placed on ensuring the conditions for diversification of activities of the local population;*
- *it is necessary to establish good cooperation between state and local governments.*

In general, more efficient and more successful implementation of local development strategy involves strategic planning in the sense that it is

necessary to know the developmental problems that exist in the environment, and the goals to be achieved in order to overcome these problems and improve the environment.

## References


1. Bogdanov, N. (2007): *Mala ruralna domaćinstava u Srbiji i ruralna nepoljoprivredna ekonomija,* UNDP Program Ujedinjenih nacija za razvoj, Beograd;

2. COUNCIL REGULATION (EC) No 1698/2005 of 20 September 2005 on *Support for Rural Development* by the European Agricultural Fund for Rural Development (EAFRD), OJ L 277, 21.10.2005.*;*

3. *Cvejić, S., Babović, M., Petrović, M., Bogdanov, N., Vuković, O. (2010): Socijalna isSrključenost u ruralnim oblastima Srbije,* UNDP Srbija, Sektor za inkluzivni razvoj, Beograd, str. 32-68;

4. *Executive Summary first national report on social inclusion and poverty reduction in the Republic of Serbia - the role of local Government, 2011*: Social Inclusion and Poverty Reduction Unit, Office of the Minister without Portfolio in charge of European Integrations;

5. *Labour Force Survey, Statistical Office of the Republic of Serbia, October 2013, Belgrade;*

6. *National Rural Development Program 2011–2013 (2010),* Ministry of Agriculture, Forestry And Water Management, Belgrade;

7. Rural development in the Republic of Serbia *(www.exchange.org.rs);*

8. Sarić, R., Grujić, B., Roljević, S. (2011): *„Rural development as the backbone of sustainable local economic development",* Thematic Proceedings *"Rural development policies from the EU enlargement perspective",* Institute of Agricultural Economics Belgrade, Serbia, pp. 65-74.;

9. Serbia 2020 (2010): "*Concept of Serbian Development by the year 2020 (draft for public debate)"*, December 2010, Belgrade;

10. Spalević, A. (2009*): „Mogućnosti za razvoj ruralnog regiona u Republici Srbiji“,* Zbornik radova Geografskog instituta „Jovan Cvijić“, SANU, vol. 59, br. 2, str. 133-147.;

11. Stojanović, Ž., Ognjanov, G. (2012): *„Strateška opredeljenja Srbije u domenu ruralnog razvoja – proizvodnja i marketing tradicionalne hrane“,* časopis Ekonomske teme, No. 1, Niš, str. 19-32.;

12. *http://www.seerural.org/wp-content/uploads/2009/05/05_LIDER-PRISTUP.pdf*

# PERSPECTIVES FOR DEVELOPMENT OF RURAL TOURISM IN REPUBLIC SERBIA*

*Boris Kuzman* [1], *Maja S. Kovačević* [2]

## Abstract

*Rural development is a very complex social, political, economic, ecological, cultural, and development issue, and represents a significant challenge for developed and developing countries. In the context of the analysis of rural development, this scientific work deals with the importance and promotion of rural tourism in Serbia, with a focus on international experiences.Rural tourism offers visitors an "rural environment" so that provides him a unique way to experience the life network of nature, culture and people. The economic development of Serbia is characterized by variation is, particularly expressed in rural and urban areas. Rural areas are far behind as compared to urban. On the other hand, the rural resource base is seen as a rich and varied and provides an almost ideal conditions for the development of different types of activities and services, and it is especially good for the development of various types of tourist activities. Besides general, the work deals with the specific issues of rural tourism. In this regard, attention is focused on the major challenges for sustainable development of rural tourism in Serbia, the competitive disadvantages of rural tourism in Serbia, as well as the main activities for the sustainable development of rural tourism in Serbia.*

**Keywords:** *rural tourism, agriculture, development, sustainable development, Republic of Serbia*

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## Introduction

Transition countries, whose economic system was based on decades of marginalization and exploitation of agriculture and rural areas, are faced with the same problem: how to ensure long-term sustainability of rural areas and provide equal conditions for their participation in economic development.Therefore concept of rural development in the late twentieth century became equally important in developed countries and countries in transition. Overcoming regional development disparity is no longer the main focus of development policies in rural areas. The new rural development policy focused on the definition of effective mechanisms to ensure coordination of agriculture and other activities in rural areas in accordance with the principles of sustainable development, in order to improve the standard of living and quality of life for citizens.[3]

In the context of the analysis of rural development, this work will deal with the importance and promotion of rural tourism in Serbia, with a focus on international experiences. The rural tourism (agritourism) is a specific form of tourism in which the main motivation for travel is, "the return of man to nature." Sublimating different views in theory and practice, which will, among other things, will be presented in the work, based on the fact that rural tourism is environmentally conscious, socially responsible, culturally authentic, ethical, valuable, market-competitive and economically profitable.

A wonderful example of the possibilities for rural development is the integration of agricultural development with the development of tourism in rural areas. A key activity for this integration is working on its grounds - improving the quality and safety of food at all stages of the food chain.Of course, the success of these actions will depend on how the local development strategy successfully identify available resources and, based on them can be defined most successful economic activities that have the capacity to contribute to the well-being of local communities. If natural and human resources do not permit the development of agriculture and tourism, all efforts may be wasted.Establishing the local economy to the sustainable management of available resources, together with rational improvement plans as a tool for their increase, is an essential precondition for success of any actions taken. For this reason, building of local

[3]Bogdanov, Natalija (2007): *Small rural households in Serbia and rural non-farm economy,* UNDP, Belgrade,p. 23

capacity for the development, which includes the promotion of partnership of all interested parties is an integral part of rural development.[4]

## Rural Development and Rural Policy

The concept of rural development can be found in economic theory and economic practice in recent decades. Rural Development was created as a response to problems related to intra and inter regional inequality degree in the economic development and serve as a (suitable) concept for more complex analysis of the development potential of rural areas.[5] Development of rural areas is a very complex social, political, economic, ecological, cultural, and development issue. The approach to rural development is necessary, first of all, take into consideration the view that it is a social process that is long-lasting and quite different from the previous simplified model of centralized planning for rural development in close connection with the issues that social theory today is trying to problematize: the question of regional development and decentralization, ie, issues of (neo) endogenous and territorial development, the issue of sustainable development in the socio-economic, environmental and any other terms, networks between relevant institutions and actors, different strategies of living and working farms and households (farm system) issues of level and ways of participation, the role of civil society, social capital, the importance of social inclusion, fight against the (rural) poverty, etc.[6] Rural development is difficult to define. One of the more meaningful definition given by Moseley, according to which rural development is a long and sustained process of economic, social, cultural and environmental changes that are designed to enhance the long-term well-being of the entire community.[7]

In the past, the agricultural sector is often the engine of growth of the rural economy and represent the dominant source of rural income,

[4]Djordevic Milosevic, Suzana, Milovanovic, Jelena (2012): *Sustainable Tourism in function of Rural Development* - Small farms and rural tourism in Serbia, the Faculty of Applied Ecology Futura, Singidunum University, Belgrade Agroznanje, Vrsac FAO, Budapest, p. 11

[5]Bogdanov Natalija (2003): Rural Development – - *EU policies, status and perspectives in Serbia*, Journal Agriculture and Rural Development in the European integration, agricultural economist symposium on the 40th anniversary of Agro Department, Faculty of Agriculture, University of Belgrade, Belgrade, p. 82-92

[6]Jankovic Dejan (2012): *Environmental dimensions of rural development*, Themes, Year XXXVI, No. 2, Nis, 627-642, p. 628-629

[7] Moseley J. Malcolm (2003): *Rural development. Principles and practice*, SAGE Publications, p. 4.

employment and production. Consequently, rural and agricultural issues are considered virtually synonymous and often assumed that agricultural and rural objectives can be realized single policy created to help transition the agricultural sector. This situation has changed , primarily because agriculture is no longer a major sector in the rural areas when is word about production or employment . Policy makers increasingly realize that rural development policy requires at least three reasons. First, rural areas face significant challenges which undermine territorial cohesion within countries. Second, rural areas often have economic potential that is largely untapped and could be better utilized for the benefit of the rural population and overall national development. Third: no sectoral policies or market forces are not able to fully respond to the heterogeneity of the challenges and potential of rural areas and to cope with all the positive and not a negative external factors .[8]Many researchers suggest that "there is a need for a new paradigm of rural development." Its main features should focus on territory, rather than sectors and highlight the investment, rather than subventions. While targets such as equalization of living conditions in rural and urban areas, increasing farm income, farm competitiveness should supplement the competitiveness of rural areas, valorisation of local resources, the exploitation of unused resources. The key stakeholders for the implementation of this paradigm are not just national governments and farmers but all levels of authorities (supranational, national, regional and local), various local stakeholders (public, private, non-governmental organizations).[9] Taking into account that rural areas make up about 85% of Serbia's territory, and that the rural population accounts for more than half of the population is an evident need for further investment in this area with the aim of improving the social and economic conditions, both in isolated rural areas which are faced with a tendency depopulation, and in suburban areas. Investing in the development of the rural economy and the local community is a vital factor in improving the quality of life in rural areas through improved access to public services, the construction of infrastructure and favorable business environment. So far foreign investment was not conducive to rural development and there is space for increasing.According to data available from RS, 2012, in the period 2001-2011. The total foreign direct investment (FDI) in Serbia amounted to about 17 billion euros (or about $ 15 billion net), of which about 40% was invested in the privatization of

[8]DordevicMilosevicSuzana, MilovanovicJelena (2012): *Sustainable Tourism for Rural Development* - Small farms and rural tourism in Serbia, op. cit., pp. 20-21
[9]Ibid., p. 21

the economy and the financial sector. The said amount was not nearly enough for a noticeable recovery of the economy, especially industry, because about 35% of the total FDI inflows were directed to the sectors of non-tradable goods and services, and only about 15% of total FDI were called. Greenfield investments - investments that are starting to work completely from scratch, without infrastructure, office space and staff.[10] as An example of this we can state the following. One of greenfield investment is the construction of a hotel on Stara Planina mountain namesake in Knjaževac and is the first greenfield project in the framework of the development of mountain tourism in Serbia in the last 20 years. Within the project, the first ski gondola in Serbia which enabled transport skiers to the top of Babin Zub, from where a total length of ski trails 13 km. Starting gondola station is near the hotel in Jabucko Ravniste. Its initial capacity is 1200 skiers per hour, expandable to 2400 skiers. Master plan for the development of tourism in Stara Planina is anticipated that the final stage is done with the accommodation capacity of 22,000 beds. Hotel Stara Planina is a marketing-oriented, a primary target group consists of family skiers.[11]Improving the competitiveness of rural areas requires the promotion of sustainable development and the creation of new employment opportunities, particularly for young people, as well as providing access to modern information and communication technologies. The diversification of activities in rural areas in agricultural and non-agricultural activities, support for non-agricultural activities and the strengthening of links between the different spheres of rural development plays an important role in this.[12]Thus, summarizing the above, we can make certain points. Rural development is a significant challenge for developed and developing countries. Adequately solving problems of rural areas can enable a shift towards an integrated approach to sustainable development in relation to the previously dominant - sectoral approach.[13]

[10]KosticStankovicMilica (2013): *Marketing and Rural Development*, Permanent Conference of Cities and Municipalities - Association of Towns and Municipalities of Serbia, Belgrade, p. 6
[11]Ibid., pp. 6-7
[12]Ibid., p. 7
[13]Dekic Snezana, Jovanovic, Sonja, Krstic, Bojan (2011*): Some determinants of policy making and strategy for sustainable rural development*, Theme Collection: agricultural and rural policies in Serbia need to speed up reforms, 49-63, DAES - Serbian Association of Agricultural Economics, University of Novi Sad - Faculty of Economics, Belgrade, Novi Sad, p. 50.

Integrated approach to sustainable rural development is based on the simultaneous focus on several key development elements, such as: a) population b) industry c) the natural environment; d) institutions. The tendency towards this, an integrated approach, especially in the EU where the reform of the Common Agricultural Policy contributed to the transfer of financial assets and liabilities to the new institutions for rural development. Unlike the EU, other countries conducted different programs of rural development, depending on the specific institutional and political characteristics, but also is very important the degree of rurality. Therefore, in some countries dominate attitude on the modernization of agriculture, and in other development policies of most underdeveloped, rural areas.[14] The policy of rural development, reliance on agriculture does not give satisfactory results. It is necessary to consider all available resources in order to diversify. However, the development of new business is a necessity because there is often an inability to deal with the existence of only agricultural activity. Therefore, the development of trade, tourism, handicrafts, services, increasingly become the backbone of rural development. It is necessary to motivate the residents of rural areas to take advantage of the comparative advantages of these areas and the development of skills and abilities of community members affect the diversification of activities. However, institutional limitations in the form of financial indiscipline, inefficiency in decision strategies and programs, law enforcement, can slow down the development of rural areas.[15] One of the important issues in rural development Policy, especially in the EU , is the protection and preservation of the environment. Agriculture should ensure sustainable growth while preserving natural Resources. The development of agriculture has to be harmonized with the Law on Environmental Protection. EU, this segment is given special care, which is reflected in a number of programs for the improvement of rural areas that comply with environmental requirements and regulations. These programs are mainly related to incentives to farmers to preserve the natural environment. Environmentally responsible behavior of farmers means less use of chemicals or their complete elimination, protection, conservation of natural pastures and others. In this segment, it is necessary to encourage local communities to recognize, promote and protect the natural and cultural values. Of great importance is to raise awareness of these values and the importance of their conservation. Ecological and economic sustainability of the basic assumptions of the

[14] Ibid.
[15]Ibid., p. 50-51.

survival of rural areas. The Society expects from the rural population to play a role of, "guardian" and "protector" of the environment. Therefore, one of the goals of sustainable rural development is the development of the highly competitive agriculture with respect to environmental issues.[16]

## The importance of rural tourism in the world and in Serbia

Rural tourism in Serbia is defined as tourism which offers visitors a "rural surroundings" by allowing him to uniquely experience the network of life of nature, culture and humans. This implies that a visitor enjoys the authentic, original experiences and return to the roots and essence of rural life . Rural tourism is based on the principles of sustainability and includes a range of activities and services that the population in rural areas is organizing precisely on the basis of the elements that characterize the rural areas. At the same time rural tourism includes not only the visible features of nature, architecture, folk literature, gastronomy, but also invisible ones such as , for example , traditional hospitality, traditions, culture relations with the nature , culture of communication , beliefs and legends of the local people of different nationalities and religions that are in a given area have developed a specific way of life . Exactly that experience, unique multidimensional net of life achieved through personal contact with the local population makes rural tourism unique.[17]

Despite the foregoing definition of the concept of rural tourism in different countries, this term is understood differently in practice and includes specific features, such as:

• in Finland it means renting to tourists of small rural houses (the cottages), including food services;

• in Hungary, said term means the offer of services and activities offered to tourists in the rural environment (financially acceptable / affordable housing, participation in agricultural work, etc..);

• in Slovenia the most important form of rural tourism is tourism on family homes - farms, where guests spend the night in the same house with the owner or in a separate guest house (emphasis on gastronomy and visits to the property);

[16] Ibid., p. 51

[17] Djordjevic Suzana, Milovanovic Jelena (2012): *Sustainable Tourism in function of Rural Development* - Small farms and rural tourism in Serbia, op. cit., p. 47

•in the Netherlands the term implies, primarily camping in family homes - farms, with an emphasis on additional activities such as. biking, hiking, horseback riding, etc..;
•in Greece is the main product of rural tourism 'bed and breakfast' accommodation in the traditionally decorated rooms with traditional breakfast often based on local products.[18]

Optimistic estimates of the volume of tourist demand, given, primarily, by the UNWTO, include their positive impact on the overall relations in the tourism market, given the dominant position of the demand in the tourism offer. In this context, as the prevailing tendency of tourism demand, especially in Europe, we can mention:
-refreshing through the contrast (tourist travel on the route lowland Mountain, urban-rural, mainland-island, etc.);
-aspiration towards experiences related to the cultural and historical heritage and untouched nature, a "green" movement and tourism, also known as the alternative, responsible, "soft", "good" or "new" tourism - refers to the tourism in the country, so in the cities and on the coast. Implies, first of all, pure water, clean and safe sea, healthy food and clean air, and tourism, which is not massive, but "friendly" directed towards to the natural environment;
-"blue" or nautical movement, or demand (cruise sea using systems marina, harbor and anchorage);
-demand for places, events and experiences that have strong identity, integrity and diversity of demand for rural (rural) and agritourism - means staying in different types of accommodation (not exclusively in rural households) and engaging in activities (sports, adventure, challenges, art, handicrafts work et al.);
-demand for health, spiritual, mental renewal and reconstruction of identity - refers to new forms of health and spa tourism: the aspiration to a better fit (recreational activities, sports and exercises, diets, fitness) and a desire for better health by combating stress.[19]"Green" tourism, health tourism and tourism related to natural and cultural environment may be considered, in the synchronized effect, the backbone of all significant forms of tourism, which is referred to as eco-tourism, alternative tourism

[18]Jelincic, Daniela Angelina (2007): *Agritourism in the European context*, Studia ethnologica Croatica, vol. 19, 269-291, Zagreb, p. 274
[19]Popesku Jovan (2014):*The key issues of the development of rural tourism*, the Center for Responsible and Sustainable Tourism Development, http://www.cenort.rs/?page_id=78 (28.02.2014.)

and responsible tourism. An important part of this, all the more important forms of tourism, the rural, ie rural tourism.[20]

Characteristics of demand and supply in rural tourism suggests that rural tourism is only one segment of the overall tourist offer, and the tourism market.There are many factors that influence the direction of tourism demand to rural areas. Still missing, however, the relevant research of specific factors that define the scope and structure of demand, according to the type of tourist destination. According to research in the UK important impact on this type of tourism demand have, in addition to the general factors (leisure, the general attitude towards nature as a tourist attraction), and: social status (education, income volume, etc.)., Car ownership, location of residence, age, gender.It is evident, based on the survey results, that are more likely to share in the tourist village of movement towards younger people, more educated, managerial positions, car owners who live in areas surrounded by nature. The main motive for directing tourists to rural areas can be considered a desire to stay in a preserved natural environment and a sense of freedom, authenticity and tradition, which together result in a feeling of relaxation and calm. These incentives are contrary to the way of life in urban areas, that are the antithesis of life in these areas. It seems that the actual or presumed "rurality" an important factor that determines the size and structure of tourist demand to rural areas, and that tourists are primarily motivated by the overall attractiveness of rural areas and not opportunities to participate in certain activities (recreational and other).[21]The heterogeneity and complexity of tourism demand directed towards rural areas auses that the tourist offer be complex. If we look at the process of forming offer from a marketing point of view, it is the education of the tourism product. Rural tourism is characterized by the existence of a large number of participants in the tourist offer side, ie in the formation of the tourism product, with the highest representation of a large number of small organizations in the private sector, and independent entrepreneurs.[22]Tourist product of rural tourism in order to be contribution to sustainable tourism development needs to be locally controlled, small volume, based on authenticity, with the price that needs to maximize the economic effects on the local population, while retaining exclusive values, status and promotion that emphasizes realistic expectations of use of the product. Should be

[20]Ibid.
[21]Ibid.
[22]Ibid.

specifically include accommodation in a local-farming family, visits to places of work activities in rural areas (farm, Decorative Handicraft, etc..), Participation in daily activities in their free time, tasting local foods and learn about the preparation of traditional national dishes, talking with elderly members of the rural communities of rural life in the past.[23] If we look at the situation in Serbia, we find that, according to the Strategy Plan for rural development, 2009-2013[24], rural areas of Serbia, depending on the applied methodology, including even 70-85% of Serbia's territory and there live 43-55% of the total population. From a total of 174 municipalities in Serbia, 130 are classified as rural, with 3,904 settlements on its territory. Low population density is one of the important characteristics of these areas. Thus, in rural areas Serbian population density is 63 inhabitants per square kilometer, which is less than the national average (97 inhabitants / km ²), and significantly less than in urban areas (289 inhabitants / km ²).Natural features of these areas are assessed as extremely affordable. Rural area of Serbia is characterized by high concentration of natural resources (such as agricultural land, forests, water, etc..) With intact ecosystems and biodiversity. Also, a wealth of cultural resources, as well as preserved traditions of the people who live in this area, is one of the advantages of these areas. Natural and cultural resources, the human resources are the most important elements of the rural resource base in Serbia. But, despite the opportunities offered by the rich and diverse resource base, the development of rural areas are identified numerous problems and limitations, as evidenced by their economic characteristics. Compared to urban, rural areas recorded lower realized gross domestic product per capita, which is an indication of their lagging behind in economic development. Analysis of the economic structure of these areas indicates a high dependence on the rural economy of the primary sector , especially agriculture. The rural population of Serbia recorded a high percentage of employment in just the agriculture sector. At the same time, it highlights the problem of low diversified activities and income of the population living in rural areas. The situation is further aggravated by the fact that the productivity and intensity of Serbian agriculture is below the European average. A major problem in these areas is the high unemployment rate (around 21% ), which indicates a lack of jobs and employment problem. All these economic circumstances influenced the list of development problems of rural areas

[23]Ibid.

[24]Plan a strategy for rural development, 2009-2013, the Republic of Serbia Ministry of Agriculture, Forestry and Water Management, February 2009

adds a depopulation and abandonment of the area by population, primarily those younger and more educated population.[25]As a result of all these phenomena, and lagging in development in a long time, today the rural areas of Serbia is characterized by extreme poverty, which is quite contrary to their resource potential. That is why in lately make the efforts, in line with European practice, the application of a new model of economic revival of rural areas by way of diversification of economic activities. In the process of diversification, tourism, due to its numerous advantages over any other activities singled as one of the most important activities which encourage the development of national policy and rural development. The experience of some European countries (eg Austria) have confirmed that the development of such models can be very successful and that tourism can contribute to the revitalization and economic empowerment of under-developed rural areas.[26] As regards the supranational level, in the European Union, which, on the one hand, reached a high level of economic development, in which, on the other hand, the economic importance of agriculture has fallen significantly, support for rural development is an important instrument of development in recent years has significantly gained in importance. There are three main reasons for this:

1. rural society still has an important role in the demographic, social and economic processes. According to estimates of the Organization for Economic Cooperation and Development (OECD), which is based primarily on population density, rural areas cover 90% of the territory of the European Union. More than half the population of the EU live in these areas and over 40% of domestic product is produced there;
2. rural areas fulfill a number of functions vital, not only for the people who live there, but also society as a whole: enable the production of food and renewable raw materials, maintain habitat for flora and fauna (ecology) are important recreational and tourism potential;
3. rural areas have their own specific economic and social structure, in which agriculture, forestry, crafts, small, medium and large companies produce, sell and provide service of narrowly local to international scale, such as tourism. These economic structure and services interact, compete with each other, create, evolve and develop. Nonetheless, compared with the global economy, many rural areas are lagging behind in economic

[25]BoskovicTatjana (2012): *The economic effects of tourism development in rural areas of Serbia*, School of Business, no. 2, 29-34, Novi Sad, Higher School of Professional Studies, pp. 30-31
[26]Ibid., p. 31

development. This is the reason why in these areas is higher unemployment, and income per capita is much lower than in urban areas because the economy relies on agriculture and forestry.[27]

## The improvement of rural tourism

The complexity of tourism as an economic and social activitycauses the the planning and management of tourism and its promotion, be specific and require a separate organization at all levels. Rural tourism has also a number of specifics that must be followed when planning and management. The overall objective of the planning and management of rural tourism development would be to create a balance between supply and demand, and the total capacity (spatial and other) in order to minimize conflicts and the full exploitation of the natural basis for the development of tourism, without degrading the environment.[28]The concept of sustainable tourism development, which is particularly important for the development of rural tourism can become the basis for meaningful development of tourism in tourist destinations on all levels if its principles are involved in the planning of tourism development, particularly strategic, and if they are expressed in the strategic development goals. One of the basic requirements for successful planning and management of sustainable rural tourism development is the active involvement of rural communities, and the local population in the process. The existence of equilibrium, or partnership relationship between the number of participants in the development of rural tourism is another important factor in the success of the planning and management of rural tourism development. Aspiration of sustainable development of rural tourism means that visitors/ tourists to actively participate in the overall process, in order tosatisfy their overall behavior of the set development goals, particularly the protection and preservation of the natural environment, cultural and historical heritage. It is the guiding behavior of visitors / tourists, and the management mode of use of total resources in rural areas by visitors / tourists (*visitor management*).[29]The main challenges that are defined by the Master Plan for the sustainable development of rural tourism in Serbia are presented in the following

[27]Lazic Lazar (2007): *Rural Tourism*, University of Novi Sad, Faculty of Sciences, Novi Sad, p. 145-146
[28]Popesku Jovan (2014): *The key issues of the development of rural tourism*, op. cit.
[29] Ibid.

table. These challenges present an opportunity for Serbia to strengthen its natural and cultural resources, foster rural community and rural tourism.

**Table 1.***The main challenges for sustainable development of rural tourism in Serbia*

| **The main challenges for sustainable development of rural tourism in Serbia** | |
|---|---|
| 1 | Mnogi jazovi u lancu vrednosti ruralnog turizma |
| 2 | The high level of competition and major challenges for the diversification of the current competitors (Romania and Bulgaria) and potential competition (Hungary and Czech Republic) |
| 3 | The need for organization and management of rural tourism |
| 4 | The need to develop the awareness and capacity of human resources |
| 5 | The need for a structured and holistic products and experiences that include rural tourism activities, accommodation and facilities created |
| 6 | Lack of created objects which provides an integrated tourist offer |
| 7 | The lack of international standards and quality assurance, as well as the need for improvement, standardization and diversification of rural accommodation, F & B and other services |
| 8 | The need to develop synergies between the agricultural sector and tourism, including the local crafts |
| 9 | High seasonality with low occupancy capacity (average occupancy rate for rural units was 4% and 21% for other accommodation units) |
| 10 | The need to improve the local infrastructure (especially rural roads to rural resources) |

**Source**:*Popesku Jovan (2011): Sustainable development of rural tourism, TAIEX, Belgrade Chamber of Commerce, ppt, p. 9*

The situation in Serbia in the field of representation and development of rural tourism, we discussed in the previous section work. If you look at the competitive disadvantages of rural tourism in Serbia as a starting point to specific recommendations that support the sustainable development of the tourism industry, we will see the following indicators.

**Table 2.***Competitive disadvantages of rural tourism in Serbia*

| The strategy and structure of the company and competition | Terms demand | Activity in the suport sector and complementary sectors | Condition of production factors |
|---|---|---|---|
| - lack of accommodation facilities in rural areas | - lack of diversification and specialization of offers, activities and services | - lack of complementary activities | - accessibility by road is limited due to the poor quality of roads |
| - lack of strategic direction and investment for the development of rural tourism accommodation facilities | - lack of image and positioning | - lack of specialized destination management company (DMC) as the organizer of products, activities and packages for rural tourism product | - low quality of public transport by bus and train |
| - lack of cooperation between the accommodation sector and other sectors in the tourism industry (tour operators, travel agencies and tourism organizations in some places) | - lack of specific information regarding the activities and products of rural tourism services | - low level of use of local attractions for tourists | - lack of specialized guides for the products of rural tourism |
| | - Travel demand is based on the domestic market, the lack of management and promotion of product from rural tourism | - insufficient number of specialized trade related to local products and local tradition | - insufficient use of cultural and natural resources for tourism |
| | | | - low quality system for the protection and maintaining of cultural and natural resources |

**Source**: *Popesku Jovan (2011): Sustainable development of rural tourism, TAIEX, Belgrade Chamber of Commerce, ppt, pp. 12-15*

For the purposes of the foregoing, the main activities for the sustainable development of rural tourism in Serbia are given in Table 3

**Table 3.** *The main activities for the sustainable development of rural tourism in Serbia*

| | **Actions that should be applied:** |
|---|---|
| 1 | Build a unique positioning and differentiate rural Serbia with multilayer unique selling proposals that emphasize the unique character of Serbia |
| 2 | Develop a holistic experience of rural tourism, which includes physical and emotional experience gained through rural activities and in rural accommodation |
| 3 | Develop an integrated operational marketing plan that supports the promotion and commercialization of rural tourism and allows visitors / tourists to reach their personal experience of rural tourism |
| 4 | Create quality assurance of products and services across the entire value chain by providing human resources through the development of service centers and the establishment of minimum standards |
| 5 | Develop an organization to manage the development of rural tourism at national and regional level |

**Source**: *Popesku Jovan (2011): Sustainable development of rural tourism, TAIEX, Belgrade Chamber of Commerce, ppt, p. 17*

## Conclusion

The economic development of Serbia is characterized by variation is, particularly pronounced in rural and urban areas. Rural areas are far behind as compared to urban. On the other hand, the rural resource base is seen as a rich and varied and provides an almost ideal conditions for the development of different types of activities and services, and especially good for the development of different forms of tourism activities.

Turbulent changes in the tourism market, both in tourism demand, and at the tourist supply, demand constant adaptation of all participants in the process. This means that the planning and management must be continuous and it infused with an innovative approach. The main goal is to protect and preserve all resources associated with the development of rural tourism.

In achieving the main goal, particularly must take account of environmental protection (preserved environment creates the basis for a successful business, and a degraded environment destroys opportunities for efficient business), as well as protection of the rights of consumers and their choice.

## References


1. Bogdanov, Natalija (2003): *Rural development - EU policy, the condition and perspectives in Serbia*, Journal Agriculture and Rural Development in the European integration, agricultural economist symposium on the 40th anniversary of Agro Department, Faculty of Agriculture, University of Belgrade, Belgrade.

2. Bogdanov, Natalija (2007): *Small rural households in Serbia and rural non-farm economy*, UNDP, Belgrade.

3. Boskovic, Tatjana (2012): *The economic effects of tourism development in rural areas of Serbia*, School of Business, no. 2, 29-34, Novi Sad, Higher School of Professional Studies.

4. Dekic, Snezana, Jovanovic, Sonja, Krstic, Bojan (2011*): Some determinants of policy and strategy for sustainable rural development,* Theme Collection: agricultural and rural policies in Serbia need to step up reforms, 49-63, DAES - Serbian Association of Agricultural Economics, University of Novi Sad - Faculty of Economics, Belgrade, Novi Sad.

5. Djordjevic, Suzana, Milovanovic, Jelena (2012): *Sustainable Tourism for Rural Development - Small farms and rural tourism in Serbia*, the Faculty of Applied Ecology Futura, Singidunum University, Belgrade Agroznanje, Vrsac FAO, Budapest.

6. Jankovic, Dejan (2012): *Environmental dimensions of rural development*, Themes, Volume XXXVI, no. 2, Niš, 627-642.

7. Jelincic, Daniela Angelina (2007): *Agritourism in the European context*, Studio ethnologica Croatica, vol. 19, 269-291, Zagreb.

8. Kostic Stankovic, Milica (2013): *Marketing and Rural Development*, the Standing Conference of Towns and Municipalities - Association of Towns and Municipalities of Serbia, Belgrade.

9. Lazic, Lazar (2007): *Rural Tourism*, University of Novi Sad, Faculty of Sciences, Novi Sad.

10. Moseley, J. Malcolm (2003): *Rural development. Principles and practice*, SAGE Publications.

11. Popesku, Jovan (2011): *Sustainable development of rural tourism*, TAIEX, Belgrade Chamber of Commerce, ppt.

12. Popesku, Jovan (2014): *The key issues of the development of rural tourism*, the Center for Responsible and Sustainable Tourism Development, http://www.cenort.rs/?page_id=78 (28.02.2014.).

13. *Strategy plan for rural development*, 2009-2013, the Republic of Serbia Ministry of Agriculture, Forestry and Water Management, February 2009.

# CHEESE MARKET IN THE DANUBE REGION COUNTRIES[1]

*Branislav Vlahović[2], Anton Puškarić[3]*

## Abstract

*The subject and the goal of the research are to recognize trends in production, export and import of cheese in the countries of the Danube region. Data sources are the FAO and the International Trade Centre (ITC) database in the time period 2005-2012. The average cheese production in the region amounts 2.7 million tons, with moderate growth tendency. The biggest producer is Germany, with share of over 70%. The average export of cheese of this group of countries amounts 1.2 million tons with modest growth tendency. The biggest exporter is Germany. The export price amounts 4.2 USD/kg. Import of the group amounts 800 thousand tons. The biggest importer is also Germany. The Danube region countries realize a positive balance of foreign trade exchange of cheese in amount of 380 thousand tons. Besides the saturated international market, the cheese market in these group countries is very stable.*

**Key words:** *Cheese, production, export, import, the Danube region.*

## Introduction

Cheese is one of the oldest food products. Nowadays, the production of cheese is modified and improved from the earliest primitive milk processing to application of the newest industrial technologies, which had resulted with numerous types of this food. There are different criteria according to which cheeses can divide into different groups – according to milk category they are made of, according to milk fat content in a dry matter, consistency, texture, according to production technology, etc. In

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accordance to the milk fat, the cheese can divide into: extra fat (with more than 60% of milk fat), full-fat (45–50% of milk fat), single-cream (25–45% of milk fat), low-fat (10–25% of milk fat) and fatless cheese, which contain less than 10% of milk fat. According to ripeness, they can divide on fresh cheeses (4-6 weeks of ripeness) and ripe cheeses (over three months of ripeness). Regarding the consistency and dough structure and amount of water they contain, the cheeses can be: extra hard cheese (with very little water), hard, semi-hard, soft cheese and cheese spread. A special group makes the autochthonous cheeses, which represent characteristics of the specific nations, countries and regions. The names of the autochthonous cheeses are strictly connected to their origin, i.e. a climate where they produce. The traditional production of the autochthonous cheeses not only that maintain, but it achieves a significant revival by increasing demand of organic food and high-quality food, with protected geographical indication, which competitiveness and price, in comparison with the conventional products, significantly increase (Savić Mirjana, Arsić Slavica, Kljajić Nataša, 2011). The Danube region countries have great conditions for milk and cheese production (tradition, processing capacities, etc.). In the cheese production realizes also value added of milk production, develops milk processing industry, employs working population. If include the additional branches of this sector, a number of totally employed persons in the cheese production is larger.

The region countries have significant, but still insufficiently used potential to grow up into serious producers of various high-quality and autochthonous cheeses, in order to be recognizable on the international market. The subject of the research is volume, dynamics and trends in production, export, import and foreign trade exchange of cheese in the Danube region countries, aiming to perceive export-import potentials of some countries (*Germany, Bulgaria, Romania, Moldova, Hungary, Croatia, Slovakia, Austria, Ukraine and the Republic of Serbia*). A special accent was put on the state and the possibilities of intensifying the production and export of cheese from the Republic of Serbia.

## Data sources and methodology

The basic sources were taken over from the statistical database of the United Nations Organization for Food and Agriculture – FAO (*Food and Agriculture Organization*) and International Trade Centre (ITC), in the time period from 2005 to 2012. The research bases on, so called, »*desk research*«, which represents processing of available data, together with

apply of standard statistical-mathematical methods. The foreign trade balance was calculated as a difference between export and import. Changes trends intensity was quantified by calculation of rate changes by application of functions with the most adjustable trend lines to the original data. Stability of phenomenon was calculated by appliance of variation coefficient. Also were used the results of the previous researches of this problem. Specific occurrences were shown in the tables and graphs.

## Research results

### Production of cheese in the Danube region countries

In the researched time period, the average cheese production in the Danube region countries was amounted 2.7 million tons (*table 1*), with a tendency of insignificant growth, by the rate of 0.90% annually. This group provides 28.3% of European and 14.8% of the world production. The production is pretty stable, to which points out the calculated variation coefficient (1.28%). The cheese production in the European Union is at the level of 8.5 million tons.

**Table 1.** *Production of cheese in the Danube region countries (2005-2012)*

| Country | Average amount (000 t) | Participation (%) | Rate of change (%) | CV (%) |
|---|---|---|---|---|
| Germany | 1.993 | 73,5 | 0,98 | 2,59 |
| Ukraine | 218 | 8,1 | -5,87 | 16,13 |
| Austria | 185 | 6,8 | 0,91 | 2,86 |
| Hungary | 91 | 3,4 | -1,36 | 5,15 |
| Bulgaria | 63 | 2,3 | -1,13 | 5,89 |
| Romania | 57 | 2,1 | 6,38 | 18,98 |
| Slovakia | 55 | 2,0 | -9,96 | 26,19 |
| Croatia | 28 | 1,0 | 5,12 | 14,58 |
| Serbia | 20 | 0,8 | 4,62 | 12,07 |
| Moldavia | 2 | 0,1 | -2,25 | 19,59 |
| **Danube region** | ***2.713*** | ***100,0*** | ***0,90*** | ***2,31*** |
| **Source:** *Calculation based on FAO Trade Yearbook* | | | | |

Far the most important cheese producer is ***Germany***, with the average production of 1.993 thousand tons (26 kg per capita), which is almost three-quarters of the total production of the Danube region countries. It represents the second biggest world (after USA), i.e. the first European

cheese producer (www.statisticbrain.com/cheese-statistics/). In the researched period was present a slight increase production trend by the rate of 0.98% annually. Three-quarters of German cheeses (more than 400 different kinds) produce in Bavaria or in the region Allgau (Alpine region of southern Germany). The other important regions for cheese production are *Mecklenburg-Vorpommern* and *Sakson-Anhalt.* The variety of cheeses available in Germany is enormous, over 600 different kinds. It is caused also by a fact that many people, being settled in Germany, had brought their original production recipes. Some examples of this international impact are the cheese *Tilsiter* (originating in the Netherlands), *Limburger* (originating in Belgium) and *Ementaler* (originating from Switzerland). The newest trend in German production is the cheese production in small, organic dairies. The cheese have high quality, and many of them characteristically strong taste and aroma (www.germanfoodguide.com/cheese-search.cfm). The most famous types of German cheese are: *Allgau Emmental* – originating in the Swiss canton Bern. It has a protected designation of origin from the region Allgau with milk from the local dairies. *Bruder Basi*l – is the most famous brand of smoked cheese in Germany, well-known also as Rauchkase. It is a creamy semi-soft cheese, produced originally by the monks in monasteries. It produces according to the traditional standards which exist since 1902. It smells like beech wood and it gives it a unique taste. *Limburger* – is the traditional aromatic cheese, which origins from the Belgium monks. Limburger first started to produce in the region of south Bavaria. *Butterkase* ("butter and cheese") is creamy and mild cheese. German original, Butterkase is also known as Damenkase, due to its delicatessen aroma. *Cambozola* – is a soft blue cheese developed in 1970 in the Kasseri Champignon Company in Bavaria. This is very popular German cheese with the characteristic blue noble mould and white bark. *Tilsit* – was originally made by the Dutch immigrants, who settled in the town of Tilsit in East Prussia, the German Tilsit is semi-hard cheese, mildly spiced (www.igourmet.com/german-cheese.asp). The level of further production will depend, first of all, of domestic demand and the state on the international market.

In the second place is ***Ukraine***, with the average production of 218 thousand tons (4.7 kg per capita). In structure of the regional production participates with 8.1%. In the analyzed period was evident a trend of significant decrease of production by the rate of 5.87%. Five the biggest companies in Ukraine give 23% of the total cheese production, the rest 77% goes to 80 small producers. The most popular brand in Ukraine is hard cheese *Šostka* (www.euromonitor.com/cheese-in-ukraine/report). The

most important types of cheese are: *Bilozhar, Bukovinskyi, Bryndza, Dobrodar, Smetankowyi, Vurda and Ukrainskyi.*

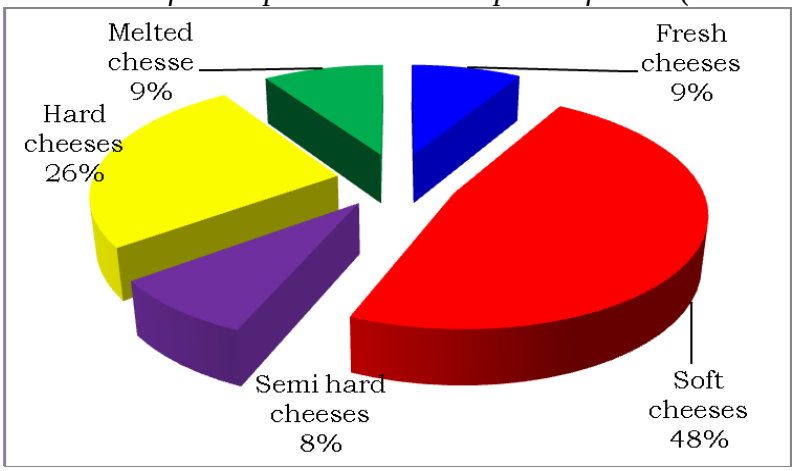
In the third place is ***Austria***, with the average production of 185 thousand tons (24 kg per capita). In the regional production structure it participates with 6.8%. In the analyzed period was evident a slight increase of production by the rate of 0.91%. The production in Austria has a long tradition. The most famous types of the Austrian cheeses are the following. *Vorarlberger Bergkase* – hard cheese, it represents the regional specialty due to its high standards. Its aromatic taste develops during ripening at least of six months. *Tiroler Graukase* – it considers as one of the oldest cheeses in Austria. It is made of low milk fat content, without any chemical additives or rennet. *Vorarlberger Alpkase* – hard goat's milk cheese which ripens at least for three months, it has a great taste and aroma. *Tiroler Almkase* – produces only during summer months on selected Tyrol pastures. After its ripening period is available solely from October to March. It is a traditional Tyrol specialty, it is characterized by a strong aromatic and piquant taste, time of ripening is minimum four months. *Tiroler Bergkase* – semi-hard cheese is characterized by a strong, completely aromatic taste. *Gailtaler Almkase* – hard cheese, produced on Alpine pastures, above the village in the valley of Gail. It produces from fresh Alpine milk from pastures and has a long tradition. The ripening period is for seven weeks (http://tasteofaustria.org/index.php/eat/cheese-culture).

Then follows ***Hungary,*** with the average production of 91 thousand tons (11 kg per capita). In the regional production structure it participates with 3.4%. In the analyzed period was evident a slight decrease of production by the rate of 1.36%. The company Pannontej Zrt is the biggest cheese producer in Hungary, with 27% of share on the market. Leading brands are: *Medveđa, Tihani and Bakoni camembert, Panoniji and Karavan cheese* of hard cheese type, which have a long production tradition in Hungary (www.euromonitor.com/cheese-in-hungary/report). The most famous types of cheese are: *Liptauer, Oazis, Orda, Pálpusztai, Trappista* etc. Trappista is far the most popular cheese in Hungary.

***The Republic of Serbia***, with the average production of 20 thousand tons (2.7 kg per capita) is on penultimate place among the analyzed region countries. In the research period, the production has a significant growth trend, by the rate of 4.62% annually. The cheeses produce in big industrial capacities for milk processing and producers' husbandries. The biggest industrial milk producers are the following capacities: *Imlek* Beograd,

*Mlekara* Šabac, *Somboled* Sombor and *Mlekoprodukt* Zrenjanin. According to the production structure, the group of big dairies is oriented primarily to the production of fermented dairy products, UHT and pasteurized milk, while middle capacity dairies and mini-dairies are more directed to the production of various cheese types, then fermented dairy products and pasteurized milk (Popović, 2009). Unable to sell milk by the favourable prices, more and more rural households opt for independent milk processing in various cheese types. In that way is done finalization of milk production and there comes to better financial results, which reflects favourably to the total economic effect of husbandries. In the production structure dominate fresh cheeses, while the lowest is the share of semi-hard cheeses (*picture 1*).

**Picture 1.** *Structure of cheese production in the Republic of Serbia (2005-2012), %*




**Source:** *Author's calculation.*

In Serbia are preserved the traditional procedures of the autochthonous cheeses production in relatively isolated mountainous areas. They emerged in a specific climate, as a result of long-time development of the traditional production. The preservation of the autochthonous cheeses is very important, because, thereby stays preserved the ethnographic wealth of the country and, at the same time, there recognizes a gastronomic and tourist supply and placement on the foreign market. The production of autochthonous cheeses is present in rural households. In order for the autochthonous cheeses to be sold on the foreign market, it is necessary to apply the traditional, but also standardized technology, along with assurance of equable quality and safety of these products, in order to be adjusted to the EU market requirements. Thanks to geographical, climatic and ve-

getation diversity in Serbian regions, in the past was developed the production of autochthonous cheeses. It is extremely important the preservation of autochthonous technologies for the cheeses production in rural areas, as: Zlatar, Zlatibor, Golija, Kopaonik, Stara planina, Šar planina etc. They are a base for approach to the organized production of autochthonous cheeses after the international standards. In the rural area Stari Vlah produces the top-quality cheeses in souse, like: Zlatar, Sjenica, Javor, Golija cheese, etc. They are well-known by their stable quality and distribution of production. Originally, these cheeses have been produced of sheep milk, but recently use more cows' milk and mixed-sheep/cow's milk. Recently revivals again use of goat's milk in making the autochthonous cheeses (Ostojić and Topisirović, 2006). The most famous traditional cheeses in Serbia are: *Homoljski, Pirotski, Staroplaninski and Svrljiški kačkavalj (kashkaval), Sjenički, Zlatarski, Golijski, Somborski, Šarski cheese* etc. (Vučić Tanja and associates 2008). In order to improve the cheese production, there are necessary significant investments for purchase of top-quality lactating animals, equipment for cheese production, marketing etc. A chance is in small production plants, which should specialize for some production structure. In the Republic of Serbia is still present a low level of cheese consumption per capita, as well as low level of consumption culture, so there is needed also permanent education of both producers and consumers.

The growth of cheese production is present in Germany, Austria, Romania, Croatia and the Republic of Serbia. The other countries of the Danube region have a trend of production decrease. The same is caused by acting, first of all, of economic factors, which reflect in the life standard decrease, saturated international market, etc. In the following period can be expected a slight reduction of cheese production. In the foreground will be quality, by which differentiation will strive to satisfy the requirements of the choosiest buyers in, first of all, the European Union countries.

**Export of cheese of the Danube region countries**

The average cheese export of the regional group was amounted 1.2 million tons and in the analyzed period was registered by the rate of 4.11% annually. A realized rate of export growth is a resultant of series of factors acting, primarily, of specific increase of production volume, size of demand on the international market, high competition by the countries, which are traditionally significant producers and exporters: France, Italy, Switzerland, etc. Of the total production exports 44% which indicates to a

fact that production of cheese, of the mentioned group-countries, has been significantly export-oriented. The value of export amounts 4.9 milliards US dollars. The average export price amounts 4.2 USD/kg and depends on type and quality of cheese (soft, hard, semi-hard etc.). It is evident that all countries of the Danube region do not have the same significance in cheese export.

Far the most significant exporter of cheese within the region is ***Germany***, which represents also the important producer in the mentioned group. Its average export amounts 942 thousand tons, which make 79.7 % of the total export of the Danube region countries (*table 2*). In the observed period was present a trend of pretty important increase of export by the rate of 5.15% annually. Of the total production exports 47% which indicates to high export orientation of the mentioned country sector. In valuable sense expressed, the export amounts 3.8 milliards USD. It is far above the other countries in the region. The average export price is 4.1 USD per kg, which is slightly lower than the average export price in the region. The most significant export is realized in Italy (22.7%), then the Netherlands (12%), Russian Federation (6.7%), France (6.4%) and Spain (6.3%). Those countries have absorbed something more than half of the total cheese export from this country (54.1%). It is evident that the highest export is directed to the European Union countries. The most important German export cheeses are: 1) hard cheeses: *Allgauer Emmentaler, Bavarian Bergkase, Beemster Very Old, Klosterkaese*; 2) semi-hard: *Beemster Old, Danish Feta, Edelpilz;* 3) semi-soft: *Beemster 2% Milk, Bierkase, Bruder Basil, Butterkase, Limburger*; 4) soft: *Doppelrhamstufel, Weichkaese etc.* There is expected the export growth in the following period.

In the second place is ***Austria,*** with the amounts of 94 thousand tons. It participates with 8% in the total cheese export of the region countries. Of the total production, it exports almost half of cheese. The export has a slight increasing trend (rate 3.43%). Valuably expressed, the export is 493 million USD. The average export price is 5.4 USD per kg and is significantly higher than the average export price of the region. The most important export cheeses are: *Golden Smoked Rebel, Mondseer, Schloss, Bergkäse, Gelundener Käse, Montafoner Sauerkäse, Steirerkäse, Kugelkase, Tiroler Graukäse*. The biggest export is realized in Germany (47.1%) which represents a traditionally important buyer of the Austrian cheeses, then Italy (12.8%), Greece (3.3%), Denmark (2.9%) and Libya (2.8%). Those countries had absorbed something more than two-third of the total

export (68.9%). It is evident that the greatest part of export is directed to the European Union countries.

**Table 2.** *Export of cheese from the countries of the Danube region (2005-2012)*

| Country | Average amount (000 t) | Participation (%) | Rate of change (%) | Average value (mil. $) |
|---|---|---|---|---|
| Germany | 942 | 79,7 | 5,15 | 3.827 |
| Austria | 94 | 8,0 | 3,43 | 493 |
| Ukraine | 76 | 6,4 | -0,72 | 334 |
| Slovakia | 27 | 2,3 | -9,33 | 110 |
| Bulgaria | 20 | 1,7 | 7,85 | 73 |
| Hungary | 13 | 1,1 | 0,37 | 54 |
| Serbia | 4 | 0,3 | 21,98 | 16 |
| Romania | 3 | 0,3 | 10,09 | 14 |
| Croatia | 2 | 0,2 | 10,80 | 9 |
| Moldova | 0.3 | 0,0 | 24,41 | 2 |
| **Danube region** | **1.182** | **100,0** | **4,11** | **4.930** |
| **Source:** *Calculation based on the data of the International Trade Centre* | | | | |

In the third place is ***Ukraine*** with 76 thousand tons. This country participates with 6.4% in the total cheese export of the region countries. Of the total production is exported one third of cheese. The export has a slight decreasing trend (rate 0.72%). The export decrease is a resultant of domestic production decrease and complex relations on the international market. Valuably expressed, the export amounts 334 million USD. The average export price amounts 4.4 USD/kg which is slightly more than the average export price in the region. The highest export realizes in the Russian Federation (83.6%), Kazakhstan (12.2%), Moldova (3.2%), Azerbaijan (0.5%) and USA (0.2%). These countries had absorbed almost all of cheese export from Ukraine. It is evident that the most of export is directed to the surrounding countries. During the first half of the year 2012, Ukraine had founded itself entangled in, so called, "cheese war" with the Russian Federation. The cheese of seven the biggest Ukrainian companies is forbidden for sale in Russia, while it consists vegetable fats, not allowed anymore in cheese on the Russian market. As a resultant of that, has come to the cheese surplus in Ukraine, which has affected the cheese consumption. Shostkinski Miskmolkombinat VAT is the biggest Ukrainian company for cheese production. According to the Ukrainian Dairies Union, in the following years, the export in Russia will be approximately at the same level. The Russian market stays attractive, primarily, due to a

fact that the cheese price in Russia is still significantly higher than in Ukraine, which makes sale profitable, in spite of relatively high price of raw milk (www.thedairysite.com/reports/?id=2960).

Then follows ***Slovakia*** with the export of 27 thousand tons which participates with 2.3% in the total export of cheese of the region countries. Of the total production exports 49% of cheese. The export has a significant decrease trend (rate 9.33%). The same is caused by extreme decrease of domestic cheese production. Valuably expressed, the export amounts 110 million USD. The average export price amounts 4.0 USD/kg, which is lower than the average export price of cheese in the region. The most important types of cheese in export are: *Bryndza, Liptauer, Tvaroh, Parenica, Urda, Oszczypek and Podhalanski*. The highest export realizes in Czech Republic (31.3%), then Belgium (18.6%), Hungary (13.1%), Great Britain (8.9%) and Germany (8.2%). These countries had absorbed more than three-quarters of the total cheese export (80.1%). It is evident that the most of export was directed to the surrounding countries.

In the fifth place is ***Bulgaria***, with the amounts of 20 thousand tons. In the region's export participates with 1.7%. Of the total production, in this country is exported 45% of cheese. The export has a significant growth trend (rate 7.85%). Valuably expressed, the export amounts 73 million USD. The average export price amounts 3.65 USD/kg, which is significantly lower than the average prices of the region's cheeses. The most important types of cheese are: *Sirene, Cherni Vit and Kashkaval*. The highest export realizes in Greece (33.8%), Romania (18.1%), USA (12.7%), Germany (8.2%) and Lebanon (7.1%). These countries had absorbed more than three-quarters of the total cheese export (79.9%). The most of cheese exports in the European Union countries. In the following period expects a trend of slight increase of export (www.euromonitor.com/cheese-in-bulgaria/report).

The cheese export from the ***Republic of Serbia*** amounts, on the average, 4.063 tons, which valuably makes 16 million USD. It is positive that the export registers a tendency of significant growth by the rate 21.98% annually. The export is a resultant of domestic production increase, but also a relative stagnation of domestic consumption. The average export price amounts 3.93 USD/kg and is lower for around 10% than the average export price of cheeses in the region.

By increase of export of the top-quality types of cheeses (hard and semi-hard), there can significantly increase a value and profitability of export. The most important foreign trade partner is the Russian Federation, where realizes 41.7% of the total cheese export. The first steps forward toward this market had made the dairy Sabac with feta cheese and cheese spreads, the dairy Selekt Milk (Indjija) with hard goat's milk cheeses and the dairy Kuc Company (Kragujevac), with hard cheeses. There expects that other companies with license for export in Russia make export businesses (Novaković, 2012). Then follows Montenegro with 26.6%. Slightly smaller importers are Bosnia and Herzegovina with 11.2% and the Republic of Macedonia with 10.3%. These countries had absorbed almost 90% of cheese export.

The most of export was directed to the CEFTA region countries, which points out that this market is very important in foreign trade exchange. Non-tariff barriers represent an obstacle in realization of available potentials in free trade of CEFTA countries. They comprise technical barriers – technical, sanitary standards and certification and administrative barriers – licensing, time and documentation necessary for import and export, availability of customs regulations, etc. (Vlahović et al., 2014).

There expects the cheese to be put under the free trade treatment within the Common Agreement on Free Trade, which Serbia has with the Russian Federation. That will influence to a higher export in the following period. There is poor perspective of export in high developed countries, which are big producers and exporters of top-quality types of cheeses (Popović-Vranješ, Anka et al., 2003). The cheese producers in Serbia still have a problem to offer a cheese of satisfying quality, made of top-quality milk, on the choosey market, a cheese with acceptable price, good marketing and to be available to a buyer. Those are basic conditions for realization of favourable position on the market. Good marketing activities and complete approach on the market are extremely important from the aspect of positioning on the foreign market. The experiences speaks that, without adequate marketing, there is no success and survival on the international market. A chance in export should not search in quantity, while Serbia is relatively small producer of cheese, but in top quality and the autochthonous types of cheese according to the selected market segments. There should go to the specialization of production, to the smaller series with top-quality and a unique trade mark „*Cheese from Serbia*“.

The autochthonous cheeses are the export potential, but they are faced with a threat of disappearing and loosing in mass industrial production. The basic limiting factors are: production is still at relatively primitive level, hygiene level is low, control and education of producer is not satisfying, sale and purchase are still unconnected making often insecurity of sale for the producers. In technology are many loose ends, the origin and name of cheeses has not been done (Sarić, Bijeljac, Sonja, 2003). In the countries in the region, this kind of protection is not still satisfying.

In order to increase Serbian export competitiveness, the one that is important is, first of all, adjusting the quality system of products with the norms of ISO9000-2000 standard and with technical regulations. It is also important to respect the international regulations and quality certification of products which export on the foreign markets. Regarding the export of products meant for the European Union market, there is necessary to respect and to satisfy the criteria of milk quality after their system and quality criterion (EU Directive, no. 92/46). Besides the valid standards, the state should regulate also the terms of which stipulated rules begin to apply, which leaves time to the agricultural producers, i.e. farmers, to adjust to the new regulations. In that way, the state would stimulate introduction of the quality standards and would motivate the farmers to economically justified production (Kljajić Nataša et al., 2011). Lately, on the international market are more and more required the cheeses from the organic production, which represents a chance of the Republic of Serbia in the following period.

Except Ukraine and Slovakia, all other countries in the region increase the cheese export. The most intensive increase of export was realized by Moldova (rate 24.41%), primarily due to low starting point. All region countries, if they want to increase their export, should pay more attention to making and strengthening of the autochthonous cheeses trade marks (brands). It represents one of the strongest and the most significant factors in competitive struggle for the market.

**Import of cheese of the Danube region countries**

The average import of cheese of the analyzed Danube region countries amounted 800 thousand tons and it registers, in the research period, a slight increase by the rate of 4.46% annually. The export value amounts 4.3 milliards USD. The average import price of cheese amounts 5.4 USD/kg. It is higher in regard to the import cheese price in the region.

The most important cheese importer is ***Germany***. The average import amounts 601 thousand tons, with a slight increasing tendency, by the rate of 3.28% (*table 3*). In the total regional import, Germany participates with three-quarters. It practically determinates import of all countries in the region and it represents the most important world importer of cheese. The average import value was amounted 3.5 milliards USD. The import is a resultant of domestic production stagnation, high purchasing power and significant consumption of 23 kg per capita, as well as of increased assortment with various top-quality types of cheese. The average European consumption of cheese is 15 kg. The most of import comes from the EU countries – here dominates the Netherlands with the share of 34.8%, France with 18.4%, Denmark with 12.1%, Austria with 7.6% and Italy with 5.5%. The above mentioned countries represent the main suppliers of the German market with the share of 78.4%. In the following period expects prolongation of a slight increase tendency of cheese import.

**Table 3.** *Import of cheese in the countries of the Danube region (2005-2012)*

| Country | Average amount (t) | Participation (%) | Rate of change (%) | Average value (mil. $) |
|---|---|---|---|---|
| Germany | 601.516 | 75,1 | 3,28 | 3.462 |
| Austria | 83.917 | 10,5 | 3,44 | 417 |
| Hungary | 34.279 | 4,3 | 5,70 | 138 |
| Slovakia | 25.268 | 3,2 | 11,19 | 105 |
| Romania | 22.714 | 2,8 | 37,79 | 89 |
| Croatia | 11.101 | 1,4 | 2,98 | 50 |
| Ukraine | 11.048 | 1,4 | 11,63 | 47 |
| Bulgaria | 7.030 | 0,9 | 22,25 | 29 |
| Moldova | 2.526 | 0,3 | 6,20 | 9 |
| Serbia | 1.398 | 0,2 | 28,99 | 7 |
| **Danube region** | **800.797** | **100,0** | **4,46** | **4.353** |
| **Source:** *Calculation based on the data of the International Trade Centre* | | | | |

Second important regional importer of cheese is ***Austria***. The average import amounts 83 thousand tons, with increasing tendency by the rate of 3.44%. In the total import it participates with 10.5%. The average import value was amounted 417 million USD. The import is a resultant of high supply and demand of 20 kg per capita, per annum. The import resultant, among other things, is the assortment supplement on domestic market, first of all, of top-quality cheeses. The most of import anticipates from the European Union countries. There dominates Germany with almost two-

third of import (59.5%), Italy with 10.7%, France with 7.7%, the Netherlands with 5.5% and Denmark with 4.4%. These mentioned countries are the main suppliers of the Austrian market, with the share of 87.8%.

Very important regional importer of cheese is ***Hungary***. The average import amounts 34 thousand tons with a significant increasing tendency, by the rate of 5.7%. The import is a resultant of decreasing domestic production and increasing cheese consumption in the consumers' nutrition. The increase of import and expansion of the assortment had caused a certain increase of cheese consumption in Hungary (Konig, Major Anita, 2006). In the total regional import it participates with 4.3%. The average value of cheese import was amounted 138 million USD. The consumption expressed per capita annually amounts 11 kg, which is less than the European Union average. The most of import is from the European Union countries – there dominates Germany with 54.5%, Poland with 15.6%, the Netherlands with 8.4%, Austria with 7.9% and Slovakia with 3.6%. The above mentioned countries provide more than three-quarters of the total cheese import (90%). In the following period is expected a slight increase of consumption and import of cheese (www.euromonitor.com/cheese-in-hungary/report).

In the fourth place regarding the cheese import is ***Slovakia***. The average import amounts 25 thousand tons with increasing growth tendency, by the rate of 11.19% annually. In the total regional import, it participates with 3.2%. The average value of import was amounted 106 million USD. The consumption of cheese is very low, it amounts only 8 kg per capita (www.euromonitor.com/cheese-in-slovakia/report). The most of import comes from the European Union countries - there dominates Poland with 41.4%, Czech Republic with 24.2%, Germany with 23.1%, Italy with 1.9% and Hungary with 1.6%. The above mentioned countries provide more than three-quarters of the total cheese import (92.2%). In the following period is expected continuation in cheese import, but with middling tempo.

In the fifth place regarding the average cheese import is ***Romania***. The average import amounts 23 thousand tons with a pronounced growth tendency, by the rate of 37.79% annually. In the total regional import, it participates with 2.8%. The average value of cheese import was amounted 89 million USD. The import is a resultant of a slight increase of demand on the market, although it is very low (only 6 kg per capita). In the following period is expected the economic recovery of the country, which will represent an incentive for the consumers to increase food consumption,

which would include also the cheese consumption (www.euromonitor.com/cheese-in-romania/report). The most of the imported cheese originates from the European Union countries: Germany 38.6%, Poland 20%, Hungary 8.9%, Bulgaria 5% and Austria 4.3%. The above mentioned countries provide more than three-quarters of the total Romanian import of cheese (76.8%). In the following period will continue increasing trend of cheese import, first of all, from the European Union.

The import of cheese in the ***Republic of Serbia*** amounts 1.398 tons, which is 0.2% of the average regional import of the Danube region countries. The import is a resultant of relatively modest assortment of domestic production and low income level, i.e. the life standard of the consumers. In the research period, it was significantly increased import by the rate of 28.99% per annum. The import trend is of more significant intensity than the export. Valuably expressed, the import amounts seven million US dollars. The average import price of cheeses amounts 5 USD/kg and is higher in regard to the export price. The most of import origins from Germany (32.8%), and dominates semi-hard and hard cheeses. Then follows the Republic of Macedonia with 29.9% (white soft cheeses), Croatia with 14.2% (semi-hard and cheese fondue), Italy with 5.8% (hard cheeses) and Austria with 4.7% (semi-hard and hard cheeses). Those countries have the significant share, i.e. 87.4% of the total import. By putting into effect the Stabilization and Association Agreement, there were expanded the fields of cooperation in regard to the Interim Trade Agreement, which had been into effect since 2009. Then has started a trade liberalization process and decrease of customs duties for industrial and agricultural products from the EU, which had developed in the previous years by phases, in order domestic production to be prepared adjust to the European standards. Since January 2014, the customs to the most of food products from the EU were decreased and cancelled. That is to say, in that time was put into effect a decree of the Interim Trade Agreement, after which Serbia has to decrease or totally cancel the customs duties for the products from the EU. In that way, the customs duties for a feta cheese and kashkaval was decreased from 15 to 10.5%, while the customs duties for milk are cancelled. This will especially hurt small producers of cheese in Serbia which have relatively high price. This measure can affect the significant import increase of different types of cheeses in the following period.

The Danube region countries realize a positive balance of foreign trade exchange of cheese, in amount of 380 thousand tons. In the total research period, it is evident that there is a positive balance of foreign trade excha-

nge of the region. The positive exchange balance realizes the following countries: Germany (340 thousand tons), Austria (10 thousand tons), Ukraine (65 thousand tons), Slovakia (1.3 thousand tons), Bulgaria (12 thousand tons) and Serbia (2.6 thousand tons). The other region countries make a negative balance of foreign trade exchange of cheese. The highest negative balance has Hungary (20 thousand tons), Romania (19 thousand tons), Croatia (9 thousand tons) and Moldova (2.2 thousand tons).

## Conclusion

In the researched period (2005-2012), the average production of cheese in the Danube region countries, was amounted 2.7 million tons, with a slight increase tendency by the rate of 0.22% annually. The mentioned group provides 28.3% of European and 14.8% of the world production. Far the most important cheese producer of the mentioned group is Germany, with the average production of 1.993 thousand tons, which is a quarter of the total production of the Danube region countries.

The average export of cheese of the regional group was amounted 1.2 million tons and in the analyzed period it was increased by the rate of 4.11% annually. The realized rate of export growth is a resultant of many factors action, first of all, of specific growth of production volume, size of demand on the international market and high competition on the international market. The export value amounts 4.9 milliards. Far the most important exporter within the region is Germany. Its average export is 942 thousand tons, or 79.8% of the total export of the Danube region countries.

The average cheese import of the analyzed Danube region countries was amounted 800 thousand tons and, in the same researched period, it was registered a slight increase by the rate of 4.46% annually. The import value is 4.3 milliards USD. The most significant importer of cheese is Germany. The average import amounts 601 thousand tons. In the total regional import, Germany participates with three-quarters. The average import value was amounted 3.4 milliards USD.

The Danube region countries realize a positive balance of foreign trade exchange of cheese in amounts of 380 thousand tons. Besides the saturated international market, the cheese market in this group countries is very stable and without greater oscillations. The Republic of Serbia is not a significant regional exporter and importer of cheese. It realizes a positive balance of foreign trade exchange. The export of cheese is limited by vo-

lume and structure of production, cheese quality and lack of marketing concept implementation in production and export of cheese on the international market.

## References


1. About German cheese (2013) www.igourmet.com/germancheese.asp: [accessed: 15.03.2014].

2. Cheese Culture (2012) http://tasteofaustria.org/index.php/eat/cheese-culture, [accessed: 20.02.2014].

3. Cheese in Bulgaria (2013) www.euromonitor.com/cheese-in-bulgaria/report, [accessed: 20.02.2014].

4. Cheese in Hungary (2014) www.euromonitor.com/cheese-in-hungary/-report, [accessed: 20.02.2014].

5. Cheese in Romania (2013) www.euromonitor.com/cheese-in-romania/report, [accessed: 20.02.2014].

6. Cheese in Slovakia (2013) www.euromonitor.com/cheese-in-slovakia-/report, [accessed: 20.02.2014].

7. Cheese in Ukraine (2012) www.euromonitor.com/cheese-in-ukraine/-report, [accessed: 20.02.2014].

8. German cheese (2014) www.germanfoodguide.com/cheese-search.-cfm: German cheese [accessed: 25.03.2014].

9. Kljajić Nataša, Savić Mirjana, Arsić Slavica, (2011): Production of milk and dairy production of milk and dairy products in the Republic of Serbia, http://agroekonomija.wordpress.com/2011/01/21/proizvodnja-mleka-i-mlecnih-proizvoda-u-republici-srbiji/ [accessed: 25.03.2014].

10. Konig, G., Major, Anita (2006): Changes in the Hungarian dairy industry after EU accession, Studies in Agricultural Economics No. 105., 101-112.

11. Novaković, I. (2012): Tržište Rusije – šansa za mesnu industriju siepa.gov.rs/files/pdf2010/EXPORTER_18.pdf[accessed: 25.03.2014].

12. Ostojić M, Topisirović LJ. (2006), Geografska oznaka porekla autohtonih sireva, Ekonomika poljoprivrede, vol. 53, br. 3, 591-604.

13. Popović, R. (2009): Strukturne promene na tržištu mlečnih proizvoda u Srbiji, časopis Prehrambena industrija – Mleko i mlečni proizvodi, vol. 20, broj 1-2, strana 7-12, Savez hemičara i tehnologa, Tehnološki fakultet Novi Sad, 2009. godine.

14. Popović-Vranješ, Anka., Vlahović, B., Mirč, D. (2003): Stanje i perspektiva izvoza sira iz Srbije i Crne Gore. Agroekonomika, Novi Sad, br. 32, str. 99-106.

15. Sarić, Z. Bijeljac, Sonja (2003): Autohtoni sirevi Bosne i Hercegovine, Mljekarstvo, Sarajevo, broj 53 (2), str.135-143.

16. Savić Mirjana, Arsić Slavica, Kljajić Nataša (2011): Oznake kvaliteta i tržište sira http://agroekonomija.wordpress.com/2011/03/07/ [accessed: 28.03.2014].

17. Ukraine Dairy and Products Annual 2013 www.thedairysite.-com/reports/?id=2960, [accessed: 28.03.2014].

18. Vlahović, B., Puškarić, A., Mugoša, Izabela (2014): Tržište sira u zemljama CEFTA grupacije, XIX Savetovanje o biotehnologiji sa međunarodnim učešćem, Zbornik radova, Vol. 19 (21), 2014., Agronomski fakultet u Čačku, Univerzitet u Kragujevcu, str. 347-353.

19. Vučić Tanja, Maćej O., Jovanović Snežana, Seratlić Sanja, Niketić Gordana (2008): Zlatarski sir-autohtona tehnologija i senzorne karakteristike, Prehrambena industrija – mleko i mlečni proizvodi, Vo. 19 br. 1-2., Savez hemičara i tehnologa, Beograd.

20. World cheese statistics (2014) www.statisticbrain.com/cheese-statistics/, [accessed: 15.03.2014].

# PLANTING VINEYARDS AS A WAY TO DEVELOP LOCAL COMMUNITIES[1]

*Branka Kalanović Bulatović*[2], *Dušan Milić*[3]

## Abstract

*Since planting vineyards demands high investments, when rendering decisions about investing into planting vineyards, the investors should have information about their acceptability and justification in the most adverse business conditions. The total investment value for 1 hectare of vineyard is 15,738 EUR/ha. The costs for setting up the points of support in the amount of 6409.4 EUR/ha accounts for 40.7 % for the structure of total costs for planting 1 hectare of vineyard. By representation, immediately after are the costs for immediate land preparation and planting (30.67%). The profitability of this production can be significantly increased by applying the modern agricultural technology in planting and regular production, by achieving high quality of final products, with good marketing, acceptable prices for customers, etc. The advantage of our viticulture lies in the spatial and biological diversity, favourable climate and tradition in the production of grapes. There is a significant interest of farmers in viticulture which may bear fruit with governmental stimulative measures and with the establishment of associations.*

**Key words:** *viticulture, investment value of plantations, planting costs*

## Introduction

Viticulture as a scientific discipline studies the vines from the biological, economic and environmental aspects in order to achieve greater yields and optimal economic results. Viticultural production represents highly intensive production, which besides great involvement of human

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workforces per unit of capacity, requires a significant capital that has to be fructified through a string of activities (Milić and associates, 2009).
Grapevine is a noble culture that is cultivated worldwide. The plant of grapevine has a very long history, measured by fifty to seventy million years ago, while viticulture, according to reliable information, comes significantly after, 9000 years ago (Trmčić, 2007). Grapevine is a culture that is cultivated worldwide in wide areas because of its fruit - grapes that can be used in fresh, dried and processed state.

According to the paleontological data, grapevine was introduced as a culture around six thousand years ago (Cindrić, 1987). The culture of grapevine is very old and much older than any known historical record since all nations say that the beginning of viticulture happened in mythical times. It is believed to have originated from the countries situated in the Mediterranean Sea basin. Grapevine was brought to our regions from Asia Minor by Thracians and Ancient Greeks, somewhere around year 2000 BC (Milić and Radojević, 2003).

Some parts of the Republic of Serbia have very favourable conditions for cultivating grapevine, specifically: districts of Timok, Niš and South Morava River, west of Morava, Šumadija and Great Morava River, Pocerina, Srem, Banat, Subotica and Horgoš, and Kosovo (Avramov, 1991). It is well known that agricultural conditions for cultivating grapevine are extremely favourable in Serbia. Grapevine plantations in these regions are mostly represented in hilly country which, because of its configuration and other properties, cannot be used for other plant growing except for fruit and viticultural production.

However, viticultural production in the Republic of Serbia is in extremely bad condition. The privatised companies have not yet reached their former level of organization and grape production. Therefore, the production of grapes is mostly performed at smaller family farms, mostly still in an extensive way. Small planted plots make harder for productive machinery and all the necessary agricultural and technical measures to be applied. Insufficient application of means for controlling diseases and pests is reflected on the amount of yield and quality of grapes. Obsolete kinds and varieties impede better offers and standard quality for the market, foreign and domestic.

Serbia doesn’t produce sufficient quantities of grapes in relation to the needs and available possibilities it possesses. In order to increase the

production of grapes, it is necessary to plant new vineyard plantations. In order to plant new plantations we need significant investment resources. The properties of vineyards, as well as of other perennial plantations, are that significant investments in planting vineyards are not made at once, but are realized on multiple occasions during a specified time period. The duration of this period depends on the selected kind and cultural. Besides, vineyard plantations have been used for a number of years, so that the mistakes made in the planting period (wrong choice of location, kind, cultivation system, etc.) have reflected on the entire period of utilization. All this can have a negative effect on the financial outcomes of legal entities, which is why special attention needs to be focused on the planning, organisation and costs of planting vineyard cultivations.

Data necessary for the formation of this paper have taken from the general documentation of grapes' producers from the Banat region. What was taken primarily was the plan for planting vineyards in the area of 8 ha in the period between 2012 and 2014, as well as planning and calculations for the production of grapes. At the same time, we used literary and other materials from conferences and congresses relating to the examined issues.

## Research results

### Concept and investment classification

The theory of investments usually mentions concepts such as "investments" and "investing", and usually signifies financial investments into the present for the purpose of achieving certain effects in the future. Investments are the basic prerequisite for efficient performance of material production in the longer time period (Kalanović, 2006). Therefore, it can be defined as investing into fixed and permanent working assets. Since, during the process of reproduction, fixed assets are gradually consumed and transferring a part of their value to the produced goods and services, there is a need for their maintenance or replacement within a certain time period. The mere replacement of the fixed assets doesn't represent an increase of the existing fixed assets capacities. Due to the rapid scientific and technical progress and changes, the demand of replacements market changes the used fixed asset with a productive one; thereby the replacement represents a certain increase of fixed assets capacity. The permanent working assets are attached to the process of production as long as the investment is useful.

The process of investing includes the set of all activities for the entire period of planning, preparation and realization of a single investment. The process of investing i.e. realization of a single investment can be perceived as a single investment cycle.

Agricultural investments are different from other investments because of the production process in agriculture and because of the diversity of functions that the fixed assets perform in this area of production. In agro economic and economic literature there are more and more investments dividing according to a greater number of criteria.

Most common investment divisions in literature are:

- According to the sources of financing the formation of investments (gross, net and new ones),
- In connection with production tasks (productive and non-productive investments),
- According to the degree of engagement of the workforce (labour-intensive and capital-intensive) and in
- Terms of investment volume (divided to complex or compound and simple or partial).

Andrić and associates (2005) opted for five general criteria for classifying all investments in agriculture.

The first division of investments is according to the properties of the investment structure i.e. according to the purpose of investing. All investments can be divided into real (productive) and financial. Real investments obtain the production means and with their use new production will be achieved or the existing production will be improved and increased. Real investments allow new values to be achieved in the production process unlike them financial investments allow the acquisition of already existing assets. Together with them, existing production means are transferred from one owner to another. Financial investments do not include acquiring new values since they include investments into development research, education of people and other.

According to the second criterion, investments are divided into: a) new, b) investing into expanding the existing capacities or into increasing the production volume, c) investing into reconstruction, capacity replacement, rationalization of the production process, d) investing into

protection and prevention of the environment pollution, e) investing into the increase of business operation security, and f) humane investments (for improving work conditions in the company).

The third criterion is established based on the influence that the investments have on the organizational structure, volume and method of production in the company. According to this criterion, real investments can be divided into simple (without significant influence on the existing organizational structure and method of production in the company) and complex (significantly affect the organizational structure and method of production in the company).

According to the fourth criterion, investments are divided to short-term and long-term, in accordance with the duration of construction and investment usage. The basis for the fifth criterion is a different application i.e. area of investment within the agriculture production (for the acquisition of land, into livestock unit, land reclamation, perennial plantations…).

Investments into viticultural plantations assume the performed previous detailed analysis of natural and economic conditions for this production – election of region, position according to the type of plantation, kinds and varieties, creation of plantation plans, organization of land territory, positioning vines, i.e. distribution of varieties and spacing between lines, from the perspective of machinery usage, transfer of road network etc. The completeness of evaluating investments requires mutual comparison of economic effects before and after investing.

During the investment period, there are three types of activities connected to the investment process: financing, investing and disinvesting (Scheme 1). Financing can be performed from various sources: personal assets, borrowed assets – loans and assets without the need of returning – donated assets and various other ways.

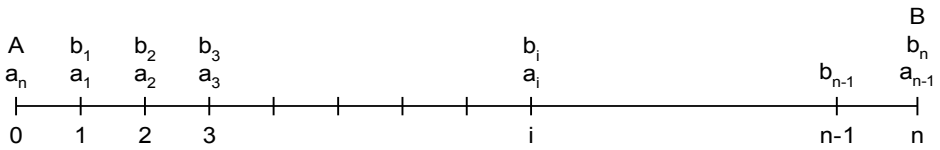
**Scheme 1.** *Economic model of the investment process*


**Source:** *Andrić J., Vasiljević Zorica, Sredojević Zorica (2005): Investicije - osnove planiranja i analize, Belgrade.*

By transferring to the investment process, invested financial assets are transformed from monetary to material form of production assets (production capacities), so that, during their use, within the production, invested financial assets could be released with realization of the obtained products – to the process of disinvestment.

During the investment period there is a whole range of monetary allocations for the acquisition, maintenance and use of the investment structure and a series of monetary receipts as a result of products obtained by realization (Scheme 2). If all non-monetary allocations and receipts are transferred to monetary, the general economic model of investments could be presented schematically as follows:

**Scheme 2.** *General economic model of investments*




**Source:** *Andrić J., Vasiljević Zorica, Sredojević Zorica (2005): Investicije - osnove planiranja i analize, Belgrade.*

With the following explanations:
A – Investing into acquisition / construction / of the investment structure,
$a_i$ (i =1,2,...,n) – allocation of monetary flows necessary for use and maintenance of the investment structure in certain years,
$b_i$ (i =1,2,...,n) – monetary flows from investments in certain years of use,
B – monetary receipts at the end of the use of the investment period,
n – number of years of investment use.
Undertaking investment activity is based, by a rule, on the hypothesis that only most appropriate investments are implemented.

## Vineyards as an essential asset in agriculture

The land complex with planted grapevine with corresponding distance in and between lines is basically a perennial planting. The perennial plantations that are properly planted in line formations on a land complex of specific shape and size, which is rationally cultivated, presents a specific form of planting called plantation (Milić and associates, 2013). Grapes plantations are contemporary and mostly large structures for

grapes production, which enable significant use of machinery while performing work process.

The perennial plants transfer their value gradually to obtained products during the period of their utilization, and by realization of these products we perform reproduction of assets invested in planting.
These plants present one of the general agricultural assets i.e. the production assets with a biological property. This category includes all plants that are successively producing and establishing certain yields each year and for a longer period of time. Therefore, perennial plants are characterized by three general properties:

- attachment to the habitat they are planted in,
- relatively long period of crops (varies depending on the type of crops and the system of cultivation) and finally,
- long period of plantation usage (even more than 30 years for certain plantations) in the realized yields determined by the development and age of plantation.

A plantation as a production capacity includes, by a rule, a complex form of investment structures which can consist of: planted vines (trees), points of support, roads, fences, irrigation systems, construction facilities in the plantations, agricultural machinery and other.

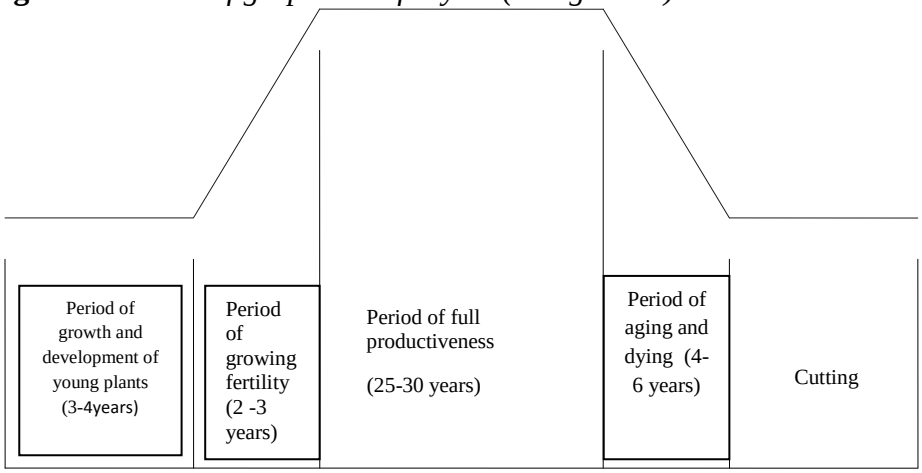
Investment period for perennial plants can be relatively long in comparison with some other fixed assets within the agricultural production, which is also very important for rendering decisions on undertaking investments as well as for evaluating the efficiency of investing in this field. On the other hand, the period of usage (utilization) of the investment structure at perennial plants is also proportionally long and can lost up to 30 years when it comes to some plantations.

Also, the characteristic of perennial plants is that monetary receipts are given once a year after the realization of the annual harvest if the plantations include more than one kind and variety of fruit. All these characteristic of perennial plants as investment structures greatly affect the security of anticipating the level of economic investment efficiency, as well as the increase of the potential risk level that the investor has to assume when rendering the decision on the investment in this field.

The complexity of investing includes multiple factors, primarily: the complexity of the investment structure, the necessity of estimating the period of investment use and the delicacy of estimating the economic effects of investments for a longer period of time as the investment is used, the need to anticipate hardly predictable factors such as movement and the price height for raw-materials, investments items and final products, the height of the interest rates and other.

Vineyards represent expensive structures. Mistakes made during their construction cannot or can hardly be repaired. When planting vineyards it is extremely important to properly select a cultivation form and variety, good land preparation, high quality planting material and it is necessary to use modern production technology during the period of planting and utilization of the vineyards. According to Kalanović (2006), within the life cycle (ontogenesis) of grapevines, there are different periods of growth and productivity: the period of growth and productivity of young plants, period of growing productivity, period of full productiveness and period of decreasing productiveness, aging and dying of vines (Figure 1).

**Figure 1.** *Period of grapevine life cycle (ontogenesis)*




**Source:** *Kalanović Branka (2006): Ocena ekonomske efektivnosti vinogradarske proizvodnje u funkciji donošenja poslovnih odluka, PhD thesis.*

The period of growth and development of young plants lasts from planting grafts or radicles until young plants enter the period of giving crops. Depending on the environment conditions and applied ampelotechnique, the length of this period is between 3 and 4 years. During the first and second year, the root system and the above ground

part of the vine are intensively developing, with 2 - 6 shoots growing on the vines that at the end of the second year, reach the length of 1-2 metres. Productive buds are formed on such shoots so, the first bunches grow during the third year (yield per ha is from 3-5 tons). If there is a delay in growth of shoots during the first two years, crops are made during the fourth or, at the latest, in fifth year.

Period of growing productivity lasts from 2-3 years depending on the cultivation form of vine which is formed in a young vineyard and on the environment conditions in which it is being formed. Establishment of trees at some of the cultivation forms lasts from 4 to 6 years, and after the vineyard is ready to be harvested, productivity is controlled by pruning in the next 2-3 years and the yield is increased by 30-40%.

The period of full productiveness begins 4-6 years after planting vines and lasts for the following 25-30 years. During this period, maximum yield and grape quality is achieved. Yield may vary around 10-20% in case of bud winterkill and 50% in case of shoot winterkill.

The period of vine aging and dying takes place at the end of the ontogenetic plant development. It lasts from 4 to 6 years and is characterised by the decreasing of shoots' growing, by drying certain branches of the vine skeleton, by decreasing the yield and worsening the grape quality. When planting singling amounts up to more than 40% of vines, maintaining vineyards is unprofitable and the next step is to clear all the vines.

In order for the production in these plantations to represent a complete process, it demands purchase and usage of certain technical assets (motor and attachable unit machinery, drainage and irrigation systems), facilities (warehouses, establishments for lodging products) and possession of a specific road network.

## Risks in viticultural production

Viticultural production is, like other branches of agriculture, under the influence of social and economic factors and under a great influence of environment conditions. These factors can have a negative effect on the movement of the yield, consumption of production process factors, price, etc…. Some of the factors can be affected by the investors, like the following: dynamics of investment, consumption of certain production

factors, selection of vines, etc. However, it is difficult to affect most of the environmental factors, the market, the economic environment, the economic policy of the country, etc. so it is very difficult to anticipate them. For the purpose of overcoming these influences, the investors take over various measures in order to increase the yield, decrease the influence of the markets of commodities, work and capital.

Given the fact that planting vineyard cultivations demands extremely high investments per unit area, when rendering investment decisions on planting vineyards, the investors should have information about their acceptability and justification in the most adverse business conditions.

Risk management is one of the most important problems in the investment analysis, since, when rendering investment decisions, one cannot certainly predict future events. This is particularly distinctive for agricultural production which is under great influence of environmental factors that can cause certain risks, so investment evaluation is under special attention when having to evaluate it in uncertain conditions. The assessment of probable future events depends on the quality of the available data, professional experience and applied methodology.
When analysing investments under uncertain conditions, we also analyse their risk in circumstances that can be difficult to predict. The causes of uncertainty can be internal and external and most commonly they affect simultaneously.

The internal causes depend on the investors that invest assets into planting cultivations and they are the ones that can usually affect them. Some of these causes are as follows:

- Dynamics and investment opportunities,
- Consumption of certain production factors,
- Representation of certain vine kinds, etc.

The investor has no effect on the external causes, such as:

- Environmental conditions (soil and climate conditions, diseases and pests, etc.)
- Market conditions (placement of grapes on the domestic and foreign market, prices of raw-materials, price of grapes, etc.),
- Financial conditions (interest rates, method and deadline for repayment, lease, etc.),
- Level of construction of the processing facility,

- Supply of adequate manpower,
- Economic policy of the country (government investments, foreign trade policy of the country, liabilities towards the country, etc.)

If the main causes for uncertainty are known, i.e. the risk of investing into viticultural production, then the question is what can be done to reduce and increase these influences.

The method of increasing the level of uncertainty (risk) of these investments depends on various factors, such as:

- type and intensity of the risk factor influence,
- economic strength of the company and the farm,
- qualification and professional capacity of the workforce,
- the possibility of selecting different methods of financing,
- availability of different markets for placement of grapes and for the acquisition of production process factors, etc.
- The risk that comes with these investments may be reduced or removed.

First, by introducing various measures such as:

- increasing stability of grape yield: introducing irrigation, better protection from diseases and pests, timely performance of certain business operations, adding the missing nutrients, insuring plantations and harvests from various natural disasters, securing adequate number of machinery and other equipment, securing qualified workforce, etc.
- reducing risks of the market conditions: representations of kinds that are increasingly demanded on the foreign market, production of grapes negotiated in advance for a known buyer and under known prices, agreed connection between grapes manufacturer with companies dealing with processing, distribution and sale, etc.
- reducing risks of the financing conditions: by using fixed interest rates instead of variable ones, by using lease instead of purchasing machinery and other equipment, by using subsidized loans given by the government and intended for encouraging the planting process of perennial plantations, etc.

Second, by previously getting introduced to the acceptability of investing into vineyard planting under the most adverse business conditions. These conditions can affect various elements on which income and expenditure depend on, i.e. economic efficiency of planting vineyards.

## The costs for planting vineyards

Cultural value of plantations is formed from two sets of costs:

1. *The costs (investments) that are paid only once during the period of planting.* These costs are made in the beginning period or in some other moment of planting. These costs include arranging, cleaning, levelling and trenching the field. Afterwards, this group of costs includes costs for marking lines and places for planting, preparation of grafts for planting, digging holes, costs for setting up pillars and poles, anchors and wires.

2. *Costs of culturing during specific years of planting.* These include costs for filling empty places with grafts, treatment, fertilization, care and protection, as well as costs of harvesting and transporting products (during the years with "low harvest").

Vineyards represent one of the most intensive methods for using land. For this reason, it is necessary to make a rational organization of production and work on the vineyard area. This included proper and economical harmonization of all the production factors, starting from planting, over utilization and to the realization of finished products. The height of economic results in viticulture directly depends on the level of harmonization of work processes for this production. Planting vineyards includes selecting soil and organization of land territory, preparation of soil, planting vines, attending young vineyard per years of establishment and setting up points of support.

## Land preparation for planting vineyards

Activities related to the preparation of land are performed before the actual planting with large capacity assets and with little use of man workforce. The activities related to the preparation of land include: clearing, levelling, terracing, making soil fertile (fertilization and land reclamation), trenching, immediate flattening, granulating the land topsoil and disinsection of the land immediately before planting (Milić and associates, 2013).

After clearing and cleaning the remaining of the roots, it is necessary to perform terrain planning and to flatten micro depressions, thereby securing a free access to tractors with attachments, securing uniform exuberance of all of the vines in the vineyard and securing atmospheric waters to flow freely after having accumulated in the micro depressions.

If there is, in the vineyards, a danger of atmospheric or underground waters, it is necessary to resolve that problem, before planting, with open drainage canal network or before building embankments for preventing floods.

The most appropriate moment for fertilizing with organic and mineral fertilizers is before planting vines, fertilizing with larger amounts of fertilizers for the purpose of repairing physical and biological properties of the soil. Fertilizers are spread over the surface immediately before trenching. The amount of organic fertilizers depends on the amount of humus in the soil. Soils that are lacking humus should be fertilized with manure in the amount of 5-10 cars per ha.

Based on the results of the chemical soil analysis, taking into account the required supply of the essential nutrients, NPK (fertilizer containing nitrogen, phosphorus and potash) fertilizers are added with melioration, fertilizers with different formulations, e.g. NPK 7:20:30 or 5:20:30.

Deep tillage preceding the planting of vineyards is called trenching or deep ploughing. This is an extremely significant agricultural and technical measure since thereby favourable conditions are made for the rapid onset of development and productiveness of the young vineyard. The depth of trenching depends on the soil and its physical and chemical properties, and it is ranging from 60cm (heavy soil) until 100cm (light, sandy soil).

The most favourable time for trenching is during the summer and in early autumn. Trenched soil is left in the open furrow up until the planting process so that, under the influence of the sun, rain and low winter temperature, the soil can be granulated and so that it can accumulate a large amount of humidity.

The total costs for planting 1 ha of vineyards amount to 15,738 EUR/ha (Table 1). The costs for land preparation with trenching amount to 1,060 EUR/ha with a share of 6.74 % in the total costs for planting 1 ha of vineyards.

The highest participation in costs for planting are the machinery costs (97.2 %), which is expected, since the land preparation is performed exclusively with high capacity assets and with small participation of man workforce.

**Table 1.** *The cumulative summary of costs for planting 1 ha of vineyards (Cordon cultivation form, row spacing 2,5x1m)*

| TYPES OF COSTS | INVESTMENTS PER YEARS | | | TOTAL | |
|---|---|---|---|---|---|
| | I | II | III | EUR/ha | Structure % |
| Land preparation with trenching | 1,060.00 | | | 1,060.00 | 6.74 |
| Immediate preparation of land and planting | 4,828.00 | | | 4,828.00 | 30.67 |
| Vineyard attendance in the first year | 791.32 | | | 791.32 | 5.03 |
| Setting up points of support | | 6,409.40 | | 6,409.40 | 40.73 |
| Vineyard attendance in the second year | | 1,132.30 | | 1,132.30 | 7.19 |
| Vineyard attendance in the third year | | | 1,516.98 | 1,516.98 | 9.64 |
| TOTAL | 6,679.32 | 7,541.70 | 1,516.98 | 15,738.000 | 100.00 |

**Source:** *Author's calculation*

## Planting vineyards

Vineyard planting should be performed in short period of time, which is why it is essential to achieve good organization and synchronization of the large number of operations that are carried out. During planting, the following operations occur: marking roads, trails and locations for planting grafts; transport and preparation of the planting material; digging holes, treating grafts with insecticides, planting, fertilization, watering and other auxiliary operations concerning planting.

Due to limited amount of time for performing a large number of intertwined operations and because of the large number of hired workers, it is necessary to create a plan of operation before the planting alone. Based on the plan of operation, it is necessary to divide workload into work groups. Each work group should be in charge for realizing a specific operation. The method of dividing workload and of forming groups shall depend on multiple factors and mostly on the method of planting i.e. if it is performed manually or mechanically.

Planting vine graphs with hydraulic drills represents an efficient method of planting. The principle of its operation is to, with a water pressure of 4 to 6 atmospheres, excavate holes. Its efficiency is reflected in the fact that

it is possible to attach three hydraulic drills to one water tank, i.e. to perform planting simultaneously in the same number of row. One worker inserts the probe into the ground, the second sets the graft, the third lays the ground onto the set grafts and the fourth one forms a hillock.

The costs of immediate land preparation and planting vineyards amount to 4,828 EUR/ha with a share of 30.67% in the total costs while planting 1 ha of vineyards (Table 1). The highest share in planting costs is the material – vine grafts (86.62%) and then labour costs (7.66%).

## Attendance of plantations in the 1st year

Operations related to the attendance of plantations start before planting and are performed during the entire period of culturing young vineyards, usually for the period of the following three years. These operations include various agricultural and technical operations with a common cause of preparing young plantations for regular production. The growth of vines, vegetative power of vines, formation time of the cultivation forms and the moment of growing into full crop, significantly depend on the timely and high-quality performance of these measures.

Operations that are performed after planting vineyards and which are successively performed for the purpose of attending to the young vineyard in the 1st, 2nd and 3rd year are various but essentially similar to the operations that are performed during the regular production of grapes with only difference in acquired effects. Therefore, the work organization is similar, while noting that there is a different proportion in the number of necessary workers and the structure of work per unit of capacity.

The costs of attending to a young vineyard are ranging in the interval from 791.32 EUR/ ha in the 1st year, to 1,516.98 EUR/ha in the 3rd year with share of less than 10 % for the total costs of planting 1 ha of vineyard (Table 1). The highest share in costs of vineyard attendance is the material – vine grafts (86.62%), and then labour costs (7.66%).

## Setting up points of support

Operations concerning setting up the points of support can be performed during the first year, and they have to be performed before the beginning of second vegetation. It is necessary to approach this type of business very seriously since the performance of this business operation demands

investing significant monetary assets. Most of the operations, which are numerous in this working process, are performed manually. Primarily there are operations connected to transportation and arrangement of pillars, which is usually performed by a group of workers in charge of loading and unloading. Secondly, there are operations relating to the dispersion of pillars, digging holes for pillars and setting up pillars, which is performed by another group. Finally, there are operation relating to setting up and fixing the wires depending on the system of support point and the method of cutting.

Pillars are usually set manually, whereby holes are dug with a shovel or a drill. After putting pillars into dug holes, backfilling and tamping pillars demand great workforce which increases the costs.

The costs of setting up support point when planting 1 ha of vineyard totally amount to 6,409.4 EUR/ha with a share of 40.73% in the structure of planting 1 ha of vineyard (Table 1). The costs for materials take up the highest share (around 80%), and then labour costs (15.40 %) in the complete costs for setting up points of support.

### Attendance of vineyards in the 2nd year

Attending to vineyards in the 2nd year include almost the same operations as the ones connected to the attendance of young vineyards in the 1st year, with only difference of the fact that in the second year, it is necessary to hoe up the vineyard in three separate occasions, to tie green shoots around 3-4 time during the process of vegetation. If the individual grafts are not received or are damaged, refilling of empty locations is performed.

### Attendance of vineyards in the 3rd year

Attending to vineyards in the 3rd year represents a continuation of the working process started in the previous two years of attending to young vineyard, noting that during this year the investment begins to accomplish a certain income, i.e. this is the year when small crops have a little value. As opposed to attendance in the previous year, in the 3rd year there are certain repairs of the points of support due to damage or lodging, then foliar feeding of vines is performed alongside pulling though the green shoots and arranging roads and trails.

## Conclusion

Since planting vineyards demands high investments, when rendering investment decisions about planting vineyards, the investors should have information about their acceptability and justification in the most adverse business conditions.

The total investment value for 1 hectare of vineyard is 15,738 EUR/ha. The costs for setting up the points of support in the amount of 6,409.4 EUR/ha accounts for 40.7 % for the structure of total costs for planting 1 hectare of vineyard. By representation, immediately after are the costs for immediate land preparation and planting (30.67%).

For the purpose of developing local communities in Serbia by planting vineyards, it is necessary to adjust to the region, to the economic power of grapes producer, to help smaller producers and to plant vineyards with red and white indigenous varieties of grapes in specific regions.

Notwithstanding the relatively high investments per unit of capacity, this is a very profitable production. The profitability of this production can be significantly increased by applying the modern agricultural technology in planting and regular production, by achieving high quality of final products, with good marketing, acceptable prices for customers, etc. The advantage of our viticulture lies in the spatial and biological diversity, favourable climate and tradition in the production of grapes. There is a significant interest of farmers in viticulture which may bear fruit with governmental stimulative measures and with the establishment of associations.

## References


1. Andrić J., Vasiljević Zorica., Sredojević Zorica (2005): Investicije - osnove planiranja i analize, Faculty of Agriculture, Belgrade.

2. Avramov, L. (1991): Vinogradarstvo, Nolit, Belgrade.

3. Cindrić P. (1987): Savremeni pravci oplemenjivanja vinove loze. Nauka i razvoj, Belgrade.

4. Cindrić P., Korać Nada., Kovač V.(1994): Sorte vinove loze, Prometej, Novi Sad.

5. Kalanović Branka (2006): Ocena ekonomske efektivnosti vinogradarske proizvodnje u funkciji donošenja poslovnih odluka, PhD thesis, Faculty of Agriculture, Belgrade.

6. Milić D., Kalanović Branka, Veljković Biljana (2013): Menadžment i organizacija voćarsko- vinogradarske proizvodnje, Faculty of Agronomy, Čačak.

7. Milić D., Radojević V.(2003): Proizvodno-ekonomska i upotrebna vrednost voća i grožđa, Group of authors, Novi Sad.

8. Milić D., Kalanović - Bulatović Branka, Trmčić Snežana (2009): Menadžment proizvodnje voća i grožđa, Faculty of Agriculture, Novi Sad.

9. Sredojević Zorica (1998): Procena vrednosti višegodišnjih zasada, magistarski rad, Faculty of Agriculture, Zemun.

10. Trmčić Snežana (2007): Profitabilnost proizvodnje i prerade grožđa sorte rizling italijanski na različitim klonovima loznih podloga, Final Thesis, Faculty of Agriculture, Novi Sad.

11. Vlahović B. (2003): Tržište poljoprivredno prehrambenih proizvoda, Faculty of Agriculture, Novi Sad.

# ECOLOGICAL CONSULTING AS A FACTOR OF INTEGRAL LOCAL DEVELOPMENT[1]

*Branko Mihailović,[2] Vesna Paraušić[3]*

## Abstract

*New methods of investments decision-making require establishing a network between economic, social and ecological criteria of resources allocation. Using the consulting, which respects a situational approach in the paper, can make a balance between economic efficiency, socially responsible business and organic production standards. Development of consulting services in the field of the environment protection and organic production has been under the influence of Serbia accessing the European Union. Approaching this market imposes stricter business conditions, which reflect in tougher competition and numerous regulations in the field of the environment protection, protection of producers and consumers, etc. Previous experiences point out to a fact that some sectors represent potential winners after the EU accession. The potential winners are: tourism, transport, construction, financial services and consulting services in the field of the environment protection. Traditional processing industry needs modernization and introduction to a marketing logic. The consulting services, connected to ecology and the environment requirements are relatively new, but there considers that in the future, this segment of consulting services market, will have a greater significance.*

**Key words:** *ecological management consulting, quality standards, consultants, organic production, sustainable development.*

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## Introduction

The consulting represents a specific activity of helping the companies' managers to solve the problems in business for which they have no enough expertness, knowledge and experiences. In modern market economies, and especially those in which aspire to build the market mechanisms, the consulting is a result of a need for adequate and timely information, as a key factor of business success. Domestic companies have done business in non-market conditions and had not made professional and dynamic managers, who manage the changes successfully. Necessity of overall transformation requires knowing the specific activities and interventions, which are a catalyst of building the efficient companies of market economy (Mihailovic, 2007).

In agro-business sector, the consulting represents one of the most important factors of business modernization. In support of this statement should state a confirmed fact that investments in the consulting (and agricultural researches) bring around 40% of an average rate of earnings, which is "much more than other investments in agricultural development" (Van den Ban and Hawkins, 1996). The consulting services market research in Serbia has determined that there is significant demand for the consulting services in agro-complex, in the field of production standardization (Mihailovic, 2011). In accordance with the companies' needs in agro-complex of Serbia, it is useful to formulate some directives for a consultant's selection in this field, and especially for realization of quality management system in the organic food production.

In implementation of the quality management system, some of the companies in agro-complex of Serbia decide to depend on their own personnel, but some of them use the external consultants' services. Selecting a consultant is very important for an organization, while there should provide that a resulting system of the quality management should be capable to fulfil all goals, which the organization had planned in the best and the most efficient way. Even when use the consultants' services for the quality management system, inclusion and devotion of the organization's top management are key factors for realization of the quality management system.

This international standard was dedicated to providing instructions regarding the factors that should be considered, when chooses a consultant for the quality management system. It can be used by the organizations for the quality management system in selecting a consultant capable to fulfil their special needs, expectations and goals, while realizing the quality management system. It could be also used by: a) consultants for the quality management system, as the instructions for consulting on the quality management system, and b) consulting organizations, for a consultant's selection for the quality management system (Directives for a consultant's selection for the quality management system and his services use, 2005).

## Concept and types of ecological consulting

Ecological factor gets its significance, which creates a demand for special consulting services regarding projection and installing of equipment for reduction/elimination of pollution. The investments value on the global ecological market has increased from 379 milliard USD in 1995, to 518 milliard USD in 2000 (Jankovic, 2006, pp. 581-588). At the same time, it is important to emphasize also the existence of increasing specialization of consultants for specific fields. Aiming to fulfil the organic production standards, it is necessary that consultants have new highly-specialized knowledge. The consultants' specialization (so called. SMS – Subject Matter Specialist) means knowing well the specific fields, like socio-economic consulting, ecological consulting, as well as getting to know with new regulations and standards in the EU.

Consequentially, the assumption of successful consulting is continual education of consultants and exchange of business experience and innovations, through consulting associations. In regard to it is also the existence of development strategic planning and connecting to AKIS (Agricultural Knowledge and Information System) and different centres for consultants' education. It can be special centres for that purpose, but the most often, those are faculties, research institutes, schools and different institutions, which, depending on the consultants needs, provide additional education. In that way, the consultants enrich their knowledge and dignify business experience. Acquired knowledge further carries over and provides solving concrete business problems of clients. The research results (Socially responsible business in Serbia, 2005) point out to underdeveloped consciousness on socially-responsible business, although are noticeable some positive moves, in sense of compatibility

development with up-to-date business concepts in developed market economies. For mass application of the previous concept is necessary the transition ending, by which make assumptions for application of a *triple bottom line* principle, which appreciates economic, social and ecological criteria (Djuričin, 2006).

The consulting services in the field of the environment protection and ecological management provide certain scientific-research organizations (institutes), Serbian Chamber of Commerce, consultative bodies of some ministries, as well as private consulting organizations, which, within business offer, have services of ecological management. In the field of ecological management are at least three types of consulting projects: 1) diagnosis of ecological terms, socially-responsible business and sustainable development, 2) education and implementation of ecological production standards, 3) interventions in production and technology. The consulting organizations offer depends on needs, i.e. demand on the consulting services market. At the same time, the offer is influenced also by human resources potential of the consulting organization. The most important are experience and expertness of the consultants, which provide to be cooperative with the clients requirements regarding the ecological management. The most significant support of consulting services notices also in the field of ecological clusters' forming. IN Serbia, the initiatives for clusters forming are also present in the ecology field. Companies – members of the Serbian Ecological Cluster are authorized for taking over and recycling of specific types of hazardous and non-hazardous wastes. It is important to point out that, all the companies – members of the cluster, have every technical condition, like necessary documentation for recycling and taking over the waste. The companies – members of the cluster, are authorized service providers in activities showed in the table 1 (Mihailovic, 2011).

The experience has shown that the most chance for success have those clusters (initiatives), which have a consensus on mutual goals and activities, which have a clear frame for cooperation and based on own initiative. In Serbian economy, during the Pilot Clusterization Program, these are, at the same time, the biggest problems. Successful work of the cluster is limited by high level of the members' distrust, lack of understanding of cluster concept, a desire for horizontal association without readiness for deeper cooperation, insisting on individual problems, fear of loosing the autonomy in business decision-making.

At the same time, absence and underdevelopment of institutional and infrastructural support largely hinder these processes in Serbian economy. The cooperation between universities, scientific-research organizations and economy sectors, is not sufficiently developed (Program for development of business incubators and clusters in the Republic of Serbia, 2006).

**Table 1.** *Fields of consulting services within ecological cluster*

| |
|---|
| ▪ Consulting in the field of implementation ISO 9001, ISO 14001, EMAS, BSI OHASAS 18001, HACCP/Codex Alimentarius, EUREPGAP, ISO 17025 , ISO 22000 |
| ▪ Making reports on strategic assessment of plans and programs influence on the environment |
| ▪ Making integral local plans of waste management in municipalities |
| ▪ Writing projects for applying for credit assets with domestic and foreign donors |
| ▪ Making and implementation of LEAP (local ecological action plans) and Agenda 21 |
| ▪ Consulting services in the field of law and policy of the environment protection |
| ▪ Lectures and trainings according to your wishes in the field of management system and the environment protection |
| ▪ Making the assessment study of influence on the environment and making all following requirements through all phases of influence on the environment assessment procedure |
| ▪ Making risk assessment from chemical accidents |
| ▪ Expertise in the field of eco-toxicology |
| ▪ Production and sale of equipment for disposal and recycling of secondary raw materials |

**Source:** *Mihailović, B. (2011): Development of consulting services in Serbia and their influence on company performances in agrocomplex, monograph, Institute of Agricultural Economics, Belgrade, p. 117.*

## Conditions for organic production in Serbia

There are natural conditions in Serbia for development of organic production, which reflect mostly in unpolluted agricultural areas, as well as in existence of households in mountain areas with the entire cycle of vegetable and livestock production. The production, processing and market placement of the organic food have to be harmonized with the international standards and with the law on organic food production in Serbia. The organic agriculture is based on application of specific methods of the organic production. It gets its more significance by bringing a man closer to nature, from which he had become renegade; it makes almost complete harmony with the environment preservation requirements and finally, it provides to population to feed with the products made by natural processes,

using organic and mineral matters (Katić et al., 2008, pp. 267-276). Accordingly, the organic production goals are the following: production of sufficient amounts of high-quality food; up keeping and increasing long-term fertility and biological activity of land by using biological, mechanical and methods adjusted to local conditions; protection and up keeping of biodiversity in nature and agriculture, on a farm and its vicinity, by using sustainable production systems; maintaining and preserving the genetic biodiversity by paying attention to genetic resources management on the farm, recognizing domestic knowledge and traditional producing system significance, their protection and apply in education (Mihailovic et al., 2007, pp. 81-94). Numerous goals stated in Codex Alimentarius can be added to those goals, such as: promotion of renewable resources in locally organized agricultural systems, managing agricultural products in a way by which will keep the organic integrity and a vital quality of products in all processing stages, etc. As these goals cannot be measured easily, the best way is to insure their realization in practice and to make a difference between the organic and conventional production and to adopt procedures, official rules, as on the national, as well as on the international level. Development of the organic production implies introduction with the IFAOM standards, by which suggest and determine a minimum of requirements for the organic production (Mihailovic et al., 2007, pp. 81-94).

The Republic of Serbia has very favourable conditions for setting up this type of production. The environment is preserved, especially in mountain regions, which occupy 71.5% of central part of the Republic of Serbia, or 51.7% of the entire republic territory (Katić et al., 2008, pp. 267-276). Most of these areas have high-quality water, clean air and are remote from highways and other sources of the environment pollution. Accordingly, the organic production realizes by very high criteria and it is regulated by special decisions. These regulatory rules exist in Serbia, too, and are well coordinated with the EU legislation. The area in which collect wild plant species from natural habitats, by the organic production method, in 2009 was amounted around 1,000,000 hectares, while arable land on which applies the organic production methods was amounted around 1,200 hectares. The organic production is based on an essential connection between agriculture and nature, with a focus on respecting the natural balance. By the organic production and supply of health-safety food creates pre-conditions for motivating export and improvement of socially-economic position of rural environment and the national economy.

## Consultants for a quality management system

The standards give the production a common language. In this way communication is easier, and marketing more successful. The standardization helps producers to insure a product which is required and can be sold, while helps buyers to get the quality they want. Big supermarkets associations introduce the quality standards, which the production has to fulfil. Those standards refer to bio-chemical characteristics, external look (mass, colour, diameter of fruit) and presence of harmful matters (nitrates and heavy metals, pesticides' residuals, phyto-hormones). It is about, primarily, EUREGAP 13 for agricultural production and HACCP in processing industry (Presna et al., 2006). Those standards appeared as consumers reaction to a phenomenon of unsafe food during the livestock diseases epidemic (mad cow disease, foot-and-mouth disease), as well as of fear from introducing the genetically modified food. The EUREGAP is the standard which covers all main aspects of production, like managing land, crops growing and gathering. It also deals with pollution issues, labour treatment and environment protection. It follows the production from sowing (analyzes origin of seeds and soil history), through growing (follows the use of herbicides, pesticides and fertilizers – quantity, type, quality, place and method of application), irrigation and gathering (hygiene level and a way of storing), to packing, transport and placing a product to a store shelves.

The standard HACCP represents a system which identifies, considers and controls risks, important for food safety. The risk includes biological, chemical or physical agents in food, with potential to cause unfavourable activity to human health. Needs for the HACCP are caused by the following factors: increasing number of polluters, increasing care of health due to hygienic food contamination, increasing risk of diseases caused by chemical problems in food production, new technologies and life styles and reducing threshold of the people, and also the world trade requires the international harmonization. The HACCP provides numerous advantages. The most important are the following: provides a preventive system for food production, more effective and more efficient supervision by the government with less inspection, responsibility for food safety transfers to industry, helps food producers to be more competitive on the global market. A stimulus for higher organic production in Serbia is small and medium companies in the field of fruit processing. The HACCP standard (hazard analysis of control critical points in production) in Serbia has introduced 12 companies in the field of fruits and vegetables

processing (Malina Produkt, Mondi Food, Sirogojno, Hibrid, Libertas, Flora, Vulić Vulić, Jevremovac ABD, Zadrugar), while the firm Libertas from Sabac, which deals, except processing, with growing fruits and vegetables, has got the first EUREGAP certificate in Serbia. Although, still high percentage of Serbian producers and processor of food, poorly or not at all, have been introduced to the food safety standards.

Taking into consideration that there is a great demand, in Serbia, for consulting services in the field of introduction and implementation of standards in production and quality management, there will consider necessary professional competence of the consulting organization for this type of consulting projects. The factors of its professional competence represent more developed and, to some extent, modified form of previously stated determinants of a consultant's competence. When chooses a consultant for the quality management system, the organization should evaluate if the consultant has the competence which suits to a size and a content of the consulting services, he should provide. The competence has been defined in ISO 9000, as a demonstrated ability for application of knowledge and skills. As such, it comprises: personal characteristics, education, knowledge and skills, knowledge and skills specific for the quality management, knowledge and skills specific for the organization, work experience, keeping and improving the competence (Directives for selection of a consultant for the quality management system and its services use, 2005). The personal characteristics contribute to a successful activity of the consultant for the quality management system. Generally, the consultant for the quality management system should have numerous personal characteristics, which will help him during his work in a company. The consultants for the quality management system should have adequate education, necessary for implementation of knowledge and skills in regard to the provided consulting services. Besides, from the consultants for the quality management system are expected to understand and apply the relevant international standards (ISO 9000, Systems for quality management – Groundwork and dictionary; ISO 9001, Systems for the quality management – Requirements; ISO 9004, Systems for the quality management – Guideline for performances' improvement; ISO 19011, Guideline for checking the quality management system and/or a system for the environment management), as well as other relevant international standards. Also, the consultant must know other standards necessary for the consulting services.

The consultants for the quality management system should have a general knowledge on: a) standardization, systems for certification and accrediting on the national and international level, b) processes and procedures for the national certification of products, systems and personnel. The consultants for the quality management system must know some appropriate principles, methodologies and procedures and to be capable to apply it.

The next list points out to such fields where the consultant's experience and ability can be useful: principles of quality management; tools and techniques for permanent improvement; adequate statistical techniques; methodologies and techniques for checking; principles of the quality economy; team work techniques; PDCA (Plan-Do-Check-Act) methodology; methodology of policy development; techniques of a process mapping; techniques for problems solving; techniques for tracking satisfaction of users/employees; brainstorming methods. Being introduced to the law requirements and other regulations, which refer to the organization activities and the consultant's workload, are important for the consulting in regard to the quality management system. However, there cannot be expected from the consultants for the quality management system to have the experience in application of this knowledge before starting their services. The relevant knowledge in this field considers typical requirements from the law and other regulations for the organization's products (for example, from ISO 9001).

The companies in Serbian agro-complex agree in one: the consulting services price issue cannot be more important than professional integrity and professional competence of the consultant (Mihailovic, 2011). On a scale of 1 to 5 (1 – the least important criteria of a consultant's selection, 5 – the most important criteria of a consultant's selection) of a consulting service price has the lowest average grade (3.8), opposite to the professional competence with the highest grade (4.66). The results of the empirical research coincide with recommendation of some international consultants association. For example, the International Federation of Consulting Engineers – FIDIC, suggest the clients to choose a consultant, according to his ability, not the price. A consultant, as a rule, forms a price and collects the service in accordance to a common practice in the profession, by which the consulting services' payment method negotiates before the business starts. If the price departs (higher or lower) from the usual market price, than is necessary to inform the client about the deviation reasons.

The analysis of the required price often opens a question of a project task form and personnel necessary for its realization, so it should also be considered and précised at the beginning of negotiations.

In that way will eliminate at the start unfavourable occurrences, which can seriously disrupt set good relations between a consultant and a client, and the least misunderstandings can jeopardize implementation of contracted business.

During the analysis of a consultant's offer, before he accepts it, a management of a company/client pays special attention to how it is correct, i.e. if it includes some unnecessary and unfavourable items:

- Consultant has suggested too expensive approach (e.g. broad data collection, using more samples than necessary, elaboration of oversized number of alternatives, supply of expensive patent systems or equipment – *hardware*, etc.).

- Proposal of the project anticipates engagement of highly-professional and more expensive experts (more senior consultants) than necessary in that case,

- Consultants suggest their people for jobs the client can do by himself or with some training and directing (Kubr, 1995).

The consulting services, connected to ecology and the environment requirements, are relatively new, but there considers that in the future this segment of the consulting services market will have more significance. In support of this conclusion is a fact that this sector strengthens in many countries, which have joined the EU. What is sure is that those services are interdisciplinary.

The consulting organizations, which basic activity is accounting, managerial and engineering consulting are present also in this market segment.

Table 2 shows an aptitude of services connected to ecology and the environment requirements toward trade. It is about the following consulting services: managing waste and pollution, issues of regulation, working environment and safety.

**Table 2.** *Commercialization of consulting connected to ecology and the environment protection*

| Services | Description | Local presence | Information technology | Local knowledge | Aptitude for trade |
|---|---|---|---|---|---|
| Managing waste and pollution | Advices for clearer production technologies and waste removal | Necessary to know materials in a client's production system | | In some casses is useful to know climatic conditions and environment conditions | Good |
| Regulation issues | Advices for rules concerning the environment and regulation | Not necessary | | Necessary to know intensively local rules and regulations | Poor |
| Work environment and safety | Advices for improvement of workers' safety at work. Suggestion of measures for increasing satisfaction at work | Necessary to know organization of a client's production system | Data bases on previous accidents, toxic materials etc. | Necessary to know local working culture and regulation of work safety | Poor |

**Source:** *The Tradability of Consulting Services and Its Implications for Developing Countries, UNCTAD, New York and Geneva, 2002., p. 157.*

The manager's task is to change production, marketing, as well as using products or services, or performing the activities in accordance with scientific and technical acknowledgements, in order to prevent a serious or irreversible degradation of the environment.

At the same time, there is necessary to measure the effect of environmental protection, to perform regularly the environment protection checking and assessment of adjustment with the internal requirements of a company, legal requirements and other regulations. In this way will provide contribution to preserve the favourable conditions for the organic production development in Serbia.

## Integral local development and some aspects of environmental protection

With occurrence of new challenges of globalization, significant interest has been directed to development of new methods for solving diverse business influence in the society. Many of those influences are far-reaching and profound. Just to mention some, as:

- *Environment pollution* caused by production, transport and using products as cars, refrigerators or newsprints.
- *Increasing problem of waste disposal* and its management as a result of excessive packaging.

- Devastating results for individuals and local communities, due to *closure of the local companies,* reduction of their size and number of employees, which is an experience well known in Europe, from South Wales in Great Britain, to the countries of Central and East Europe.
- *Erosion of local cultures and surroundings* owing to a penetration of mass tourism in places like: Mallorca fishing villages, Swiss alpine communities, as well as ancient Roman monuments.

After the *Earth Summit*, held in 1992 in Rio de Janeiro, a concept has imposed as the one which should be at full length applied (although it had not been unilaterally accepted). It is about a new conceptual frame for evaluation of not just business activity especially, but also industrial and social development generally. That concept is the *sustainability concept*. The sustainability has started to be a common expression in a rhetoric regarding a business ethics, so its uses in full length by corporations, governments, consultants, scientists, etc. Despite the wide use, sustainability is a concept which is used and interpreted in different ways (Dobson, 1996). Probably the most common use of the expression is related with the sustainable development, which usually defines sustainable development as: *Development that meets the needs of the present without compromising the ability of future generations to meet their own needs* (World Commission on Environment and Development, 1987).

This definition, however, represents only a basic idea of a widely deniable expression, which was also a subject of enormous series of different conceptualizations and definitions. Thus, along with all the caution against an unquestioning acceptation of any interpretation, on a basic level, it seems that sustainability primarily refers to the system preservation, as well as to the fact that our activity does not affect the systems (for example, Earth or biosphere) in a way that their long-term sustainability is jeopardized. Focusing on the sustainable development and the future generations potential to satisfy their needs, sustainability also faces reflections on inter-generational capital, i.e. on equality between one generation and another. For a long time the sustainability concept has substantially stayed a synonym for human environment sustainability. Recently was yet enlarged not only to the environment considerations, but also to the economic and social development (Elkington, 1998). This sustainability concept enlargement has emerged not only for the reason that it is impractical, sometimes even impossible,

to analyze the sustainability of natural surroundings without the consideration of social and economic aspects of relevant social communities and their activities. The second argument for this consideration continuation is if the capital should enlarge to the future generations, then it is logical that it also should be enlarged to those in the existing generation. Thus, one of the primary goals set by the World Commission for Environment and Development is to uproot the world poverty and inequality. As it is noticeable, sustainability can be observed through three components: ecological, economic and social. It refers to a definition: "*Sustainability refers to long-term system preservation in accordance to a man's environment, economic and social development*" (Djuricin, 2006). Maintain the subtle balance between industrial development and environmental conservation leads to redefine the existing resource combinations due to the costs of transition to new technologies friendly to the environment. Although the definition is meant for determination of a basic content of sustainability concept, it is obvious that sustainability as a phenomenon represents a specific goal, which should be achieved. Shaping the sustainable development as the goal of the business activity of a company is the most complete expressed through a "triple bottom line" concept. The "triple bottom line" is a term which has been formulated and strongly pleaded for, by John Elkington, director of the Consulting Agency for Sustainability Strategies and the author of many esteemed books on corporate environment. His opinion on this concept was based on the fact that it represents an idea that business is not related only to one goal which reflects in maximizing economic value, but he added the enlarged set of goals, which implies including the environment and a wider social community. From this point of view it should be clear why sustainability is a new goal, potentially important for business ethics. However, in order to develop clearer picture on what these three sustainability components represent for the business ethics, one must analyze each of them.

*Perspectives related to the environment protection*. The sustainability concept is generally considered that it has emerged from the environment protection perspective, especially in forestry, and later also in other areas of resources management. Indeed, in this moment there is still quite a widespread perception in business (although we believe it is wrong) that sustainability is often a concept of man's environment protection. Thoroughly sustainability principle in the perspective of the man's environment protection comprises an effective management of physical resources, in a way to be preserved for the future. All bio-systems are

observed as the ones with limited resources and finite capacity, and thereby also the sustainable human activity must work at the level which does not jeopardize endangered species health. Even at the most basic level, these problems point out to a need to eliminate a certain number of critical business problems, like influences of industrialization on biological diversity, further use of non-renewable resources as oil, steel and coal, as well as the production of harmful environment polluters. Although those relations also increase the economic growth issue, as a vexed question remains if the future generations could really realize the same life standard as us, without cancellation of increasing production and consumption trend. Consequently, ecological factor gets its significance, which makes a demand for special consulting services related to projection and installation of equipment for reduction/prevention of pollution (Cvijanovic, Mihailovic, 2010, pp. 99-106).

*Economic perspective.* The economic perspective of sustainability has emerged from the economic growth model, which assess capacity limits of the planet Earth. Understanding that a continuous growth of population number, industrial activity, resources utilization and the environment pollution can lead to the life standard reduction, have initiated the sustainability occurrence as a way of thinking which would insure that the future generations will not be in an unfavourable position due to activities and choices of the existing generation. In time has expanded the opinion on improvement of sustainability macroeconomic comprehension. Such opinion implication on the business ethics have appeared at different levels. Narrow concept of economic sustainability focuses only on economic performances of the corporation. The management is responsible only for development, production and market of those products which ensure long-term economic performances of the corporation, without respect for the environment and society requirements. Paying bribes or forming cartels, for example, can be considered economically unsustainable, while these activities jeopardize long-term functioning of the market.

*Social perspectives*. Development of the social perspective related to sustainability usually comes after the ecological and economic perspectives and stays relatively new, as a phenomenon. Explicit integration of social problems into the business discourse about sustainability could be seen as a phenomenon during the ′90s, and, first of all, seems as answer to a worry regarding the business activities influence on autochthonous communities in less developed countries and regions.

Introduction of social reflection within the sustainability area has characterized a significant shift in this concept's interpretation. A key question in the social perspective is the one concerning the social justice. Regardless to an impressive progress of life standard, the UN, during 2005, had issued the *Report on Social Situation in the World*, which had identified a constant deepening of inequality on the planet. With 80% of the world gross domestic product, which belongs to one milliard people living in developed countries, and the rest 20% shares 5 milliard people who live in developing countries, as it is stated in the Report, was suggested that "solving the inequality must secure a social justice and better life conditions for all the people, which is unachievable in this moment, so the communities, countries and regions are still vulnerable to social, political and economic subversion" (The Report of the World Social Situation, 2005). More concrete, in the Report is stated that there is "an increasing chasm among qualified and unqualified workers, the chasm among formal and informal economy, as well as significant differences in health care, education and opportunities for social and political participation" (The Report of the World Social Situation, 2005).

Although the UN had determined the goals, they, in effect, represent a government responsibility which should achieve them. Some of them have very direct implications for business, while the others refer to wider environment in which companies have to do business. In regard to this enlarged set of expectations, which are put in front of business in accordance with the concept of "Triple Bottom Line", there are many significant implications regarding the way in which should be observed the business ethics. Aiming to achieve sustainability in previously defined areas, maybe expects too much nowadays. There are negligible products, firms or industries which could reliably claim that they are sustainable in the full sense of the word. Nevertheless, with the concept of sustainable development widely promoted by governments, companies, non-governmental organizations and academic communities, which is obviously important in order to understand full implications and evaluate the business ethics application, at least according to potential contribution to sustainability. The programs of support to the sustainable development (primarily rural development) can have more significant effects if they are directed to competitiveness, innovations and employment in rural areas. By introduction of the rural development local strategies (LEADER approach), through stimulating interest of the local population by their active participation and creating the local action groups (LAG), the social capital in these areas can significantly increase. The EU Agrarian Council

adopted in 2005 a fundamental reform of rural development policy for the period 2007-2013 (Regulation EC No. 1698/2005). The new rural development policy has set exactly the LEADER initiative as a leading approach in distributing support and has notably simplified the procedures, and these are the following "axes" in the period until 2013: Improvement measures, i.e. increase of the agrarian sector competitiveness; improvement of the environment and rural environment through the support to land management; economic diversification and improvement of life quality in rural areas; and the so-called, "horizontal" component or fourth axis of financing and conducting the rural development policy – the LEADER approach. Integrative approaches in the local development have been useful in the previous period, especially in sense of the local capacities construction and assistance to the government agencies and to the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia. Positive influence reflects, first of all, in creating the adequate support measures and more qualitative assessment of the specific measures′ effects on the local development.

## Conclusion

Liberalization of domestic economy means not just the international competition, but also stricter business conditions. New terms of business competition imply understanding and implementation of regulations in the field of the environment protection, health care, safety, protection of producers and adequacy of a product. The managers in Serbia have no sufficient business experience in market conditions, so they need support in knowledge, skills and introduction to the organic production standards. Consulting appears to be a good form of this support. Condition of our companies and insufficient managerial abilities and skills contribute to the consulting actuality role in understanding and accepting the standards referring the organic production. Accordingly, in this paper was pointed out to the significance of the consulting services in the organic production affirmation in Serbia and identification of its development limit. There was also analyzed the consulting contribution to the organic production development in context of compatibility with socially-responsible business and a concept of sustainable development in Serbia.

In Serbian companies has dominated the production orientation which has not accepted the market requirements. Domestic companies have lost a brand and the traditional markets. Coming out from the crisis requires a constitution of market-oriented companies, which implies a series of

structural changes, directed to improvement of business efficiency and adjustment to the market requirements. Development of companies in the transition conditions requires many expertises, abilities and skills in comparison with developed market economies, where there is great accumulated knowledge and experience. Modern production implies modern technologies. In that sense, aiming to fulfil the EU standards, it is necessary for the consultants to have new, highly-specialized knowledge.

## References


1. Cvijanović, D., Mihailović, B. (2010): "Značaj konsultanata u proizvodnji organske hrane u Srbiji", *Međunarodna konferencija "Zdrav život"* 10. april 2010., Trebinje, u okviru V međunarodnog sajma turizma, ugostiteljstva i trgovine „Mediteranski dani – Trebinje 2010", str. 99-106.

2. Dobson, A. (1996): "Environment Sustainabilities: An Analysis and a Typology", *Environmental Politics*, 5(3), pp. 401-428.

3. Društveno odgovorno poslovanje u Srbiji, Stratedžik Marketing, januar-jun, Beograd, 2005.

4. Djuričin, D. (2006): Tranzicija, stabilizacija i održivi razvoj: Perspektiva Srbije, Uvodni referat, Miločerski ekonomski forum 2006: *Evropski prioriteti i regionalna saradnja*, Savez ekonomista Srbije, Miločer.

5. Elkington, J. (1998): *Cannibals with forks: The triple bottom line of 21st century business*, Gabriola Island, BC Canada: New Society Publishers.

6. Janković, D. (2006): Organizacioni modeli poljoprivrednog savetodavstva u Nemačkoj, *Ekonomika poljoprivrede*, Broj TB (13-667), pp. 581-588

7. Katić, B., Cvijanović, D., Cicea, C. (2008): Organska proizvodnja u funkciji zaštite životne sredine u Srbiji - stanje i regulativa, *Ekonomika poljoprivrede*, vol. 55, br. 3, pp. 267-276.

8. Kubr, M. (1995): *Kako odabrati i koristiti konsultante: Vodič za klijente*, (Prevod), Ekonomski institut, Beograd.

9. Mihailović, B. (2007): *Uloga konsaltinga u restrukturiranju preduzeća u tranziciji*, monografija, Institut za ekonomiku poljoprivrede, Beograd.

10. Mihailović, B. (2011): *Razvoj konsultantskih usluga u Srbiji i njihov uticaj na performanse preduzeća u agrokompleksu,* monografija, Institut za ekonomiku poljoprivrede, Beograd, pp. 117-168.

11. Mihailović, B., Savić, M., Katić, B. (2007): Konsalting, održivi razvoj i organska proizvodnja: perspektiva Srbije. *Industrija*, broj 4, pp. 81-94.

12. Presna, M.B., Branković, A., Savčić, R., (2006): *Sveže voće i povrće 2006: Konkurentnost privrede Srbije*, Jefferson Institute, Beograd.

13. Program za razvoj poslovnih inkubatora i klastera u Republici Srbiji 2007-2010, Republika Srbija, Ministarstvo privrede, Beograd, decembar, 2006.

14. Regulativa *EC* broj 1698/2005 o podršci ruralnom razvoju od strane Evropskog fonda za poljoprivredu i ruralni razvoj *(EARDF)*, Regulativa *EC* i Strateške smernice Zajednice za ruralni razvoj (Programski period 2007-2013).

15. Smernice za izbor konsultanata za sistem menadžmenta kvalitetom i korišćenje njihovih usluga, Standard Srbije i Crne Gore, JUS ISO 10019, 2005.

16. The Report of the World Social Situation 2005: The Inequality Predicament, United Nations Publications, New York.

17. The Tradability of Consulting Services and Its Implications for Developing Countries, UNCTAD, New York and Geneva, 2002.

18. Van den Ban, A.W., Hawkins, H.S. (1996): *Agricultural Extension*, Blackwell Science, UK, 1996.

# NICHE POLICIES AND TENDENCIES ON THE ROMANIAN ORGANIC PRODUCTS' MARKET

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## Abstract

*We are presenting the organic farming in Romania, the general background, the legislation bearing on it, the institutions created to coordinate this activity, the evolution of areas and productions, organization of producers, trade, the new challenges in the filed, tendencies and traditions. By this paper we would like to put in evidence the importance of the organic products on the present market characterised by high competitiveness and niche opportunities. For the analysis, we use long time series data based on statistical data provided by the National Institute of Statistics of Romania, the Ministry of Agriculture and various publications in this field. The conclusions and results of the paper will underline the present market tendencies, the opportunities of the Romanian business environment, the benchmarks for policy makers, niches alternatives and the level of the Romanian organic products market on a competitive global market.*

**Key words:** *Organic products, Niche market, Policy, Tendencies, Romania*

## Introduction

Organic foods are foods that are produced using methods of organic farming with limited modern synthetic inputs such as synthetic pesticides and chemical fertilizers (http://en.wikipedia.org/wiki/Organic_food). Organic foods are also not processed using irradiation methods, industrial solvents, or chemical food additives.

A niche market is a focused, targetable portion of a market. By definition, then, a business that focuses on a niche market is addressing a need for a

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product or service that is not being addressed by mainstream providers. You can think of a niche market as a narrowly defined group of potential customers. Niche markets are segments within your larger target audience that have similar demographic, buying behavior and lifestyle characteristics (Archer,C.,2013-University of Arizona). Small business owners often function as niche companies, targeting a specific industry or type of consumer. Through strategic marketing tactics, specialized industries can use marketing and advertising to directly appeal to their niche market. Some advantages of using niche marketing include lower levels of competition, and the ability to set products and services at premium prices. Reaching target markets are more effortless and more directed. The main disadvantage of niche marketing can be attributed to greater difficulty in gaining high profit levels due to smaller market size (truetobusiness.com).

In the same time, competitiveness is the ability of a firm or a nation to offer products and services that meet the quality standards of the local and world markets at prices that are competitive and provide adequate returns on the resources employed or consumed in producing them (Businessdictionary).

The paper discusses and analyses the concepts mentioned above, the policies in the field and tendencies observed during the last years on the Romanian market.

## Material and methods

For the analysis, we use long time series data based on statistical data provided by the National Institute of Statistics of Romania, the Ministry of Agriculture and various publications in this field. We split the analysis in two distinct periods: the organic market before European Union (EU) accession and after EU accession. In the same time, we use the partial results from the FP7 Project COMPETE (International comparisons of product supply chains in the agro-food sectors: determinants of their competitiveness and performance on EU and international markets), leaded by IAMO (Halle/Saale-Germania), which started in 2012 and lasts three years. The project is the result of the cooperation of the consortium established and comprises sixteen institutions from ten countries, financed by European Communities and co-financed by National Ministry of Education. The Institute of Agricultural Economics-Romanian Academy is partner in this consortium.

## Legal framework

The legal basis of the organic farming system was established in the 1990s by the Commission Regulation (EC) no. 2092/1991 regarding organic farm production and the indications for their presentation as agricultural and agri-food products.

At the national level, together with the signing up of the Association Agreement and the initiation of the EU accession negotiations – Romania's legislation had to get in line with the EU legislation. Following this process, at present, Romania's legislation complies with EU requirements and orientations.

The main normative acts, produced are: Government's Emergency Ordinance (OUG) no. 34/2000 on the organic agri-food products, approved by Law no. 38/2000; Government's Decision no. 917/2001, for the approval of the Methodological Norms for the application of provisions from OUG no. 34/2000 regarding the organic agri-food products; The Joint Order no. 417/2002 and no. 110/2002 of the Minister or Agriculture and of the President of the National Authority for Consumers' Protection; Order no. 70/2002 of the Minister of Agriculture on the establishment of the Commission for Organic Farming Development in Romania; Order no. 527/2003 of the Minister of the Agriculture for the approval of the Rules on the inspection and certification system and the accrediting conditions for the inspection and certification bodies in organic farming; Order no. 721/2003, of the Minister of the Agriculture for the approval of Rules on the import and export of organic agri-food products; Order no. 153/2006 regarding the approval of the componency of the Commission for the accrediting of inspection and certification bodies in the organic farming sector, which inspects and controls the operators on Romania's territory; Order no. 317/2006 regarding the modification and completion of the Annex to the Order of the Ministry of Agriculture and of the President of the National Authority for Consumers' Protection no. 417/110/2002, for the approval of the Specific labelling rules for the organic agri-food products; OUG no. 62/2006 for the modification and completion of OUG no. 34/2000 on the organic agri-food products; Law no. 513/2006 on the approval of OUG no. 62/2006 for the modification and completion of OUG no. 34/2000 regarding the organic agri-food products; Order no. 219/2007 on the approval of Rules regarding the organic farmers' official registration. All these provide information, rules and norms necessary in this field like: the

authority responsible for organic farming; the general rules and principles of organic production; the duration of the conversion period; the inspection and certification system; the list of accepted products to be used by the organic farming practice; the list of ingredients and processing methods that can be used in the preparation of organic foodstuffs; sanctions etc.

## Institutional framework

In Romania, the governmental policy is elaborated and coordinated by Ministry of Agriculture and Rural Development (MADR), under which the Office of the National Authority for Organic Products (ANPE) is operating, which is the authority in charge of the organic farming sector. ANPE has collaborated with different agencies, education and research institutions, foundations, among which we can list the following: The National Agency For Agriculture Consultancy – ANCA (no longer exist nowadays); The Academy of Agricultural and Forestry Sciences – ASAS; Higher education institutions, agricultural research institutes and stations; The National Organic Farming Federation, whose activity is based on the "sustainable development principle", a development type which should not disable the next generations' access to a clean environment.

The Ministry of Agriculture has established an action plan for the development of the domestic market of organic products, which includes:

- The intensification of actions promoting the organic farming concept;
- The improvement of information on organic farming practice, and the qualification of the participants in this sector;
- The increase of areas under the experimental modules "organic micro-farms";
- The delimitation of organic farming areas;
- Support to farmers during the conversion period;
- The creation of an information system accessible to farmers.

## Market organization

At the beginning of the Romanian accession into EU (2007), the following organizations were registered at MADR, with attributes or

concerns in organic farming, rural development, environment protection and sustainable development[2]: The Association for ecological agriculture "agri-eco", with the headquarters in Cluj Napoca, the professional Organization ,,Agroecologia" – Cluj Napoca, the Association of the bio-farmers in Romania ,,BIOTERRA" – Cluj' county, the Romanian Association for Sustainable Agriculture – Călăraşi County, the Association ,,Terra Verde" – Bucharest, the Association of the Bio-poultry breeders in Romania – BIOAVIROM – Ilfov County, the Association for the organic farming development in Romania, "Ecofocus" – Bucharest, Ecorural – Bucharest, the Association for the Environmental Protection and ecological agriculture ,,TER'' – Bucharest, the Foundation ,,Mama Terra" – Bucharest, ,,The National Association of the Agricultural Consultants" – Bucharest, the Academic Foundation for Rural Progress ,,TERRA NOSTRA" – Iaşi, ,,The Ecologist Society in Maramureş" – Baia Mare, ,,The Foundation for Rural Development in Romania" – Bucharest, ,,The Ecological Group for Cooperation Bucovina" – Suceava, the Foundation ,,Business School Mehedinţi" – Drobeta Turnu Severin, the Society ,,Avram Iancu" – Cluj Napoca, the Foundation ,,The Operation Romanian Villages" – Bacău county, ,,The Ecological Club Transylvania" – Cluj Napoca, ,,The Romanian Rural Foundation" – Timişoara, ,,Bioclub Cluj" – Cluj Napoca, ,,the Group of Gardeners Biodynamics" – Târgu Mureş, ,,the Romanian Association for Applied Biofarming" – Arad county, ,,the Centre for Ecological Consulting Galaţi" – Galaţi, ,,the Association for Environmental and Nature Protection" – Târgu Mureş, the Foundation ,,Divers Eco" – Maramureş county, the Foundation ,,Noema Consulting" – Cluj Napoca, the Association ,,Albina" (the ,,Bee") – Bucharest, the Association for Environment Protection and Preservation of Resources – Bucharest.
In Annex 1, we present the list of the organizations in organic agriculture, rural development, environmental protection, and durable development, at the end of 2012.

Organic operators (farmers) were registered at MADR and classified by three large categories of products: crop, livestock and beehive products. The farmers are organized either as independent producers, physical entities, or as family associations or commercial companies as legal

[2] Voicilas, D.M. (2007): Alternatives of rural development-organic farming. In: Multifunctional agriculture and rural development – Rural values preservation. Institute of Agricultural Economics-Beograd, ISBN 978-86-82121-48-0, Beograd/Beocin, Serbia

entities under the form of limited liability companies or joint stock companies. Not all the counties are included in this evidence. Most organic farmers are from a few counties: Suceava (North), Mureş and Sibiu (Center), Tulcea and Constanţa (South-Est).

## Supply of organic products in Romania

The data provided by MADR reveal the increasingly importance of this activity sector for the domestic producers. The positive evolutions of the areas and production in the organic farming sector prove the existing potential, initiative, development prospects and increasing demand from the consumers' part. In the Table 1, Table 2 and Table 3, we shall present the dynamic of the field, which proves the above statements.

**Table 1.** *Areas under organic farming system before EU accession (2000-2006)*

| Specification | Yearly Index | | | | | | 2006 |
|---|---|---|---|---|---|---|---|
| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | |
| Total area, out of which: | 100 (17,438 ha) | 1.65 | 2.51 | 3.28 | 4.23 | 6.33 | ***8.20*** |
| Cereals | 100 (4,000 ha) | 2.00 | 3.00 | 4.00 | 5.12 | ***5.52*** | 4.08 |
| Pastures and fodder crops | 100 (9,300 ha) | 1.51 | 2.15 | 2.58 | 3.37 | 4.55 | ***5.51*** |
| Oilseeds and protein crops | 100 (4,000 ha) | 1.58 | 2.50 | 3.90 | 5.02 | 5.65 | ***5.97*** |
| Vegetables | 100 (38 ha) | 2.63 | 18.40 | 5.26 | 7.89 | 11.58 | ***18.95*** |
| Fruits (sour cherries, cherries, apples) | - | - | 100 (50 ha) | 2.00 | 4.00 | ***8.64*** | 5.84 |
| Spontaneous flora collection | 100 (50 ha) | 2.00 | 6.00 | 8.00 | 10.00 | 352.60 | ***774.00*** |
| Other crops | 100 (50 ha) | 6.00 | 16.00 | 18.00 | 18.00 | 97.68 | ***242.00*** |

**Source:** *Own calculation based on MADR and INS (National Institute of Statistics) data*

Land areas (Table 1) increased in the mentioned period. The trend is increasing and the perception of these crops as an alternative activity and income source is positive (Voicilas, D.M., 2007). Comparing the objectives established by the government's strategy with the field results, we could say that the objectives were reached, the bases were created for the development of this activity and for the use of the market niches, both on the domestic and world markets.

As in the case of land areas, productions (Table 2) continuously increased in the investigated period. Although the production levels were much higher at the moment of accession into EU than those obtained 5-6 years before, the domestic supply cannot totally meet the demand, which makes it possible for the imported organic products to penetrate the Romanian market, as we shall see later on (Voicilas, D.M., 2007). For instance, total crop production increased by 12 times, oilseeds and protein crops by 13 times, vegetables by 14 times. In the same time, an incredible grow had spontaneous flora collection with almost 125 times.

**Table 2.** *Organic farm production before EU accession (2000-2006)*

| Specification | Yearly Index | | | | | | 2006 |
|---|---|---|---|---|---|---|---|
| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | |
| **Total crop** production, out of which: | 100 (13,502 to) | 1.81 | 2.39 | 2.25 | 6.46 | 9.77 | ***12.34*** |
| -**Cereals**, out of which: | 100 (7,200 to) | 1.74 | 2.22 | 2.00 | 5.69 | ***7.64*** | 6.73 |
| Export | - | - | - | - | 100 (7,100 to) | 1.56 | ***2.55*** |
| -**Oilseeds** and protein crops, out of which: | 100 (5,500 to) | 1.31 | 2.00 | 2.27 | 6.73 | 8.29 | ***13.29*** |
| Export | - | - | - | - | 100 (9,800 to) | 1.23 | ***2.26*** |
| -**Vegetables** | 100 (600 to) | 6.67 | 6.67 | 3.33 | 5.00 | 12.00 | ***14.51*** |
| -**Fruits** (sour cherries, cherries) | - | - | 100 (200 to) | 1.50 | 2.50 | ***5.00*** | 1.70 |
| -**Spontaneous flora** collection, out of which: | 100 (200 to) | 2.00 | 1.50 | 1.60 | 22.50 | 83.74 | ***124.81*** |
| Export | - | - | - | - | 100 (3800 to) | ***3.74*** | - |
| -**Other crops** | 100 (2 to) | 150.00 | 400.00 | 450.00 | 600.00 | 3175.00 | ***5520.50*** |

**Source:** *Own calculations based on MADR and INS database*

In the Table 3, we present the evolution of the organic agriculture in last years, after the accession into EU.

**Table 3.** *Areas and producers in organic agriculture after EU accession (2007-2012)*

| Indicator | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|
| No. of farmers | 3834 | 4191 | 3228 | 3155 | 9703 | 26736** |
| Area in arable area (ha) | 65112.0 | 86454.0 | 110014.4 | 148033.5 | 151109.0* | 164936.9 |
| Area - permanent crops of pastures and fodder (ha) | 57600.0 | 46006.5 | 39232.8 | 31579.1 | 78198.0 | 105835.6 |
| Area - permanent crops of orchards and grapevine (ha) | 954.0 | 1518.0 | 1869.4 | 3093.0 | 4166.0 | 9430.0 |
| Spontaneous flora collection (ha) | 58728.0 | 81279.0 | 88883.4 | 77294.4 | 80120.0* | 1088641.3 |

** estimations; ** producers, processors, traders, importers, exporters*
**Source:** *MADR database – County Agricultural Departments (www.madr.ro)*

According to the last data from MADR, in 2012 the areas under organic agriculture increased fantastic, due to the facilities accorded by the ministry and the EU funds at the producers' disposal, on one side and on the other side due to change of the classification of organic producers (this was mainly due to the existing support measures for the period conversion granted under art. 68 of Regulation (EC) laying nr.73/2009 common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers). In the same time, there are estimations that the number of organic operators increased in the same way, nowadays being over 10000, at the level of 2011 (Eco Ferma, 2014, http://www.eco-ferma.ro/performantele-agriculturii-ecologice/) and over 26000, at the level of 2012 (http://old.madr.ro/biofach2013/Anexa_sector_ecologic_romana.pdf).

## Demand and trade of organic products in Romania

Baased on the results presented in the previous chapter, the organic farming could be considered as a dynamic sector in Romania (Voicilas, D.M., 2007). Also, we want to mention that the sector has an increasing trend with rapid changes year by year. As a result, the organization of the marketing (www.agricultura-ecologica.ro) of the organic products is an increasingly important element in this sector. The sale of organic products can take place directly from the farm, or through the traders registered at

MADR. The organic products are found both in the large store network and in the small-specialized shops.

On Romanian market, organic product range is quite limited. On national market, in 2011, were sold: vegetables and fruits produced, processed fruits and vegetables, herbal teas, bread, pasta, flour products, processed cow and sheep milk (butter, feta cheese), eggs, oil, wine made from grapes certified organic, processed soy products, honey, etc. Most food is brought from abroad (canned vegetables, fruits, bread). Bestsellers organic products are milk, eggs, yogurts, fruits, vegetables, and meats.

Immediately after joining the EU, total sales of organic products in Romania reached about 10 million, which represents less than 1% of the retail market and very little compared to 5-6%, as is the European average (2008). At present, the estimations of total sales of organic products, made by MADR are double.

The organic products are found both in the large store network and in the small-specialized shops. At the beginning of EU accession, only two shop networks were registered: "BIOCOOP" (Sibiu) and Naturalia (www.naturalia.ro), with units both in Bucharest and in the county Ilfov (Voluntari). After one year, there were registered other 6 shops. At the end of 2012 there are already 25 shops registered.

The sale on the domestic market is through the wholesale networks Metro, Selgros mainly by retail shops. The main stores that introduced organic products in their assortment of goods are: Carrefour, Cora, Gima, La Fourmi, Mega Image, Nic, Primavera, OK.

An important role in market promotion and obtaining new market shares and segments of consumers is represented by the marketing activity. The presentation of products, the beneficial effects upon the human body, the gains obtained by buying clean and healthy products, even though they are more expensive than the conventional products, as well as consumers growing aware of their importance, are the main concerns that the producers and sellers of organic products should have in their development policy. The participation in exhibitions, fairs and other national and international manifestations is a modality to present the organic products and to establish new contacts for marketing these products. It is only a promotion modality among several possibilities, with a special impact upon consumers.

The fact that the organic products have a market in Romania is proved by imports, which are doubling almost every year. In 2007, the market of organic products was estimated at 2.5 mil EUR (1 mil EUR more than in 2006, before accession). At that time, about 70% from the organic products on the market were from import. Meantime, the imports decreased and at the end of 2010 the exports were about 150 mil. Euro and imports were about 35 mil. Euro ( Eco Ferma, 2014, http://www.eco-ferma.ro/performantele-agriculturii-ecologice/).

The study done by Expert Group company in 2007 reveals that only 30% of the organic production is sold on the domestic market (the rest was exported). The main organic products sold through the organized commercial network were eggs and dairy products. In comparison, in 2012 a percentage of approx. 70-80% of organic products was exported.

The Romanian organic products are mainly exported to Western Europe (Germany, Italy, Switzerland, Netherlands for example) and attempts are being made to penetrate the US market. The wild berries, either organic or non-organic, have a much higher export price, and the price is even higher if these are organically certified. Main exported products are: cereals, oilseeds and protein, berries, herbs, honey and sheep cheese.

**Policies, tendencies and problems on organic market in Romania**

There were identified a few directions of strategic importance for the future of the sector, which can guide the activities of the operators in the next years, by the authorities, organizations and businessman in the field. Among them, we would like to mention:

- The increase in the number of operators in this sector with financial support from the Government Programs;
- Increase of the role of the non-governmental organizations (NGOs) in this sector through programs for the development of trade with organic products;
- Increase in the number of exporters who are actively involved in programs for organic agricultural trade development in the less-favoured areas;
- Support provided to organic commercial farms, so as to be more active on the market;
- The association of the small organic farmers so as to co-operate in the marketing of organic products;

- The increase in the number of municipal and regional organizations directly involved in the implementation of the National Export Strategy in its initial stage;
- The increase in the number of local processing units and foreign direct investment projects;
- The increase of investments in related activities in rural areas;
- The increase in the number of employees in the exporting units which are implementing the organic farming regulations;
- The increase of investments in the activities related to exportable organic products from the less developed rural areas;
- The increase of the organic farm output;
- The increase in the number of new companies involved in export activities with primary and processed organic agricultural products;
- The increase in the number of optimal operation modules by the association of crop and livestock farms;
- The development of processing capacities for the organic farming sector;
- Capacity improvement in terms of products and value added;
- The development of services oriented towards the export of organic products;
- The diversification of the exportable cultivated species (for example: vegetables, fruits) and of the range of processed products (e.g: bakery and pastry products);
- Increase in the number of new approved investment projects.

During the recent years, a few problems were identified in the field. The interviews and discussions with operators in the sector put in evidence the main concerns and troubles they were confronted on the market. In the next paragraph, we would like to mention few of them.

In the opinion of some farmers who had initiatives in this field, organic agriculture became a non-efficient business in Romania, not because the outlet is not large enough, but rather because the government has not shown interest in this activity so far; on the other hand, this activity was given as an example of opportunity to conquer the foreign markets. The lack of financial support from the state, in addition to the extreme weather phenomena in the last years, is the main factor which determines the producers to think giving up their business. In many reports made by the producers or in the communications at the scientific events organized by them, it is mentioned that farmers are confronted with the problem of

higher production costs as well as with the problem of products distribution.

The problem of the ratio of the production cost to the price of the product is not the only problem for organic farmers. The consumer is interested more in the price than in the quality of the product, and this constrains the development of the sector.

As always happens in such conflicts, on the other side, of the state institutions, the announcements are optimistic, satisfactory, and even praiseworthy. All governmental statements and the official documents show the favourable evolution of this sector and government's active implication in its development. For example, the documents elaborated by Romania's Government in the last years regarding the strategy in this field in the future, comprise concrete references on the next steps and have clearly identified objectives. We can easily remember what was stated in the past, before accession: Romania has great opportunities for promoting and developing organic farming due to its large agricultural land area, i.e. 14.9 mil ha and its non-polluted soils; the increase of organic farmers' participation to the economic events in the country and abroad (BioFach 2006). By the examination of the valoric chain and of the consumers' requirements on the world market, the following critical success factors could be identified: price, assortments, package, branding, and availability.

## Conclusions

In conclusion, after our analysis, we can conclude that there are two factors that are responsible for consumer demand which is concentrated in the most affluent countries of the world: first is the premium price of the products and second is the level of education of the consumers. In case of the first factor, the price restricts demand to countries where consumers have high purchasing power. This explains why most sales are in countries where there is a sizeable middle-class in the population. In the case of the second factor is almost obvious that a high level education of population "opens the minds" and open new doors for consumption. They are well informed and have new tendencies of consumption. As consumers become more educated and informed of food issues, they are more inclined to buy organic products whether it is because of factors like food safety, concern for the environment, or health reasons.

Other important conclusion of the study puts in evidence the importance of the regional markets on the globe. As production of organic crops increases across the globe, regional markets are also expected to develop in which organic farmers will produce organic products for consumers in their region. This is expected to stimulate sales of organic products in many developing countries, where economic development is increasing at a rapid rate and a more educated and affluent middle-class of consumers is developing (Willer, H. and Yussefi, M.-Eds., 2004).

The final conclusions resulted from this analysis, as regards the ways which can contribute to the improvement of the competitiveness of the Romanian organic sector in the next period, considered an important niche market, are, as follows: the sector in Romania is very dynamic; the businessman has many opportunities on the market; the authorities has an important role in supporting and stimulating the sector, based on national strategies and EU financial programmes. In the same time, the main questions which can still remain under discussion for specialist and policy makers are: which production is proper for Romania, mass/conventional or niche? If niche, which is competitive at EU (world level) and must have support from Romanian authorities: organic products, nostalgic products, traditional products, MGOs or others?

## References


1. Archer, C., (2013), *The Advantages of Niche Companies in Marketing*, Demand Media, from http://smallbusiness.chron.com (University of Arizona)

2. Expert Group Studies

3. INS Database

4. MADR Database

5. National Export Strategy for the period 2005-2009

6. Voicilas, D.M. (2007), *Organic farming*, in Ionel, I. (Ed.): Non-conventional farming economics (pag. 70-125), Romanian Academy, Institute of Agricultural Economics, Terra Nostra Publishing House, ISBN 973-8432-75-8, 65-125, Iasi, Romania

7. Voicilas, D.M. (2007): *Alternatives of rural development-organic farming*, in: Multifunctional agriculture and rural development – Rural values preservation, Institute of Agricultural Economics-Beograd, ISBN 978-86-82121-48-0, Beograd/Beocin, Serbia

8. Willer, H. and Yussefi, M. (Eds.) (2004), *The World of Organic Agriculture – Statistics and Emerging Trends*, 6th revised edition, ISBN 3-934055-33-8, International Federation of Organic Agriculture Movements, Bonn, Germany

9. World Bank-MADR Project ExtEco - „Extension for Eco-Profit"

10. http://www.businessdictionary.com/definition/competitiveness.html

11. http://www.eco-ferma.ro/performantele-agriculturii-ecologice/www.truetobusiness.com

12. http://en.wikipedia.org/wiki/Organic_food

**Annex 1.** *Romanian organizations in organic agriculture, rural development, environmental protection, and durable development (2012)*

| Name of Organization | Location/web |
|---|---|
| Federaţia Naţională de Agricultură Ecologică | Cluj/ www.fnae.ro |
| Organizaţia profesională „Agroecologia" | Cluj/ www.agroecologia.ro |
| Asociaţia bioagricultorilor din România „BIOTERRA" | Cluj/ www.greenagenda.org/bioterra |
| Asociaţia Română pentru Agricultură Durabilă | Călăraşi/ www.agriculturadurabila.ro |
| Asociatia operatorilor din agricultura ecologica BIO ROMANIA | Calarasi/ www.asociatiabioromania.ro |
| Asociaţia Bioavicultorilor din România – BIOAVIROM | Ilfov/ www.bioavirom.ro |
| Societatea pentru o Agricultură Ecologică | Cluj |

| | |
|---|---|
| Asociaţia de Protecţia mediului şi agricultură ecologică „TER’’ | Bucureşti/ www.ter.ro |
| Fundaţia ,,Mama Terra” | Bucureşti |
| ,,Asociaţia Naţională a Consultanţilor din Agricultură” | Bucureşti |
| Fundaţia Academică pentru Progres Rural ,,TERRA NOSTRA” | Iaşi |
| ,,Societatea ecologistă din Maramureş” | Maramureş |
| ,,Grupul Ecologic de Colaborare Bucovina” | Suceava |
| Societatea ,,Avram Iancu” | Cluj |
| Fundaţia ,,Operaţiunea satelor româneşti” | Bacău |
| ,,Clubul Ecologic Transilvania” | Cluj |
| ,,Fundaţia Rurala România” | Timiş |
| ,,Bioclub Cluj” | Cluj |
| ,,Grupul Grădinarilor Biodinamici” | Mureş |
| ‚Asociaţia Romana de Bioagricultura Aplicată” | Arad |
| ,,Centrul de Consultanţă Ecologică Galaţi” | Galaţi |
| ‚Asociaţia pentru Protecţia Mediului si a Naturii” | Mureş |
| Fundaţia ,,Divers Eco” | Maramureş |
| Fundaţia ,,Noema Consulting” | Cluj |
| Asociaţia Albina | Bucureşti http://www.ere-concept.com |

| | |
|---|---|
| Asociaţia pentru Protecţia Mediului şi Prezervarea Resurselor | |
| Asociaţia „Terra Verde” | Bucureşti |
| Asociatia Romano-Italiana AgriEcològica | |
| Asociatia Romana de Bioagricultura Aplicativa – Ferma Ecologica Familiala | Arad |
| Asociatia EcoLogic | Maramureş |
| Asociatia bioagricultorilor din Moldova„BIOMOLD” | Bacau |

**Source:** *MADR (Romania)*

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Project coordinated by IAMO (Halle/Saale-Germany),
Partner: Institute of Agricultural Economics-Romanian Academy (Team leader: D.M.Voicilas)

# MODERNIZATION OF AGRICULTURE AND RURAL DEVELOPMENT: A CASE OF THE FARM DIVERSIFICATION

*Dejan Janković, Marina Novakov*[*]

## Abstract

*In this paper, the authors analyze several core, still very current issues in the theory of rural development. In accordance with the general theoretical features of the modernization process, authors analyze some characteristics of modernization of agriculture, as one of the most important processes, i.e. the sector in rural areas. At the same time, there has been reference to different views of rural development and the relationship of rural development and modernization of agriculture. In this context, farm diversification was considered as one of the levels for operationalization of rural development. In conclusion authors point to the necessity of taking into account the specifics of various directions of development of Serbian farms and in the Serbian socio-economic context.*

**Key words:** *modernization, modernization in agriculture, farm diversification, rural development*

## Introduction

There are numerous reasons why the analysis of rural development could start within the context of modernization. First, modernization is one of the most influential theoretical and ideological orientations within neo-evolutionism according to the number of authors who have dealt with it, its problematic, analytical framework and supporters (Popović i Ranković 1981: 195). On the other hand, the frequent use of the term modernization as a synonym for social development and progress requires systematic analysis of

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the reasons and justification for such usage today. Some authors (Fliege 1998: 2) consider that this term "irritates ... first of all because what is labeled by "modernization" means a large number of processes and phenomena, and that within social sciences there are a number of theories, models, and development concepts of modernization in the analysis of modern societies that are, apparently, partly mutually opposed." As one of the most influential paradigm, modernization has attempted to provide an explanation of the change in modern society, and its legitimization is the most commonly seen in understanding of the development process as linear, from the traditional to the modern. Classical dualistic modernization paradigm seems to be quite logical: the development of traditional, underdeveloped, pre-modern (rural) societies into a modern or modernized segment of global societies. In this sense, bureaucratization, secularization, individualization, economic development, industrialization, development of law and an independent judiciary, democratic institutions, free markets, mass media, education, communication and infrastructure ... are all the elements that represent "modernizing" societies, but at the same time their (integral) rural segment.

In the context of the topics we deal with, modernization is one of the most common conceptual category in discussions about development - "modernization" of agriculture, rural areas and inevitable "modernization" of society in general. This category seems automatically reasonable even without deeper questioning its theoretical roots. Is this a legitimate use, we will try to respond with elaboration of some approaches to "modernization", i.e. the application of the conceptual and other frameworks of "modernization" in the field of agriculture and rural development. We will briefly present the theory of modernization and modernization of agriculture as a theoretical and hypothetical framework for the analysis of rural development. Then we will operationalise rural development on several levels and in the final analysis point to one of the levels of analysis, namely, the farm (household level) and diversification of income and of activities as relevant aspects of rural development. Finally, we will present results of some empirical research in Serbia and conclude on the necessity of taking into account the specifics of the development of Serbian households in socio-economic context.

## Modernization theory

At the outset it is clear that modernization theory has suffered influences from a whole range of theoretical approaches and perspectives, starting with the input of classical evolutionism and Marxism, through structural

functionalism, diffusionism etc. Modernization can be seen as a process in which economic, political, social and cultural changes presumably collide more or less with traditional systems, which "should" leave to place modern ones. As a term often used as a synonym for development or - more precisely - progress, modernization implicitly contains value/ideological connotation. By the logic of modernization paradigm, developed (western) societies should serve as a model for other, underdeveloped societies. According to many critics, modernization theory has appointed global society for the unit of analysis and thus often overlooked analysis of social, economic, and political disturbances that occur within the underdeveloped and developing societies, which are moving towards the modernization according to the Western model. This process is still evident especially in recent years in Europe, after the fall of the Berlin Wall[1] (and the Eastern block) and the inclusion of the new member states in the western development framework embodied in the European Union, and its universal standards as a prerequisite for inclusion.

Although it is difficult to blame all the different modernization theorists for this theoretical-methodological shortcomings, it seems like an immanent to this theoretical orientation, especially to structural functionalist, which have been criticized for not being able to deal with social change and process of historical development, socio-cultural and historical context and social conflicts. They were criticized that the macro-structural and institutional approach is not sufficient for the analysis of these processes. We will not further address the criticism that structural-functionalism suffered by a number of other theoretical approaches.

## Modernisation of agriculture and rural development

Modernisation of society entails complex changes in the economic, social, cultural and political fabric of any society. These complex processes usually involve a gradual abandonment of former (traditional) model of organization and functioning of society and its various subsystems. Modernization in rural areas, both in theory and research practice, is mainly associated with the

[1] In his excellent study *Sociology of modernization and development* Harrison refers to the political climate in the context of modernization that has largely been saturated by "Americanization" of many countries, not out of altruism (development or improvement of living conditions of underdeveloped), but of the danger that “they will "flirt" undesirable elements, that is, the USSR” (Harrison 1997: 8). Modernization theory “has been again and again blamed for being nothing but was the intellectual accompaniment of American imperialism after World War II" (Schelkle and Krauth 2000: 25, 31).

modernization of agriculture. It had numerous positive outcomes, such as solving the problem of food supply (both rural as well as urban), linking the food chain and its control (through quality control and food safety), the increase of farm incomes and reduce of labor intensity and hard work in agriculture, as characteristics of the peasant works etc.

In terms of general modernization of rural life, civilization benefits of the developed societies and urban areas are spilling over into rural areas and improving the quality of life through development of infrastructure, transport, telecommunications and other linkages with the global society, increase of the quality of life (education, housing, nutrition..), as well as social and health care for the rural population. From the standpoint of technological change it is important to emphasize three important factors that have significantly changed some aspects of rural social and economic life and enabled them to better integrate into the global society (Woods 2005: 31): refrigeration technologies, both for commercial storage and for domestic use; development of motor vehicles has changed practices of both production and consumption in the countryside; development of telecommunications technology.

Qualitative dimensions and the degree to which various social changes affected rural areas are very different. The level of development of rural areas depends primarily on the achieved level of development of the society which is the subject of analysis, and then certain rural areas in the analyzed global society, having in mind their heterogeneity across different characteristics. The modernization of agriculture and rural areas of developed countries is largely different from those in underdeveloped countries or countries in transition. This does not mean that all problems are solved in developed western countries. This means that the problems are significantly different, since the achieved level of development of those societies is different. These implications are also reflected on the social theory that investigates those processes.

The process of modernization of agriculture aims to transform traditional agriculture and to deal with the issues of food production. Even before the World War II and especially after its end (the fifties and sixties of the 20$^{th}$ century), the modernization of agriculture was the explicit aim of the agricultural policies of developed countries. Although some aspects of the modernization of agriculture are always present (development and transfer of technology in agriculture), an impressive level of modernization in agriculture in these countries was reached relatively quickly by having a

clear focus on the goals of modernization, substantial investments from the side of the government (supported by subsidies), adequate and relatively stable agricultural policies (on the national, but later also on supranational level e.g. EU) and with the competitiveness of agriculture, as a commercial sector within the global food market. Modernisation of agriculture as a state and a political project, which was supposed to replace the "backward" traditional structures and processes that have been present for centuries in rural areas, has led to significant structural changes in developed countries (Janković 2005). Those structural changes are common to the national economies and developed countries' society (Woods 2005: 303): agriculture and other economic activity in rural space is almost entirely for commercial purposes rather than self-sufficiency; commercial exploitation of rural resources is performed in a capitalist free market economy; all but the most remote rural areas are provided with basic infrastructure including electricity and water supply; the state accepts the principle of a universal entitlement to public services across its territory; the population as a whole is sufficiently affluent to pay for the commodification of rural landscapes, lifestyles, artefacts and experience; there is a shared consumption of film, TV, literature and music that informs perceptions of the rural.

## The critics of the modernization of agriculture and farmers' response to the modernizations' consequences

The concept of the modernisation of agriculture, with all its positive aspects, however meant „an essential rupture with existing practices and types of discourse of the countryside"(Long and van der Ploeg 1994: 2). Modernisation as an external, centralized model of intervention that has aimed at a new organisational models, innovations, new links with the markets implied that „the degree of discontinuity *vis-à-vis* existing practices, relationships and role definitions increased considerably" and that it was not sensitive to heterogeneity of farmers and their families and the whole socio-economic system and cultural context. This means that „the practice of modernisation turned out to be a highly differentiated phenomenon that not only reproduced existing difference, but increasingly generated its own differences and inequalities. In this way modernisation resulted in growth as well as underdevelopment and marginalisation" (Ibid. 2, 3).

From the point of fundamental social change and development, which are generated in rural areas (infrastructure development, electrification, road construction, village renewal, the system of public services, participation in a global society, etc..) the process of modernization was inevitable. In fact the

issue is not about contrasting modernist and traditionalist views that criticise or defend modernization, but about the analysis of the various aspects and effects of modernization, manifest and also latent. This kind of contrasting is based on the false dichotomy of "traditional" - "modern" (which actually is one of the consequences of the idea of modernization), the dichotomy of the modern urban and the traditional rural, but also the dichotomy within the rural frameworks, namely „a false dichotomy between a dynamic rural present and an unchanging rural past" (Woods 2005: 30). In this sense, rural sociology was for a long time in crisis, accused of great contribution to the development of diverse models of traditional-modern and as "an intellectual companion of the project of modernization in agriculture", of state institutions and programs that explicitly aimed at transforming traditional practices in agriculture into a modern, dynamic, optimal, acceptable forms of agricultural development.

According to some authors (Wiskerke 2004: 47) a way out of that the crisis is actually seen in reflective analysis of the impact of the process of modernisation in agriculture. Modernisation of agriculture has implied so called productivism as the dominant trend, which has aimed at increasing agricultural productivity, technical progress, intensification (higher productivity, investment in machinery and infrastructure, chemicalization etc..), concentration (maximizing profits and reducing costs, increasing land property, marketing of product) and specialization of production. Intensive modernization and productivism led to the displacement of significant parts of the population out of the agricultural sector, job losses, but also creation of new ones, both in cities and in other segments of the rural economy (e.g. manufacturing industry, industry of inputs for agriculture etc.). The deagrarisation trend occurred all over the developed world, but it must be emphasized that any new technology, although terminates jobs, at the same time creates a lot of new jobs, usually different in type, nature, requirements and similar. Modernised agriculture with numerous and heterogeneous actors, oriented toward increased food production, economies of scale, maximizing profits and lowering costs, specialization, intensification and concentration, produced many unintended consequences. But, "in terms of its central objective of increasing agricultural production, productivism was an undoubted success" (Woods 2005: 51). However, on many other levels, negative effects of modernization in agriculture largely dominated discussions related to agricultural policy and future trends in the development of agriculture, which is often referred to as post-productivism, the concept that is also under fire (see, Woods 2005: 54-57). As some of the negative consequences of modernization of agriculture, we could refer to:

environmental problems, problems related to diseases of animals and humans; the consequences of GMO technology on human health, natural resources and national economy; job losses due to "economies of scale" and of the growing dependence of farmers on external inputs and cash flows - loans, grants ...), the vulnerability of the sector (which is of public importance), the fluctuations in national and global markets, etc. During the modernization period farmers were increasingly represented as – and *de facto* remoulded into – agrarian entrepreneurs“ (van der Ploeg et al. 2000: 401). It is an undeniable fact that - in accordance with the principles of modernisation - technological, economic and political-institutional models of development are being imposed to undeveloped agricultural systems and societies. However, more often there is a criticism of macro trends in the development of agriculture, in terms of... “cultural offensive”, that made ”vanguard farming” appear to be a normative model which could be used to judge, to hierarchize and to reorganize the impressive heterogeneity of European farming (van der Ploeg and Saccomandi 1995: 10). Researchers from the Central and Eastern Europe more often emphasize different socio-economic and political-institutional contexts that are present in the developed countries of the European Union, the new member states and the countries in "transition". In their view, it is necessary to distinguish between what is called the "European model of agriculture" and "development strategy for agriculture," which seeks to raise the level of income on the farm for a large number of small farms/farmers in rural areas of these countries, which according to FAO (including European countries of the former Soviet Union) is about 112 million people (Petrick and Weingarten 2004).

Modernization paradigm in agriculture or depeasantiation has had following tendencies (van der Ploeg 2005): „1) the search for system integration, which replaces the struggle for autonomy; 2) a subsequent development of the resource base along the lines of market dependency and external prescription and sanctioning and 3) an increased artificialization of the process of production, which includes a growing distance from nature. Wherever such tendencies become dominant they result in the creation of entrepreneurial or corporate modes of farming that strongly contrast to the peasant one”. According to some authors (van van der Ploeg et al. 2000; der Ploeg 2003; van der Ploeg, 2008), conditions that have been created as a result of modernization in agriculture have led to a process of specific “repeasantization*”* of farmers, which can be regarded as their defensive response to these conditions. This process tells about the relative uncertainty and dependence produced by concept of modernisation, on the one hand and

autonomy for which farmers struggling (as a form of reaction to the imposition of modernization development model), on the other.

The reflexive critique of the negative effects of modernization in agriculture, has practically initiated so called ”actor-oriented approach” in rural sociology that has its roots in sociology and anthropology in the late sixties and seventies of the last century, and that makes a shift from structural analysis (Long 2006: 13). It tries to explain the different responses to similar structural conditions, even if they appear as relatively homogeneous (Ibid.). Rural sociology critique of modernisation of agriculture suggests that "farmers define and operationalise their objectives and farm management practices on the basis of different criteria, interests, experiences and perspectives. That is, through time farmers develop specific projects and practices on how their farming is to be organised” (Long and van der Ploeg 1994, according to Wiskerke 2004: 47). This approach has led to the research of different *farming styles (or styles of farming)* that actually implies the critics of modernization of agriculture because it proves that markets and technology (as the two main factors determining the neoclassical economic conception of modernization) do not need to uniformly determine the form, content, direction and pace of agricultural development. Within those factors room for manoeuvre is being constituted because “farmers themselves, as social actors, are able to define and influence the way they relate their farming activity to markets and technology... Making distance from and/or integration into markets and technology is of course not a matter for capricious decision. It is the object of strategic reasoning, embedded in local history, ecology and prevailing politico-economic relations“(van der Ploeg 1994: 9). That approach (recognised as very important for the theoretical grounding of rural sociology, see Marsden 1990; Mardsen 2006) emphasises working processes and farm management, specifics of resource mobilisation and conversion, as well as selling of agricultural products.

The aforementioned implies that social theory of developed countries noted that the modernization paradigm in agriculture (in developed countries) has long been experiencing a sort of crisis. The crisis has already sensed in the eighties of 20$^{th}$ century, with the situation of a large surplus of food and instability of agricultural markets as a result of "modernized and globalized" agriculture. Since then, begin the socioeconomic considerations the future of European agriculture and its changing roles in modern European society. Present rethinking of this role is in terms of deviation from productivism in agriculture, which is regarded as virtually synonymous with the postwar modernization model. Postproductivistic transition imposes different trends:

extensification, farm diversification, an emphasis on a countryside stewardship and enhacing the value of agricultural products (see, Woods 2005: 54-59). Many authors (van der Ploeg et. al 2000, O'Connor et al. 2006; Brunori and Rossi 2000; Wiskerke 2004, etc.) point to actually two different paradigms: on the one hand modernization paradigm, that is represented with the economy of scale and "that has reached its intelectual and pracitcal limits", and from the other, "rural development paradigm, that is being considered much more than just an addition to the exsisting pattern of (modernised) agriculture and rural life". The referent group of authors (van der Ploeg *et al*. 2000: 391) claims that „the modernization paradigm that once dominated policy, practice and theory is being replaced by a new rural development paradigm". Other authors (O'Connor *et al.* 2006: 3) also point similar: „at many different, but strongly inter-linked levels, Europe is moving away from agricultural modernisation towards rural development. This latter model is slowly gaining ground as the guiding principle for policy formulation, the development of enterprises and the design of new institutional arrangements".

The aforementioned effects of modernization have led to a crisis in agriculture and its viability as a sector. Farmers are struggling with: increased costs and stagnating or even declining revenues; pressure to increase the volume of production, technical efficiency, to adopt new technologies and adapt marketing strategies and farm management; food surpluses and the fight for market share; unstable markets; different consumer preferences, environmental pressures due to the importance of natural resources as public goods (see, Jankovic, 2012b) and animal welfare issues etc. Although these problems did not occur everywhere, in all branches of agricultural production in the same manner and at the same time, one can say that these trends in agriculture around the world are generally present. Researchers have noticed several years ago that farmers are trying to respond to this crisis by seeking out different ways to generate new income. This process might be considered as a specific form of rural development. According to a dozen prominent European authors (van der Ploeg et al., 2000: 391-395) rural development can be analyzed at different levels: global interrelations between agriculture and society; as a new development model for the agricultural sector; of individual farm household; of countryside and its (economic) actors; of policies and institutions; of "multi-dimensionality" of rural development. The structure of rural development at the farm level, i.e. three basic types of responses to the current crisis in agriculture is: 1. *pluriactivity* and *regrounding of resources*; 2. *broadening*; 3. *deepening* (van der Ploeg *et al.* 2000; van der Ploeg 2004; 2008; Wiskerke 2004; O'Connor *et al.* 2006; Knickel and Renting 2000 and others).

*Pluriactivity*: This is a way to diversify income and activities, such as wages earned outside the farm that can be used for household purposes, or for the purpose of investing in the farm business. These revenues can have a greater or lesser share in the total income of the household. The second and different strategy is focused on new ways to mobilize and use resources within the family farms and households, and rural communities, as well. This strengthens the vitality of the farm and its maintenance. The strategy may be cost reduction, which means the substitution of external inputs with more efficient use of internal resources of the farm. It may include reducing the use of external inputs of agro chemistry, foodstuff, but also a decline in the share paid labour force or loans.

*Broadening* refers to a more frequent occurrence that the part of household income is generated from non-agricultural activities (i.e. those revenues and activities that are not directly related to *food production*), but which is implemented within the farm. This type of practice of rural development involves a variety of activities such: Agro-environmental measures: e.g. landscape management. These and similar measures intend to reduce the negative environmental impact of intensive agricultural practices. Within such schemes, the farmer is paid or compensated for setting aside or abandoning the intensive management practice that has negative effects or these activities may also be associated with other activities, such as agro-tourism and manufacturing of quality food etc.); Agritourism: a response to the needs of the urban man who wants to spend their leisure time in nature (offering accommodation, food consumption, as well as direct sale and traditional food products from farm production); New forms of activities at the farm for the visitors of rural areas - fishing, hunting, horse riding, renting of a bike or sports equipment, production of bio-gas, electrical energy (e.g. wind turbines), providing types of services, etc. or diversification in terms of activities that are not focused on food production, but other crops or animals (flax, hemp, rapeseed, medicinal herbs etc..).

*Deepening* refers to the transformation of agricultural activities that aim to achieve a higher income, and greater value added per unit of output. So, instead of selling raw materials to processors, farmers process their own products"behind their gates" and thus play an active role in defining the quality of a specific product from the farm. In that way they generate more income that would otherwise have to indulge example processors (external actors). This refers to the high quality and regionally specific products (products with protected and (or) with the geographic origin), organic farming (which is subsidized and whose products have a higher prices in the market), direct

marketing and more. All of these activities, in the opinion of many authors, may also increase employment on the farm and local community level, to increase communication between producers and consumers, and can generally be seen as a response to consumer demands related to food quality, traceability and food production that has distinctive features in terms of quality.

Empirical data on these types of activities related to rural development (from the IMPACT project that comprised 7 countries, 11 Universities, 36 case studies, see O'Connor et al. 2006), show that about 80% of farmers were practicing some of these activities: more than half (51%) farmers were engaged in activities that implied "broadening" and "deepening", 60% of farmers had some activity in terms of cost reduction. It is noteworthy that most of these groups of farmers overlap each other in terms of their activities. In another study, (van der Ploeg, 2008) only 17% of farmers were not engaged by any of these types of activities. Irish example (Kinsella et al. 2000) shows that by the end of the seventies of the 20$^{th}$ century acquiring of off-farm incomes increased from 30% to 44%, and a projection for 2010. year showed that 60% of agricultural households are going to be engaged in some form of off-farm activities.

Data on the example of the Netherlands (van der Ploeg, 2008: 33) indicate that about 75% of farmers acquired off-farm income. For professional dairy farms about 30% of the revenues were gained from these sources (off-farm), and on the arable farms this figure reached about 50%. Generally speaking, family incomes were higher on these (pluriactive) farms than on farms that generate total income out of agriculture (and/or animal husbandry). On many of these farms agricultural activities can be continued precisely because the family income is being supported from other source that is through involvement in rural development activity… If this was not the case, many of these farms would have already disappeared and their production would have been reallocated (van der Ploeg and Renting 2000: 538). Pluriactive farms are, of course, not a new phenomena because this type of farming has already been elaborated in rural sociology. However, „what is new, is the changing role of pluriactivity in rural development processes“ (Knickel and Renting 2000: 527). Pluriactivity that has once been considered as an expression of a disappearing peasantry, it is again present as a mechanism through which the peasantry reconstitutes itself anew (van der Ploeg 2008: 33, 159). Combining income from agriculture to other income sources has been the subject of numerous studies of the seventies and eighties of the 20$^{th}$ century. However, while it was initially considered as a temporary adjustment of agricultural households, "now it is widely accepted as a structural phenomenon that is

widespread in Europe ... and influenced its acceptance, both in political and in the research agenda" (Renting *et al.* 2008; Kinsela *et al.* 2000). Renting *et al.* (Renting *et al.* 2008: 370) claim that trends in national statistics leave no doubt that pluriactivity is more than a transitory phenomenon in the movement towards agricultural modernization. However, it remains largely an open question whether pluriactivity persists because it is a viable livelihood strategy as such, or because there is continuously a category of farms 'on its way out of farming'.

Such activities on farms are now "associated with well-being" (Kinsella et. Al 2000) i.e. capabilities of households to activate their resources in order to gain competitive advantage and to meet certain needs. This might be a consciously chosen development strategy of farms or perhaps even a lifestyle and identity issue. Such rural development activities also imply:
"a reconstruction of agriculture and countryside; re-defining the relationship between town-countryside in an entirely new way; it is connected with transfer of resources from the urban to the rural economy; Pluriactive rural households consciously choose to build up a livelihood in the countryside and farming, whether as hobby, cultural identity or family commitment, continues to form an essential part of this way of life… The attractiveness of the countryside induces pluriactivity and on a growing scale. However, pluriactivity is also responsible for keeping the countryside attractive: by making it possible for people to stay in rural areas it ensures there is a sufficient basis to maintain for local services and fuel economic development. It is important that pluriactivity be seen as an integral part of rural development" (van der Ploeg *et al.* 2000: 396-398).

## Concluding remarks

The above-mentioned types of rural development, although related to the farm, go beyond this level because they are intrinsically linked to regional, rural, and national economies. This approach is an excellent starting point for the analysis of rural development as a multi-sectoral process, with many actors and levels of analysis (Knickel and Renting 2000; van der Ploeg et al. 2000) and refers to the analysis of global processes, structures and institutions of modernization in agriculture and individual farms, farmers and their responses (answers) to these conditions. As a theoretical and methodological framework, such approach shows the ability to overcome the shortcomings of the sociological approach which was not capable of micro-macro translation, namely, for a comprehensive analysis of the structure - institutions and processes – interactions. Observing these and other

"practices" within the paradigm of rural development, the conclusion is that pluriactivity and farm diversification can be seen as part of the vitality of rural areas, whose significant part can be ensured through these livelihoods and thus, certain lifestyles or even a form of identity. However, it must be clear that these and other forms of activities on farms/households have a different significance in different socio-economic and political conditions. It must be noted that these forms of activities on farms are not the dominant development models. Many farms in developed countries strongly follow the modernization model of development, either as explicit, the intended strategies, or inertia - a necessity, supported by agricultural policy and market conditions. In any case, surely it is a phenomenon that requires different approach to agriculture (and its importance for rural areas), taking into account the heterogeneity of practice, socio-economic, cultural, historical and political specificities, particularly from the standpoint of the concept of multifunctional agriculture. These practices in developed western countries are seen as activities within rural development and appear as a kind of "politics of the extensification". However, one should be careful with this concept of extensification (as in Western Europe) ”because it would be bad for agriculture, which is still not developed" and that necessarily has to modernize fast, like Serbian one (Erjavec, in Ševarlić and Tomic 2009: 141 questions, answers, discussion).

In terms of underdeveloped agriculture (Serbia), rural development has to have different goals, i.e. must be understood as a strengthening (modernization) of agriculture, which has to reach levels of productivity and competitiveness of developed countries, as well as a strengthening of the rural economy (directly or indirectly related to agriculture), rural infrastructure, system services, the regional (territorial) development and management at the regional and local governments (Janković 2012, Bogdanov and Jankovic, 2013). This attitude, however, is inaccurate if it disregards the heterogeneity of peasant-farming populations. Modernization is necessary for all farmers in Serbia, especially for better off farms. Other, insufficiently competitive farms, should seek their survival strategies in some of the abovementioned activities (forms of rural development). The modernization of agriculture (and society in general) in developed countries has been going on continuously for nearly a century and is marked by a relatively stable agricultural policy (Janković 2012: 675) and state support the concept of modernization of agriculture, resulting in higher incomes and quality of life as a farmer, and the quality of life in rural areas. In such circumstances, European farmers develop strategies for their "survival", but in an evolutionary different level of modernization. On the other hand,

Serbian "peasants" and their existence today is largely consisted of the fight against poverty at the level of modernized agriculture of the late eighties of 20th century. Their "pluriactivity" and agriculture is largely an expression of a survival strategy to avoid poverty because most farmers earn minimum incomes due to many factors, and off farm income usually provides the only way to survive or a chance for partial overflow of those funds into small scale agricultural production. Diversification in Serbia is type of "*distress-push*" diversification in which economically disadvantaged are forced to seek employment outside the farm as a survival strategy. Current structure of employment and income of the rural population in Serbia shows the reflection of the unfavourable economic environment and poverty. Income of small rural households ... shows that diversification was forced by the need to reduce income risks (see, Bogdanov 2007).

Other empirical data on the diversification of farms in Serbia show that the ability to generate external income or additional income on a farm is a decisive factor in reducing the risk of poverty of members of family farms (Cvejić et al. 2010: 66). According to the results of this study, the structure of income of family farms indicates that the income from agriculture is not a crucial factor for the separation of households in relation to the defined poverty line, but it is income from employment in other sectors and different social benefits, particularly pensions. This shows the importance of human capital and labour and their competitiveness in the labour market, because these factors have the greatest impact on the economic status of the family farms. Agricultural income is a significant source of income mostly for large farms and for small farms agriculture provides only 10% of total revenues, of which 4% of income based on wages; regionally speaking, the income from agriculture has great importance for farms in Vojvodina (28.4%) and farms in Western Serbia (25.2%); the least diversified income have farm households in Vojvodina, whereas the highest degree of diversification is in Western Serbia. These and other data confirm the hypothesis that medium-sized pluriactive farms, with diversified income, are the most stable in times of crisis (ibid. p. 66-68). Farms with size of the property above 20ha have only 3.1% of households in Serbia, and they use 44% of agricultural land. On the other hand, farms under 5ha constitute 77.7% of the total number of farms and use 22.5% of agricultural land. Although this ownership structure is similar to the model of agriculture of the South Europe, in Serbia there are some differences compared to the surrounding countries, regarding larger share of farm size 2-10 ha (about 40%), using a total of 35.3% of agricultural land. This group of farms could be modernized but could also diversify in order to "stay in business" or to preserve their livelihood or lifestyle and identity in rural areas. Data from

authors'own investigation[2] of farms intensively engaged in activities of extension service in Vojvodina (mostly better off farms) show that almost 50% of farms are pluriactive, but almost 50% of those farms estimate this type of off farm income as less important. Out of those 50% those who diversify, additional income is mostly earned by a provision of services with their mechanization. It is also interesting that 72,8% of surveyed farms do not intend to increase income from those non-agricultural activities in the future. Those who have such intentions, plan additional employment or acitvities in agri/rural tourism (around 36%). This is in line with conclusions (Bogdanov and Jankovic 2013) that this region (Vojvodina) characterises performances of the natural capital that are more oriented towards exploitation of this high-quality land for agricultural purposes. This indicates the need to employ different policies to possibly stimulate the development of the lacking resources and diversification, which should not be considered as opposite to modernization and implies the development and diversification of rural economy, employment and business opportunities. Some other analysis (Rodic, Bosnjak, Jankovic, Karapandzin 2013) point to the unfavourable demographic trends and the consequently unfavourable demographic situation in Vojvodina in general, especially when it comes to its rural population. Obvious negative demographic changes certainly make modernization of agriculture and necessary diversification of the rural economy more difficult. Having in mind what kind of effects of modernisation in agriculture one society may expect"the policy makers should define appropriate policies (not just agricultural) which would stop the negative demographic and economic trends, and to ensure the preservation of the natural and cultural heritage of rural areas" (Bogdanov 2007) as supportive rural (development) policy that would allow rural population to live and earn in rural areas and make their inclusion in society more effective.

## References


1. Bogdanov, Natalija (2007). Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija. UNDP. Beograd.
2. Bogdanov, N. and D. Janković (2013). Territorial capital of rural areas: an example of analysis of the potential for rural tourism development in Serbia. In Škorić, D.; Tomić, D. and V. Popović (eds.) Agri-food sector in Serbia - state and challenges. Serbian Association of Agricultural Economics & Serbian Academy of Sciences and Arts. Belgrade.


[2] Survey "Evaluation of the Agricultural Extension Service of Vojvodina with selected farms" (2011/2012). Coordinator: Zivojin Petrovic, research team: Dejan Jankovic, Jovana Cikic, Marina Novakov, Marica Petrovic.

3. Brunori, G. and Adanella, Rossi (2000). Synergy and coherence through collective action: some insights from wine routes in Tuscany. *Sociologia Ruralis*. Vol. 40 (4). P. 409-423.

4. O' Connor, D, Renting, H, Gorman, M. and J. Kinsella (2006). The evolution of rural development in Europe and the role of EU policy. In Connor, D, Renting, H, Gorman, M. and J. Kinsella (ed). Driving rural development: policy and practice in seven EU countries. Van Gorcum. Assen.

5. Cvejić, S., Babović, Marija, Petrović, Mina, Bogdanov, Natalija i Olivera, Vuković (2010). Socijalna isključenost u ruralnim oblastima Srbije. UNDP. Beograd.

6. Erjavec, E., Rednak, M., Tica, Volk. i Natalija, Bogdanov (2009). Izazovi poljoprivrede Zapadnog Balkana u perspektivi pristupa Evropskoj uniji. U Ševarlić, M i D. Tomić (ur.) (2009). Tematski zbornik sa skupa „Agroprivreda Srbije i evropske integracije: gde smo i kako dalje?". DAES. Novi Sad.

7. Fliege, T. (1998). Bauernfamilien zwichen Tradition und Moderne. Campus Verlag. Frankfurt am M.

8. Harrison, D. (1997). The sociology of modernization and development. Routlege. London and New York.

9. Janković, D. (2005). Perspektive ruralnog razvoja u Srbiji. In: Cvijanović, D., Popović, V., Subić, J., Savić, M., Bukvić, R. (eds.) Multifunctional agriculture and rural development. Belgrade: Institute of Agricultural Economics. pp.393-403.

10. Janković D. (2012). Territorial Approach to Regional Rural Development. *Ekonomika poljoprivede*. Br. 4. UDC 332.122:338.43 ISSN 0352-3462 str. 675-686.

11. Janković D. (2012b). Ekološke dimenzije ruralnog razvoja. *TEME*. Niš. Br. 2. Str. 627-642.

12. Kinsella, J., Wilson, Suzan, de Jong, Floor and H. Renting (2000). Pluriactivity as a livelihood strategy in Irish farm households and its role in rural development. *Sociologia Ruralis*. Vol. 40 (4). P. 481-496.

13. Knickel, K. and H. Renting (2000). Methodological and conceptual issues in the study of multifunctionality and rural development. *Sociologia Ruralis*. Vol. 40 (4). P. 512-528.

14. Long, N. (2006). Development sociology. Actor perspectives. Routlege. London and New York.

15. Long, N. and J. D. van der Ploeg (1994). Endogenous Development: Practices and Perspectives. In Ploeg**,** J.D. van der and Ann, Long (ed). Born from within. Practice and perspectives of endogenous rural development. Royal Van Gorcum. Assen.

16. Marsden, T. (1990). Towards the political economy of pluriactivity. *Journal of Rural Studies.* Vol. 6 (4). P. 375-382.

17. Marsden, T. (2006). The road towards sustainable rural development: issues of theory, policy and practice in a European context. In Cloke, P., Mardsen, T. and P. H. Mooney (ed). Handbook of rural studies. SAGE Publications.

18. Petrick, M and P. Weingarten (ed.) (2004). The Role of Agriculture in Central and Eastern European Rural Development: Engine of change of Social Buffer? *IAMO*. Halle. Vol. 25.

19. Ploeg**,** J.D. van der (1994). Styles of farming: and introductory note on concepts and methodology. In Ploeg**,** J.D. van der and Ann, Long (ed). Born from within. Practice and perspectives of endogenous rural development. Royal Van Gorcum. Assen.

20. Ploeg, J. D. van der (1995). From structural development to structural involution: The impact of new development in Dutch agriculture. In Ploeg J. D. van der and D. Dijk (eds.). Beyond modernization. The impact of endogenous rural development. Royal Van Gorcum. Assen.

21. Ploeg, J. D. van der (2003). Virtual farmer. Past, present and future of the Dutch peasantry. Royal Van Gorcum. Assen.

22. Ploeg, J. D. van der (2005). Empire and the peasant principle. Paper presented at the plenary session of the XXI Congress of the European Society for Rural Sociology, Keszthely, Hungary. Internet stranica: http://www.jandouwevanderploeg.com/NL/publicaties/artikelen/empire-and-the-peasant-principle/ (pristupljeno: 27.02.2014.).

23. Ploeg, J. D. van der (2008). The new peasantries. Struggles for autonomy and sustainability in an era of empire and globalization. Earthscan. London.

24. Ploeg, J. D. van der and V. Saccomandi (1995.). On the impact of endogenous rural development. In Ploeg, J.D.van der and D. Dijk (ed.).

Beyond modernization. The impact of endogenous rural development. Van Gorcum. Assen.

25. Ploeg, J. D. van der and H. Renting (2000). Impact and potential: a comparative review of European rural development practices. *Sociologia Ruralis*. Vol. 40 (4). P. 529-543.

26. Ploeg, J. D. van der, Renting, H., Brunori, G., Knickel, K., Mannion, J., Marsden, Terry, de Roest, K., Sevilla-Guzmán, E. and Flaminia, Ventura (2000). Rural development: from practices and policies towards theory. *Sociologia Ruralis*. Vol 40 (4). P. 391-408.

27. Popović, M. i M. Ranković (1981). Teorije i problemi društvenog razvoja. BIGZ. Beograd.

28. Schelkle, W. and W. H. Krauth (2000). Introduction: Paradigms lost – and found. U Schelkle, W., Krauth, W. H., Kohli, M. and G. Elwert (ed.). Paradigms of Social Change: Modernization, Development, Transformation, Evolution. Campus Verlag. Franfurt/M. New York.

29. Renting, H., Oostindie, H., Laurent, C., Brunori, G., Barjolle, D., Jervell, A.M., Granberg, L. And Heinonen, M. (2008). Multifunctionality of agricultural activities, changing rural identities and new institutional arrangements. *International Journal of Agricultural Resources, Governance and Ecology*. Vol. 7 (4/5). P. 361-385.

30. Vesna Rodić, Danica Bošnjak, Dejan Janković, Jelena Karapandžin (2013). Demographic characteristics of rural populations in Vojvodina as a factor of rural economy diversification. Paper presented on the Scientific Symposium with International Participation "Agriculture and Rural Development – Challenges of Transition and Integration Process. September 27th 2013. Belgrade. http://ageconsearch.umn.edu/handle/161797

31. Wiskerke, J.S.C (2004). Rural sociology in the Netherlands: past, present and future. Agrarwirtschaft und Agrarsoziologie. 02/04. P. 39-63.

32. Woods, M. (2005). Rural Geography. Processes, Responses and Experiences in Rural Reconstructing. Sage Publications. London.

# CAPACITY BUILDING OF RURAL POPULATION FOR ECOLOGICALLY CLEAN FOOD, BRAND AND TOURISM

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## Abstract

*Rural areas represent a place of life and work of rural population, but on the other hand, they today assume a number of new functions. Specificity of development problems in rural areas varies depending on the particular social context in which they are being studied. Local initiatives, through local partnerships, have a number of positive effects on the efficiency of development projects at the local level, enabling the capacity building of the local population. The concept of rural development is based on the principle of multi-functional development and by that we mean the combined development of agriculture and other activities. One of the base aspects of rural development is the agro-rural economy model, and it is believed that the production of organic food is the solution to the issue of food quality, food safety, environmental protection and preservation of agro-ecosystems. To start the development of rural and ecological tourism, it is necessary to animate and educate local population, develop strategic plans at the local level, establish local working groups or groups for the development, and marketing activities, through branding, are moved to the local level.*

**Keywords:** *rural development, environment, tourism, marketing, branding*

## Introduction

Every society, in its urban-rural context, is faced with the problems of sustainable and balanced spatial, socio-economic and demographic development. The topic of rural development in the world in recent years becomes more important. Any consideration of the future development of

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Serbian society, as part of its problems, must seriously take into account the issue of rural development and prevent urban-centered development trends. Environmental, socio-economic, demographic, and any other kind of equity in the development of a society is a necessary condition for its progress. A large part of the rural population is below the poverty line, socially and in every other way excluded from social events, and agriculture, as still dominant activity in rural areas, has been in crisis for decades (Jankovic, 2007).

A rural area can have the following functions: production of food, rest and recreation, conservation and improvement of the ecological stability of the entire territory, etc. (Huber, 1988: 36) In future it will be more and more emphasized the exploitation of the potential of rural areas for non-agrarian purposes. Rural development is not just the production of goods and services for the expansion of market goods and services, but also the environment protection. Sustainable rural development is possible only with the preservation of ecological values (even the improvement, if possible) of rural areas. Thus, the basic principles of sustainable development put agriculture farmers and other rural residents in the position of protectors of nature. It can be seen from the following principles:

- Integration of the development of nature in the development of agricultural production,
- Minimizing the use of externalities and non-renewable inputs,
- Full participation of farmers and other rural people in decision-making processes related to sustainable development,
- Greater use of local farmers knowledge and practices and
- Increasing social goods provided in rural areas (Đekić, 2000: 57).

Elements of competitiveness are many and depend on the context of each area individually. The main long-term objective of the development policy observed this way is the increase of widely understood quality of life in rural areas, creating jobs for the rural population, the integration of the area into a wider social system (health, education, cultural institutions), the creation of a network of relationships and cooperation of all stakeholders from government and public sector to private enterprise, NGOs and local associations. The aim is to mobilize local actors, local partnerships and active participation of interested individuals, social groups and institutions for better implementation of the endogenous potentials of the areas.

## Social capital and capacity building of rural areas population

Rural areas represent a place of life and work of rural population, but on the other hand, they today assume a number of new functions. Specificity of development problems in rural areas varies depending on the particular social context in which they are being studied. This social context is conditioned by the development of every global society, the degree of its socio-economic development, the structure of the entire social system and the problems that every global society is facing. In the context of the development of rural areas, the problems that dominate are largely under the influence of the development of agriculture and rural economy. Rural areas are usually faced with the issue of isolation, social exclusion, transport and infrastructure incoherence, institutional non-development and the issue of diversification of the rural economy, which is to provide a place of employment of the rural population.

The comparative advantage of an area is reflected in the attractiveness of rural areas for the realization of opportunities for job creation, investment in infrastructure construction, local entrepreneurship and investment in small and medium-sized businesses, manufacturing facilities, the strategies for development of tourism, attractiveness of the area as a place of residence, and recreation and leisure and so on. Regional development policy should not encourage those activities that include maintaining the existing economic structure of the region no matter how much it makes them economically and developmental non-competitive, all for the sake of preserving social peace and social security of its people. The focus of regional development in terms of free market economy should be to strengthen the competitiveness of the region. This means that measures of that policy at local, regional and national level should make the region developmentally prosperous. With those actions it is necessary to activate the developmental potentials of the region, to take advantage of local sources of investment, incorporate the economy of the region in the national economy as a whole, and so on. It is particularly important that these measures make the region attractive for capital inflows from other parts of the country (especially the economically developed), and foreign investments.

In this regard, in addition to state incentives, the measures at local and regional level are particularly important. They need to allow potential investors to obtain economically acceptable and easily achievable locations for their business, stimulating use of local infrastructure, establishment of good relations with local government, and establishment of fair and friendly

relations between the local population and the incoming investors. Am especially significant role of the overall regional administration is promoting and implementing the strategy of regional economic development of the state and the regions. Their involvement should be oriented towards the effective implementation of development directions and goals so that they jointly contribute to raising the overall competitiveness of the economy (general labor productivity and the efficient use of assets), while encouraging local and regional initiatives and environmental protection. Sustainable development means that from the perspective of endogenous growth model, the local community has a certain level of participation and control over the development process, and the possibility of achieving and maintaining the benefits of the development (and its reproduction) in local frame. The ultimate goal is actually sustainable development, and an important element of sustainability is the potential synthesis of all dimensions of competitiveness, because a region must achieve competitiveness on several levels, e.g. environmental problems and pollution of land, water, air, can largely nullify "attractiveness" of an area for investment, housing, boost the so-called push factors for potential migrants - particularly rural youth, facilitate the development of tourism, the production of quality food and branding of local products and so on. On the other hand, the lack of human capital, for example the absence of younger educated population as a potential source of high-quality workforce, may prevent the investment of small and medium enterprises in rural areas.

Local rural communities have different degrees of ability to mobilize the local population and their potential for action in the direction of the desired socio-economic development. Social capital, on the one hand, is a prerequisite for development, but, on the other hand, it is a result of the ability of different actors to jointly and effectively act on the achievement of certain development goals. The basis for the establishment and maintenance of social capital vary, and as some of the most important are frequently highlighted the specific features of social organization, social norms, trust, quality and frequency of interaction, cooperation and mutual interest, distinctive local identity, the transparency of the development process. As such, social capital is seen as a resource that creates and maintains relationships, human and organizational resources, and the "glue" that connects people acting together. (Shucksmith, 2000)

Networks of interpersonal relationships and the recognition of common interests can lead to the creation of institutions that represent that interest. Farmers' associations as a result of the interaction of interests of producers

and social capital of a certain rural community, represent interest groups that have a range of functions, from the economic (marketing of agricultural products), to the function of mediation (negotiation) between the organizations of affiliated farmers and markets, that is, the institutions of global society. These associations serve as the mean of representation of the interests of affiliated members gathered around a commonly recognized interest, around joint (cooperative) values and norms which the affiliation means. Within these associations it is possible to strengthen the existing social capital (represented by the very institution of association), through education, advisory functions, information and networking of the actors in the market. In this regard, the associations of local rural people generally have different functions and do not refer exclusively to a particular sector (agriculture). The associations for local community development, for preservation of local traditions and heritage, folklore, sports, hunting, fishing, tourism, and a number of other associations can have a significant impact on the lives and development of a local rural community.

The state with its development models and centralist programs and strategies, can often produce a latent consequence of creating a sense of "mental addiction" with the local population, a feeling of helplessness and a state of continuing expectations for the government to do something to improve the situation. In such a situation, local initiatives may be unrecognized, inadequately supported or even completely absent. Local initiatives through local partnerships (between different actors - especially the public and private sectors) in planning, funding, coordination, implementation, monitoring and evaluation of development projects have a number of positive effects on the efficiency of development projects at the local level. This enables the exchange of experiences and ideas useful for development projects, joint decision making improves the quality of the project and its implementation, local knowledge and experience leads to better analysis of the advantages and disadvantages that exist at the local level, there is an increase accountability, improve of relationships (conflict management), feeling of social inclusion and so called capacity building of the local population (Moseley, 2003: 115-141).

It would be illusory to expect that these processes are not burdened with numerous problems. They are very much, especially in terms of the fact that local population is not used to such forms of cooperation and engagement, the risk of realizing the interests of powerful individuals and groups, the problems of the relative advantages of better organized local communities and regions that can attract a significant portion of the investment in their

area (often influenced by local policy and powerful individuals). Also, there are problems for local groups to make a realistic assessment of the development and investment opportunities, which is the insufficient "capacity" of local groups and local administration to plan feasible and viable projects, which would have long term effects. In addition, there are possible legal and administrative barriers, lack of information, the problem of adequate and optimal mechanisms for the participation of local citizens and permanent open channels of participation, their motivation, dealing with financial management and assuming accountability, legitimacy of included representatives of local rural communities, possible conflicts due to the different interests and different view of the problems, burden of previous conflicts and bad experiences, as well as the aforementioned under-developed capacity of local administrations to manage such projects, and so on. In any case, the aim of this approach is the initiation of the so-called process of "capacity building" and it represents a "long term investment" in human and social capital which is necessary for the processes of social changes. To achieve this, it is required a stronger cooperation between the public and private sector, state, local and territorial governments, non-governmental organizations, cooperatives, farmers' associations and other associations in rural areas, educational institutions, mass media, etc., which is urgently needed for the sake of efficient work in the rural development process.

## Clean food production and rural development

The concept of rural development is based on the principle of multi-functional development (Tosic, 2001). By this it is meant a combined development of agriculture and other activities. The role of government is reduced to the help in terms of funding in the form of subsidies and loan approval for raising social standards and public utilities in the area and improvement of infrastructure, investment in human resources, the development of processing facilities, etc. (Vujatović - Zakić Stojanovic, 2004). Significant measures of economic and agricultural policy in the future should solve problems in the operation of small family farms. Before the increase of the economic power of rural regions it is necessary to create the conditions for increasing the motivation of people to work. The use of innovation in rural activities should create space for entrepreneurial activity with the participation of young people. The quality of that potential workforce will be provided by the retraining of workers, as well as directing people which lost their jobs in the cities towards the activities in the rural areas.

The main instruments for achieving rural development are the activities such as conservation of natural resources, regulation of agricultural land and making progress and economic security of rural areas, while protecting and preserving the environment. One of the base aspects of rural development is the model of agro-rural economy. Agriculture as an important economic sector accounts in the total GDP for about 37 % (Bogdanov, 2007). The growing demand for food has led to the fact that the agricultural production primarily relies on the application of chemicals, with the aim of achieving the highest possible yields and profits. It is believed that the organic food production is the solution to the issue of food quality, food safety, environmental protection, conservation of agro-ecosystems, etc. and that it is potentially one of the most rewarding jobs in the world. Organic agriculture represents a production management system that promotes the recovery of ecosystems including biodiversity, biological cycles and emphasizes the use of methods which largely exclude the use of off-farm inputs. This means the maximum use of renewable energy, reducing all forms of pollution, environmental protection, as well as the creation of conditions to meet the basic needs of agricultural producers and acquiring adequate income. Organic farming emphasizes the human health and respects the natural balance, and avoids various types of pollutants (Ceranić, 2010).

Cleaner production requires changes in behavior, responsible environmental management, development and implementation of appropriate policies and constant evaluation of different technology options. Cleaner production is focused on the causes of the problems related to the environment, rather than on the consequences and not only deals with the processes of production, but can also be applied to the entire product life cycle, from the beginning of its development, the consumption to the disposal phase. CP task is to ensure the conservation of resources, elimination of hazardous materials and waste reduction. Five basic techniques of implementation of cleaner production are responsible business, process optimization, substitution of raw materials, new technology and new product development. Cleaner production protects the environment by preventing the inefficient use of resources and the waste that can be avoided. Companies that implement cleaner production should gain an economic advantage by reducing labor costs, reduced volume of waste treatment, reducing disposal costs, reduce environmental pollution and so on. Investing in cleaner production has a long term impact on better economic results of enterprises and reduces costs in relation to the implementation of solutions for the treatment of the already existing waste. Cleaner production, in addition to the high investment, requires that a company operates in terms of constant change. Such a dynamic situation

requires a different and more expensive technology and human resources. These conditions disrupt the stability that is necessary to safely achieve mass production, which is essential to make profits in a market economy. Application of cleaner production thus potentially causes major changes in the organization and management.

## Non-agricultural potentials of rural areas - tourism development and branding

The specifics of some rural areas, or the attractions that they can provide, must be used up within the rural development. There can be identified certain areas of recreation (sports, hunting, fishing), and the development program may, depending on the conditions, include the development of tourism. The development of the rural tourism should be based on, among other things, the preservation of cultural and spiritual values of the area, which means it is not necessary in all the segments of a rural area to insist on the establishment of equality between rural and urban. It provides an opportunity for increasing agricultural production because a part of the production would be intended for tourists, especially when it comes to environmentally friendly food. In general, activities in the field of rural tourism should also be carried out in accordance with ecological principles, without damaging the environment, by those who provide as well as by those who use tourism services.

To start the development of rural and ecological tourism, it is necessary to animate and educate the local population, develop strategic plans at the local level, establish local working groups and development groups (Lazovic, 2004). When animating the population it is necessary to give a clear view of all the positive aspects of the introduction of tourism to the local community. The effects and benefits that the local community could have must be clearly pointed out, but it must not be forgotten to present the effects of preservation and placement of local cultural and historical heritage. The development of tourism in rural areas is also reflected in the creation and definition of development plans that are based on valid information, and accepted by the local population. We cannot speak about the development of tourism if the funds in various funds and state authorities are not provided. The role of the state would be reflected in the co-financing of development plans relating to the improvement of infrastructure and basic living conditions, which is the prerequisite for the development of rural and ecological tourism (Tourism Development Strategy of Serbia for the period of 2005-2015). A prerequisite for the activation of rural areas is improving the quality of life, with the following measures: increasing the availability, an appropriate level of

technical infrastructure, provision of basic public services, and retraining of the population. In order to increase the competitiveness of a rural region as a destination in the domestic and international tourism market, in the short and long term, it is necessary to remove the existing deficiencies. Identified competitive disadvantages can be eliminated by applying the key competitiveness programs and their application should remove competitive disadvantages and significantly improve its competitive position in the domestic and international tourism market. The competitiveness programs can be seen in terms of separate program parts:

- Development and improvement of accommodation facilities,
- Development of tourism infrastructure,
- Training of personnel,
- Development of entrepreneurship,
- Planning, development and protection of the area,
- Tourism signalization,
- Improvement of public services and public infrastructure,
- Establishment of quality systems.

The current level of management and tourism development has a basic flaw in the absence of clearly defined management structure, as an organizationally professional approach to the determination that tourism is one of the directions of the future development of a region. The issue of management on the level of a tourist destination is particularly significant because it is one of the main driving forces of development of the value chain that would allow tourists an unforgettable travel experience. That means that someone is engaged in the development of competitiveness of certain area in a professional, effective and efficient manner, that is, it means that there is an institution that will assume the operational responsibility for the implementation of this strategy. In this context, it is necessary to consider possible models for organizing the management of the region as a tourist destination. In the process of globalization the focus has shifted from the local to the global level, from the branding of products and services on the branding of regions. In the current process of connecting the world and the creation of a large global village, it is a challenge to brand a whole rural region, introduce to the world its unique characteristics, and promote the true values, while making the region develop in the right direction. In order to achieve these goals it is necessary to form all the marketing activities so as to improve the function of socio-economic interests of the destination. The main objectives of promoting should be:

- Development of Tourism,
- Development of the economy,

- Boosting investments,
- Improving the image.

Popularity of branding is directly driven by the process of globalization with the goal of unique differentiation and positioning. Clearly defining the image of a place, better positioning and popularizing within the international market framework, all of that helps to know better different destinations and bring closer different cultures and people. In the future, the phenomenon of branded regions will be more prominent. In a sense, it seems that the identification with the brand, in our individualistic, materialistic, purchasing, egocentric era, became in a sense a sort of replacement or supplement to religious beliefs, that brands represent a person's identity in a confusing, competitive world in which there is the possibility of losing rational choice (Olins, 2003). People define themselves through brands, express themselves, their emotions, and complement their personalities, position in the globalized social environment. Brands and branding have a certain prospective in the future, but it is up to us which way we will direct it and how we will shape it. Reviewing the current situation in the world market, where there are many examples of manipulation by brand, we come to the conclusion that it is needed to use brands and branding in favor of socio-economic development of countries and regions. The brand has a perspective if strong emotional ideas, coherence and consistency basically support the development of loyalty to itself. Depending on these settings, brands can be divided into desirable and undesirable. They can become socially responsible and promote positive values, achievements and obtain a certain attitude (positive or negative) towards the local community.

In the field of globalization and strengthening of the market competition, regions pay strong attention to branding in order to transfer the image to the world public of a desirable tourist or investment destination. Region branding is the modern way of their development, which may contribute to their promotion and positioning in the country and the world. Having in mind the actuality of countries, regions and cities branding in the world, significant benefits would be achieved from the definition and implementation of effective brand strategy of the regions in our country. The goal of branding is to develop a notion of a location as unique, attractive and credible. In this way, the main objectives of a region should be: economic development, tourism development, increase of investment and improving the image. The result of the project of branding is an emphasis on a clear competitive advantage, which would ultimately contribute to greater inflow of foreign direct investment in

the region, increased exports, increased tourist numbers and/or larger number of organized cultural and sporting events. Accordingly, the branding of a region would help in the overall socio-economic development of the region by strengthening the economy, promotion of cultural heritage, job creation and poverty reduction. Branding is a complex process in which, in order to achieve maximum results, it is needed the involvement of all stakeholders (residents, local authorities, industry representatives) to create and broadcast a single message to the public. For this reason, branding is primarily seen as the responsibility of local government to take the initiative and utilize all the resources in close cooperation with representatives of industry and experts in relevant fields.

Tourism is almost entirely dependent on the environment. Natural resources and man-made resources are the primary source of tourism. Any degradation of the primary sources is likely to cause the reduction of tourism. Thus, their economic analyses are of great importance for tourism. Like other economic activities, tourism requires the consumption of certain resources. Today, tourism is seen as one of the main economic activities in the world. It contributes about six percent of the world's income. Of course, it has a significant impact on the demand of exhaustible and renewable resources. It manages the significant amount of waste and thus influences the solution of the problem. Operation of tourism enterprises reflects market characteristics of other economic sectors. The expansion of tourism or concentration in certain destinations have neglected the long-term dependence of industry and the environment, which has led to over-exploitation on natural resources and non-economy (Cater, Goodall, 2002). Ecotourism is a form of such use of the space, which means minimizing the negative impacts on nature and the local population. It helps the protection and management of the protected natural resources and other natural areas. Ecotourism affects the long-term participation of local people in decision-making and determines the economic and other benefits to the local population.

## The potentials of Leader initiatives

The processes of planning of rural development must be located both at the regional and local level because of the optimal use of resources, facilitation of the connection of regional and local actors, avoiding bureaucratization and lack of understanding of regional and local conditions with the central institutions, etc. In this way, local and regional (internal) issues are gaining in importance (e.g. level of income in the region, the level of employment and preservation of natural resources,

increasing revenues from agriculture, local initiatives for development and rural regeneration, etc.). Experiences in terms of rural development in Europe are numerous and they partially represent local and regional (territorial) answers to questions of development of rural areas, which are incorporated into national rural development strategies. Examples of this are European initiatives of so-called endogenous rural development Leader 1 and Leader 2. A general assessment of Leader 1, 2 and Leader + initiatives is positive. The positive experiences of the first two initiatives have led to the continued funding in the form of Leader + initiative, i.e. the measures planned for the period after the year 2007, when Leader exceeds the level of a pilot initiative and becomes an integral part of the "programming" of rural development. This initiative has led to the creation of hundreds of local action groups throughout Europe, which are connected and share experiences of their development projects.

General characteristics of the Leader initiatives (symbolically, often called "laboratories of rural development") are: development focused on a specific territory for better use of endogenous potentials of the area, horizontal integration activities, strengthening the common identity and vision for development; bottom up approach, which is reflected in the active participation of local people; local partnerships, operationalized through local action groups (LAG) that actively coordinate these processes; innovative approach, aimed at creating alternative and original solutions for the sake of raising the competitiveness of the area; multi-sectorial integration, as a combination of activities of the various economic sectors, social groups and institutions; networking, in terms of connecting different groups and territories covered by Leader initiatives, in order to allow dissemination of information, ideas and experiences among rural regions of Europe and to stimulate cooperation among regions (active participation in this task is mandatory for all users of Leader programs); decentralized management and financing, with participation in the financing by the person who uses the programs.

Leader actions have contributed to the sustainability of the development processes at the local level, have proven to be adaptable to different socio-economic and managerial context and applicable to smaller territorial activities in rural areas, have induced the responsibility of local partnerships, linking public and private sector in a common strategy, as well as the interests of many different stakeholders (Shucksmith, et al., 2005: 109). These activities are faced with many problems and obstacles such as the influence of interest groups and the issue of the quality of

partnerships in local action groups, problems of administrative barriers for the implementation of projects, the relatively low participation of women in local action groups and problems of institutional underdevelopment, which can be an obstacle to successful development activities. Leader in the next period becomes an integral part of the EU rural development policy, along with other similar types of SAPARD funds (IPARD), PHARE, ISPA or similar national programs similar to Leader, focused on rural development of local rural communities.

According to the 2007-2013 financial perspective, 43 percent of the total EU budget goes to rural development and the implementation of EU agricultural policy. Given the complexity of the Common Agricultural Policy, EU supports candidate countries in the adaptation of the agricultural sector and rural areas, as well as the implementation of EU legislation in the framework of the Common Agricultural Policy. Component relating to rural development is intended for candidate countries in order to prepare for the implementation and management of the Common Agricultural Policy. Implementation of assistance under this component contributes to the sustainable development of the agricultural sector and rural areas, as well as an improved implementation of the *acquis communautaire* in the field of the Common Agricultural Policy. Also, through the process for using this component of IPA, the candidate countries for EU membership are prepared to use funds from the European Agricultural Fund for Rural Development. Technical assistance is a measure which is related to the assistance to the public administration in the implementation of IPARD operational program. This measure is aimed for helping to establish the IPARD Monitoring Committee, conducting monitoring and evaluation activities, seminars and meetings, and so on. It is also important to note that the administration and organizations active in the field of rural development, established in the beneficiary countries under this IPA, have access to the European network for rural development. Through participation in this network a user can have an easy way to establish cooperation with relevant actors in the field of rural development in the EU member states and thus to further improve the agricultural sector and the protection of their interests at European and global level.

Measures that are particularly important are:

Encouraging the diversity and development of rural economic activities through the launch of economic activity, creating employment opportunities and through diversification into non-agricultural activities.

Priority is given to investments for creating micro and small enterprises, crafts and rural tourism in order to improve the development of entrepreneurship and economic production. In areas where the local rural development strategy is already determined, the investment under this section shall be in accordance with these strategies.

Preparation and implementation of local rural development strategies through the preparation of projects of cooperation in accordance with the priorities of rural development and management of local public-private partnership by establishing so-called "Local action groups".

Activities to improve the environment and nature, through the implementation of pilot projects in order to develop practical experience in the implementation of actions to improve the environment and nature, both at the level of administration, and the level of agricultural holdings. Examples include organic farming, crop rotation, reducing the use of fertilizers, etc.

Improvement and development of rural infrastructure by reducing regional disparities and increasing the attractiveness of rural areas for the development of entrepreneurship and providing conditions for the development of rural economies. Priority in this program is to measure the investment in water and energy supply, waste management, local access to information and communication technologies, local access roads of particular importance for local and economic development, as well as infrastructure and fire protection because of the risk of forest fires.

Improving the training in order to contribute to the improvement of professional skills and competence of persons engaged in the agricultural, food and forestry sectors and other economic actors employed in the fields covered by this component (but keep in mind that the funds will not be awarded for training courses that form part of normal education programs or systems at secondary school or higher levels).

## Conclusion

Important experiences of rural development policy in the European Union, from which Serbia should learn are mobilizing and connecting all stakeholders in the process of rural development, regionalization, decentralization (de-concentration of decision-making and management), application of knowledge and experience of other countries, regional and

local development projects, the idea of local action groups at the community level and so on. Serbia should turn this idea into a formal development strategy and operationalize them in a way that they can be practically achievable. Thus would be built the capacity of rural areas population, which in conjunction with other forms of capital of every rural area can increase its competitiveness and potentially produce a number of positive social changes. Industrialization enables the improvement of the living standards of a large number of people on Earth, but it has a negative impact on the environment and human health. Education for environmental protection is not just about exploring the natural and social sciences necessary for understanding and solving environmental problems and environmental pollution, it also includes upgrading moral principles and the establishment of a new value system of man in relation to nature and the environment. The main instruments for achieving rural development are the activities such as conservation of natural resources, regulation of agricultural land and making a progress and economic security in rural areas, while protecting and preserving the environment. Organic farming as a model agro-economic development can be an important instrument for achieving rural development, given the fact that it is a solution to the issue of food quality and safety, environmental protection and conservation of agro-ecosystem, and that it is potentially one of the most rewarding jobs in the world.

The specifics of some rural areas, or the attractions that they can provide, must be used up within the rural development. Activities in the field of rural tourism should also be carried out in accordance with ecological principles, without damaging the environment, by those who provide as well as by those who use tourism services. In the current process of connecting the world and the creation of a large global village, it is a challenge to brand a whole rural region, introduce to the world its unique characteristics, and promote the true values, while making the region develop in the right direction. Branding is a complex process in which, in order to achieve maximum results, it is needed the involvement of all stakeholders (residents, local authorities, industry representatives) to create and broadcast a single message to the public.

## References

1. Bogdanov, N. (2007): *Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija*, Beograd: Ministarstvo poljoprivrede, šumarstva i vodoprivrede i UNDP.

2. Cater, E., Goodall, B. (2002): *Must tourism destroy its resource base?*, u: Mannion, A., Bowley, S. (ur.) *Environmental Issues in the 1990s*, Chichester: Wiley.

3. Ceranić, S., Paunović, T. (2010): *Organska proizvodnja u MSP - šanse i izazovi za razvoj poljoprivrede*, Naučni simpozijum sa međunarodnim učešćem, Agro-Sym (I), zbornik radova, Jahorina.

4. Đekić, S. (2000): *Agrarni i neagrarni aspekti ruralnog razvoja*, Ekonomski horizonti,2, (1-2) str. 53-59.

5. Huber, S. (1988): *Formulisanje ruralne politike u Švajcarskoj*, Glasnik poljoprivredne proizvodnje, prerade i plasmana, Beograd, br. 1-2/88.

6. Janković, D. (2007): *Importance of social capital in the development of local rural communities*, Zbornik Matice srpske za društvene nauke, (123), 173-190.

7. Lazović, O. (2004): *Razvoj manje razvijenih regiona kroz razvoj ruralnog turizma i obezbeđenje održivog razvoja*, Planiranje uređenja sela i ruralnih područja, Banja Vrujci.

8. Moseley, M. (2003): *Local partnerships for rural development: The European experience*. CABI

9. Olins, V. (2003): *O brendu*, Beograd: Profile.

10. Shucksmith, M. (2000): *Endogenous development, social capital and social inclusion: Perspectives from LEADER in the UK*, Sociologia Ruralis, vol. 40, (2).

11. Shucksmith, M., Thomson, K.J., Roberts, D. (2005): *The CAP and the regions: Territorial impact of the common agricultural policy*. CABI

12. (2006). *Strategija razvoja turizma Srbije za period 2005. – 2015.*, Službeni glasnik RS, br.91/06.

13. Tošić, B. (2001): *Mogućnosti za razvoj seoskih naselja u Srbiji*, Regionalni razvoj i demografski tokovi balkanskih zemalja, knjiga 6, Niš.

14. Vujatović–Zakić, Z., Stojanović, Ž. (2004): *Integralni ruralni razvoj kao strateško opredeljenje Srbije*, Razvoj sela u novim društveno–ekonomskim uslovima, Banja Vrujci.

# FINANCING AGRICULTURE AS A FACTOR OF THE RURAL DEVELOPMENT IN THE REPUBLIC OF SERBIA

*Gordana Radović, Nikola Njegovan*[1]

## Abstract

*Due to its specific production circle, agriculture can not be self financed and it needs help in the form of an adequate financing model. So far, the Republic of Serbia has not had a proper one; therefore, financing Serbian agriculture is the most serious and most complex problem of domestic agrarian policy. The aim of the paper is to analyze the problem of financing Serbian agriculture in the previous period, and to propose possible models of financing domestic agriculture, based on the drawbacks of the previous solutions. Analytical-empirical, quantitative and comparative methods were used in this paper, as well as the method of synthesis. The authors believe that state financial support in the system of financing Serbian agriculture is necessary in order to strengthen the agricultural entities. The support should be implemented by the subsidies from the agrarian budget and the loans, supported by specialized agricultural banks, whose forming is also suggested in the paper. In the system of financing domestic agriculture, we need to develop new sources of finance such as securities, term contracts (options and futures), and public-private partnership, as well as to use the potential of foreign financial sources.*

**Key words:** *financing, agriculture, rural development, the Republic of Serbia*

## Introduction

According to OECD categorization, rural areas in Serbia occupy 85% of the territory and are inhabited by 55% of the total Serbian population. The results from the Census of Agriculture in 2012, show that Serbia has 631.122 agricultural households. Family owned agricultural households

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(farms) are dominant and make 99.5% of the households registered, while only 0.5% of the farms belong to the agricultural enterprises. The average size of the land is 5.4 hectares and the average farm owner is 59 years old.[2] Women make 43% of the total number of full-time employed members of the agricultural households. Besides primary agricultural production, 78.301 (12%) of the agricultural households are engaged in other profitable activities, that are not related to agriculture.[3] Based on the above mentioned data, we can conclude that primary agricultural production is still the main activity of the domestic agricultural households and that the farms are predominantly family-run. Furthermore, the sector of micro-agrobusiness is still underdeveloped, and the age structure of the people engaged in primary agricultural production is unfavourable.

According to the authors, the main macro-economic factors that indicate the importance of agriculture for the economy of any state are the following: (a) the share of agriculture in the total population; (b) the share of agriculture in the total employment; (c) the share of agriculture in the gross domestic product; (d) the share of agriculture in the external trade.[4] Based on the data from the Survey on the Workforce from 2011, 42% of the total workforce in Serbia lives in rural regions, while 19% of them work in the sector of agriculture, forestry and water management. Regionally, 19.8% of the people employed in this sector are from Vojvodina, 27% are from Šumadija and Western Serbia, 27.7% are from Southern and Eastern Serbia and 3.2% are from Belgrade. Even though the agricultural share in GDP is constantly decreasing, the agriculture, forestry and water management participated with 7.95% of the total export and 2.91% of the total import in 2011, which means that this sector actually gained the surplus in the external trade.[5] We could conclude that, in the previous period, agriculture has been an important sector for our economy, as it employed one-fifth, or in some regions, one-fourth of the total workforce, which positively influenced the balance of payments.

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[2] Statistical Office of the Republic of Serbia (2013): The Census of Agriculture in 2012- Agriculture in Serbia, Book 1, Belgrade p.13.

[3] Statistical Office of the Republic of Serbia (2013): The Census of Agriculture in 2012- Agriculture in Serbia, Book 2, Belgrade p.125.

[4] Bogdanov N. (2007): Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija, MPŠV RS, UNDP, Beograd

[5] http://webrzs.stat.gov.rs/WebSite/repository/documents/00/00/61/71/SB_550_ARS2011_SAJT.pdf; from February 23, 2014.

Contemporary problems of domestic agriculture include: financial devastation, fragmented land, a small number of successful farmers' associations, as well as rare cases of successfully transformed ownership in agricultural industry. The agricultural households are characterized by the dominant mono-functional agriculture, low productivity, outdated machinery and the lack of necessary agro-technical measures, as well as common using of saved seed and parity agricultural loans.The structure of the agricultural households is becoming older and poorer, with less people living on farms. Poverty has become the "rural phenomenon" in the past years, since there are twice as many poor inhabitants in rural areas than in urban ones. Therefore, we strongly believe that all the listed problems of the domestic agriculture are related to the problem of financing of Serbian agriculture.

According to the analyses of the closing balance of the companies engaged in primary agricultural production, we could learn that relative profit to total income ratio shows low profitability. The total amounts for reproduction (profit and amortization are constantly decreasing, and as a result, our agriculture has not invested in the amortization in the last two decades which is the obvious example of financial devastation. The reasons for the financial devastation are of endogenous character and are conditioned by price disparity and inadequate financial support to the agriculture. It is the case of the distinct imbalance between economic importance of the agriculture on one hand, and the implemented financial support to this branch of economy, on the other.[6]

The challenges of financing Serbian agriculture are, at the moment, the greatest and the most complex problem in domestic agriculture, whose solution would help the development of the primary agricultural production. It would also help the development of multifunctional agriculture and the rural development of the Republic of Serbia. "Agriculture needs constant financial and credit support, as it needs to place the financial sources into production at once, and it needs to act in accordance with the scope of work, nature of production, long period of keeping the sources (or low turnout of investment) and low profit that primary production always faces. It also means that is not possible for the

[6] Pejanović R., Njegovan Z., Maksimović G. (2013): *Ekonomika poljoprivrede, agrarna politika i ruralni razvoj,* Društvo agrarnih ekonomista Balkana, Beograd,, str.149.

production to accumulate its own sources of finance".[7] The aim of the paper is to analyze the problems of financing agriculture in the Republic of Serbia and to propose some new concepts of financing domestic agriculture, based on the analysis done. The main hypothesis serving as the ground for the research is that domestic agriculture needs the adequate state financial and credit support because of its economic and social importance. Analytical-empirical, quantitative and comparative methods were used in this research, as well as the method of synthesis.

## The roots of the problem of funding

Serbian agriculture was financially completely dependent on the state until 1994, when The Programme of Reconstruction of Monetary System was adopted. The state had an enormous influence on creating the measures for financing agricultural production. The measures were mostly loans from the National Bank primary issues with favorable loan terms. "The National Bank of Serbia granted the loans from the primary issues using discount rates, which were much lower than the rates on the market. The discount rate in the early 1990s was twice or even five times lower than the interest rates of the commercial banks on the market."[8] Credit placement of the commercial banks in the agriculture was also influenced by the state. During that period, we could say that short term and long term loans were influenced by the state control, and that financial sources were administratively directed towards agriculture. According to some authors,[9] the placement of the selected loans from the primary issues into agriculture was justified, as it partly fixed bad economic position of the agricultural companies. The same source claims that preferential loan placements were necessity because of the underdevelopment of domestic financial market, insufficient mobility of finances, as well as the need for seasonal investments which had to be made in the short term. Furthermore, preferential placements were required for the export of agricultural and alimentary products, as it was impossible to collect receivables in a short period of time.

[7] Radović G. (2009): *Podrška države u funkciji finansiranja poljoprivrede*, Naučni časopis Agroekonomika br.41-42, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad, str. 69-79.
[8] Radović G. (2009): Magistarska teza: *Modaliteti finansiranja agrara u tranzicionom periodu*, Univerzitet u Novom Sadu, Ekonomski fakultet Subotica, str. 25.
[9] Bjelica V. (2001): *Bankarstvo (teorija i praksa)* , Stilos, Novi Sad, str.122

The Programme of Reconstruction of Monetary System annulled the privileged position of the Serbian agriculture and its right to the selective and preferential credit policy, as these placements was considered the generators of inflation. The annulment of the privileges of the agricultural sector did not bring another source of financing which would adequately replace the previous one, and the agricultural companies had to start taking unfavorable loans with high interest rates.

The individual producers could not take loans,[10] so they had to take PIK loans, to make arrangements with the processing companies. The additional disadvantage was the placement of the premiums for milk[11] via processing companies, which drove the producers in more difficult position and influenced the production volume.

In our opinion, financing agricultural sector from the primary issues of the National Bank was wrongly characterized as the "generator" of hyper inflation which shook our monetary and financial system in the 1990s. The loans placed in the agriculture had actual loan coverage in agricultural production, and the "trigger" was the inadequate control system of financing agriculture from the primary issues of the National Bank, which was given to the commercial banks.

It is necessary to point out that financing agriculture in the 1990s was difficult because of unfavorable developing performance of our economy, which was the result of the economic embargo, disintegrated Yugoslav market and the armed conflicts. The accumulative ability of the agriculture was negatively influenced by price discrepancy. The price discrepancy was conditioned by the need for securing food for the society and the worst period was in 1994 and 1995. It was estimated that, during this period, Serbian agriculture "lost" around 5 billion US dollars.

[10] It is estimated that in Serbia only 10% of the farmers' property is registered with land registry. In most cases, they are not able to submit the proof of ownership to the banks, and can not use morgage as the means for securing loans

[11] ''From 1996 to 2003, the premiums for milk used the greatest part of the agrarian budget, as 1/3 of the budget finances was used for the premiums. We should bear in mind that this measure had a social aspect, because the premiums were paid to the producers regardless of the amount of milk delivered and the great number of farms met the requirements." Radović G. (2009): Magistarska teza: *Modaliteti finansiranja agrara u tranzicionom periodu*, Univerzitet u Novom Sadu, Ekonomski fakultet Subotica, str. 33.

## Agrarian budget as the means of granting subsidies and loans

Agrarian budget became the part of Serbian state budget in 1996. The initial idea was to establish the agrarian budget as the stable and permanent source of financing agriculture, the model that exists in all agriculturally-developed countries. According to some authors, the agrarian budget in domestic conditions represents the source of reimbursement rather than financing. The distinguished authors also question the function of granting loans which has been present in the budget since 2004[12], which can not be called a financial function. In the past, there were some quick changes in the models of granting subsidies from the agrarian budget to the agriculture. Those changes confused the farmers and prevented them from planning their production. In our opinion, better results would be achieved if we used the model of granting subsidies via specially formed state financial institution, whose work would be constantly monitored by the National Bank of Serbia.

Besides the quantitative, the agrarian budget has also got the qualitative aspect, as it represents the key element for the implementation of agrarian policy measures. It is necessary to emphasize that Serbian agrarian policy (in the last fifteen years) has undergone some sudden and inconsistent changes. The previous period can be divided into three stages, the first one being from 2001 to 2003. This stage was characterized by the measures of price support for wheat, sugar beet, sunflower, soy beans and milk premiums. The measures of agrarian policy, which were introduced during the second stage from 2004 to 2006, were directed towards the investment and rural development.

The third stage, which started in 2007, introduced the subsidies per area of agricultural land and per head of livestock. The mandatory registration of agricultural households was introduced in 2004 and since then, the registered farms have been eligible for financial support from the agrarian budget. Contrary to our domestic policy, EU Common Agricultural Policy is defined by seven-year period during which the priorities of development and the measures of agrarian policy are established.

[12] Agricultural loans, with the support from the agrarian budget, were not granted only in 2013 even though 500 million dinars were planned for granting.

**Table 1.** *Agrarian budget share in the total budget of the Republic of Serbia from 1996 to 2013*

| Year | Total Budget (million/rsd) | Agrarian budget (million/rsd) | Share of agrarian budget in total budget RS (%) | Share of agriculture, forestry and water management in GDP (gross value added in current prices) (% ) |
|---|---|---|---|---|
| **1996** | 10.240,2 | 900,0 | 8,3 | 19,5 |
| **1997** | 13.821,0 | 828,9 | 6,0 | 19,3 |
| **1998** | 16.807,5 | 975,3 | 5,8 | 18,3 |
| **1999** | 17.640,7 | 878,2 | 5,0 | 21,4 |
| **2000** | 32.702,4 | 1.823,4 | 5,6 | 18,2 |
| **2001** | 127.339,9 | 3.940,1 | 3,1 | 17,5 |
| **2002** | 177.600,0 | 7.640,0 | 4,3 | 12,9 |
| **2003** | 271.800,0 | 10.990,0 | 4,0 | 11,1 |
| **2004** | 329.300,0 | 20.140,0 | 6,1 | 11,5 |
| **2005** | 432.900,0 | 18.980,0 | 4,4 | 10,0 |
| **2006** | 505.820,1 | 27.543,9 | 5,4 | 9,4 |
| **2007** | 595.517,8 | 26.095,8 | 4,4 | 8,6 |
| **2008** | 695.959,1 | 32.895,4 | 4,7 | 8,9 |
| **2009** | 719.854,1 | 26.690,4 | 3,7 | 8,0 |
| **2010** | 825.884.9 | 31.577,9 | 3,8 | 8,5 |
| **2011** | 824.575,9 | 33.676,0 | 4,1 | 9,1 |
| **2012** | 1.018.633,4 | 40.876,7 | 4,0 | 8,3 |
| **2013** | 873.409,4 | 44.699,5 | 5,1 | * |
| **Average share** | | | **4,9** | **12,97** |

**Source:** *Ministry of Agriculture, Forestry and Water Management and Republic Office for Statistics; The author's calculation*

Serbian current financial support to domestic agriculture is based on the Law on Agriculture and Rural Development[13] and the Law on Incentives

[13] The Law on Agriculture and Rural Development, Official Gazette of the Republic of Serbia, No 41/2009

in Agriculture and Rural Development[14]. The Law on Agriculture and Rural Development defines the application of the system of budget support to reach the following: (1) improvement of competitiveness of agricultural products on the market; (2) provision of healthy, quality food; (3) provision of support to the living standard for the farmers that can not secure their presence on the market; (4) provision of the support to rural development and protection of the environment from the negative effect of agriculture.

The Law on Incentives in Agriculture and Rural Development defines the measures of the agrarian policy that are applied via regulated incentives: (1) direct payment; (2) incentive measures for rural development; (3) special incentives related to creating institutional framework for the implementation of the above mentioned types of incentives. The Law states that the share of agrarian budget in the state budget can not be lower than 5%, except for the year 2013, when the Law was passed.

The analysis of the date presented in table 1 shows that the average share of the agrarian budget in the total budget of the Republic of Serbia was almost three times smaller than the share of agriculture, forestry and water management in gross added value for the period given. The presented data show the domestic problem of financing agriculture – the ratio of the budget allocations aimed at investment in agriculture and the contribution of agriculture in creating the state gross added value. The Law on Incentives in Agriculture and Rural Development states that agrarian share in the total state budget can not be less than 5%, except for the year 2013, when the Law was passed. The total budget allocations for the investment in agriculture in the previous period included the allocations from the Republic, AP Vojvodina and local governments. "The average share of the budget allocations from AP Vojvodina's for financing agrarian sector from 2004 to 2012 was only 4.2%, which is rather inadequate, if we consider the importance of agricultural development in AP Vojvodina*."*[15]

[14] The Law on Incentives in Agriculture and Rural Development, Official Gazette of the Republic of Serbia, No 10/2013

[15] Pejanović R., Radović G. (2013): *Agrarni budžet kao faktor ruralnog i regionalnog razvoja Republike Srbije*, XVIII Naučni skup: Regionalni razvoj i demografski tokovi zemalja jugoistočne Evrope, Univezitet u Nišu, Ekonomski fakukltet, Niš, 21.jun 2013.godine, str.241-252.

Quantitatively, in the future, we need to increase the agrarian share in the total budget to at least 5%, which is the minimum defined by the Law on Incentives in Agriculture and Rural Development. Bearing in mind the importance of agriculture for the economic development and its social aspect, some authors believe that 10% of the total budget would be optimal for the agrarian budget."Qualitatively, in the future, it is necessary for the budget to allocate more funds into rural development, as Serbia is predominantly rural country. More than half of Serbian population lives in rural areas, therefore it is essential for us to create new jobs and to improve living standards of the rural population, as well as to increase the level of economic development through the process of diversification".[16] It is crucial for the Strategy of Rural Development which is in the process of adopting, to precisely define the period, measures of agrarian policy as well as the measures related to diversification of rural economy and their share in the structure of agrarian budget. The proposal is based on the requirements of agricultural entities that need the predictability of agrarian policy and its harmonization with the EU Common Agricultural Policy.

## Commercial bank loans

The loans granted to domestic agricultural entities by the commercial banks in the transitional period were characterized by: (1) high interest rates; (2) application of currency clause; (3) many requirements for granting the loan; (4) strict selection of loan applicants; (5) high expenses of securing the loan; (6) short loan period; (7) non-existence of grace period or extremely short grace period; (8) obligation of one-off loan processing fee; (9) the lack of loan flexibility according to the seasonal character of agricultural production; (10) most of the banks accrued the interests on the entire loan amount, and not only on the rest of the debt. The interest rates on the placed agricultural loans were extremely high because of the huge risks related to agricultural production. "The expenses of loan interests can seriously endanger the economic position of the farms, as well as the producers".[17]

[16] Ibidem

[17] Pejanović R., Tica N.(2005): *Tranzicija i Agroprivreda (Ogleid iz agrarne ekonomije),* Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad, str.139.

"The risk in agricultural production is constant and can be classified as: (a) the production risk – depending on weather conditions, animal and plant diseases; (b) the price risk; (c) the institutional risk; (d) the financial risk; (e) the personal risk; (f) the goods production risk (damage or complete loss of production technology due to the theft or natural disasters); (g) the risk of fire or any other threats.Therefore, agriculture is a very risky activity not only because of its natural, biological factors, but because of its social factors as well (such as the influence of the market).[18] Because of the risks mentioned and slow turnover of the capital, the banks in Serbia are not willing to fund individual agricultural producers. "Small, family-run farms (that are predominant in Serbia) are in the worst, unenviable position and they do not actually have the access to the commercial loans".[19] "However, the commercial banks have been more interested in funding the agriculture in the last decade, which can be explained by the arrival of the foreign banks with a long tradition of funding agriculture in their home country." [20] According to the current data, the following banks play the major role on the domestic market of agricultural loans: ProCredit, Banca Intesa, Credit Agricole, and Komercijalna Banka.

### Agricultural loans of the specialized state financial institutions

**Development Fund of the Republic of Serbia** in accordance with its policy can not grant loans to the individual producers, but only to the agricultural companies- legal entities. In the previous period, the loans were granted to the food processing industry. Those loans were characterized by favorable annual interest rate (up to 3% annually), and a very short repayment period, if we consider that the maximal loan period was 6 years for the investment loans. "The average share of agricultural loans in the total number of long-term loans, granted by the Fund from

[18] Pejanović R., Njegovan Z., Tica N. (2007): Monografija, *Tranzicija- ruralni razvoj i agrarna politika*, Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad, str.103-104.

[19] Pejanović R., Njegovan Z., Maksimović G. (2013): *Ekonomika poljoprivrede, agrarna politika i ruralni razvoj*, Društvo agrarnih ekonomista Balkana, Beograd,, str.151

[20] Radović G., Pejanović R., Njegovan Z. (2013): *Credit as a source of financing agriculture Serbian*, The Seminar on Agriculture and Rural Development - Challenges of Transition and Integration Process, 50th Anniversary Department of Agricultural Economics, Belgrade - Zemun, 26.-28.09.2013.,ISBN:978-86-7834-180-9. http://ageconsearch.umn.edu/bistream/161589/2/UBelgradeProceedings%20AEK50-Finall.pdf

2010 to 2012, was 33%, which means that one third of all long-term loans of Development Fund of the Republic of Serbia was placed in the development of agricultural and food processing industry."[21]

**Provincial Fund for Agricultural Development** was founded by the Assembly of Autonomous Province of Vojvodina in 2001[22] in order to provide incentives for agricultural development in AP Vojvodina. The main idea of the Fund was to enable agricultural producers to access the necessary funds for their production faster. The Fund's loan terms were rather favorable as the interest rate was 2% annually, with the grace period, while the maximal amount per loan reached 20.000 euros. The unfavorable terms were related to the short repayment period (up to four years). "By December 2011, Provincial Fund for Agricultural Development granted 1.875 loans, placed for agricultural development in Vojvodina, with the total amount of 8.063.560.13 euros".[23]

**The Provincial Fund for Development** was founded in 2013, in order to grant loans to the industry, agriculture and entrepreneurship and to encourage even regional development, increase export and employment. At the end of 2013, the Fund announced the first call for agricultural loans. There were two types of loans: long-term loans for agricultural development and long-term loans for the development of food processing industry. The terms were rather favorable, as the annual interest rate was 4% maximum, the loan amounts were acceptable and there was a grace period. These loans were unfavorable considering requested guarantees, short repayment period, and the calculation of intercalary interest during the grace period, and high obligatory participation which forms minimum of 20% of the calculated loan value.

**The Fund for Capital Investments of AP Vojvodina** was founded by the Assembly of Autonomous Province of Vojvodina in 2006 in order to finance programmes and projects of capital significance for Autonomous Province of Vojvodina. One of the most important areas for the fund is definitely agricultural development. The mission of the Fund is investment in projects and programmes as a pledge for further and stronger economic, commercial, cultural and political development of Vojvodina and the Republic of Serbia. "From 2006 to 2008, The Fund for

[21] Ibidem
[22] Official Gazette of AP Vojvodina, No 3/01
[23] http://www.fondpolj.vojvodina.gov,.rs The Report for 2011 (Page visited June 6, 2013).

Capital Investments placed 160.66 million dinars in agriculture, forestry and water management.*"*[24]

**Guarantee Fund of Autonomous Province of Vojvodina** was founded by the Assembly of Autonomous Province of Vojvodina in 2003. Its main goal is to make the access to the financial market easier, and to ensure favorable loan conditions in comparison with the market conditions for individual producers, private entrepreneurs and small and medium enterprises in AP Vojvodina. The Guarantee Fund conducts the activities of guarantee issuing, in order to ensure the repayment of the loans approved with the commercial banks. Based on the data in Table 2, we can conclude that, so far, the Fund has placed 42.80 million euros of guarantees in its programme activities and rural development of AP Vojvodina.

**Table 2.** *Engagement of guarantee potential from 2004 to 2013*

| Activity | Effect | Guarantee potential (€) | Number of guarantees |
|---|---|---|---|
| Procurement of mineral fertilisers | 20.148 tons | 4.174.000,00 | 42 |
| Procurement of tractors | 1.032 tractors | 32.708.805,59 | 891 |
| Support to female entrepreneurship –new job positions | 748 new job positions | 2.760.918,77 | 195 |
| Purchase of agricultural land | 711 hectares | 2.373.018,00 | 12 |
| Export stimulation | | 781.000,00 | 1.338 |
| The total of nominal amount of guarantees issued (without interests and fees) | | 42.797.742,36 | 1.338 |

**Source:** *Data from Guarantee Fund of APV*

## Possible Models of Financing Domestic Agriculture

Domestic agriculture needs a specialized agricultural bank. The bank could take on the role of granting subsidized loans to agriculture, which was the job of the agrarian budget in the previous decade. The main task of the specialized bank should be the influx of all available funds (from the state budget, foreign donations or assets from renting state land) and their placement in agriculture. "The placements should be implemented under beneficial conditions, and should take into account the seasonal

[24] Radović G. (2009): Magistarska teza: *Modaliteti finansiranja agrara u tranzicionom periodu,* Univerzitet u Novom Sadu, Ekonomski fakultet Subotica, str.149-152.

character and dynamics of agricultural production and then act in accordance with the dynamics of placing assets and annuity, as well as with the bank fees. The specialized agricultural bank should offer the system of selective interest rates, depending of profitability of certain lines of agricultural production*".*[25]

The specialized agricultural bank could have an important role in pre-financing of the investments that would be granted by the EU pre-accession funds. It is expected that the Republic of Serbia is funded with 200 million euros from the funds, while 16-18% of the funds could be implemented through IPARD programme. In order to ensure the pre-financing of the investments, we need to provide the credit lines with three-year grace period. The three year period is required, as it is the time needed to repay the assets from IPARD. We also need to offer the interest rates adapted to the financial potential of domestic agricultural enterprises.

In order to lower the interest rates on the banking market, we need to reduce the risk that is always linked to the agricultural loans. Therefore, it is necessary to increase the insurance of plant and livestock agricultural production. "The insurance represents an economic mechanism, which uses premiums in order to compensate the loss that would exist if there was no insurance. The insurance replaces the uncertain low cost with huge uncertain loss."[26] To ensure the increase in the agricultural insurance, it is necessary to keep subsidized insurance premiums, which were granted from the agrarian budget.

Domestic concept of agricultural financing should include securities, in order to provide extra sources of financing and to develop market conditions. "This way, better conditions for agricultural loans will be created as well as equitable share of risk (which is common for agricultural production), and greater price stability."[27] At the moment, short term securities such as commercial and warehouse receipts can be used for financing domestic agricultural production. This method has

[25] Radović G. (2009): Magistarska teza: *Modaliteti finansiranja agrara u tranzicionom periodu*, Univerzitet u Novom Sadu, Ekonomski fakultet Subotica, str.178-179.
[26] Pejanović R., Njegovan Z., Tica N. (2007): Monografija, *Tranzicija- ruralni razvoj i agrarna politika*, Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad, str.105
[27] Radović G. (2010): *Hartije od vrednosti u funkciji finansiranja agrara*, Naučni časopis Agroekonomika br.45-46, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad, str. 69

been in practice since 2009, when the Law on Public Warehouses for Agricultural Products was passed and when The Indemnity Fund was founded. According to the research done by European Bank for Reconstruction and Development (EBDR) for the period since the foundation of The Indemnity Fund until February 2014, over 30 million euros were placed in agricultural loans, using warehouse receipt as the security instrument. The loans granted with warehouse receipt are characterized by lower interest rates, which are 5% lower than other interest rates on the market. The amounts of loans granted are 70-75% of the value of the commodities in the warehouses, and the only drawback of these loans is the short loan period, which is 12 months only. This way of financing agriculture represents the combination of the state support and commercial ways of funding; it is favorable for the agricultural entities and should be used more in the future.

"Financial derivatives (derivative securities) are potentially important way of financing domestic agriculture. The standard term contracts (futures and options) are still not common in Serbia, because of the lack of financial institutions for their implementation. There is also the lack of "free" cash funds in agricultural sector that would allow "luxury" for the users to obtain the initial margin in case of the futures or premiums with option contracts"[28] The application of the term contracts would allow the agricultural producers to: (a) adequately plan and to start the profitable agricultural production; (b) ensure the placement of products and protect themselves from the market risk which is also related (with the term contracts) to the food processing industry and traders; (c) partially finance the production with the payment of the term contract price (premiums with option contracts). "The application of term contracts would increase the profitability and accumulation of this significant economic sector. Under our domestic conditions, it is reasonable to expect that we will start trading with options and then later with futures, considering that they demand higher level of liquidity of the entities using them."[29]

The possible ways of financing domestic agriculture and the overall rural development in the Republic of Serbia in the transitional period are the

[28] Radović G. (2009): Magistarska teza: *Modaliteti finansiranja agrara u tranzicionom periodu,* Univerzitet u Novom Sadu, Ekonomski fakultet Subotica, str.173

[29] Vunjak N., Radović G. (2012): *Finansiranje agrara u Republici Srbiji u tranzicionom periodu,/Financing agriculture in Serbia in the transition perod/,*XVII Naučni skup:Regionalni razvoj i demografski tokovi zemalja jugoistočne Evrope, Niš, jun 2012.godine, str.397-404.

following: leasing, joint ventures of residential and non-residential subjects, foreign investments, the investments of foreign investment funds, financial potential of the Diaspora and public-private partnerships.

## Conclusion

The state financial support in the system of financing agriculture in the Republic of Serbia is necessary in order to economically boost the agricultural entities. This support should be implemented through the subsidies from the agrarian budget and the loans supported by the specialized agricultural banks. In order to lower the credit risk, we need to introduce compulsory insurance of the agricultural production, which would be subsidized by the agrarian budget. It is also necessary to ensure the predictability of domestic agrarian policy, which should resemble EU Common Agricultural Policy, to define programme period and the packages of agrarian measures.

Agrarian budget should quantitatively amount 5% (minimum) of the total state budget, which is defined by the Law on Incentives in Agriculture and Rural Development. Qualitatively speaking, we need to gradually adapt to the EU agrarian budget, in whose structure 1/5 of the finance is for rural development.[30] Besides the budget support, the system of financing domestic agriculture should benefit from the new sources of financing such as securities, term contracts (options and futures), public-private partnerships, as well as possible foreign sources of finance. The excellent example of the combination of the state support and commercial way of funding of agriculture is definitely the using of warehouse receipts as the means of securing the agricultural loans. In the previous period, this method has been used by the commercial banks in association with The Indemnity Fund of the Republic of Serbia. We should use this method of financing agriculture in the future, when the number of licensed public warehouses is increased.

## References

1. Bogdanov N. (2007): Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija, MPŠV RS, UNDP, Beograd.

[30] Pioeg, J.D.Van der, Long A., Banks J. (2003): *Rural development: the state of the art*, http://www.agris.fao.org, (sajtu pristupljeno 22.02.2014.)

2. Bjelica V. (2001): Bankarstvo (teorija i praksa), Stilos, Novi Sad.

3. Pejanović R., Tica N.(2005): Tranzicija i Agroprivreda (Ogledi iz agrarne ekonomije), Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad.

4. Pejanović R., Njegovan Z., Tica N. (2007): Monografija, Tranzicija-ruralni razvoj i agrarna politika, Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad.

5. Pejanović R., Njegovan Z., Maksimović G. (2013): Ekonomika poljoprivrede, agrarna politika i ruralni razvoj, Društvo agrarnih ekonomista Balkana, Beograd.

6. Pejanović R., Radović G. (2013): Agrarni budžet kao faktor ruralnog i regionalnog razvoja Republike Srbije, XVIII Naučni skup: Regionalni razvoj i demografski tokovi zemalja jugoistočne Evrope, Univezitet u Nišu, Ekonomski fakukltet, Niš, 21.jun 2013.godine, str.241-252.

7. Pioeg, J.D.Van der, Long A., Banks J. (2003): Rural development: the state of the art, http://www.agris.fao.org, (sajtu pristupljeno 22.02.2014.)

8. Radović G. (2009): Magistarska teza: Modaliteti finansiranja agrara u tranzicionom periodu, Univerzitet u Novom Sadu, Ekonomski fakultet Subotica.

9. Radović G. (2009): Podrška države u funkciji finansiranja poljoprivrede, Naučni časopis Agroekonomika br.41-42, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad, str.69-79.

10. Radović G. (2010): Hartije od vrednosti u funkciji finansiranja agrara, Naučni časopis Agroekonomika br.45-46, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad, str. 69-77.

11. Radović G., Pejanović R., Njegovan Z. (2013): Credit as a source of financing agriculture Serbian, The Seminar on Agriculture and Rural Development - Challenges of Transition and Integration Process, 50th Anniversary Department of Agricultural Economics, Belgrade - Zemun.

12. Republic Office for Statistics (2013): Census of Agriculture 2012 – Agriculture in the Republic of Serbia, Book 1&2 , Belgrade.

13. The Law on Agriculture and Rural Development, Official Gazette of the Republic of Serbia, No.41/2009.

14. The Law on Incentives in Agriculture and Rural Development, Official Gazette of the Republic of Serbia, No 10/2013.

15. Vunjak N., Radović G. (2012): Finansiranje agrara u Republici Srbiji u tranzicionom periodu**,/**Financing agriculture in Serbia in the transition period/, XVII Naučni skup: Regionalni razvoj i demografski tokovi zemalja jugoistočne Evrope, Niš, jun 2012.godine, str.397-404.

16. www.statistika.gov.rs

# JUSTIFICATION OF INVESTMENT IN POULTRY PRODUCTION

*Grujica Vico*[1], *Dragić Živković*[2]

## Abstract

*Consumption and production of eggs and chicken meat are constantly growing, but also an increasing number of producers who are facing problems in business. Therefore, a feasibility analysis of investment in the reconstruction of existing and erection of new production facilities becomes more important to perceive the consequences, among other things, and the legislation relating to animal welfare and changes in the current production process. The return on investment on the farm for the exploitation of layer hens that can be used as an example in the region is analysed in the paper.*

**Key words:** *poultry, investment, economic efficiency, cost-effectiveness*

## Introduction

Poultry production is a very important branch of livestock production, which includes the production of table eggs (light line) and the production of chicken meat (heavy line). The importance of poultry production is reflected in the constantly growing consumption of table eggs and poultry meat per capita in the world. The reason for this trend is the fact that these products are rich in protein and amino acids, and are comprised of a low percentage of fat. The European Union Directive on the welfare of animals, in addition to the increasing demand, has influenced the increased investment in poultry production. This directive has caused to increase the living space per layer hen in farms and this has led to a significantly lower level of production in existing facilities. Also, this directive is an obligation imposed on the manufacturers to carry out the production in new modern farms providing animals better environmental conditions for life.

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## Investments

In recent years, the market has been undermined by overproduction, which led to a significant drop in price. In this situation, manufacturers who do not have large storage facilities and cold stores are willing to sell their products at a price much lower than the cost of manufacturing, to prevent the goods from being spoiled. Also, at the same time, large egg producer appeared attempting to undermine already acquired market position with dumping prices.

The market situation affected the production company policy. In fact, a certain amount of finished product is sold at profitable prices, primarily due to annual contracts that the company has signed with customers. The remaining amount of products the company has placed on the market at prices that are lower than the cost price.

With the onset of the economic crisis, the question arose as to whether to invest in production expansion, invest in some other activity or slow down the investment and further strengthen the current market position. The plan for the development of the company anticipates:

- expansion of existing facilities in the cage system of rearing of 18-week old hens,
- expansion of existing facilities in exploitation of layer hens - egg production,
- capacity building for meat processing,
- continuous procurement of means of transport depending on the needs at a given moment and
- investment in human resources.

The reconstruction and upgrading of existing farms for breeding 18-week old hens and farms for exploitation of layer hens – production of table eggs, are planned. The project includes two farms for breeding hens (dimensions 65 x 13m) and four farms for egg production (dimensions 75 x 13m). The investment includes a detailed reconstruction of the facilities (modified roof replacement design, thermal insulation, etc.) with minor additions.

**Table 1.** *Plan of investments in construction of the breeding farm facilities*

| No. | DESCRIPTION | Amount in € |
|---|---|---|
| 1. | Making the roof of steel structures, panels and painted steel sheet on the farm for breeding 18 – week old hens | 32.600,00 |
| 2. | Reconstruction and upgrading of the building section of the farm for breeding 18-week old hens | 12.800,00 |
| 3. | Thermal insulation works | 6.150,00 |
| 4. | Other expenses | 2.500,00 |
| 5. | TOTAL | 54.050,00 |
| 6. | Number of farms | 2 |
| 7. | TOTAL BREEDING FARM FACILITIES: | 108.100,00 |
| 8.. | Road infrastructure and hydrants | 7.700,00 |
| 9. | TOTAL BREEDING FARM | 115.800,00 |

**Source:** *Internal documents of the company*

After completing the construction/building works, the next phase is procurement and installation of equipment for breeding 18-week old hens and equipment for the exploitation of layer hens and the necessary actions required to put production capacity in use.

The equipment, which is the biggest expense at this stage, is imported from Germany - the company "Big Dutchman" which is one of the largest companies in this industry in the world and complies with all European and world standards stipulated in poultry production.

This will be the first farm of its kind in Bosnia and Herzegovina and the region. It should be noted that, firstly, the farm for breeding 18-week old hens shall be installed and put in operation, and continued with the installation of equipment for the exploitation of layer hens.

**Table 2.** *Plan of investments in construction of the exploitation farm facilities*

| No. | DESCRIPTION | Amount in € |
|---|---|---|
| 1. | Making the roof of steel structures, panels and painted steel sheet on the farm for exploitation of layer hens | 37.600,00 |
| 2. | Reconstruction and upgrading of the building section of the farm for exploitation of layer hens, with storage facility / warehouse for table eggs | 27.250,00 |
| 3. | Thermal insulation works | 7.000,00 |
| 4. | Other expenses | 2.500,00 |
| 5. | TOTAL | 74.350,00 |
| 6. | Number of farms | 4 |
| 7. | TOTAL FACILITIES | 297.400,00 |
| 8. | Road infrastructure and hydrants | 3.500,00 |
| 9. | TOTAL EXPLOITATION FARMS | 300.900,00 |

**Source:** *Internal documents of the company*

**Table 3.** *Plan of investments in equipment for breeding farm facilities*

| No. | DESCRIPTION | Amount in € |
|---|---|---|
| 1. | Cost of equipment | 150.599,00 |
| 2. | Transport and freight/shipping costs | 5.750,00 |
| 3. | Installation of lighting | 8.700,00 |
| 4. | Installation of the heating system | 6.400,00 |
| 5. | Cost of equipment installation | 6.250,00 |
| 6. | Other expenses | 2.500,00 |
| 7. | TOTAL | 180.199,00 |
| 8. | Number of farms | 2 |
| 9. | TOTAL EQUIPMENT BREEDING FARM | 360.398,00 |

**Source:** *Internal documents of the company*

Upon completion of installation of equipment in the farms for breeding, day-old chicks of light line will be housed in them, so that by the end of the installation of equipment for the exploitation of layer hens are bred and ready to be moved into the farm for exploitation.

**Table 4.** *Plan of investments in equipment for exploitation farm facilities*

| No. | DESCRIPTION | Amount in € |
|---|---|---|
| 1. | Cost of equipment | 161.845,00 |
| 2. | Transport and freight/shipping costs | 5.750,00 |
| 3. | Installation of lighting | 10.250,00 |
| 4. | Installation of the heating system | 6.250,00 |
| 5. | Cost of equipment installation | 2.500,00 |
| 6. | Other expenses | 186.595,00 |
| 7. | TOTAL | 4 |
| 8. | TOTAL EQUIPMENT FOR EXPLOITATION FARM | 746.380,00 |

**Source:** *Internal documents of the company*

**Table 5.** *Summary of Financial Investment plan*

| No. | DESCRIPTION | Amount in € |
|---|---|---|
| 1. | Construction/building works – breeding farm facilities | 115.800,00 |
| 2. | Construction/building works – exploitation farm facilities | 300.900,00 |
| 3. | TOTAL CONSTRUCTION/BUILDING WORKS | 416.700,00 |
| 4. | Equipment - breeding farm facilities | 360.398,00 |
| 5. | Equipment - exploitation farm facilities | 746.380,00 |
| 6. | TOTAL EQUIPMENT | 1.106.778,00 |
| **7.** | TOTAL INVESTMENTS | 1.523.478,00 |

**Source:** *Internal documents of the company*

## Sources of project funding

Funding sources indicate the origin of the funds from which any particular investment is financed. The basic division of financial resources is:

- own sources of funding - the cheapest source of financing, the safest source of funding, providing greater flexibility and autonomy in the conduct of business policy;
- loan financing sources – more difficult procurement conditions, permanence of obligations regardless of the size of the profit, reduced flexibility, reduced independence and stability in the conduct of financial policies.

List of investments and the financing related to this project are provided in Table 6.

**Table 6.** *List of investments and their financing*

| Description of investment | Borrowed funds | Own funds | TOTAL |
|---|---|---|---|
| Facilities: | | | |
| Breeding farm (2 pieces) | | 115.800,00 | 115.800,00 |
| Exploitation farms (4 pieces) | | 300.900,00 | 300.900,00 |
| Equipment: | | | |
| Equipment for breeding farms (2 sets of equipment) | 301.198,00 | 59.200,00 | 360.398,00 |
| Equipment for exploitation farms (4 sets of equipment) | 647.380,00 | 99.000,00 | 746.380,00 |
| **TOTAL** | **948.578,00** | **574.900,00** | **1.523.478,00** |

**Source:** *Internal documents of the company*

All six facilities will be financed from own funds. Regarding the financing of equipment, the procurement of equipment from abroad will be financed from special purpose loan, while the other expenses associated with placing the equipment in use (transport and freight costs, installation costs, installation of the lighting ...) will be financed from own funds.

The plan of the company is to finance working capital from its own sources. It should not be a problem since shortly after introducing of layer hens into farms for exploitation (10-15 days), they begin to lay eggs, which are sold in the market and resulting in the inflow of money into the company. If the need arises, the company can realize short-term loan for liquidity.

Loan for the purchase of equipment in the amount of € 948,578.00 the company will provide through commercial banks. Repayment period will be eight years, and interest on similar loans issued by this development bank is about 5 %. This means that the total interest on the loan will amount to around € 189,760.00 or € 23,720.00 annually.

## Activation of the production process

Activation of the production process involves an investment in working capital. It should be noted that the production cycle in raising layer hens lasts 4.5 months, and the production cycle in exploitation of layer hens lasts 12 months. Due to this fact, the investment structure in working capital for the two productions is different.

## The financial plan of investment in working capital

The capacity of the farm for breeding hens is 80.000 (40.000 each) in one cycle, or 160.000 bred hens per year.

**Table 7.** *Calculation of production costs per production cycle – 18-week old hens*

| Number | TYPE OF EXPENSES | Amount in € |
|---|---|---|
| 1. | One day old female chicks - 82.000 | 41.000,00 |
| 2. | Utilized animal feed - 516.000 kg | 159.960,00 |
| 3. | Energy | 9.500,00 |
| 4. | Labour | 11.250,00 |
| 5. | Cost of immunoprophylaxis | 14.580,00 |
| 6. | Housing of chicks and emptying of the facility (moving of hens) | 4.050,00 |
| 7. | Other overheads and administrative expenses | 2.500,00 |
| 8. | TOTAL | 242.840,00 |
| 9. | Number of reared layer hens | 80.000,00 |
| 10. | Cost price | 3,0355 |

**Source:** *Internal documents of the company*

Hens raised in the first cycle are moved to their own farm to produce eggs and, in the calculation of cost-effectiveness, they represent the cost of farms for the production of table eggs, and hens raised in the second cycle will be sold in the external market.

## The financial plan of investment in working capital required for the exploitation of egg-laying hens

The capacity of farms to produce hens is 80.000 (20.000 each) in a single cycle.

**Table 8.** *Calculation of production costs in production of table eggs per cycle*

| Number | TYPE OF EXPENSES | Amount in € |
|---|---|---|
| 1. | 18-week old layer hens | 242.840,00 |
| 2. | Utilized animal feed - 3.360.000 kg | 1.092.000,00 |
| 3. | Energy | 12.000,00 |
| 4. | Consumed packaging | 171.050,00 |
| 5. | Labour | 53.100,00 |
| 6. | Housing of hens and emptying of the facility | 4.000,00 |
| 7. | Cost of marketing and distribution | 72.000,00 |
| 8. | Other overheads and administrative expenses | 7.500,00 |
| 9. | TOTAL | 1.654.490,00 |
| 10. | Produced table eggs | 24.000.000 |
| 11. | Production cost of table egg | 0,0689 |

**Source:** *Internal documents of the company*

## Expected revenues

Revenues that this investment will generate can be divided into:

1. Revenues from the sale of 18-week old reared hens - hens from the first production cycle are moved to their own farm while layers from the second cycle are sold on the external market and the expected income from the transaction is € 320.000,00 per year (80.000 units at a price of 4.00 €/pcs). Price of reared hens has been stable over the last 5 years and this trend is expected to continue in the future,

2. Revenues from sales of table eggs in the amount of 1.800.000,00 per year (24.000.000 units at an average price of 0.075 €/pcs). It is important to emphasize that the trend of increase/decrease in price of finished product follows the trend of increase/decrease in prices of raw material. It is very difficult to estimate the price movement in the future, but given the high correlation between the price movements of finished goods and raw materials, we can conclude that the end result will be very similar, if not identical,

3. Revenues from the sale of culled hens - after a period of one year of laying eggs, hens are going to slaughter. According to the technology, 8% of hens die during the production process (in this case, 6.400 units). The remaining 73.600 units are sold for slaughter price of 0.55 €/pcs and on that basis, the annual revenue of € 40.480,00 is generated.

It is very difficult to predict the price of table eggs in the future because it does not depend directly on the price of components for their production, and neither of the other indicators. Previously the cost of components was assessed and based on these indicators, assessment of the value of eggs was made.

However, year 2012 is proof that this is not a good way. The price of maize, the most important grain in poultry production, was at the highest level at the time of harvest, while expectations were quite different. This is another proof that these methods of prediction have become obsolete and should be replaced by more advanced analysis and econometric methods and models.

Poultry companies are not flexible in the short term (cannot quickly change the volume of production), and therefore accurate predictions are more important for them. Poor business decision in one period has consequences not only during that period but for the next few periods in the future. Because of all this, the prediction in poultry production is more important than in some "flexible" industries.

## Assessment of profitability

Calculation of return/profitability will be the same in the first 8 years because it is the same period for repayment of loans taken for the purchase of equipment for the farm.

After a period of 8 years, the calculation of return/profitability will be identical, with the modification that the expenses will be less because there will be no expenditure on interest.

**Table 9.** *The estimated annual profit and loss/income statement of the project (in €)*

| No. | DESCRIPTION | Expenses | Revenues |
|---|---|---|---|
| 1. | Revenue from the sale of hens | | 320.000,00 |
| 2. | Expenses in rearing of layer hens | 242.840,00 | |
| | **Profit from rearing of hens** | | **77.160,00** |
| 3. | Revenue from the sale of table eggs | | 1.800.000,00 |
| 4. | Revenue from the sale of culled layer hens | | 40.480,00 |
| 5. | Expenses in production of table eggs | 1.654.490,00 | |
| 6. | **Profit from production of table eggs** | | **185.990,00** |
| 7. | Total revenues | | 2.160.480,00 |
| 8. | Total expenses | 1.897.330,00 | |
| 9. | **GROSS PROFIT** | | **263.150,00** |
| 10. | Interest expenses | 23.720,00 | |
| 11. | **NET PROFIT** | | **239.430,00** |

**Source:** *Internal documents of the company*

According to this estimate, the result is identical in all 8 years since the capacity will always be to the maximum filled and there is no space for an increase.

## Period of return

Period of return is the necessary time to compensate ("cover") all investments from the net proceeds of economic flow. It is actually a time period in which the sum of the net proceeds is equal to the amount of total investment.

Period of return on the investment will occur in the seventh year or more precisely, after 6 years and 4 months. This is very favourable indicator considering that the economic useful life of buildings is about 40 years, of equipment 15 years (bearing in mind that the limit use of equipment can be up to 30 years), and the period of return on investment in the construction and equipment is much shorter.

**Table 10.** *Calculation of the period of return on investment (in €)*

| Year in the duration time of the project | Net proceeds in business | | Uncovered part of the investment |
|---|---|---|---|
| | Annual amount | Cumulative | |
| 0 | -1.523.478,00 | | -1.523.478,00 |
| 1 | 239.430,00 | 239.430,00 | -1.284.048,00 |
| 2 | 239.430,00 | 478.860,00 | -1.044.610,00 |
| 3 | 239.430,00 | 718.290,00 | -805.188,00 |
| 4 | 239.430,00 | 957.720,00 | -565.758,00 |
| 5 | 239.430,00 | 1.197.150,00 | -326.328,00 |
| 6 | 239.430,00 | 1.436.580,00 | -86.898,00 |
| 7 | 239.430,00 | 1.676.010,00 | 152.532,00 |

**Source:** *Calculation of the author*

## Indicators of profitability

In modern economy, business result is piece of information about a company that is most interesting to stakeholders of the company. This claim is largely related to creditors of the company. In Serbia, banks are the main creditors of companies, as opposed to the Anglo-Saxon areas dominated by the capital market. Earlier, in approving the loan, principal security for banks were assets (capital) of the company and not much attention was directed to the profitability of the company. Today, the role of the capital (assets) as a collateral is retained, but it loses the dominant position in relation to the profitability of the company. In fact, in the modern economy, only one that is profitable survives, and assets, used as collateral, due to unprofitability, can very easily become a weight/burden that drags the company into the abyss due to high fixed costs.

It is well known that banks are always trying to charge in money and that the last option is to take over assets used as collateral, because it takes long time to sell the acquired assets and collect. Banks have realized this and, presently, when obtaining credit, profitability of the company as a requirement is as important as the presence of assets used as collateral.

There are two groups of indicators of profitability:

1. indicators which express partial profitability because they use only the data from the income statement (coefficient of performance - COP)
2. indicators which express as a global cost–effectiveness / profitability using data from the balance sheet and income statement (the rate of return on assets and return on net assets).

*Coefficient of performance (economic efficiency)* represents the relative ratio between total revenue and total expenses, i.e. how much revenue the company generates on every cent/euro of expenses. It is preferable that the company has a high coefficient of efficiency, but it does not necessarily mean that the company achieves a high rate of return.

Coefficient of performance (economic efficiency) $= \frac{2.160.480}{1.897.330} = 1{,}14$

Expected annual revenues are in excess of the expected annual expenses and coefficient of performance (economic efficiency) is greater than 1, which indicates the fact that, according to this indicator, the project is cost-effective (profitable).

*Rate of return on assets (ROA)* shows the relative ratio of net income plus interest expense and total funds invested in the project, i.e. how much net profit is generated on every cent/euro that was invested into the project.

ROA$= \frac{239.430+23720}{1.523.478} * 100 = 17{,}27\%$

Return on assets shows the quality of the overall asset management. This indicator ignores the structure of funding sources, as it expresses the height of the realized net profit on their own and borrowed funds. The higher the value of this indicator, more profitable is the project. The value of ROA of 17.27% is rate of return which is absolutely confirming the fact that this project is profitable/viable.

*Rate of return on capital/equity (ROE)* shows the relative ratio of net income and own funds invested in the project, i.e. how much net profit is generated on every cent/euro of own funds invested in the project.

ROE$= \frac{239.430}{574.900} * 100 = 41{,}65\%$

Return on capital/equity shows the quality of the equity/capital management. The higher the value of this indicator, more profitable is the project. Considering that ROE>ROA, we can conclude that there is a positive effect of financial leverage (rate of return realized on borrowed funds is higher than the effective rate at which funds are borrowed). Considering the ROE of 41.65% and all of the calculated ratios, it can be concluded that this project is profitable/viable and should be implemented in practice.

## Justification of investment

Looking at the financial aspect of the project, we can conclude that it is cost-effective. Besides leading to increased production, it will also increase revenues and company profits.

As the state is concerned, the implementation of this project will lead to an increase in the inflow of tax funds in the budget. Common strengths for the state and the local community is the fact that it will reduce unemployment because it will employ 10 workers. This is very important for the region because it will get the customer which will require a large amount of raw materials for animal feed production.

For forecasting of sales price in 2013, the seasonal *ARIMA* model was evaluated. In the first stage of identification of the model (in a broad sense), the model (0,0,0) (1,1,0) with seasonal step 4 was selected of many models, as in this model the correlation and partial correlation function of the residuals were within the limits of the confidence interval of Box-Ljung *Q*-statistics. After the evaluation of parameters (identified in the narrow sense), by the maximum likelihood method, the model was evaluated $(1\text{-}0{,}321267B^4)(1\text{-}B^4)X_t = \varepsilon_t$, t = (2,508097)**.

In the first phase of model identification for forecasting of the cost (in the broad sense) the model (3,1,0) (0,1,3) with seasonal Step 4 was selected because in this model the correlation and partial correlation function of the residuals were within the limits of the confidence interval of Box-Ljung *Q*-statistics. After the evaluation of parameters (identified in the narrow sense) by the maximum likelihood method, the following model was evaluated:

$(1\text{-}B)(1\text{-}B^4)(1+0{,}809314B+0{,}966224B^2+0{,}749801B^3)Xt = (1\text{-}0{,}639467B^4\text{-}0{,}451729B^8+0{,}322624B^{12})\varepsilon t$

(-7,5294)** (-11,4914)** (-6,3415)** (4,0344)** (3,0359)** (2,1123)**

**Table 11.** *Forecast of sales price of table eggs in 2013*

| Forecast | Lower - 90,0000% | Upper - 90,0000% | Std. Err. |
|---|---|---|---|
| 0,143575 | 0,112035 | 0,175114 | 0,018888 |
| 0,153213 | 0,108609 | 0,197816 | 0,026712 |
| 0,143575 | 0,088947 | 0,198202 | 0,032715 |
| 0,146787 | 0,083709 | 0,209866 | 0,037776 |

**Table 12.** *Forecast of cost of table eggs in 2013*

| Forecast | Lower - 90,0000% | Upper - 90,0000% | Std. Err. |
|---|---|---|---|
| 0,130176 | 0,113117 | 0,147236 | 0,010200 |
| 0,132118 | 0,105592 | 0,158644 | 0,015860 |
| 0,130138 | 0,097937 | 0,162339 | 0,019253 |
| 0,125438 | 0,086970 | 0,163906 | 0,023000 |

It should be considered that the cost of feed for laying hens account for about 60% of the cost of table egg. So, the slightest change in the cost of food significantly affects the cost of an egg.

For this reason it is essential that the company has its own feed mixers. Broadly speaking, two advantages are realized, quantitative and qualitative:

1. Quantitative (financial) advantage - the cost of animal feed produced in the own production is lower than the externally purchased feed, and

2. Qualitative advantage - a company fully controls the quality of animal feed and it is certain that hens receive adequate food (the company controls the quality of purchased raw materials as well as the entire production process).

## Conclusion

Given all of the above it can be concluded that the investment is justified. Period of return is shorter than the economic viability of purchased fixed assets, cost-effectiveness ratio/coefficient of performance is greater than 1, and "ROA" and "ROE" have high positive values.

In the mass production of table eggs, number of partially damaged eggs is high. With the construction of new farms most of the egg production (and most damaged eggs) will be located in one place. The management of the company has found a way to use these eggs – to break them, properly package and freeze. Thus, the resulting product is called a frozen melange and sold to factories engaged in the production of powdered eggs.

Integral part of the centre for sorting, packing and temporary storage of eggs is a plant for the production of frozen melange with adequate cold storage.

After the exploitation (which takes about a year), layer hens are culled and slaughtered. The company is not always able to sell the meat which resulted in a need to keep the meat in cold storage. Required temperature for storage of melange and meat is -20°Celsius (deep freezing).

Due to the problem of storage of frozen melange, frozen meat and storage of table eggs, in the next investment cycle, it will be necessary to build a cold storage.

Implementation of this project will result in benefit for all stakeholders who are interested in it (company, government, local communities, etc.).

## References

1. Bošković O., Dragutinović Mitrović R. (2009): Osnovi statističke analize: elementi analize vremenskih serija, Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu

2. Ivanišević M., Krasulja D., (2006): Poslovne finansije, Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu, Beograd

3. Munćan P., Živković D., (2004): Menadžment rada i proizvodnje u poljoprivredi, Poljoprivredni fakultet u Beogradu, Beograd

4. Paunović B., Zipovski D., (2010): Poslovni plan - vodič za izradu, Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu, Beograd

5. Ralević N., Marić N., Filipović L.(2001): Poslovna statistika, Megatrend univerzitet primenjenih nauka, Beograd, 2001.

# APPLYING COBB-DOUGLAS USING GMM METHOD. EVIDENCE FROM ROMANIAN AGRICULTURE

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## Abstract

*The paper introduces a new concept of applying Cobb-Douglas production function using Generalized Method of Moments (GMM) vs. the smallest squares method in Romanian agriculture. Also, in the paper is tested various forms of Cobb-Douglas function specifications, which might help to explain the agriculture evolution during the last 40 years. Using the results of different form of this production function it is supposed that the substitution process of capital/ labour in this economic sector will increase significantly owing to the investment process in the next years. The comparison of Generalized Method of Moments (GMM) with the smallest squares methods given by the Cobb-Douglas function shows significant improvements that it is possible to expect in a direct substitution process decrease in using more capital in the last period. Trying to use the GMM having as tools the differences of first order has returned insignificant results and adding to the tools the differences of second order has deteriorated the estimation results.*

**Key words:** *Cobb-Douglas, GMM Method, agriculture, capital, labour*

## Introduction

Romanian agriculture has experienced a long transitional process form centralized economy to a free and well functional market economy and integration in European Union. During this period, a lot of transformations took placed, but main features remained almost unchanged. After a period of more than 20 years of transition and 7 years of EU integration, Romanian agriculture, has remained in a developing stage. In this study, using a most

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applied production function - Cobb-Douglas, with a variety of its form, in a special research, as agriculture is, we intend to demonstrate the role of human labor and capital in a transitional agriculture as Romanian agriculture is. As novelty we used Generalized Method of Moments (GMM), for improving the results and not only the method of the smallest squares as it was used by now in major studies carried on.

The data analysis was firstly performed by using the method of the smallest squares, starting from the basic expression of the production function:

$$Y = q_t \cdot L_t^{\alpha} \cdot K_t^{\beta} \cdot e^{\varepsilon_t}.$$

To determine the parameters we reduce the function to the explicit shape with the help of the logarithms and we obtain:

$$\ln Y = \ln q + \alpha \ln L + \beta \ln K \qquad (1)$$

Applying the method of the smallest squares means solving the system:

$$\begin{cases} n \ln q + \alpha \sum \ln L + \beta \sum \ln K = \sum \ln Y \\ \ln q \sum \ln L + \alpha \sum \ln^2 L + \beta \sum \ln L \ln K = \sum \ln L \ln Y \\ \ln q \sum \ln K + \alpha \sum \ln L \ln K + \beta \sum \ln^2 K = \sum \ln K \ln Y \end{cases} \qquad (2)$$

By q there has been denoted the total productivity factor. The effects caused by this variable in total output are not accounted via traditionally measured inputs, that is, this measure cannot be measured directly. qt represents the time-invariant productivity effects in total output not caused by inputs.

The data sets used in computing Cobb-Douglas production function are collected from the official statistics provided by Romanian National Statics Institute in Statistic Yearbook 1990-2009, The Statistical Breviary 2008–2010 and TEMPO database and also, operative data from National Ministry of Agriculture and Rural Development

In order to refine the results (including the values of total factor productivity) we considered the estimation of the parameters via Generalized Method of Moments (GMM), using as instruments the first-order differences. The data of Table 1 indicates this improvement, by increasing the value of t-statistic for parameters of exogenous variables, as the reduction of the total productivity factor.

**Table no. 1**

Dependent Variable: Y
Method: Generalized Method of Moments
Sample(adjusted): 1971 2010
Included observations: 40 after adjusting end points
White Covariance

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| $\ln q$ | 0.872194 | 0.247140 | 3.529151 | 0.0011 |
| $\alpha$ | 0.898420 | 0.173283 | 5.184712 | 0.0000 |
| $\beta$ | 0.343408 | 0.023369 | 14.69536 | 0.0000 |
| R-squared | 0.748721 | Mean dependent var | | 2.581341 |
| Adjusted R-squared | 0.735138 | S.D. dependent var | | 0.347311 |
| S.E. of regression | 0.178743 | Sum squared resid | | 1.182112 |
| Durbin-Watson stat | 1.306335 | J-statistic | | 5.51E-30 |

**Source***: authors` own computation based on INS(2012) and TEMPO database*

The essay of introducing new instruments (second-order differences) leaded to a reduction of results quality (see table 2). Otherwise, there were stated the historical correlation between this variable and energy conversion efficiency (Ayres and al., 2002). Following Solow (1957), this variable is a residual.

**Table no. 2**

Dependent Variable: Y
Method: Generalized Method of Moments
Sample(adjusted): 1972 2010
Included observations: 39 after adjusting endpoints
White Covariance

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| $\ln q$ | 0.891747 | 0.248913 | 3.582563 | 0.0010 |
| $\alpha$ | 0.912588 | 0.183684 | 4.968252 | 0.0000 |
| $\beta$ | 0.333567 | 0.022259 | 14.98557 | 0.0000 |
| R-squared | 0.746492 | Mean dependent var | | 2.590130 |
| Adjusted R-squared | 0.732408 | S.D. dependent var | | 0.347316 |
| S.E. of regression | 0.179664 | Sum squared resid | | 1.162051 |
| Durbin-Watson stat | 1.258177 | J-statistic | | 0.059574 |

**Source***: authors` own computation based on INS(2012) and TEMPO database*

In this respect, there might be stated that

$$\varepsilon_t = \log(q_t) + u_t \tag{3}$$

with $u_t$ the residual variable, $u_t \sim N(0, \sigma^2)$. (4)

As a residual, the total productivity factor is also dependent on estimates of the other components, and different studies tried to correct the weaknesses of these

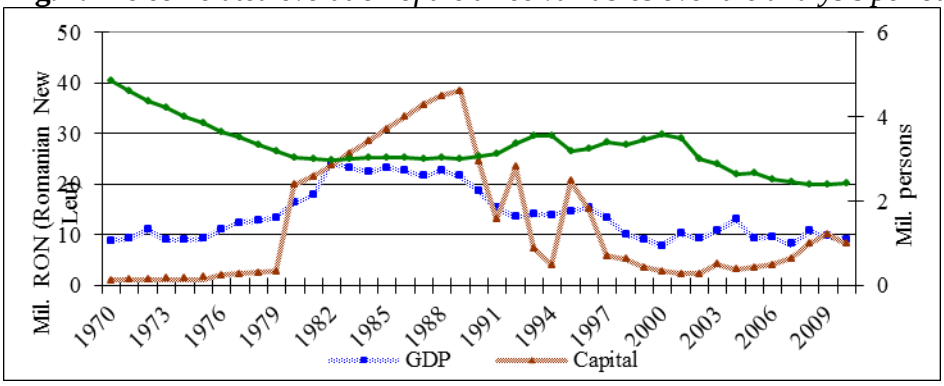
estimations. Following other recent researches (Colinsk, 1989; Sangho et al. 2004; Dupuy, 2006) that impugned the residual feature of the total productivity factor, we considered εt as the independent and identically distributed residual disturbance with

$$E(\varepsilon_t) = 0 \text{ and } \text{var}(\varepsilon_t) = \sigma^2. \quad (5)$$

Total output, that is, the added value of the yearly agricultural production (Y) is a function of total-factor productivity (q), capital inputs (K), labour inputs (L), and the two inputs' respective shares of output (α and β are the capital input share of contribution for K and L respectively). An increase in either q, K or L will lead to an increase in output.

The capital and labour input are tangible factors, while total-factor productivity intangible feature occurs from joint-action of technology and human capital (worker's knowledge). Fig. 1 indicates the correlated evolution of the three variables over the analysis period.

**Fig. 1.** *The correlated evolution of the three variables over the analysis period*




**Source:** *authors` own computation based on INS (2012)*

## Methodology

As we stated above, in the case of Cobb-Douglas production function, even it might be difficult to suppose that past realizations determine the current level of the dependent variable, it is assumed a contemporaneously correlation between at least one regressor and disturbance-error term. In order to reduce this source of issues, such serial correlation, heteroscedasticity and endogeneity that may occur, should be used dynamic panel data model estimation techniques.

First developments of such dynamic models estimators consisted of using lagged values of the dependent variables as instruments in the differenced equations (Anderson and Hsiao 1981, 1982; Griliches and Hausman, 1986; Holtz-Eakin et al., 1988).

These estimators are consistent but not efficient, because they ignore some restrictions between the error term and regressors. With the aim to overcome this situation and improve the study results, we followed the generalized method of moments (GMM) (Arellano and Bond, 1991). Giving that this technique uses additional instruments (lagged values of endogenous and exogenous variables) it allows obtaining both consistent and efficient estimators in respect of the orthogonality conditions. Assume that the model is based on *K* explanatory variables

$$y_t = X_t^{'} B + \varepsilon \tag{6}$$

where $t = \overline{1,T}$, $X_i^{'}$ and $B$ are $K \times 1$ vectors of observations and corresponding regression coefficients respectively; $Y$ and $\varepsilon$ are $T \times 1$ vectors of the scalar dependent variable and random-error term. Defining the $T \times K$ regressor matrix $X = \left[X_1^{'}\ X_2^{'}\ ...\ X_T^{'}\right]^{'}$, the associated model is:

$$Y = X\hat{B} + \varepsilon \tag{7}$$

The corresponding estimator for intercept and slope coefficients is given by (Kiviet, 2009):

$$\hat{B}_{GMM,Z}(W) \equiv \left(X'ZWZ'X\right)^{-1} X'ZWZ'Y \tag{8}$$

where $Z$ is the $T \times L$ matrix of instruments of rank $L\left(L \geq K\right)$, and $W$ the $L \times L$ weighting matrix.[3] In this research, we use one step GMM-estimator. Even Arellano and Bond (1991) prove the superior efficiency of the two-step GMM-estimator in comparison with one-step estimator, they suggest the-one step estimator to make inferences on estimated coefficients.

The validity of instruments and estimator is subject of testing after estimation.

[3] This gives the two-step GMM estimator. The one-step GMM estimator is obtained by replacing *ZWZ*' with $\sum_{i=1}^{n} Z_i^{'} G Z_i$, where *G* is a $\left(T-2\right)$ square matrix with twos in main diagonal, minus ones in the first sub diagonals and the rest zero.

The GMM estimators are consistent if there is no second-order serial correlation in the error-term of the first differenced equation (Turgutlu, 2010).

The test is deployed using the statistics $m_1, m_2 \sim N(0,1)$ under the null hypothesis of no serial correlation. The validity of instruments is subject of testing using Sargan statistic test (denoted by *S*) of over-identification (Sargan, 1988):

$$S = N.R^2 \tag{9}$$

with $R^2$ as result of regression of $\hat{u}_t$ on all exogenous variables (regressors and instruments). Under the null hypothesis that all instruments are exogenous, the test $S \sim \chi^2_{m-k}$, where *m* is the number of instruments and *k* is the number of exogenous variables. In the specific case of Cobb-Douglas production function another test regards the scale elasticity. This test is obtained (Tudorel and Bourbonnais, 2008):

$$t = \frac{\hat{\alpha} + \hat{\beta} - 1}{\hat{\sigma}_{\hat{\alpha}+\hat{\beta}}} = \frac{\hat{\alpha} + \hat{\beta} - 1}{\sqrt{\hat{\sigma}^2_{\hat{\alpha}} + \hat{\sigma}^2_{\hat{\beta}} + \operatorname{cov}(\hat{\alpha}, \hat{\beta})}} \tag{10}$$

Under the null hypothesis that the process yield scale is constant, test statistic has a Student distribution with $t - 3$ degrees of freedom.

Using (2) we obtain the function's coefficients as;

$$\ln q = 1{,}246609;\ \alpha = 0{,}63861;\ \beta = 0{,}304617 \tag{11}$$

and the production function estimated according to the capital function and the number of employees is:

$$Y = 3{,}47852725 \cdot L^{0{,}63861} \cdot K^{0{,}304617} \tag{12}$$

The values of the statistics show that estimators are significant at a significance level of 1%. Using the technique considered *statistical* calculation F, whose value (63.38) shows that the estimation is efficient, and the model is significant and correctly specified as it is presented in Table no. 3.

**Table no. 3**
Dependent Variable: Y
Method: Least Squares
Sample: 1970 2010
Included observations: 41
White Heteroskedasticity-Consistent Standard Errors & Covariance

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| $q$ | 3.47852725 | 0.287054 | 4.342763 | 0.0001 |
| $\alpha$ | 0.638610 | 0.202720 | 3.150202 | 0.0032 |
| $\beta$ | 0.304617 | 0.029183 | 10.43820 | 0.0000 |
| R-squared | 0.769358 | Mean dependent var | | 2.571880 |
| Adjusted R-squared | 0.757219 | S.D. dependent var | | 0.348252 |
| S.E. of regression | 0.171593 | Akaike info criterion | | -0.617021 |
| Sum squared resid | 1.118885 | Schwarz criterion | | -0.491638 |
| Log likelihood | 15.64894 | F-statistic | | 63.37872 |
| Durbin-Watson stat | 1.204416 | Prob(F-statistic) | | 0.000000 |

**Source:** *authors` own computation based on INS(2012) and TEMPO database*

The results lead us to conclude that, in the analyzed period the fixed capital contributed with only 32.3% $\left(\frac{0,304617}{0,304617+0,63861}\cdot 100\right)$ to achieve production, the preponderant intake was of the work factor, 67.7% respectively. The results express the deeply negative situation in which the Romanian agriculture is and is expressed in an explanation of the lack of competitiveness.

To see which is the production increase appropriate to the changes of each factor their differential yield is calculated: $\delta\eta_L = \alpha\frac{Y}{L}$ and $\delta\eta_K = \beta\frac{Y}{K}$.

Substituting in these relations the known data concerning the production, fixed capital, number of employees and their elasticity coefficients we get:

$$\delta\eta_L = 0,63861\frac{570,723\cdot 10^6}{133,533\cdot 10^6} = 2,894 \text{ for the employees}$$

$$\delta\eta_K = 0,304617\frac{570,723\cdot 10^6}{490,477\cdot 10^6} = 0,3758 \text{ for the fixed capital.}$$

The calculations show that increasing the number of employees with a person improves the production with 2,894 lei and the modification of fixed capital with 1 leu, has the effect of changing the annual production with 0.3758 lei.

We note the influence that the employees have in production, which expresses, in fact, the labour productivity level in the Romanian agriculture as well as the low productivity of the capital in this sector (in terms of the given production), which may explain the lack of investment appetite , in fact, the situation is explained due to the low level of technical equipment of work by extremely low yields obtained through excessive use of human resources and can be remedied only by promoting investments.

In fact, the situation of the productivity can be expressed with the help of the medium yield specific to each factor, calculated with relations:
$\bar{\eta}_L = \frac{Y}{L}$ and $\bar{\eta}_K = \frac{Y}{K}$, from which we obtain, at a total level:

$$\bar{\eta}_L = \frac{570.73 \cdot 10^6}{133{,}533 \cdot 10^6} = 4{,}274 \text{ lei /employee/year}$$

$$\bar{\eta}_K = \frac{570{,}73 \cdot 10^6}{490{,}477 \cdot 10^6} = 1{,}163 \text{ lei /1 lei fixed capital /year}$$

These results give through themselves the measure of the inefficiency of the use of the production factors in agriculture over the period mentioned. The annual production obtained by an employee is of 4.274 lei, however, the production of 1 leu fixed capital is of only 1,163 lei per year. This situation was evident in the recent years especially in the market analyzes and in the standings of most independent experts and certain officials with responsibilities in the financial and economic growth. Within certain limits, the production factors are interchangeable. To calculate the fixed capital needed which can provide the replacement of an employee we calculate the marginal substitution rate with the formula:

$r = -\frac{K}{L} \cdot \frac{\alpha}{\beta}$, from which we get:

$$r = \frac{-490{,}477 \cdot 10^6}{133{,}5328 \cdot 10^6} \cdot \frac{0{,}63681}{0{,}304617} = -7{,}7 \text{ lei}$$

This means that in order for it to be substituted by one person - namely the production which is obtained through the work of an employee - through a better machinery equipment and with work plants is necessary to increase the capital stock by 7.7 lei.

Considering that the same coefficients of elasticity will continue to be maintained, for work and fixed capital and that the technical progress will occur only in incorporated shape in the two production factors taken into account, but which improves the work productivity with an average annual rate of 10%, the production which is to be made and then the fixed capital requirements for making this production can be established.

Regarding the fact that the average annual labour productivity (of the total branch), is $W = \frac{Y}{L} = \frac{570{,}723 \cdot 10^6}{133{,}533 \cdot 10^6} = 4{,}274$ lei/employee, according to the average annual rhythm of work productivity growth *(rW)* the level is calculated over five years (which means the year six) resulting:

$$W_6 = W_1 (1+rW)^5 = 4{,}274(1+0{,}1)^5 = 6{,}8834 \text{ lei/employee}$$

Considering an economic average annual growth of 5.5% over the next five years in the industry considered, to achieve a production of 11.742 million LEI, based on labour productivity calculated above determines the number of employees, namely:

$$L_6 = \frac{Y_6}{W_6} = \frac{11{,}742 \cdot 10^6}{6{,}8834} = 1{,}706 \cdot 10^6 \text{ employee}$$

Based on the production function $Y = 3{,}47852725 \cdot K^{0{,}304617} \cdot L^{0{,}63861}$ and the calculated amounts we have: $11{,}742 = 3{,}47852725 \cdot K^{0{,}304617} \cdot 1{,}706^{0{,}63861}$, from where

$$\ln K = \frac{\ln 11{,}742 - \ln 3{,}4785275 - 0{,}63861 \ln 1{,}706}{0{,}304617} = 2{,}874$$

K=17,71 mil.lei

The result shows that an increase in annual production of 2.75 million lei requires increasing the fixed capital with 17.71 million lei, in the next five years.

A more complete form of the *Cobb-Douglas production function* is the one in which we take into account the influence of the technical progress itself, meaning the one that does not influence, through the two production factors taken into account (labour and fixed capital) respectively the measures of organization of production and work, the better quality of raw materials, etc. In this case the production function becomes:

$$Y(t) = gL^{\lambda}K^{\mu} e^{\gamma t} \qquad (13)$$

in which:

$e$ –the mathematical constant (of Napier), approximated to the real number 2,71828;

$\gamma$ – the coefficient of elasticity of production with respect to autonomous technical progress;

$t$ –the number of years taken into account, the other symbols having the same meaning as above.

In the case analyzed, if we assume that $\psi = 0{,}2\ \%$, then the production function can be written:

$$Y(t) = 3{,}47852725 \cdot K^{0{,}304617} \cdot L^{0{,}63861} \cdot e^{0{,}002t} \qquad (14)$$

or

$$11{,}742 = 3{,}47852725 \cdot K^{0{,}304617} \cdot 1{,}706^{0{,}63861} \cdot e^{0{,}002 \cdot 5} \qquad (15)$$

from where,

$$\ln K = \frac{\ln 11{,}742 - \ln 3{,}4785275 - 0{,}63861 \cdot \ln 1{,}706 - 0{,}01 \ln 2{,}71828}{0{,}304617} = 2{,}841$$

and K = 17,14 mil. lei which means that promoting the autonomous technical progress with 0,2% will determine reducing the needed fixed capital with 0,57 mil. lei. To improve the results obtained, we proceeded to reconsidering the function's parameters using the method of generalized moments (GMM), by using as tools the differences of order 1. Table 2 shows the reduction of the constant value and the increasement of the value of the statistics corresponding to the coefficients of exogenous variables, compared with MCMMP. Attempting to add new tools (differences of order 2) resulted in a reduction of the results' quality. Therefore, the analysis considered the results presented in Table no.2 as GMM, where the function's coefficients are:

$\ln q = 0{,}8727194$; $\alpha = 0{,}89842$; $\beta = 0{,}8343408$, and the production function that approximates the evolution of the production capital to operate and the number of employees is:

$$Y = 2{,}392153 \cdot K^{0{,}343408} \cdot L^{0{,}89842}. \qquad (16)$$

The results obtained lead us to conclude that the work was the determining factor for achieving production in the analyzed period, 72.35% while the use of fixed capital contributed with only 27.65%. $\left( \frac{0{,}343408}{0{,}343408 + 0{,}89842} \cdot 100 \right)$.

The results confirm the situation outlined by the previous analysis, although with a slight improvement. To see what is the increase of production

appropriate to the changes of each of the factors the yield differential is calculated for each of them:

$$\delta\eta_L = \alpha\frac{Y}{L} \text{ and } \delta\eta_K = \beta\frac{Y}{K}. \quad (17)$$

Substituting in these relations the known data concerning the production, fixed capital, number of employees and their elasticity coefficients we get:

$$\delta\eta_L = 0{,}894842\frac{570{,}723\cdot 10^6}{133{,}533\cdot 10^6} = 3{,}834 \text{ for the employees}$$

$$\delta\eta_K = 0{,}304617\frac{570{,}723\cdot 10^6}{490{,}477\cdot 10^6} = 0{,}399 \text{ for the fixed capital.}$$

The calculations show that increasing the number of employees by a person improves the production with 3,834 lei and the modification of fixed capital with 1 leu, has the effect of changing the annual production with 0.399 lei, in other words, in the current production structure the increasement with a unit of the fixed capital has as a result an added value ten times lower than that provided by the increasement with a unit of the labour factor.

This prevailing influence of the employees on production, translates, in fact, in the labour productivity level at the level of the Romanian agriculture, as well as the low productivity of capital in the sector (in terms of the given production), which may explain the lack of investment appetite, in fact, the situation is explained by the low level of technical equipment of work, by extremely low yields obtained by using excessive human resource and can be remedied only by promoting investments. In fact, the situation can be expressed by the help of the medium specific yields of each factor, calculated with the relations:

$$\bar{\eta}_L = \frac{Y}{L} \text{ and } \bar{\eta}_K = \frac{Y}{K}, \quad (18)$$

from which we obtain, at a total level:

$$\bar{\eta}_L = \frac{570.73\cdot 10^6}{133{,}533\cdot 10^6} = 4{,}274 \text{ lei /employee/year}$$

$$\bar{\eta}_K = \frac{570{,}73\cdot 10^6}{490{,}477\cdot 10^6} = 1{,}163 \text{ lei /1leu fixed capital /year}$$

These results give through themselves the inefficient use of inputs in agriculture over the mentioned period. The annual production obtained by an employee is of 4.274 lei, however, the production per 1 leu fixed capital is of only 163 lei per year. This situation was especially evident in the recent years especially on the market analyzes and the standings of most independent

experts and certain officials with responsibilities in the financial and economic growth.

Within certain limits, inputs are interchangeable. To calculate the fixed capital requirements which can provide the replacement of an employee the marginal rate of substitution is calculated with the formula:

$$r = -\frac{K}{L} \cdot \frac{\lambda}{\mu} \tag{19}$$

and we obtain:

$$r = \frac{-490{,}477 \cdot 10^6}{133{,}5328 \cdot 10^6} \cdot \frac{0{,}89842}{0{,}343408} = -9{,}61 \text{ lei}$$

This means that to be substituted by one person - namely the production can be obtained through the work contribution of an employee - through a better equipment with machinery, tools and work installations is necessary to increase the capital stock with 9.61 lei.

Considering that the same coefficients of elasticity will be further maintained, for work and fixed capital and the technical progress will occur only as incorporated into the two factors of production taken into account, but which improves work productivity with an average annual rate of 10%, it can be established the production to be achieved and then the required fixed capital for making this production.

Considering the fact that annual average work productivity (per total branch) is $W = \frac{Y}{L} = \frac{570{,}723 \cdot 10^6}{133{,}533 \cdot 10^6} = 4{,}274 \text{ lei/employee}$, according to the annual average rhythm of increasement of work productivity *(rW)* the level for over five years is calculated (which means year six), resulting:

$W_6 = W_1 (1+rW)^5 = 4{,}274(1+0{,}1)^5 = 6{,}8834$ lei/employee

Considering an average annual growth of 5.5% over the next five years in the industry considered, to achieve a production of 11.742 million lei, based on the labour productivity calculated above we determine the number of employees, namely:

$$L_6 = \frac{Y_6}{W_6} = \frac{11{,}742 \cdot 10^6}{6{,}8834} = 1{,}706 \cdot 10^6 \text{ employees}$$

Based on the production function $Y = 2{,}392153 \cdot K^{0{,}343408} \cdot L^{0{,}89842}$ and the

calculated amounts we have: $11,742 = 2,392153 \cdot K^{0,343408} \cdot 1,706^{0,889842}$, from where

$$\ln K = \frac{\ln 11,742 - \ln 3,4785275 - 0,89882 \ln 1,706}{0,343408} = 3,2357$$

K=25,42 mil. lei.

The result shows that an increase in annual production of 2.75 million lei should increase the fixed capital by 25.42 million lei, in the next five years.

An even more complete form of the *Cobb-Douglas production function* is the one in which we take into account the influence of the technical progress itself, meaning the one that does not influence, through the two production factors taken into account (labour and fixed capital) respectively the measures of organization of production and work, the better quality of the raw materials, etc. In this case the production function is:

$$Y = q \cdot K^{\alpha} \cdot L^{\beta} \cdot e^{\gamma t} \tag{20}$$

In which:

$e$ –the mathematical constant (of Napier), approximated to the real number 2.71828;

$\gamma$ –the coefficient of elasticity of production with respect to the autonomous technical progress;

$t$ –the number of years taken into account, the other symbols having the same meaning as above.

Based on the results obtained in table no.4, the equation can be written:

$$Y = 12,532331. \cdot K^{0,264304} \cdot L^{-0,169866} \cdot \mathrm{e}^{-0,012651t}$$

(21)

From the preliminary analysis of the estimated results made based on MCMMP we can observe the supersizing of the coefficient of proportionality (12.532331), the negative value (though statistically insignificant) of the exponent of the labor factor (describing the adverse effect of this factor on production) as well as the negative coefficient (statistically significant) of the autonomous technical progress.

`Therefore, we proceeded to a new estimation of the coefficients using GMM. The results are presented in table 4.

**Table no. 4.**
Dependent Variable: Y
Method: Generalized Method of Moments
Sample(adjusted): 1972 2010
Included observations: 39 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| $q$ | 6.425979 | 0.355649 | 5.230851 | 0.0000 |
| $\alpha$ | 0.313297 | 0.022439 | 13.96218 | 0.0000 |
| $\beta$ | 0.274675 | 0.245438 | 1.119121 | 0.2707 |
| $\gamma$ | -0.009714 | 0.002767 | -3.511269 | 0.0012 |
| R-squared | 0.817066 | Mean dependent var | | 2.590130 |
| Adjusted R-squared | 0.801386 | S.D. dependent var | | 0.347316 |
| S.E. of regression | 0.154785 | Sum squared resid | | 0.838549 |
| Durbin-Watson stat | 1.627293 | J-statistic | | 0.002903 |

**Source:** *authors` own computation based on INS(2012) and TEMPO database*

The resulting production function is:

$$Y = 6{,}425979 \cdot K^{0,313297} \cdot L^{0,274675} \cdot \mathrm{e}^{-0,09714} \tag{22}$$

From the preliminary analysis of the results of estimation, there is a positive influence of the fixed capital on production as well as maintaining the negative nature of the technical progress (both with a statistically significant value). The labour factor exponent is positive, with a value of the *t* statistics two times higher than using the MCMMP but, still insignificant. Based on these observations we conclude that, by taking into account the autonomously technical progress, the estimated results show that labour exerts an insignificant influence on production and technical progress is negative over the analyzed to period, despite the fact that the *F* statistic (66, 01) related MCMMP (with sensitively close results) is significant at a significance level of 1%.

In an attempt to deepen the analysis level, we proceeded to divide the considered period into two subperiods, so that you can capture any effects in terms of profound social changes that occurred in the mid-term agricultural production sector considered. The Y takes the form:

$$Y = 15{,}69118 \cdot K^{0,221606} \cdot L^{-0,385339} \tag{23}$$

In this case also, we can observe the supersizing of the coefficient of proportionality (15.69118) as well as the negative value (although statistically insignificant) of the labour factor exponent (describing the adverse effect of this factor on production), given by the employment surplus in agriculture during the respective period. The results obtained by taking into account the

technical progress (MCMMP) are:

$$Y = 14{,}37364 \cdot K^{0{,}210374} \cdot L^{-0{,}3334841} \cdot e^{0{,}004299} \quad (24)$$

The results express the fact that the technical progress over the respective period is positive, although with a very low value (0.4%), and excess labour has detrimental effects on production, the coefficient's values of these two factors are statistically insignificant, and it takes the following form:

$$Y = 17{,}49517 \cdot K^{0{,}381889} \cdot L^{-0{,}393181} \cdot e^{-0{,}037422t} \quad (25)$$

The resulted above Y form obtained by using GMM is similar to those obtained with MCMMP. The results are presented in table 9 and

$$Y = 11{,}99752 \cdot K^{0{,}313896} \cdot L^{-0{,}179847} \cdot e^{-0{,}015928t} \quad (26)$$

The results of the estimation related to the period data 1990-2010, indicating within the table of the method used are presented in tables 10-12. Where

$$Y = 4{,}028717 \cdot K^{0{,}216052} \cdot L^{0{,}586396}$$

We note that using the MCMMP returns the significant results, like those related to the period 1970-2010, (see table no.11.) and Y becomes:

$$Y = 3{,}018853 \cdot K^{0{,}272606} \cdot L^{0{,}748532} \quad (27)$$

The results from GMM, confirm the above situation, emphasizing the contribution of labour factor to the detriment of the capital, indicating that the reduction of the constant term value and t statistics values indicate an improvement in the quality of estimations, for all coefficients. Table 5 presents the results obtained by taking into account the technical progress and takes the following expression:

$$Y = 48{,}51097 \cdot K^{0{,}041824} \cdot L^{-0{,}936213} \cdot e^{-0{,}044558t} \quad (28)$$

**Table no. 5**
Dependent Variable: Y
Method: Least Squares
Sample: 1990 2010
Included observations: 21
White Heteroskedasticity-Consistent Standard Errors & Covariance

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| $q$ | 48.51097 | 0.757773 | 5.122640 | 0.0001 |
| $\alpha$ | 0.041824 | 0.058416 | 0.715974 | 0.4837 |
| $\beta$ | -0.936213 | 0.506400 | -1.848761 | 0.0820 |
| $\gamma$ | -0.044558 | 0.010825 | -4.116086 | 0.0007 |
| R-squared | 0.771974 | Mean dependent var | | 2.438282 |
| Adjusted R-squared | 0.731735 | S.D. dependent var | | 0.240338 |
| S.E. of regression | 0.124482 | Akaike info criterion | | -1.159673 |
| Sum squared resid | 0.263427 | Schwarz criterion | | -0.960717 |
| Log likelihood | 16.17657 | F-statistic | | 19.18435 |
| Durbin-Watson stat | 1.886993 | Prob(F-statistic) | | 0.000011 |

**Source:** *authors` own computation based on INS(2012) and TEMPO database*

We notice the high value of the coefficient of proportionality (although statistically significant) the negative contribution of labour factor and technical progress factor, and the reduced value of capital input factor (last, statistically insignificant).

## Conclusions

In conclusion, we can see that, whatever the estimation method used, taking into account the technical progress expresses its negative contribution and the insignificant character of the labour factor in achieving production during the mentioned period, and a constant supersizing of the value of the term free (the proportionality factor).

Concluding that the results obtained by estimating with the help of GMM, using as instruments the differences of order are similar to those obtained with MCMMP (excepting the negative sign and the significance of the coefficient of technical progress), the parameters were re-estimated by adding to the tools the differences of the order two.

After the 1990 the agriculture becomes a very labour intensive and not capital intensive as a modern agriculture tend to be. In this context a massive investment process must be planned and financed in order to transform agriculture in a very productive economic sector.

## References


1. Anderson, T.W., Hsiao, C., (1982). Formulation and estimation of dynamic model using panel data. Journal of Econometrics (18):47–82.

2. Arellano, M., Bond, S., (1991). Some test of specification for panel data: Monte Carlo evidence and application to employment equations. Review of Economic Studies 58, 277–297.

3. Ayres, R. U., Ayres, L. W., Warr, B. (2002). Energy, Power and Work in the U. S. Economy 1900-1998. INSEAD'S Center For the Management of Envileimental Resources, 2002/52/EPS/CMER, p. 48.

4. Barnett, W. (2004). Dimensions and economics: some problems. The quarterly journal of Austrian economics vol. 7, no. 1, pp 95-104.

5. Ciccone, A., Papaioannou, E. (2006). Human capital, the structure of production, and growth. European Central Bank Working Papers Series, no. 623.

6. Colinsk, J. (1989). An Aggregate Model of Technical Change. The Quarterly Journal of Economics, 104(4):787-821

7. Dupuy, A. (2006). Hicks Neutral Technical Change Revisited: CES Production Function and Information of General Order. Topics in macroeconomics (2006) v.6, p.1-24

8. Griliches, Z., Hausman, J.A., (1986). Errors in variables in panel data. Journal of Econometrics (31): 93–118.

9. Holtz-Eakin, D., Newey, W., Rosen, H.S., 1988. Estimating vector autoregressions with panel data. Econometrica (56):1371–1395.

10. Hussain A.M., Saed A. (2001). Econometric estimation of agriculture production Function in Jordan: 1981-1996, Journal of Economic&Administrative Sciences, College of Business and Economics, UAE University, (17):90-103

11. Kiviet, J. (2009), Strength and weakness of instruments in IV and GMM estimation of dynamic panel data models – Preliminary version. IZA conference, Hausdorff center for mathematics, Bonn, 29 p.

12. Psacharopoulos, G., Patrinos H. A. (2004). Returns to Investment in Education: A Further Update. Education Economics, 12(2):111-134.

13. Sangho, K., Hyunjoon L. (2004). Does the Solow Residual for Korea Reflect Pure Technology Shocks?. Econometric Society 2004 Far Eastern Meetings

14. Solow, R. (1957). Technical Change and the Aggregate Production Function. The Review of Economics and Statistics, 39(3):312-320

15. Tudorel, A., Bourbonnais, R. (2008). Econometrie. Editura Economica, Bucharest, p.178.

16. Turgutlu, E. (2010). Cyclical behavior of price-cost margins in the Turkish banking industry. Economic Modelling (27):368–374.

17. Warr, B., Ayres, R. (2006). Economic growth, technological progress and energy use in the US over the last century: Identifying common trends and structural change in macroeconomic time series. XIV International Economic History Congress, pp. 1-26.

18. Zaman G., Goschin Z., Partachi I. and Herteliu C. (2007). The contribution of labour and capital to Romania's and Moldova's economic growth, Journal of Applied Quantative Methods 2(1):179-185

19. INS (2012), Anuaraul Statistic al Romaniei, Bucuresti, 2013

20. ***TEMPO online database, https://statistici.insse.ro/shop/

# LEGISLATION AND DETERMINANTS OF DEVELOPMENT OF AGROTOURISM AS A FACTOR OF LOCAL DEVELOPMENT

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## Abstract

*Agricultural landscape of Serbian villages, along with multifunctional development of agriculture represents a basis for the development of agritourism. Agritourism is a form of tourism focused on core issues, healthy diet for tourists and residing in a healthy environment, through integrated development of agriculture, taking into account sustainability aspects. Basic principles of rural development indicate that sustainable development of rural tourism must be economically justified, apart from the preservation of natural, social and cultural characteristics of a touristic destination. The efficiency of an agritouristic organization depends of several significant determinants. In addition to a detailed analysis of agritourism development determinants, the focus of this work is also on the legal framework of agritourism development, which consists of a series of legal texts, enacted in order to create a comprehensive and effective legislation.*

**Key words:** *tourism, agritourism, rural development, legislation*

## Introduction

Tourism is often viewed as a targeted, planned and motivated behavior, where the most important role in making of travelling decisions is played by the expectations of the traveler. Therefore, the needs, attitudes and motives of tourists are crucial. Tourism may be viewed as a type of link between the urban environments and non-urbanized areas, rich in various natural resources.

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Since it covers large areas of preserved nature, tourism is an activity which valorizes those elements of space that are of marginal interest to a variety of other activities. Only tourism may valorize sandy, gritty and rocky sea coasts, lake shores and river banks, lookout points, mountain slopes covered in snow, swamps, some climate elements, caves and pits, relict and endemic specimens of plants and animals, sunsets and picturesque landscapes, i.e. necropolis, tombstones, archaeological sites, frescoes and the like. Tourism is a unique space user, and its specificity lies in the fact that it is not an irreversible consumer of natural elements. Space refinement can be performed through controlled development of tourism, along with the construction of suitable facilities.[3]

Tourism, as an industry, has no significant share in the total gross domestic product of Serbia. Significant potential for tourism development in Serbia is related to rural areas, which provide the possibility to produce healthy food, rest with the use of accommodation in these areas and consume food and beverages produced in this area. Agritourism is a branch of tourism on the rise, but its development in Serbia requires additional investment and commitment in the field of economic measures and marketing services, and certainly an adequate legal framework that shall enable maximum utilization of natural assumptions that our country has.

The situation in this domain within the European Union framework, as well as global frameworks, differs significantly.

Due to the globalization of capital, finance, labor, technology, transportation and communication during the second half of the twentieth and early twenty-first century, tourism is experiencing a strong expansion. With the increase in leisure time and income, 180 million Europeans go on a holiday every year. Within the European Union, tourism represents one of the largest economic sectors with 9% of employees and 9% of consumption share. It also represents one of five export categories in 83% of all countries in the world and a main source of foreign exchange earnings in nearly 38% of countries. Therefore, tourism plays a major role in the economies of numerous countries, as a source of employment and a manner of battling against poverty.[4]

[3] Jovičić Dobrica (2000): *Tourism and Environment*, Belgrade, Foundation Andrejević, p. 17
[4] Stefanović Vidoje, Azemović Nedžad (2012): *Sustainable tourism development on the example Vlasina surface*, School of business, No 1, 38-50, p. 39

According to statistical data, the income from foreign tourism in the world in 2006 amounted to 735.000.000.000,00 USD, which means 1.304.109.500 USD per day. Tourism is an sector that employs 260.000.000 people today. Out of 100 employees in general, tourism employs 6 people in France, 7 in Portugal and Austria, 9 in Switzerland, 11 in Spain, 12 in Greece and 15 in Austria. Tourism analysts anticipate that in 2030 the share of those who travel as tourists to foreign countries, in relation to the total number of global population, will reach 14,1% which any other activity may hardly obtain.[5]

The number of employees in tourism industry in our country has declined significantly. Legal requirements for performing business in the field of agritourism have been obtained in recent years, and they should be accompanied by state incentives.

## Rural tourism in Serbia and benefits for the local community

According to an OECD definition, rural areas in Serbia occupy 85% of the territory inhabited by more than half of the total population (55%), with population density of 63 inhabitants per square kilometer. The majority of natural resources of the country (agricultural land, forests, water) with rich ecosystems and biodiversity are located in rural areas. Particularly significant potential lies in human resources employed in various economic activities. An important component of rural sector is natural, cultural and historical heritage.[6] According to the abovementioned Plan of Strategy for Rural Development, the region of Serbia with the largest tourism potential and the highest rate of share in the tertiary sector in the economic structure, includes the following municipalities: Mali Zvornik, Krupanj, Osečina, Ljubovija, Bajina Bašta, Kosjerić, Užice, Čajetina, Priboj, Prijepolje, Nova Varoš, Ivanjica, Sjenica, Tutin, Novi Pazar, Raška, Brus and Aleksandrovac. In this part, the structure of agriculture is fairly underdeveloped and mainly based on the use of natural resources, particularly in livestock feed.[7]

[5] Stanković Stevan, Marić Svetomir (2008): *Regional aspects of tourism in the world*, Tourism, No. 11

[6] Plan of the Strategy for rural development, 2009–2013, The Republic of Serbia, Ministry of Agriculture, Forestry and Water Management, February 2009., p. 4

[7] *Ibid.* p. 11

Rural tourism in Serbia is defined as tourism which offers "rural environment" to the visitor, allowing him to uniquely experience the network of life between nature, culture and people. This implies that the visitor may enjoy the authentic, original experiences and return to the roots or the essence of rural lifestyle.

Rural tourism is based on the principles of sustainability and involves a variety of activities and services organized by the population in rural areas, precisely on the basis of elements that characterize such rural areas. In doing so, offers in rural tourism include not only the visible characteristics of nature, architecture, folklore, gastronomy, but also the invisible ones such as, for example, traditional hospitality, traditions, culture of relationship with nature, culture of communication, beliefs and legends of local population of various nationalities and religions that have developed a specific manner of living within a certain area. It is this experience of a unique multidimensional network of life, realized through personal contact with the local population that makes rural tourism unique.[8]

Although rather developed, especially in certain parts of Vojvodina, Central and Western Serbia, rural tourism is still underdeveloped and insufficiently recognized tourist product of Serbia. Based on a research of local tourist organizations in the Republic of Serbia, it is estimated that rural tourism in 2010 was directly involved in the economy of Serbia with 10,4 billion dinars.

This represents 16% of the total GDP in the sector of travelling and tourism in the Republic of Serbia in 2010. It is estimated that, in 2009, rural tourism generated 2,7 million overnight stays, or 27% of the total number of tourist overnight stays in the Republic of Serbia.

Analysis of data from these researches indicates that there are large seasonal variations and low occupancy rate of accommodation facilities in rural areas.[9] In the following table we shall present the principles of rural development.

[8] Đorđević Milošević Suzana, Milovanović Jelena (2012): *Sustainable Tourism for Rural Development - Small farms and rural tourism in Serbia*, Faculty of Applied Ecology Futura, Singidunum University, Belgrade Agroznanje, Vršac FAO, Budapest, p. 47
[9] *Ibid*.

**Table 1.** *Basic principles of rural development*

| Sustainable rural development | | | |
|---|---|---|---|
| Environmental principles | Social principles | Cultural principles (heritage) | Economic principles |
| - respect the natural diversity of the destination<br>- undertake measures to control the sustaining capacity of the destination together with the development of rural tourism | - ensure that tourism development protects and does not devastate the cultural diversity and the local community<br>- actively discourage forms of tourism that cause and contribute to social problems | - develop tourism that is characteristic of the area (indigenous) – avoid duplication<br>- promote unique characteristics of the culture and heritage of the area | - encourage employment opportunities for prevention of outflow of population<br>- prevent loss of traditional occupations<br>- promote the use and sale of local food products |

**Source:** *Popesku Jovan (2011): Sustainable development of rural tourism, TAIEX, Belgrade Chamber of Commerce, ppt, p. 4-6*

We conclude that sustainable development of rural tourism must be economically justified, with the preservation of natural, social and cultural characteristics of the tourist destination.

In spite of the abovementioned definition of the notion of rural tourism, in different countries this term is understood differently in practice, and includes certain specificities, such as:
- in Finland it implies renting small rural houses (so-called cottages) to tourists, including food services;
- in Hungary the said term includes supply of services and activities offered to tourists in a rural setting (financially acceptable/affordable accommodation, participation in agricultural activities and the like);
- in Slovenia, the most important form of rural tourism is family home - farm tourism, where guests spend the night in the same house as the hosts or in a separate guest house (emphasis is on gastronomy and visits to the property);
- in the Netherlands, this term primarily implies camping at family homes – farms, with an emphasis on extracurricular activities such as cycling, walking, horse riding and the like;

- in Greece the main product of rural tourism is "bed and breakfast" with accommodation in traditionally decorated rooms with traditional breakfast frequently based on domestic products.[10]

There are still several common characteristics that represent key elements which identify rural tourism: rural/quiet surroundings, preserved environment, accommodation in traditional country households, communication with the hosts, domestic food in locally distinctive ambience (e.g. cottages, taverns etc.), and introduction to agricultural operations, whereas complementary activities implied by rural tourism are mostly related to the organization of cultural and recreational activities.[11]

**Table 2.** *Key elements of rural tourism*

| | **Key elements of rural tourism** |
|---|---|
| 1 | located in rural areas |
| 2 | functionally rustic: based on small entrepreneurship, outdoor in direct contact with the nature; based on heritage and traditional activities |
| 3 | allows participation in activities, traditions and lifestyle of the local population |
| 4 | provides personalized contact |
| 5 | settlements and buildings are rural (small-scale) |
| 6 | traditional by sense, slow and organic growth, related to local families |
| 7 | various kinds, represents a complex pattern of rural environment, economy, history and localities |
| 8 | high share of tourist revenue which benefits the local community |

**Source:** *Roberts Lesley, Hall Derek (2001): Rural Tourism and Recreation: Principles to Practice, CABI Publishing, London*

The main attraction of agritourism is the experience of life and work within the village household and authentic products, along with related services. According to several researches, agritourism offers an entire range of potential benefits for the local community:
- it may generate possibilities of diversification of business activities of the local economy in order to achieve higher revenues;
- it may serve as a means of educating the public in regard to the significance of agriculture as an economic activity and its contribution to

[10] Jelinčić Daniela Angelina (2007): *Agritourism in the European context*, Studia ethnologica Croatica, vol. 19, 269-291, Zagreb, p. 274
[11] *Ibid.*

the development of the local community economy and the quality of life in it;
- it may obtain economic incentives and reduce disparities among the urban and rural part of the local community;
- it may play a significant role in the creation of image and recognition of local products and creation of additional value, as well as allow direct marketing of the local community, all of which serving to stimulate economic activities and improve the quality of life of the local community or region.[12]

## Determinants of agritourism development

Agritourism is a form of tourism focused on core issues, healthy diet for tourists and residing in a healthy environment, through integrated development of agriculture, taking into account sustainability aspects.[13]

Above all, agritourism is a part of the tourism sector, which encompasses the totality of relationships and business related to travelling and temporary stay of people outside their place of residence, for rest, recreation and the like. Tourism can be: summer holiday, rural, hunting, health, leisure, culture, sports, sightseeing, accommodation; seasonal and off-seasonal; domestic, foreign and borderline; individual and collective etc. Tourism is important to the local and national economy, since it incurs revenue from tourists. The development of tourism (and agritourism) leads to a rapid improvement of all activities associated to it (transport, industry, agriculture, communal services, cultural institutions, handicraft industry, hospitality industry).[14]

Speaking of the development of rural, agro or village tourism, we have to start from the multifunctional development of a rural area. Versatile rural development includes demographic revival, the use of available resources for healthy food production, the development of non-agricultural activities, and urbanization in the sense of development of infrastructure, education, culture and conservation of eco-environment. A particularly important concept is the one of development of households, small and medium sized enterprises, agro

[12] Lobo E. Ramiro, Goldman E. George, Jolly A. Desmond, Wallace B. Diane, Schrader L. Wayne, Parker A. Scott (1999): *Agricultural Tourism: Agritourism benefits agriculture in San Diego County*, California Agricuture, University of California
[13] Pejanović Radovan, Vujović Slavoljub (2008): *Rural development and agrotourism*, Agroekonomika, No 37 – 38, Vol. 37-38, 5 -15, Faculty of Agriculture, Novi Sad, p. 6
[14] *Ibid*., p. 8

production and agro processing, rural tourism, services of business cooperatives and advisory services. It is necessary to create social, economic and cultural conditions for rural development. Thus, the enlargement of properties, technical equipment of households and educational and cultural milieu can innovate village development.[15]

Within the framework of agritourism development, a significant role is played by revitalization of ethno ecological villages, spatial planning, agricultural landscape, old crafts and branded offers from traditional manufacture. The development of agritourism requires considerable investment in the renovation of existing and construction of new facilities, infrastructure and sports and recreational activities. It is the health and recreational-sports tourism that contributes to the development of ecological food production. The basic prerequisite for the development of agritourism is the development of road infrastructure, cultural facilities and ethno tradition. High quality and controlled sanitary conditions are certainly a primary factor of agritourism development. The development of agritourism strengthens the relationship between agriculture and tourism. This integral relationship is based on food consumption by tourists, engagement of labor force in the rural area, improvement of quality of services with a significant share of final agricultural products.[16] According to Babović, agritourism appears as a supplementary occupation and additional income of the rural population. From an economic point of view, tourists buy food and thus employ the population, creating a basis for the development of the village. Increase of employment and improvement of living standards of farmers represents a barrier to further migration of the population. Tourism affects spatial and urban planning of the village and from a demographic point of view it increases educational and cultural level of the rural population. In addition to food supply, especially of the organic kind, holiday and any types of active holiday in a rural ambience, we must mention the development of hunting tourism, fishery, implementation of special food regimes and organization of tourist events within the scope of agriculture and sports and recreational activities.[17]

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[15] Veselinović Janko, Ignjatijević, Svetlana (2013): *The legal framework and economic measures to promote agritourism*, International Scientific Conference *Planning and Legislative Security and Environment*, Palić, 145-150, p. 146

[16] *Ibid*.

[17] Babović Jovan (2008): *Agri-environment and agro-economic policy of the EU, multifunctional development – agri-eko-tourism*, Organic farming, Novi Sad, Institute of Field and Vegetable Crops

The efficiency of agritourism organization includes municipal authorities, accommodation providers, other service providers and local administration authorities.

The absence of awareness regarding the tourism potentials and values of natural and cultural assets among the population, as well as insufficient capacity and inadequate agritourism support indicate the necessity of developing the capacity of human resources in this segment. Promotion of agritourism in the domestic and international market is an imperative of contemporary agritourism. Having in mind that the number of foreign visitors is still low in comparison with domestic, the basis for the development of agritourism is actually in the domestic market.

In the context of the aforementioned, it is important to emphasize that production and service activities in tourism, as well as in agritourism, involve a plethora of human labor, seasonal business, night work etc. Agritourism activity is specific, since the family that conducts tourism activity within its household must primarily perform activities related to agricultural production. In addition to the knowledge necessary for the regular performance of agricultural activity, people who work in an agritouristic household must possess certain communication abilities and a culture of dealing with people and the like. This implies that people who are engaged in agritouristic activity must have plenty of various skills in order to meet the fundamental requirements for the provision of agritouristic services. Due to this reason, yet again we come to the conclusion that human resources play a key role in the development of agritourism activities.

In the context of convergence of agritourism to the local population, availability – poor road infrastructure, distance and poor and missing signalization have significant impact. The aforementioned is further followed by lack of information, lack of facilities and suppliers, as well as poor hygiene conditions in tourist areas and the absence of offer of organized activities and other attractions along with accommodation offer. Therefore, in order to ensure the arrival of domestic, and especially foreign tourists, and their pleasant stay, physical infrastructure such as roads, hotels, restaurants, sports and recreational equipment etc. should be developed.

The basis of the development of agritourism is a rural household. Diverse offer of interconnected companies based on multifunctional agriculture gives significance to rural tourism offer. Tourists' requirements vary to

begin with. Tourists require a healthy environment, traditional food, local specialties, ethno tradition, life in a rural environment, landscape and biodiversity. On the other hand, attitudes and expectations of agritourism service providers are of great importance.

In order to conduct business development and program planning within the destination, it is relevant to understand what motivates business facilities' owners, and what is the impact of their goals and values on the nature and implementation of such activities. In other words, is the family or owner of a business facility in the rural area primarily motivated by the lifestyle introduced by organizing agritouristic activity in the family agro household, or are his goals aimed towards the increase of revenue and further expansion of business.[18]

The basic service of agritourism is accommodation. In order to use the capacities in a more complete manner, apart from promotion of rural tourism it is necessary to improve the existing and future offer of accommodation, and to increase the number of beds in accordance with market demands. For instance, a large proportion of the target population interested in rural tourism belongs to various groups: hikers, children, teams from a variety of companies etc. one of their primary requirements is not to be separated when accommodated. Therefore, a specific village in which they are to be accommodated (if it is impossible to do so within one household) should be able to accommodate 45-50 people, this being the usual standard for tours with bus transportation. If this condition cannot be met, there is no activity that would retain the tourists on that location, not even a perfect food or leisure offer and the like. In the best case, some of the services offered within a settlement that may not provide accommodation of the entire group would be consumed by such groups only incidentally along the way. For example, if the target group is a family, the lack of bathrooms etc. cannot be tolerated. Accommodation offer, in this regard, should be amended via introduction of special labels to indicate the quality of accommodation and services offered.[19]

Upon analyzing the determinants of agritourism development, the conclusion is that this form of tourism has the following characteristics:

[18] Brščić Kristina, Franić Ramona, Ružić Drago (2010): *Why agritourism - the opinion of the owner*, Journal – Central European Agriculture, Volume 11, No. 1 (31-42), p. 33
[19] Đorđević Milošević Suzana, Milovanović Jelena (2012): *Sustainable Tourism for Rural Development - Small farms and rural tourism in Serbia*, op. cit., p. 48

- positive yet insufficiently developed status in relation to other forms of tourism;
- insufficient marketing support, both on domestic and foreign markets;
- significant market potential
- significant future investments in the renovation of existing and construction of new resources (facilities, infrastructure, sports and recreational activities etc.);
- plenty of potentially interested parties, both providers of tourist services and tourists themselves, in the future.

All of the aforementioned indirectly suggests that the culture of communication in the relationship: village households - production and service activities – (natural environment) – tourist, has so far developed within a modest scale, whereas the full scope of development is yet to be achieved. Appropriate legislation is also relevant to the above.

## Legal framework of agritourism development

In recent years, the conditions have been created for the development of tourist activities and tourist capacities, especially in agritourism, relying on the advantages Serbia has in this area. The legal framework of tourism development consists of a series of legal texts adopted in order to create a comprehensive and effective legislation.

The law that regulates the conditions and planning of tourism development, tourist organizations for the promotion of tourism, tourist agencies, hospitality activities, nautical activities, hunting tourism activities, tourism services, fees and penalties in tourism, Tourism Register, other issues of significance to the development and improvement of tourism is the Law on Tourism.[20] The Law on Tourism is a *lex generali* legal text in the field of tourism. In addition to the provision of basic definitions of tourism terms, this Law, among other things, prescribes the norms related to planning and development of tourism, tourist organizations for the promotion of tourism, tourist agencies, activities and services in tourism, as well as other relevant issues.

According to this Law, the regulation of relations in the field of tourism is based on the principles of (Article 2):

[20] "Official Gazette of the Republic of Serbia", No. 36/2009, 88/2010, 99/2011 – state law and 93/2012

1) integral development of tourism and accompanying activities, as factors of overall economic and social development, which in accordance with the law provides the implementation of mutually agreed plans and programs;
2) sustainable development of tourism as a harmonized system of technical and technological, economic and social activities, based on economic development, preservation of natural and cultural assets, preservation and development of the local community;
3) increase in efficiency and accountability in the area of use, management, protection and improvement of tourist space;
4) ensuring uniform standards for the provision of tourism services;
5) protection of national economy, consumers of touristic product and tourism professions;
6) partnership between private and public sector and civil society in planning, design and placement of touristic product on the market;
7) provision of uniform, public and electronic records of registered and recorded data in the field of tourism;
8) contained in the Code of Ethics in Tourism of the World Tourism Organization of the United Nations;
9) planning and realization of tourism development policy in accordance with the Tourism Development Strategy.

When it comes to the development of rural tourism, a very significant normative framework – *lex specialis*, also lies in the Law on Agriculture and Rural Development.[21] Until the adoption of this Law (in 2009), the field of agriculture and rural development had been normatively unregulated. Under such conditions, it was very difficult to develop agritourism in areas where basic economic activities was uncertain.

The Law on Agriculture and Rural Development provides for the following: objectives of agricultural policy and the manner of its implementation, types of incentives in agriculture, conditions for eligibility for incentives, incentive users,[22] Register of agricultural holdings, recording and reporting in agriculture, integrated agricultural information system, supervision over the implementation of this Law. This Law establishes the Department for Agricultural Payments, as an administrative authority within the ministry responsible for agriculture affairs and regulates its jurisdiction (Article 1).

[21] "Official Gazette of the Republic of Serbia ", No. 41/2009 i 10/2013 – st. law
[22] See the following *lex specialis* on issues related to incentives.

Objectives of agricultural policy and policy of rural development of the Republic of Serbia are (Article 3, paragraph 1):
1) strengthening the competitiveness of agricultural products in the market;
2) provision of high quality and sanitary healthy food;
3) provision of support to the standard of living for farmers that cannot accomplish economic survival on the market through their own production;
4) providing support to rural development;
5) protection of the environment from adverse impacts of agricultural production.

Agricultural policy and policy of rural development of the Republic of Serbia are implemented via realization of the Strategy of Agriculture and Rural Development of the Republic of Serbia, the National Program for Agriculture and the National Program for Rural Development (Article 3, paragraph 2).

Strategy of Agriculture and Rural Development of the Republic of Serbia determines long-term directions of agricultural development, including the following: establishment of market economy, increase of agriculture profitability of the Republic of Serbia and concern regarding the development of rural areas (Article 4, paragraph 1).

The National Program for Agriculture defines medium-term and short-term objectives of agricultural policy, method, sequence and deadlines for achievement of such objectives, anticipated results, as well as the form, type, purpose and volume of individual incentives (Article 5, paragraph 1).

The National Program for Rural Development encompasses measures and other activities, as well as anticipated results, forms, types, purpose and volume of individual incentive measures (Article 6, paragraph 1).

A special law that supplements to the preceding one, which deals with a very important issue in the field of rural development is the Law on incentives in agriculture and rural development.[23]

This Law regulates the types of incentives, method of use of such incentives, the Register of incentives in agriculture and rural

[23] " Official Gazette of the Republic of Serbia ", No. 10/2013

development, as well as conditions for eligibility for incentives in agriculture and rural development (Article 1).

Incentives under this Law are funds provided from the budget of the Republic of Serbia, as well as funds provided from other sources that are assigned to agricultural households and other entities in accordance with this Law, in order to achieve the objectives of agricultural policy and rural development policy (Article 2, point 8).

Rural development is a development policy governed by the state and which represents a set of measures that contribute to the improvement of quality of life for people living in rural areas (Article 2, point 14).

Legal norms that are indirectly relevant to the tourism field can be found in the Law on Companies[24]. These are norms that are related to the status issues of companies, that may be registered and carry out business in the field of tourism.

This Law regulates the legal position of companies, especially their establishment, management, status changes, changes in legal form, cessation and other issues of relevance to their position, as well as the legal position of the entrepreneur (Article 1, paragraph 1).

## Conclusion

Serbian terrains include a range from wealthy, fertile plains of the Pannonian Plain in the north, through the limestone mountain ranges and basins in the east and west, to the ancient volcanic massif in the south. In an effort to identify the similarities and differences among the rural areas of Serbia, as well as their strengths and weaknesses, their typology has been developed through cluster analysis. This analysis has identified four homogeneous groups of municipalities as representative types of rural areas of Serbia. Type 1: highly productive agriculture and integrated economy. – This group of rural municipalities includes municipalities in Vojvodina and the northern part of Serbia around the Sava and Danube rivers. In these areas, highly productive agriculture is represented by better structured households (larger households with more productive soils) and vertical integration with the agro-food sector. Also, services and industrial sector in the context of Serbia are better developed here.

[24] " Official Gazette of the Republic of Serbia ", No. 36/2011 and 99/2011

Type 2: small urban economies with intensive agriculture labor. – This cluster region is geographically spread across rural municipalities along river valleys and is located near the main roads of Serbia that radiate out from Belgrade towards Montenegro, Bosnia and Macedonia. These areas are identified as the so-called urbanized villages, located near large cities. They have intensive agricultural production (vegetables, vineyards) that is market oriented, while their rural economy is diversified – developed services and small and medium sized enterprises. The productivity of agricultural land is at a similar level as in the rural parts of Vojvodina. Type 3: mainly mountainous economy oriented towards natural resources. – This cluster region includes rural municipalities in the mountainous region of Southeast Serbia. This economic structure has lower productivity in agricultural production, some industrial activities, more developed services and tourism potential. It is basically a rural region oriented towards natural resources, with unused natural resources and tourism potential, and with a possibility of exploitation of rural amenities: natural resources, rural environment, cultural heritage. Type 4: large tourist capacities and poor agricultural structure. – This cluster of rural municipalities is located in the western parts of Serbia and has large tourism capacities. The index of number of hotel rooms per 1000 people in this cluster is three times higher than the national average. However, the agricultural structures are the poorest among all the types described herein.[25]

The presented cluster analysis indicates the natural potentials of rural areas in Serbia. Mountainous areas with wealthy natural resources are particularly oriented towards tourism. The municipalities of Southeast Serbia, and especially Western Serbia have remarkable tourism capacities.

However, in addition to natural resources and geographic characteristics of terrains that Serbia undoubtedly has, an important role in the development of agritourism is played by legislation. Although tourism sector is not a particularly significant element in the total gross domestic product of Serbia, in recent years plenty of conditions for the development of tourist sector and tourist capacities have been created (including legislation conditions that are very important).

[25] Đorđević Milošević Suzana, Milovanović Jelena (2012): *Sustainable Tourism for Rural Development - Small farms and rural tourism in Serbia,* op. cit., 35-36

Normative regulation of the tourism sector in general, but also agritourism, has for a long time been at odds with the natural capacities and social frameworks in which it would develop. It also applies to the arrangement of status position of entities involved in tourism, including their activity. To a large extent, this field has been unregulated for quite a long period of time.

The adoption of the Law on Tourism, as a general law in the field of agritourism, as well as other special laws related to certain issues in this field, introduced an optimal normative framework to the tourist sector in Serbia. Legal forms, criteria and conditions for its performance have also been identified.

## References


1. Babović Jovan (2008): *Agri-environment and agro-economic policy of the EU, multifunctional development – agri-eko-tourism*, Organic farming, Novi Sad, Institute of Field and Vegetable Crops.

2. Brščić Kristina, Franić Ramona, Ružić Drago (2010): *Why agritourism - the opinion of the owner*, Journal – Central European Agriculture, Volume 11, No. 1 (31-42).

3. Đorđević Milošević Suzana, Milovanović Jelena (2012): *Sustainable Tourism for Rural Development - Small farms and rural tourism in Serbia*, Faculty of Applied Ecology Futura, Singidunum University, Belgrade Agroznanje, Vršac FAO, Budapest.

4. Jelinčić Daniela Angelina (2007): *Agritourism in the European context*, Studia ethnologica Croatica, vol. 19, 269-291, Zagreb.

5. Jovičić Dobrica (2000): *Tourism and Environment*, Belgrade, Foundation Andrejević.

6. Law on Tourism, "Official Gazette of the Republic of Serbia", No. 36/2009, 88/2010, 99/2011 – st. law and 93/2012.

7. Law on agriculture and rural development, "Official Gazette of the Republic of Serbia", No. 41/2009 and 10/2013 – st. law.

8. Law on incentives in agriculture and rural development, "Official Gazette of the Republic of Serbia", No. 10/2013.

9. Law on Companies,"Official Gazette of the Republic of Serbia ", No. 36/2011 i 99/2011.

10. Lobo E. Ramiro, Goldman E. George, Jolly A. Desmond, Wallace B. Diane, Schrader L. Wayne, Parker A. Scott (1999): *Agricultural Tourism: Agritourism benefits agriculture in San Diego County*, California Agricuture, University of California.

11. Pejanović Radovan, Vujović Slavoljub (2008): *Rural development and agrotourism*, Agroekonomika, No 37 – 38, Vol. 37-38, 5 -15, Faculty of Agriculture, Novi Sad.

12. Plan of the Strategy for rural development, 2009–2013, The Republic of Serbia, Ministry of Agriculture, Forestry and Water Management, February 2009.

13. Popesku Jovan (2011): *Sustainable development of rural tourism*, TAIEX, Belgrade Chamber of Commerce, ppt.

14. Roberts Lesley, Hall Derek (2001): *Rural Tourism and Recreation: Principles to Practice*, CABI Publishing, London.

15. Stanković Stevan, Marić Svetomir (2008): *Regional aspects of tourism in the world*, Tourism, No. 11.

16. Stefanović Vidoje, Azemović Nedžad (2012): *Sustainable tourism development on the example Vlasina surface*, School of business, No 1, 38-50.

17. Veselinović Janko, Ignjatijević, Svetlana (2013): *The legal framework and economic measures to promote agritourism*, International Scientific Conference *Planning and Legislative Security and Environment*, Palić, 145-150.

18. Wall Geoffrey, Mathison Alister (2006): *Tourism: change, impacts and opportunities*, Pearson Education Limited, Harlow.

# ANALYSIS OF ECONOMIC TRENDS IN THE REPUBLIC OF SERBIA (WITH FOCUS ON THE VRBAS MUNICIPALITY)[1]

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## Abstract

*The world economic crisis, from the end of the last decade of current century, has led to a global recession, as well as to the fall of the values of all macroeconomic aggregates and indicators in large number of world countries. Many nations are faced with the problems of decline in production and export, expressed illiquidity of actors within the local economies, turbulences in the labour market, rapid fall of the living standard and other. Unfortunately, gradual recovery of the world economy was cut in 2011 by new global challenge embodied in the public debt crisis. As previously mentioned problems were also came to Serbia, the main goal of the paper is identified in the brief review of economic trends through the achieved macroeconomic aggregates (such as GDP, FDI, unemployment rate and other) in the last few years. During the presentation and analysis of the key macroeconomic aggregates was used the bottom-up approach (from national to the level of local communities), with a special focus to the economic trends in the municipality of Vrbas. Since that level of development and recovery of the national economy are significantly contained in the intensive attraction of financial assets (from domestic and international funds) and investment in new and recapitalization of existing holders of economic activities, a broader overview of realized investment trends in observed time and spatial frame (with assessment of realized investments in agriculture) it is also provided.*

**Key words:** *macro-economic aggregates, up-bottom approach, Serbia, Vrbas municipality, investment.*

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## Introduction

Efficiency in the implementation of the goals and measures defined in the Strategic plan of development of the Vrbas local community for the period 2014-2020 will depend in great extent on the level of achieved macroeconomic stability within the period of its realization. It is estimated that the mentioned period will be marked at the macroeconomic level with higher or lower degree of instability, as well as connected with several risks. To this is pointed by realized economic trends in the period of transition, which are additionally burdened with the effects of global economic crisis that started at the end of 2008, and still lasts. World crisis, initiated by the collapse on the real-estate market in the United States, spilled over to financial sector, and later to the real sector, what led to global recession and reduction of economic activity, in other words fall in production and exports, illiquidity, employment cuts, fall of living standard and rise of poverty. *The crisis has caused a decline of all macroeconomic aggregates and indicators, at all countries worldwide.* Economy in the world still has not succeeded to realise of the burden of previous crises, when in 2011 came to new crisis, best known as *the public debt crisis.* According to all, this crisis is much more serious, where the recovery process will be long, very slow and uncertain, accompanied by the deepening of the foreign trade exchange deficit, instability of the exchange rate, small capital accumulation, higher investment risk and illiquidity of economic environment. All mentioned aspects will additionally affect weakening of domestic economy, which has been already very fragile.

Macroeconomic aggregates are a system of global and synthetic indicators that quantify the structure, dynamics and results of the economic activity of certain economy. Main macroeconomic indicator of any economy is the GDP (gross domestic product), which represents a value of the sum of final goods and services produced during certain period in observed country. In Serbian statistical methodology, until 2006 were counted little different macroeconomic aggregates. So GDP was corresponded to the NP (national product), (*Subic et al., 2013*).

Republic of Serbia is in a transition stage, which should represent a radical turnover and real milestone in future development of national economy and all stakeholders within it. The development of a market economy can be accelerated by inflow of assets through investments in new and recapitalization of existing companies, as well as with consolidation of the financial system. However, many enterprises in Serbia still have not favourable business performances, what is manifested through decline in market share and low profitability, increasing of indebtedness, inadequate investment and increased

volume of diversified business activities vice the primary activity[4]. Although it is established a increscent investment trend (in the period 2006-2012, the average annual growth rate was 12.29%), macroeconomic indicators of investment trends in the Republic of Serbia show a higher investment risk in local companies, what disabled more dynamic investment process. By risk decreasing would be increased the attractiveness of investment, what is a stimulus for domestic and foreign investors, which estimate different combinations of risks and incomes.

The business environment within the region of Vojvodina, as well as within the whole Serbia, is much improved in last fifteen years (since 2001) by virtue of the adoption of a number of legal regulations. The main goals of law reforms that are in accordance with EU regulations are focused to easier conduction of business and safer investment process. In accession process to the EU adoption of many new reform regulations is expected, where for investors the most significant will be the laws from the area of land and building, as well as the regulations that are connected to industrial and technological parks (*Subic, 2012*). Market size, macroeconomic stability, business costs, human resources, geographical position and investment infrastructure are the most important among the many factors that create the municipality of Vrbas as one of the most attractive locations for business in this part of Southeast Europe. Municipality offers to all investors relatively good sales potential for several products of local economy (in first place products of agriculture and processing industry), both on world and national market. Mentioned arise from:

- Interim Trade Agreement and the Stabilisation and Association Agreement (SAA), which provide that in next six years it will be gradually established a free trade with industrial and agricultural products between Serbia and the European Union (EU);
- Free trade agreement established between Serbia and Russian Federation; Serbia and Belarus; Serbia and Turkey; Serbia and Kazakhstan; Serbia and countries member of the European Free Trade Association (EFTA);
- Agreement on mutual liberalization of trade with industrial and agricultural products, which was established among the countries of Central and South-Eastern Europe (SEE)[5];
- General System of Preferences (GSP), program of approval of trade preferences that United States of America (USA) gives to their trade partners

[4] Period of decomposition of the former Yugoslavia, war on its territory, and after that transition, affected termination of many companies (or work with a significantly reduced capacity) in the Republic of Serbia.

[5] By access of Romania, Bulgaria and Croatia into the EU, CEFTA Agreement currently includes Albany, Bosnia and Herzegovina, Macedonia, Moldavia, Serbia and Montenegro.

with main goal to support their economic development (currently is used by more than 140 countries, including Serbia).

Therefore, there is a openness to any investor, which is specifically focused to the attraction of foreign direct investments, what will significantly increase the growth rate of gross domestic product (GDP) and gross value added (GVA) at the local level, as well as reduce the unemployment rate.

Compared with other countries in the region, the potential for investment attraction, according to the business costs, is relatively more favorable in the Republic Serbia, primarily because of[6]: *Lower tax rates* [income tax of 15%[7]; value added tax (general rate is 20%[8], while the special rate is 10%[9]); tax on salaries of 10%]; *Cheaper communal products and services* (such as electricity, gas or water); *Quality and costs of labor*, which represent according to investors, one of the key reasons for investment in the Republic of Serbia (human resources are characterized by high productivity, excellent technical education and significantly lower labor costs); *Transport infrastructure* (European Transport Corridor VII, which links the EU countries with the Middle East); *Development of cross-border and regional cooperation* (Republic of Serbia is bordered by several EU member states: Croatia, Hungary, Romania and Bulgaria); *Closeness to European markets* (goods in a short time can be transported to and from the major European markets).

## Working material and methodology

Conduction of observed research imposes the need for identification of data/information from many sources (scientific and statistical publications) that are before all related to the following thematic areas: macroeconomic aggregates, investments, economy, agriculture and demography.

In order to evaluate the realized investments in agriculture in the municipality of Vrbas, it was used the methodology which involves calculation of the volume of financial (cash) investments in fixed assets based on the following indicators[10]:

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[6] www.siepa.gov.rs

[7] Income tax in some countries within the region is: 10% in Bulgaria; 16% u Romania; 19% in Hungary; 20% in Croatia.

[8] Gross value added (GVA) – general rate, in some countries from the region is: 20% in Bulgaria; 24% in Romania; 25% in Croatia; 27% in Hungary.

[9] Government of the Republic of Serbia (2013): Informacija o paketu mera za stabilizaciju javnih finansija i oporavak privrede, Ministry of Finance, Belgrade, Serbia.

[10] Part of indicators is taken from methodology that was shown in monograph of the authors: Cvijanović, D., Hamović, V., Popović, V., Subić, J., Katić, B., Paraušić, V. (2007): Mulifunkcionalna poljoprivreda i ruralni razvoj u AP Vojvodini, IAE Belgrade, Serbia.

1. Achieved investments in agriculture per rural/agricultural inhabitant;
2. Achieved investments in agriculture per active agriculturalist;
3. Achieved investments in agriculture per registered agricultural husbandry;
4. Achieved investments in agriculture per unite of used agricultural land;
5. Achieved investments in agriculture per unite of arable land surfaces;
6. Achieved investments in agriculture per head of cattle.

Research procedure that follows the volume of realized investments on the territory of Vrbas municipality may be useful for any unit of local government within the Serbia.

## Analysis of basic macroeconomic aggregates

In the process of transition towards market economy, the core concept of production has been abandoned in all countries where it was previously used. So, Statistical Office of the Republic of Serbia (SORS) was stopped to calculate and publish a data on the national product as macroeconomic aggregate from the narrower concept of production.

After the 2005, SORS has no longer published the data about GDP per each municipality for what there is certain justification, having in mind that at municipal level this indicator has very low explanatory power (Subic et al, 2013). Data of basic indicators of macroeconomic trends in the Republic of Serbia, for the period 2006-2012, are given by the next table (*Table 1*).

Beside the EU countries and the countries from the region, economic crisis has had also a great impact on the economic development of the Republic of Serbia.

Taking into consideration the incomplete transformation process and great delay for other transition countries, especially some developed European countries, period 2006-2012 was peculiarly difficult for the Serbian economy. Within the analyzed period, the decrease of investment funds has significantly slowed economic growth.

**Table 1.** *Basic macroeconomic trends in the Republic of Serbia, period 2006-2012*

| Indicators | Year | | | | | | | Average annual growth rate (in %) |
|---|---|---|---|---|---|---|---|---|
| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | |
| GDP, current prices[1], in mld. RSD | 1,962.1 | 2,276.9 | 2,661.4 | 2,720.1 | 2,881.9 | 3,208.6 | 3,348.7 | 9.3 |
| GDP, growth rate, u %[1] | 16.5 | 16.0 | 16.9 | 2.2 | 5.9 | 11.3 | 4.37 | - |
| GDP, mil. EUR | 23,327.4 | 28,473.9 | 32,678,9 | 28,951.9 | 27,967.8 | 31,472.4 | 29,601.0 | 4.0 |
| GDP, per capita, in EUR | 3,147.4 | 3,857.4 | 4,446,0 | 3,954.7 | 3,835.7 | 4,350.6 | 4,111.8 | 4.6 |
| Average number of citizens (middle of year), in 000 | 7,411.6 | 7,381.6 | 7,350,2 | 7,320.8 | 7,291.4 | 7,234.1 | 7,199.1 | -0.5 |
| GDP, mld. RSD (current prices of previous year, ref. year 2010) | 2,702.6 | 2,848.1 | 2,956,8 | 2,853.2 | 2,881.9 | 2,927.1 | 2,882.5 | 1.1 |
| GDP, real growth, in %[1] | 3.6 | 5.4 | 3,8 | -3.5 | 1.0 | 1.6 | -1.5 | - |
| FDI[2], net, in mil. EUR[3,4] | 3,322.6 | 1,820.8 | 1,824,4 | 1,372.5 | 860.1 | 1,826.9 | 231.9 | -35.8 |
| FDI, growth rate, in % | 165.7 | -45.2 | 0,2 | -24.8 | -37.3 | 112.4 | -87.3 | - |
| FDI, % GDP | 14.2 | 6.4 | 5,6 | 4.7 | 3.1 | 5.8 | 0.8 | -38.4 |
| Value of EUR in compare to RSD, average for the period | 84.1 | 80.0 | 81,4 | 93.9 | 103.0 | 101.9 | 113.1 | 5.1 |
| Number of unemployed persons, average, in 000[5] | 2,026.0 | 2,002.0 | 1,999,0 | 1,889.0 | 1,796.0 | 1,746.0 | 1,727.0 | -2.6 |
| Unemployment rate, MOR[6] | 20.9 | 18.1 | 13,6 | 16.1 | 19.2 | 23.0 | 23.9 | - |

Note: [1] From January 2011, new methodology for GDP calculation is used; [2] Foreign Direct Investments; [3] From 01.01.2010 is implemented general system of trade that involves all goods which enter/go out the economic territory of the country, except goods in transit. According to this are corrected data for 2006, 2007, 2008 and 2009; [4] From 2007 is applied new methodology for Balance of Payments; [5] Statistical Office of the Republic of Serbia was corrected data about employed persons from March 2009, between all because of correction of evidences of Republic Office for Health Insurance; [6] Annual data of SORS from the Survey about labor force for the citizens older than 15 years.

**Source:** *Statistical Office of the Republic of Serbia (2014): Bruto domaći proizvod (BDP) u Republici Srbiji 1997-2012 (http://webrzs.stat.gov.rs/WebSite/Public/PageView.aspx?pKey=61); Ministry of Finance (2014): Osnovni indikatori makroekonomskih kretanja (www.mfin.gov.rs/pages/article.php?id=7161); National Bank of Serbia (2014): Osnovni makroekonomski indikatori (www.nbs.rs/internet/cirilica/80/index.html).*

Although after the first crisis impact comes to obvious recovery of economic activities in the Republic of Serbia, macroeconomic indicators are still at the level below the pre-crisis, transition period 2006-2008. In 2011 has been achieved a slight recovery of the Serbian economy (growth of real GDP by 1.6%), but with presence of certain dose of risk of further deterioration, influenced by new crisis wave.

To impacts of global recession, EU has responded with new growth strategy up to 2020 (*Europe 2020*)[11], which is based on competitiveness, sustainability, knowledge and innovation, and social and territorial cohesion. In order to complete coordination of socio-economic and political goals of the country with the process of accession to the EU, Serbia has aligned its goals with the mentioned strategy.

As it was shown that previous growth model, based on increase of domestic consumption and import is unsustainable, it has been established a new model of economic growth based on industrial growth, investment and export, rapid reform processes and European integrations.[12]

A new impact of recession in 2012 has led to the emergence not only of the debt crisis in the European Union, but to the real decline of GDP in the Republic of Serbia (1.5%). In compare to 2011, it was also come to significant decrease in FDI (real decrease of 87.3% was recorded). Based on achieved negative oscillations in movement of observed macroeconomic parameters within the period 2006-2012, it may be noted that the macroeconomic environment in the Republic of Serbia is quite unstable. Exit from the crisis requires institutional and economic-political adjustments that would lead to a change in behavior of consumers and investors[13].

Government has a key role in solving the problem of lack of confidence among market participants due to the market collapse. So, the statement that the market is capable to solve alone the emerged crisis only with short-term losses is unfounded. Without intervention from the state level, institutional adaptations and quality economic policy, market efficiency and stability can not be increased.

Effects of global economic crisis that affected the entire national economy in period 2006-2012 are reflected also to the economic situation in the Province. However, the Vojvodina region, in 2011, has larger share in creation of Republic GDP in compare to 2010 (i.e., it was achieved a increase of 0.8%).

Also, Vojvodina region, in 2012, has again larger share in creation of Republic GDP in compare to 2011 (i.e., it was achieved a increase of 0.6%), (*Table 2*).

[11] http://ec.europa.eu/europe2020/documents/related-document-type/index_en.htm
[12] Team of authors (2013): Program razvoja AP Vojvodine 2014-2020, Draft, Government of AP Vojvodina, Novi Sad, Serbia.
[13] Bošnjak, M. (2011): Globalna finansijska i ekonomska kriza 2007-2010. i njen uticaj na privredu i finansije Srbije, Ministry of Finance of the Republic of Serbia, Belgrade, p. 4.

**Table 2.** *Regional GDP*[14]*, period 2011-2012*

| (Republic of Serbia/ Region) | GDP (current prices, mil. RSD) | | | Index | | Share (%) | | | GDP per capita (000 RSD) | | | Index level (RS=100) | | | Annual growth rate (in %) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2011/ 2010 | 2012/ 2011 | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | |
| **Republic of Serbia** | *2,881,891* | *3,208,620* | *3,348,689* | *111.3* | *104.4* | *100.0* | *100.0* | *100.0* | *395* | *442* | *465* | *100.0* | *100.0* | *100.0* | *7.80* |
| **Belgrade region** | 1,152,005 | 1,271,691 | 1,326,547 | 110.4 | 104.3 | 40.0 | 39.6 | 39.6 | 703 | 772 | 797 | 177.8 | 174.6 | 171.4 | 7.31 |
| **Vojvodina Region** | 748,673 | 859,808 | 917,636 | 114.8 | 106.7 | 26.0 | 26.8 | 27.4 | 382 | 442 | 477 | 96.8 | 100.0 | 102.6 | 10.71 |
| **Region of Šumadija and West Serbia** | 562,911 | 610,143 | 635,037 | 108.4 | 104.1 | 19.5 | 19.0 | 19.0 | 276 | 301 | 315 | 69.9 | 68.2 | 67.6 | 6.21 |
| **Region of South and East Serbia** | 418,302 | 466,979 | 469,469 | 111.6 | 100.5 | 14.5 | 14.6 | 14.0 | 253 | 285 | 294 | 63.9 | 64.4 | 63.3 | 5.94 |
| **Region KiM** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |

**Source:** *SORS (2013): Regionalni bruto domaći proizvod 2010-2011 (http://webrzs.stat.gov.rs/WebSite/Public/PageView.aspx?pKey=62); SORS (2014): Regionalni bruto domaći proizvod 2011-2012 (http://webrzs.stat.gov.rs/WebSite/Public/PageView.aspx?pKey=62).*

[14] Regional GDP represents regional equivalent of gross domestic product as the most important macroeconomic aggregate of some national economy and indicator of its productivity and efficiency in the production of goods and services required for different types of consumption. Sum of GDP of all regions is identical to the GDP of the Republic of Serbia.

After a focus on the region of Vojvodina, in accordance to the accounting principle in 2012, next can be concluded: Share in Republic GDP is 27.4%; With GDP per capita of 477.000 RSD, it has for 2.6% higher GDP per capita in compare to republic average (what is for about 5.9% higher amount in compare to data from 2010); Index is above the republic average level, what reflects relatively higher growth rates of this region in period 2010-2012.

In contemporary concepts of management and decision making, regional development includes three principles, which are in relation with[15]: Decentralization; Planning; Partnership.

Synergy of terms and actors on different levels of management is enabled by complete business environment that has to provide: System of strategic decision making on lower levels (*decentralization*); Planned management and targeted attraction of investments (*planning*); Establishment of network of public-private sector (*partnership*); Competitive advantages (of local area).

The Development Strategy of the Republic of Serbia up to 2020 is based on a new model of economic growth, which essence lies on sustainable and dynamic development of the industry that can easily fit into unique market of the EU and hold out competitive pressure of member countries. *Without a stable growth of the industry and its dominant influence on export and balance of payment, it is not possible to sustain economic growth and macroeconomic stability*, not only of Serbia, but also of the Vojvodina region (including the territory South Backa district and municipality of Vrbas). So, in the period up to 2020, economic growth and development will be based on next principles:[16]

- Dynamic and sustainable industrial growth and development (without dynamic industrial growth – *with an average growth rate of processing industry of 7.3%* - is not possible accomplish planned *real GDP growth of 5.8% in average per year*[17], and with that reduce the gap within the level of development in compare to European countries);
- Pro-active role of the government - institutional establishment (specialization and/or diversification of industrial production and production of products with higher added value, which according to their quality and price find their place in the global market are the necessary preconditions for the growth);

[15] Team of authors (2013): Program razvoja AP Vojvodine 2014-2020, Draft, Government of AP Vojvodina, Novi Sad, Serbia.
[16] Team of authors (2010): Postkrizni model ekonomskog rasta i razvoja Srbije 2011-2020, USAID, FREN, MAT Belgrade, Serbia.
[17] According to that, Vojvodina region can expect in average real annual growth of GDP of 7.9%.

- Improvement of the investment environment (attraction of large volume of FDI requires open economy and healthy market ambient suitable for foreign investments, greater savings on national level and creation of critical mass of small and medium-sized enterprises - SMEs – that will take over employees of unprofitable enterprises);
- Encouraging the faster development of entrepreneurship (through the promotion and support to establishment of new enterprises, development of human resources for competitive SMEs sector, different schemes of SMEs financing, development of SMEs competitive advantages oriented to export markets and development of stimulated environment for SMEs, higher employment and balanced regional development);
- Increase and restructuring of export (through significant structural changes in export, which is currently based on primary products and products of lower levels of processing);
- Reform of the system of education in accordance to requirements of national economy (establishment of education system that corresponds to the economy needs is not possible without strong relationship between employers, institutions responsible for education, scientific institutions and labor market);
- Active and dynamic cooperation between science and industry (the most effective method of productivity growth and structural changes in industry is innovation – conducting activities that will lead to establishment and provision of active and dynamic cooperation between research organizations and universities, on the one, and industry on the other hand, what will gradually lead to the creation of favorable conditions for start and implementation of important economic projects based on the research results and innovation - investments in new products, implementation of new technologies and processes, or activities that will provide significant improvement of existing products, processes or services);
- Reform of the labor market and employment policies, in order to reduce the labor force fiscal burden (especially for lower paid work), reaffirmation of sectoral/collective bargaining, with leading role of the industrial sectoral contracts in national system of collective agreements, management of responsible and predictable politics of minimal wages, increase of participation of assets for active labor market programs in GDP, especially for subsidies determined for new employment and training;
- Polycentric development of regional industrial centers and regional business infrastructure (through specific programs and system measures which will support polycentric development of industrial centers);
- Improvement of energetic efficiency;
- Environmental protection (through support of cleaner production, and reduction of pollution and pressure on environment).

## General characteristics of total investments

Investment trends in the period 2006-2012 indicate to strong correlation between the political credibility of the country and investment risk. Foreign direct investment (FDI) can contribute to the faster modernization of equipment and production processes, having by that a impact on increase of investments' share in GDP. Factors that contribute to greater inflow of FDI are[18]: Highly educated labour force; High level of investment in scientific-research activity; Strong regional connections among companies; Easy adjustment on new technologies; State of physical infrastructure and level of telecommunication development.

The inflow of FDI in Serbia is characterized by remarkable unevenness in different country regions. Developed and more advanced areas, such as Belgrade and Vojvodina, attract much more capital in compare to poor and underdeveloped areas, such as majority of municipalities in Central Serbia. More attractive areas for foreign investments are developed territories, because of: location, or geographical position; profile of labour force; promptness and devotion of local administration; successful examples of foreign investments. Within the period 2006-2012 inflow of FDI into the Serbia was followed by downward trend (with exception in 2011 when, in compare to 2010, it was recorded growth of 108,84%), (*Table 3*).

**Table 3.** *Inflow of FDI in Republic of Serbia, period 2006-2012 (in mil. USD)*

| Year | World | Europe | Republic of Serbia | Share of the FDI inflow in Republic of Serbia | |
|---|---|---|---|---|---|
| | | | | In FDI inflow in World (%) | In FDI inflow in Europe (%) |
| 2006 | 1,463,351 | 639,814 | 4,256 | 0.29 | 0.67 |
| 2007 | 2,002,695 | 906,531 | 3,439 | 0.17 | 0.38 |
| 2008 | 1,816,398 | 571,797 | 2,955 | 0.16 | 0.52 |
| 2009 | 1,216,475 | 404,791 | 1,959 | 0.16 | 0.48 |
| 2010 | 1,408,537 | 429,230 | 1,329 | 0.09 | 0.31 |
| 2011 | 1,651,511 | 472,852 | 2,709 | 0.16 | 0.57 |
| 2012 | 1,350,926 | 275,580 | 352 | 0.03 | 0.13 |

**Source:** *World Investment Report 2012 & World Investment Report 2013*
*http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=171*
*http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=588*

Such these trends have been consequence of both *internal* and *external* factors. Among internal factors, at first place were instability and underdevelopment of institutions, as well as political differences related to dynamic of reforms and European integrations, especially since the majority of EU member states have been

[18] Republic office for development (2009): Strategija prostornog razvoja Republike Srbije do 2020. godine (Održivi prostorni razvoj privrednih delatnosti).

adopted the independence of Kosovo (at the beginning of 2008). Relative abundance of capital until the end of 2007, as well as financial crisis and withdrawal of foreign, especially portfolio investors, since 2008, were the key external factors of FDI slowdown[19]. Up today, FDI in Serbia were mainly directed to conquest of domestic market through the production, services (banks, trading houses, insurance companies, leasing companies, etc.) and acquisition of some assets (real estates, facilities) that are effectuated at national market, while Greenfield investments were extremely limited.

Data analysis related to FDI inflow in the World, Europe and Serbia (in period 2006-2012) refers to fact that the share of FDI inflow in Serbia into the FDI inflow in World and Europe was very modest. According to that, mentioned indicator was recorded the lowest level in 2012 (0.03% in worldwide FDI inflow, or 0.13% in FDI inflow in Europe), while its highest level was recorded in 2006 (0.29% into the worldwide FDI inflow, or 0.67% in FDI inflow in Europe). But, even in 2006, when was achieved record FDI inflow in Serbia (4,256 mil. USD), that amount was lower than FDI inflow in Greece (5,355 mil. USD), Hungary (6,818 mil. USD), Bulgaria (7,805 mil. USD), or Romania (11,367 mil. USD).[20]

In order to obtain the most realistic picture of previous investment activities on the territory of Vrbas municipality, in following tables and graphs were presented investments as on regional as well as on national level. Therefore, the research included a multi-year investment trend within the economy of the Vrbas municipality and characteristics of the investment process in the economy of South-backa District, region of Vojvodina and complete Serbia.

Observing the period 2006-2012, it can be concluded that the Vrbas municipality is characterized by weak and insufficient investment activity accompanied by visual annual oscillations. Total investments at the municipality level in 2012, despite the fact that it reflects a decrease compared to 2011 (for 19.82%), are more than doubled in compare to realized value in 2006. In other words, they reflect in 2012 an increase in amount of 970,847 thousands RSD (or 121.36%) compared to the total amount of realized investments in 2006 (*Table 4*).

[19] Stepanović, B. (Editor in Chief), (2012): STRANE direktne investicije u Srbiji 2001-2011 = Foreign direct investments in Serbia 2001-201, Business info group, 2012 (Belgrade: Politika).
[20] World Investment Report 2012, available at: http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=171

**Table 4.** *Spatial distribution of totally achieved investments* (in 000 RSD)*

| Year | Unit of measure | Republic of Serbia** | Vojvodina Region | South-backa District | Vrbas municipality |
|---|---|---|---|---|---|
| 2006 | RSD | 340,795,050 | 94,317,316 | 36,361,563 | 799,999 |
| | % | 100.00 | 27.68 | 10.67 | 0.23 |
| 2007 | RSD | 482,340,888 | 115,475,861 | 38,065,109 | 1,542,695 |
| | % | 100.00 | 23.94 | 7.89 | 0.32 |
| 2008 | RSD | 566,836,857 | 135,206,492 | 52,622,804 | 1,852,824 |
| | % | 100.00 | 23.85 | 9.28 | 0.33 |
| 2009 | RSD | 455,485,248 | 103,034,938 | 42,558,027 | 1,032,556 |
| | % | 100.00 | 22.62 | 9.34 | 0.23 |
| 2010 | RSD | 425,400,001 | 100,024,608 | 52,339,704 | 1,326,219 |
| | % | 100.00 | 23.51 | 12.30 | 0.31 |
| 2011 | RSD | 493,100,031 | 124,208,129 | 53,419,549 | 2,208,483 |
| | % | 100.00 | 25.19 | 10.83 | 0.45 |
| 2012 | RSD | 608,508,303 | 150,382,309 | 59,862,549 | 1,770,846 |
| | % | 100.00 | 24.71 | 9.84 | 0.29 |

* Investments in fixed assets (data are referred to all legal units, except those one which according to the paragraph 7. of the Law of accounting and audit are marked as small), in current prices.
** Data for KiM are not included (in period 2006-2007).
**Source:** *SORS (2007-2013): Opštine (opštine i regioni) u Republici Srbiji 2006-2012.*

Total investments in Vrbas municipality in 2012 takes 2.96% of total achieved investments in South-backa District, or 1.18% of total investments achieved in the Vojvodina Region, or 0.29% in compare to Republic level.

The highest amount of investments in Vrbas municipality was achieved in 2011 (2,208,483 thousand of RSD), when its share in investments at the Republic level was 0.45%. On the other hand, the lowest amount of investments in the Vrbas municipality was achieved in 2006 (799,999 thousands of RSD), when its share in investments at the Republic level was 0.23%.

After calculation of average annual growth rates (for the period 2006-2012), it was turned out that the rate achieved on the Republic level (10.14%) is lower than the rate achieved at the municipality level (14.16%). So, it can be concluded that the higher investments caused higher economy growth of municipality in compare to the economic development of the complete Serbia. This fact points to lower unemployment, as well as to higher number of newly opened jobs within the municipal economy in relation to the Republican level.

## Evaluation of achieved investments in agriculture

For evaluation of achieved investments in agriculture of Vrbas municipality, next indicators will be used: Achieved investments in agriculture per rural/agricultural

inhabitant; Achieved investments in agriculture per active agriculturalist; Achieved investments in agriculture per registered agricultural husbandry; Achieved investments in agriculture per unit of used agricultural land; Achieved investments in agriculture per unit of arable land surfaces; Achieved investments in agriculture per head of cattle. For more realistic evaluation of achieved investments in agriculture on the territory of Vrbas municipality, in following table are presented indicators that refer as on regional, as well as on national level (*Table 5*).[21]

**Table 5.** *Evaluation of achieved investments in agriculture*

| Indicator | UM | Territory | | | |
|---|---|---|---|---|---|
| | | Republic of Serbia | Vojvodina region | South-bačka district | Vrbas municipality |
| Achieved investments in agriculture per rural inhabitant* | RSD | 11.28 | 31.07 | 59.12 | 68.27 |
| Achieved investments in agriculture per active agriculturalist* | RSD | 17.42 | 53.25 | 103.25 | 132.37 |
| Achieved investments in agriculture per registered agricultural husbandry**[1] | RSD | 26.87 | 80.55 | 79.17 | 176.35 |
| Achieved investments in agriculture per unit of used agricultural land**[1] | RSD | 4.94 | 7.39 | 8.80 | 20.02 |
| Achieved investments in agriculture per unit of arable land surfaces** | RSD | 6.75 | 8.11 | 9.21 | 20.46 |
| Achieved investments in agriculture per head of cattle**[2] | RSD | 2.80 | 6.18 | 5.83 | 7.19 |

Note: in category of head of cattle, cumulatively are written next heads: cattle, sheep and pigs. *Census 2002; **Census 2012.

**Source:** *SORS (2013): Popis poljoprivrede 2012, Knjiga I; SORS (2013): Popis poljoprivrede 2012, Knjiga II; SORS (2011-2013): Opštine (opštine i regioni) u Republici Srbiji 2010-2012.*

According to analysis of obtained results, it can be concluded that on the territory of Republic of Serbia, Vojvodina province, South-bačka District and Vrbas municipality, in compare to all observed indicators, the highest value is gained at achieved investments in agriculture per registered agricultural husbandry (or, at achieved investments in agriculture per active agriculturalists, for South-bačka District), while the lowest value is gained at achieved investments in agriculture per head of cattle, in next portion: Republic of Serbia (9.60:1,00); Vojvodina Region (13.03:1.00); South-bačka District (17.71:1.00); Vrbas municipality (24.53:1.00).

[21] It should be aware that all data about mentioned indicators were not available for the same year, so it could be concluded that their comparison does not have sense. However, comparison is performed based on the assumption that the differences are not large, so that similar results will be also obtained in the case that all data for 2012 are available.

## Conclusion

Summarizing the macroeconomic trends from the last decade, it can be concluded that the economic growth and development were taking place in the parallel attempt to achieve growth of citizens and public consumption, and on other side through the market reforms, privatization and inflow of FDI to establish institutional and material assumptions for sustainable development. However, if achieved results, for the period 2006-2012 are observed, derives conclusion that they were, at the best, partial. Achieved average annual GDP growth rate of 1.8% looks like at first sight acceptable, but it is still insufficient to compensate large development gap from 90's. On the other hand, the great problem is also reflected through the unfavorable structure of creation and use of a slightly growing GDP, what leads to increase of foreign economy imbalance due to the growing foreign trade and current account deficit. In observed period, the major component of economic growth was services. Although the total value of investments in Vrbas municipality in 2012, in compare to 2010, reflects growth, their participation in the total sum of investment on Republic level has been decreased. Reduction of share is caused primarily by weak growth of investments in Vrbas municipality in relation to increase of investment activity in Serbia.

Indicators of achieved investments in agriculture assessment, point to the fact that municipality is on significantly higher level in compare to republic, Vojvodina region and South-backa district level in all observed indicators (with special accent on realized investments in agriculture per unit of used agricultural land). So, it can be said that from the aspect of sustainable development, agriculture of the Vrbas municipality has greater contribution than the same indicator on the levels of Serbia, Vojvodina region, or South-backa district. Within the basic scenario of the future development, in the period up to 2020, the domination of consumption growth will be replaced by the dominance of investment growth (what will assume that after the candidate status, Serbia will become a full EU member, what will, at the end, brought to easier use of all economic benefits that come from this political engagement).

## References

1. Bošnjak, M. (2011): *Globalna finansijska i ekonomska kriza 2007-2010 i njen uticaj na privredu i finansije Srbije,* Ministarstvo finansija Republike Srbije, Beograd, str. 4.

2. Cvijanović, D., Hamović, V., Popović, V., Subić, J., Katić, B., Paraušić, V. (2007): *Mulifunkcionalna poljoprivreda i ruralni razvoj u AP Vojvodini,* monograph, IAE Belgrade, Belgrade, Serbia.

3. Government of the Republic of Serbia (2013): *Informacija o paketu mera za stabilizaciju javnih finansija i oporavak privrede,* Ministry of Finance, Belgrade, Serbia, available at: www.srbija.gov.rs/vesti/vest.php?id=198865 http://webrzs.stat.gov.rs/WebSite/Public/PageView.aspx?pKey=61

4. Ministry of Finance (2014): *Osnovni indikatori makroekonomskih kretanja,* MF, Belgrade, Serbia, available at: www.mfin.gov.rs/pages/article.php?id=7161

5. National Bank of Serbia (2014): *Osnovni makroekonomski indikatori*, NBS, Belgrade, Serbia, available at: www.nbs.rs/internet/cirilica/80/index.html

6. Republic office for development (2009): *Strategija prostornog razvoja Republike Srbije do 2020. godine* (Održivi prostorni razvoj privrednih delatnosti).

7. Statistical Office of the Republic of Serbia (2011-2013): *Opštine (opštine i regioni) u Republici Srbiji 2010-2012*, SORS, Belgrade.

8. Statistical Office of the Republic of Serbia (2013): *Popis poljoprivrede 2012, Knjiga I*, SORS, Belgrade.

9. Statistical Office of the Republic of Serbia (2013): *Popis poljoprivrede 2012, Knjiga II*, SORS, Belgrade.

10. Statistical Office of the Republic of Serbia (2013): *Regionalni bruto domaći proizvod 2010-2011*, SORS, Belgrade, available at: http://webrzs.stat.gov.rs/WebSite/Public/PageView.aspx?pKey=62.

11. Statistical Office of the Republic of Serbia (2014): *Bruto domaći proizvod (BDP) u Republici Srbiji 1997-2012,* SORS, Belgrade, available at: http://webrzs.stat.gov.rs/WebSite/Public/PageView.aspx?pKey=61

12. Statistical Office of the Republic of Serbia (2014): *Regionalni bruto domaći proizvod 2011-2012*, SORS, Belgrade, available at: http://webrzs.stat.gov.rs/WebSite/Public/PageView.aspx?pKey=62

13. Stepanović, B. (glavni i odgovorni urednik), (2012): *STRANE direktne investicije u Srbiji 2001-2011 = Foreign direct investments in Serbia 2001-201*, Business info group, 2012 (Beograd: Politika).

14. Subić, J. (2012): *Strateško planiranje održivog poljoprivrednog i ruralnog razvoja lokalnih zajednica – model MZ Glogonj*, in Cvijanović, D., Subić, J. (Edt.): *Investicije u poljoprivredu i ruralni razvoj* (pp. 46-61), monograph, IAE, Belgrade, Serbia.

15. Subić, J., Brankov, T., Njegovan, N. (2013): *Stanovništvo i privredna struktura,* Chapter in the monograph: Stanje i mogućnosti razvoja održive poljoprivrede i ruralnog razvoja u Podunavlju, IAE Belgrade, Serbia, pp. 90-120.

16. Team of authors (2010): *Postkrizni model ekonomskog rasta i razvoja Srbije 2011-2020*, USAID, FREN, MAT Belgrade, Serbia, available at: www.kss.org.rs/doc/1102_makroekonomska_proj__razv_Srbije_2011-2020.pdf

17. Team of authors (2013): *Program razvoja AP Vojvodine 2014-2020*, Draft, Vlada AP Vojvodine, Novi Sad, available at: www.region.vojvodina.gov.rs/upload/Program_razvoja_AP_Vojvodine_2014_2020_3891.pdf

18. World Investment Report 2012, available at: http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=171

19. World Investment Report 2013, available at: http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=588

20. http://ec.europa.eu/europe2020/documents/related-document-type/index_en.htm

21. www.siepa.gov.rs

# CORN PRODUCTION IN FUNCTION OF INTEGRAL LOCAL DEVELOPMENT[1]

*Marijana Jovanović, Lana Nastić*[2]

## Abstract

*Corn production represents significant component of economic stability of region in which is cultivated, considering the numerous possibilities for exploiting. In paper will be given an overview of corn production on administrative territory of the Upper Danube region, which for the purposes of this research includes the territories of the following municipalities: Sombor, Apatin, Bač and Bačka Palanka. Based on these results, we can conclude that the observed region has a natural predisposition for improvement of this type of production. By investing in the corn production would be enhancing the strength as well state properties, but also individual farms; which would lead to the preservation of local resources and local development, reduction of import and strengthening corn prices in the market.*

**Key words:** *corn production, Upper Danube region, local development*

## Introduction

Corn (*Zea mays* L.), besides wheat and rice occupies the most important place in world production of field crops. Economic importance arises from its versatile use in nutrition of humans, livestock and industrial processing, as well from the volume of production. It has a high yield potential and ranks among a group of plants with the highest production of organic matter per unit area, because it is possible to use almost all aboveground organs of plants. So today from corn plant, with numerous technological procedures, produces more than 1.500 different industrial products (*Glamočlija, 2004.)*

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Based on data of world database[3], corn production is increasing from year to year, so that the production of commercial maize performed on 166 million hectares with a yield of 860 million tonnes (2012.), from which 2 of 3 tonnes goes to the production of fodder corn and 120 million tons of corn intended for the production of bioethanol. Maize production globally in 2013. achieved significant increase from the 2011th and 2012., when was recorded 965 million tonnes corn.[4] In five countries are almost half the world's area under maize: USA, China, EU-27, Brazil and Mexico. USA leads the world in the international exchange of commercial maize (export largest in MT), and Japan on the other side of the country with the largest importation of this grain.

In Europe, the production of corn (season 2012/2013) performed on an area of 15,5 million hectares, which is about 4% more than the 14,9 million hectares sown in 2011/2012th years.[5] The countries who are largest producers: France with 13,6 MT; 11,9 MT Ukraine; Romania 9;7 MT.

Corn represents a plant which in production of animal feed can be used in several ways: as a concentrated feed (in grain) or in the form forage. Grain can be used as a concentrated animal feed or as a component of feed mixtures. Utilization of the whole plant can also be performed in several ways. It can be used for pasture, then a fresh green fodder, like as silage, dry plant mass and as cornstalks. For making silage corn is very convenient, because besides grain and other edible parts of plants are suitable for making silage and fodder have value (*Vučković, 1999*.).

In the world production fodder corn performed at 12.5 million hectares and represents most economical forage crop for producers. The largest area under corn cattle are found in the EU-27, with more than 40% of the world's surface. As the largest producers stand out: 5.6 Mha - EU; 2.25 Mha - USA; 1.3 Mha - Russia; etc.. In Europe, the largest producers are located in the territory of Eropske Union (7.5 million ha), of which 2/3 area located in France and Germany. According to data from 2011. Serbia is producing 0.5 Mha of field corn.

Republic of Serbia has natural potentials for orientation in maize production in rural areas. However, we see substantial oscillation yields of corn per year,

[3]CIC, STRATÉGIE GRAINS, FNPSMS, CEPM, USDA, BRAZILSKO MINISTARSTVO, AGRESTE, EVROSTAT, ONU TRADE

[4]http://www.fao.org/news/story/en/item/175772/icode/

[5]http://usda01.library.cornell.edu/usda/fas/worldag-production//2010s/2013/worldag-production-04-10-2013.pdf

which is caused by low investment in production, especially in dry farming conditions, and the plants are sensitive to changes in meteorological conditions during the growing season.

Due to the availability of a large number of hybrids for different purposes and extremely large yield potential, in the next period would be the main goal should be intensification of agricultural technology. In this way it would be possible to achieve sufficient yield of grain and vegetative biomass for the growing needs of the food industry, livestock production and exports.

Another model of production improvement would be reflected in changes in our ways of using corn and its use as a forage plant, especially growing in mixtures with legumes. This could cause a development from manufacturing in the hilly and mountainous regions, where it is possible to successfully plant hybrids a short period of time and use them for the production of silage (*Bekrić, V.; 1980*).

## The needs of corn according environmental conditions

Corn, in the first place thanks to expressed polymorphism, can be grown over a wide geographical range and variety of climatic and soil conditions. According to *Kovačevića (1995)*, „intensive maize production is characterized by a large number of the operations that have an immediate impact on soil characteristics, weed infestation and yield with high load of costs of production. In order of costs reducing its must be rationalized cultural practices, especially tillage, which is the largest consumer of energy".

Corn plants are susceptible to frost and lack of moisture in the soil. The minimum temperature required in the initial stage of growth and development is 8-10°C, while the optimum temperature, which requires corn during the growing season is between 22-25 °C. In the initial stages of development (germination and phase from the first to third leaf) plants tolerate short frosts, and to -3 °C. As a thermophile plant tolerates high temperatures (above 35 °C), but not in the stages of flowering, pollination and fruit set.

With regard water needs, the needs are uneven and largely depend on the phenological phases. Demand for water increases with plants, so the crop is necessary to provide about 300 to 550 mm of water during the growing season, in order to achieve a stable yield. The greatest need for water residue was recorded and stages of growth trees, tasseling silking, fruit set.

It has expressed needs according light to provide intensive photosynthetic activity. Although the short-day plant, it can be grown in areas that are characterized by long days and over 20 hours, as the result of the breeder.

For growing corn are the best soil slightly acidic to slightly alkaline (pH 6.5-7), loose, permeable and well aerated soils with high capacity for water. These types of land belonging to the middle and lake clays, such as chernozem, meadow black soil, clay soil more fertile cultivating soils and smonitza of the favorable physical characteristics.

Majority of the land in Serbia is more or less dense due to inadequate treatment and the heavy mechanical composition. Such lands is characterized by unfavorable water-air regime, which may result in reduced microbial activity, and in them can overcome anaerobic chemical processes that lead to an increase in acidity. Therefore, on such land necessary to introduce additional investments in land reclamation repairs.

Corn positively responds to growing the crop rotation, the best preceding for him is: grain legumes, cereals, grass-legume mixtures, potatoes, red clover. Such cultivation is achieved effectively combat weeds; pests and plant diseases; better utilization of plant assimilative from land; rational use of agricultural machinery and reducing production costs. This provides a significant provision of raw materials for the food industry and food for domestic animals.

With the proper performance of the farming operations, a force for stability in corn production is the proper selection of varieties and hybrids. Corn production in dry farming conditions become unsafe due to all the unfavorable distribution of rainfall during the growing season, especially during periods of critical water. (*Glamočlija, 2004.)*

Diversified use of corn in different industries is a task that needs to be addressed properly, with respect to the ability to adapt to our climate and land conditions, drought resistance, solid stem, earliness and uniformity of maturation, as well as the suitability for mechanical harvesting and grain quality.

Depending on the type (purpose) of application (hybrids that are grown for grain for direct use in human or group of hybrids that develop large biomass grown for preparing roughage) and earliness (maturity group), it is possible to improve maize production the existing environmental conditions.

## Natural potential of Upper Danube region

Municipality of Sombor, Apatin, Bač and Bačka Palanka is the administrative areas that belong to the territory of AP Vojvodina, which for the purposes of the present study will include the Upper Danube region. They are located on the right bank of the Danube River and represent a specific site, where agricultural production and widespread as possible in terms of natural conditions, and in terms of economic viability.

Area of the Upper Danube region in Serbia is characterized by favourable relief, straight and slightly wavy, which influences the development of micro- and nano- landforms that affect the changes in vegetation composition and distribution of plant vegetation. In terms of climatic parameters on the Upper Danube basin average long-term value of the minimum air temperatures ranging from -13,0 °C (January) to 10,3 °C (July). The values of the maximum temperatures are in the range of from 0,0 ° C (December) to 21,9 ° C (July). The average amount of rainfall is 613,0 mm for the whole year, while the vegetation period (April-October) was 360,6 mm.

On the Upper Danube region represented a wide variety of soil types and subtypes: chernozem, black soil, meadow black soils, saline (solonchak and solonetz), alluvial soil and black soil. The land could be used for agricultural production. Dominantly represented intensive conventional agricultural production of basic agricultural products for mass consumption, processing and exporting. The production structure of primary agricultural products the most common is the production of wheat, oilseeds and sugar beet; as the availability of advisory services, existence of processing facilities and proximity to developed markets and encourage the development of organic agriculture, primarily vegetables and herbs, aromatic plants (*Popović i sar., 2013.)*.

A special feature of region Upper Danube is the presence of the Danube River, which is the main watercourse. Danube is the second longest river in Europe, with a catchment area 817,000 $km^2$. An important natural resource, but also the backbone of the development of the municipalities of the Upper Danube region, which gravitate toward her. Together with its tributaries makes hydrographical system is important for the development of a waterway for tourism, hunting and fishing. It is important from the aspect of agricultural activity, because in this way may require the creation of specific economic niche where there is a layered development of micro-activities in the production and linking producers, processors and consumers in the interest

groups. Area of the Upper Danube basin represents a special nature reserve; that in his area of 19,500 ha includes unique plant and animal ecosystems, which play an important role in preserving the biodiversity of the observed region. Therefore, this is an interesting area and to introduce methods of agricultural production that would ensure sustainable use of natural resources - organic farming.

In order to strengthen local communities of the observed region, agricultural production has an important place as a factor of stability and competitiveness. It is therefore an important factor given corn production, and in that respect and the importance of recognizing the resource potential of this crop, which can be exploited in various ways. By investing in the production of corn, the selection of new production technologies and the use of varieties and hybrids, can be provided integrally observed strengthening of municipalities of the Upper Danube region.

## Methods and materials

For the purpose of this research is defined administrative area that includes the municipalities of Sombor, Apatin, Bač and Bačka Palanka. In the following text, the entire project area will be called the Upper Danube region. Based on the data of the National Bureau of Statistics will be carried out to analyse the current state of corn production in the territory of the Upper Danube region, AP Vojvodina and Republic of Serbia; based on the parameters of the total agricultural area; structures using arable land and gardens. The survey was conducted for the period from 2003 to 2012. year. For a better overview explanation will be displayed and maize production in the surveyed municipalities. The research will be presented and Costing of mercantile corn on the basis of variable costs.

## Results and discussion

The basis for the improvement of plant production is situated in the existence of farmland on which is possible flow of current production and future expansion needs for the production of crops. In Serbia, maize production occurs in 1 to 1.2 million hectares each year, of which 2/3 of the production is located in the plain area of the country.

Area of the Upper Danube region is characterized by a favourable geo-strategic location, natural resources, richness in flora and fauna, as well as good infrastructure connections of all municipalities and distribution

capabilities of primary agricultural products and products in developed markets in Serbia. In terms of regionalization, Upper Danube is located in Vojvodina (Bačka region), with the southern and western parts are the most favourable area for corn production (due to above average natural conditions, together with the eastern and southern Srem and Podrinje-Kolubara region, in the area of the three produces about half of the total corn production).

Summary of total agricultural land in the Upper Danube region, as well as an overview of the AP Vojvodina and Serbia, is the basis of further analysis corn production (*Table 1*).

**Table 1.** *Total agricultural areas in period 2002-2011. year (in ha)*

| | **Republic of Serbia** | **AP Vojvodina** | **Upper Danube region** |
|---|---|---|---|
| 2002 | 5.106.900 | 1.783.175 | 198.974 |
| 2003 | 5.115.072 | 1.793.572 | 200.698 |
| 2004 | 5.113.307 | 1.792.159 | 199.876 |
| 2005 | 5.112.323 | 1.790.565 | 199.836 |
| 2006 | 5.105.008 | 1.780.950 | 198.798 |
| 2007 | 5.052.957 | 1.747.441 | 194.136 |
| 2008 | 5.093.192 | 1.781.253 | 199.606 |
| 2009 | 5.096.646 | 1.780.756 | 198.392 |
| 2010 | 5.091.507 | 1.784.352 | 201.271 |
| 2011 | 5.096.267 | 1.780.588 | 200.949 |

**Source:** *Municipalities in Serbia 2003-2010; Municipalities and regions in Republic of Serbia 2011-2012, NBS, Serbia*

In the ten-year period covered by the study, it can be concluded that there is a strong track surface on which to carry out agricultural activities. On the level of **Republic of Serbia**, most agricultural land was recorded in the 2003$^{rd}$ year, after which he ended the 2007$^{th}$ there was a decrease in areas that are used for agricultural purposes. The 2008$^{th}$ and 2009$^{th}$, coming to increased investment and expansion of agricultural land, then a slight decline in 2010., but a slight increase in 2011 year.

Following the same trend and the share of agricultural land in **AP Vojvodina**, it's a noticeable decrease in agricultural land after the 2003$^{rd}$, which lasts until 2007$^{th}$. In the 2008$^{th}$ is noticeable increasing of the area for agricultural purposes; a trend increase in the area lasted until 2010$^{th}$; while in the final year of study (2011.), noticeably re-reduction of agricultural land.

On the territory of the **Upper Danube region** are favourable characteristics for agricultural activities in terms of agricultural land. The share of agricultural land follows the same trend, as is the case in Serbia and AP Vojvodina. Is noticeable that in the course of 2010th; mostly surfaces separated it for agricultural production during the whole of the period when it recorded the highest proportion in relation to the agricultural areas of the Republic of Serbia (0,003%), as compared to the AP Vojvodina (11,29%) . Further, in the observed period of ten years was awarded alternating trend of increase and decrease of agricultural land.

The total agricultural land use in the territory of the Republic of Serbia is 3.355.859 ha. According to the "*Statistical Yearbook of the Republic of Serbia in 2012*," the total agricultural area in 2011th, arable land accounted with 64,6%, with 4,7% of orchards, 1,1% of vineyards, 12,2% accounted meadows and pastures with 16,6%. The structure of sown areas of arable land, grain accounted for 58,0%, industrial crops with 13,0%, vegetables with 8,3% roughage with 13,8%.

On territory of AP Vojvodina, the structure of utilized agricultural lands consists of arable land and gardens with 90,33%; orchards with 1,03%, vineyards with 0,57%; meadows with 2,35% and pastures with 5,72%.[6]

According to the *Statistical Yearbook of the Republic of Serbia 2013th* total rural agricultural land use in the Republic of Serbia in 2012. Was distributed in the following categories: Arable land (64,97%), fruit (4,71%), vineyards (1, 69%); meadows (12,09%) and pastures (16,54%).

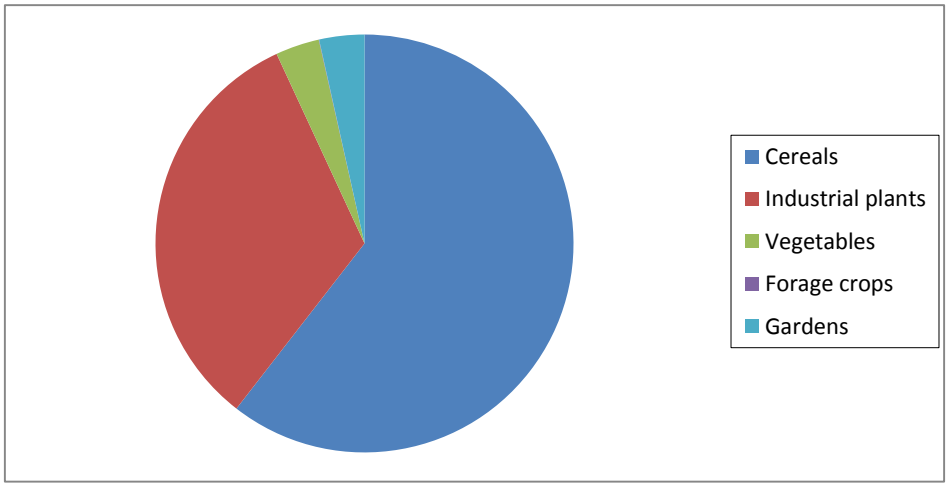
At the level of AP Vojvodina, in the course of 2012. we recorded the following structure of utilized agricultural land: arable land (90,33%), fruit (1,03%), vineyards (0,51%); meadows (2,41%) and pastures (5,72%).[7]
The structure of agricultural land in the municipalities of the Upper Danube region is dominated the production of grain and industrial crops, while orchards, vineyards; as well as meadows and pastures are in a small percentage.

When we talk about the structure of the use of arable land and gardens (data for 2011.), in municipalities the Upper Danube region (Sombor, Apatin, Bač i Bačka Palanka) is dominated production of wheat (60,50%) and industrial

[6] http://pod2.stat.gov.rs/ObjavljenePublikacije/G2012/pdf/G20122007.pdf
[7] http://pod2.stat.gov.rs/ObjavljenePublikacije/G2013/pdf/G20132010Knjiga.pdf

products (32,59%); while vegetable production is performed at 3,39% arable land and gardens. The smallest proportion of occupied forage crops with 0,03%. Production that is performed on individual plots (Garden) occupies an area of 3,49%. (*Graph 1*).

**Graph 1.** *Structure of used arable land and gardens in Upper Danube region in 2011 year (%)*




**Source:** *Municipalities and region in Republic of Serbia, 2012. NBS*

At the Republic level, corn production is observed in the ten-year period, characterized by cyclic but stable yield. In 2007. and 2012., is recorded the lowest yields as a result of bad weather conditions during the years, which had resulted in reduced yields (*Table 2*).

Vojvodina, as a province of Serbia, has an exceptionally favourable natural conditions for the production of corn and the products are over 50% of the total maize production in the Republic of Serbia (*Table 2*). Production in the period is characterized by the trend of output growth from 2003 to 2005. year; followed by a decline that lasts until the 2008th year as a result of the global crisis, and therefore less investment in agricultural production. Since 2009. until 2011., corn production in Vojvodina was to grow while in 2012. is recorded the highest variation in corn production in comparison to 2011., production fell by half (51,84%) .
The area of the Upper Danube region, which geographically belongs to the region of Bačka, together with the eastern and southern Srem and Podrinjsko-Kolubara region, is the area which produces about half of the total maize production. Favourable temperature conditions in the growing season allows

the cultivation of hybrid maturity groups as a basic or stubble crop. Schedule and the total amount of rainfall enable breeding a large number of plants per hectare and cost-effective use of large amounts of mineral fertilizers, as corn production more economical than in other parts of Serbia.[8]

The municipalities in observed area is characterized by relatively stable corn production in the period, with most production is realized in the municipality of Sombor; where production is almost twice bigger than in other municipalities in observed region.

**Table 2.** *Production of corn in municipalities of Upper Danube region (in tones)*

| Year | Republic of Serbia | AP Vojvodina | Municipality | | | |
|---|---|---|---|---|---|---|
| | | | Apatin | Sombor | Bač | Bačka Palanka |
| 2003 | 3817338 | 2123968 | 26762 | 136929 | 36768 | 83429 |
| 2004 | 6569414 | 3726497 | 42419 | 252508 | 43012 | 118843 |
| 2005 | 7085366 | 4248695 | 56342 | 299704 | 43227 | 127868 |
| 2006 | 6016765 | 3665852 | 39184 | 260717 | 38166 | 112885 |
| 2007 | 3904825 | 2677223 | 33048 | 152130 | 31170 | 86839 |
| 2008 | 6158122 | 3959261 | 54466 | 283288 | 35277 | 116780 |
| 2009 | 6396262 | 4000283 | 52116 | 255012 | 26327 | 101948 |
| 2010 | 7207191 | 4688616 | 12376 | 56840 | 35042 | 136763 |
| 2011 | 6479564 | 4404542 | 59630 | 314259 | 36404 | 128813 |
| 2012 | 3532602 | 2283398 | 29734 | 156931 | 22955 | 67446 |

**Source:** *Municipalities in Serbia 2004-2013; NBS, Serbia*

In a large extent, corn is grown in monoculture, and greater number of years in the same areas, particularly on family farms, which significantly affects the yield and this is definitely one of the reasons why the amount of corn produced varies from year to year. However, one of the major reasons for the unbalanced production of the occurrence of drought, or unfavourable climatic conditions during the analyzed period of ten years, which are due to lack of irrigation particularly pronounced. The coverage of the territory of the Republic of Serbia with irrigation systems is extremely poor, and given the area that is irrigated, and is under the grain and corn silage situation is also very unfavourable (*Table 3*).

[8]Milisav Stojaković, Mile Ivanović, Đorđe Jocković, Goran Bekavac, Božana Purar, Aleksandra Nastasić, Dušan Stanisavljević, Bojan Mitrović, Sanja Treskić, Rajko Laišić (): Izbor hibrida kukuruza na osnovu multilokacijskih ogleda, Ratarstvo i povrtarstvo, 103-112, ISBN 978-86-80417-28-8, 45. Savetovanje agronoma srbije, Zlatibor, 30.01-05.02.2011.

**Table 3.** *Irrigated area of cereal and corn for sillage*

| Area | Cereals and corn for fodder | |
|---|---|---|
| | ha | share of irrigated area in total area under crops, % |
| Republic of Serbia | 36.154 | 2,1 |
| AP Vojvodina | 22.062 | 2,2 |
| Apatin | 927 | 7,2 |
| Sombor | 515 | 0,9 |
| Bač | 42 | 0,5 |
| Bačka Palanka | 717 | 3,1 |

**Source:** *Census of Agriculture 2012, Agriculture in the Republic of Serbia, Statistical Office of the Republic of Serbia, Belgrade 2013*

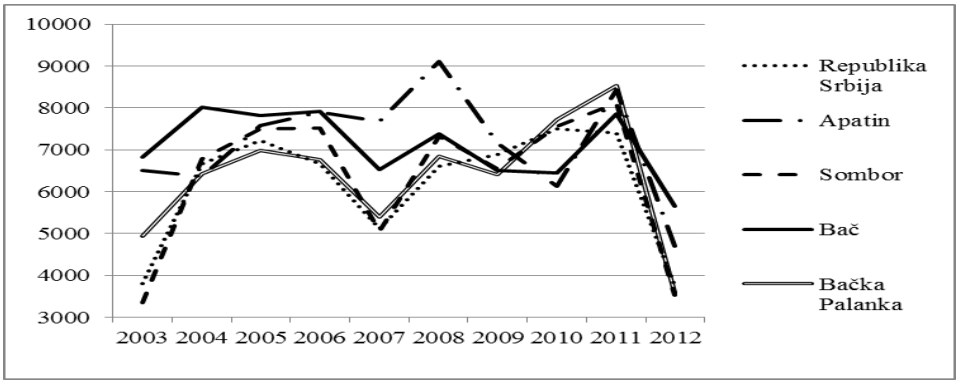
The largest share of irrigated land in total area under cereals and corn silage is (from the analyzed area) in the municipality of Apatin (7,2%), while in the area of Bač least a share of irrigated area (only 0,5%). It is notable that the share of surface grains and corn are irrigated in the municipality of Apatin increasing almost 3,5 times the area irrigated in Serbia.

Extremely dry year in analyzed ten-year period were in 2003 and 2007. Properly in the past three years, as a result of drought, achieved extremely low corn production in all areas, and accordingly are average yields for commercial companies and cooperatives, as well as family farms were significantly reduced (*Graphs 2 and 3*).

Fragmentation of land properties can certainly be a problem in improving the production not only of corn, but other crops. Associating by small farmers and fragmentation of land holdings in one unit will make it easier applying for grants, as well as more stable and higher price to purchase the product.

The average yield of maize in business companies and cooperatives in the municipalities of the Upper Danube region is analyzed in most years above the average for the Republic of Serbia, and is by far the highest yield was achieved in the area of Apatin in the 2008$^{th}$ year. Yields of corn in business companies and cooperatives are at a much higher level compared to the yields of family farms.

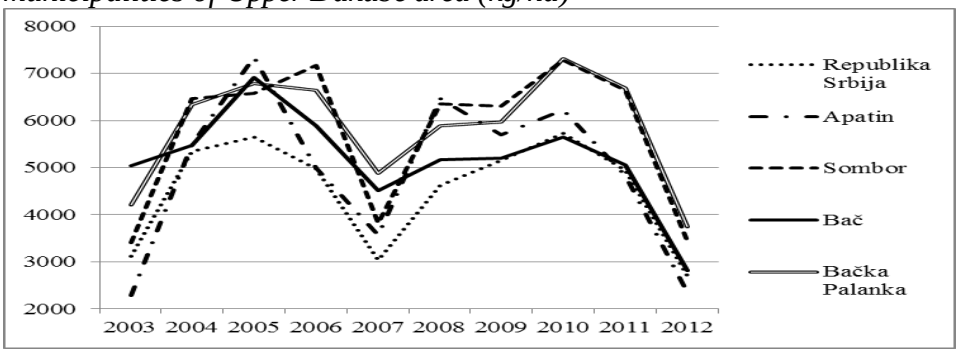
**Graph 2.** *Average yield of corn in business companies and cooperatives on Upper Danube area (kg/ha)*




**Source:** *Municipalities in Serbia 2004-2013; NBS, Serbia*

On family farms highest average yield per hectare in most of the analyzed was achieved in Sombor and Bačka Palanka and are far above the average for the Republic and Vojvodina.

**Graph 3.** *Average yield of corn on* family farms *in* Republic of Serbia *and municipalities of Upper Danube area (kg/ha)*




**Source:** *Municipalities in Serbia 2004-2013; NBS, Serbia*

Corn during 2012. was the most important agricultural export product and by the data of the Serbian Chamber of Commerce export value of yellow maize in the period January - December 2012. Amounted to 541 mil. USD.[9]

The value of exported maize during the period 2006-2011 year is increasing, with the exception of 2007, when the reduced amount of corn exported due to falling yields due to drought (*Table 4*).

[9] http://www.pks.rs/PrivredaSrbije.aspx?id=13&p=2&

The value of imports of maize is negligible compared to the value of exports and is in the range of 1,20% to 5,12% of the value of exports of corn during the analysis period 2006-2011 year.

**Table 4.** *Quantity and value of export and import of corn in Serbia*

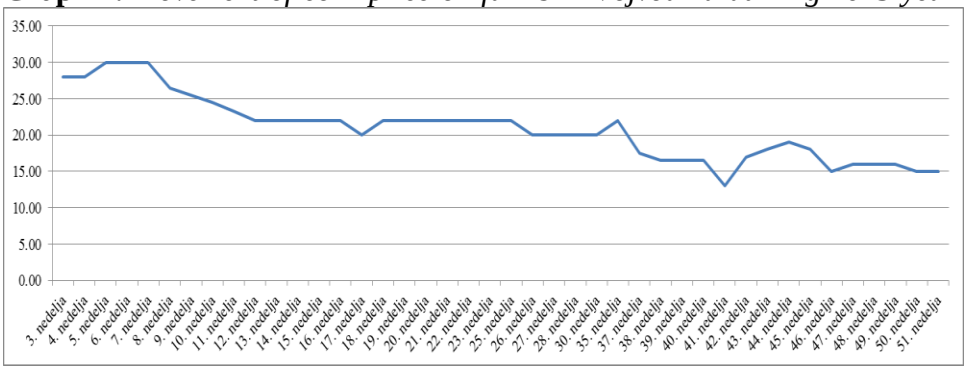
| Year | Uvoz | | Izvoz | |
|---|---|---|---|---|
| | Quantity (tones) | Value (1000 $) | Quantity (tones) | Value (1000 $) |
| 2006 | 1545 | 3,064.00 | 1350512 | 179,712.00 |
| 2007 | 951 | 2,934.00 | 415740 | 85,099.00 |
| 2008 | 2233 | 6,629.00 | 551059 | 129,577.00 |
| 2009 | 2841 | 7,991.00 | 1602073 | 288,129.00 |
| 2010 | 1670 | 4,005.00 | 1662151 | 334,923.00 |
| 2011 | 3509 | 11,326.00 | 1630891 | 455,504.00 |

**Source:** *http://faostat.fao.org/site/535/DesktopDefault.aspx?PageID=535#ancor*

Movement of the price of corn on farms in Vojvodina during the 2013. according to the data of STIPS-a is shown in Figure 4 As you can see, during the year marked a negative trend, and the price of corn has a tendency to fall.

But the price of corn during the 2013. Allegations are farmers from family farms were lower than the above, during the year appeared the problem with increased alfatoksin above the statutory amounts in corn, and therefore in the milk.

**Graph 4.** *Movement of corn price on farms in Vojvodina durring 2013 year*




**Source:** *http://www.stips.minpolj.gov.rs/stips/nacionalni*

Calculation of mercantile maize production is made based on of variable costs, based on information from family farms where corn is produced on large areas and to achieve higher yields per hectare than the average.

**Table 5.** *Calculation of mercantile maize production based on variable costs for 2013. year*

| | RSD / ha | € /ha |
|---|---|---|
| INCOME | | |
| Corn in grain<br>*(7.500,00 kg per ha X 14 RSD per kg)* | 105.000,00 | 914.95 |
| Total | 105.000,00 | 914.95 |
| VARIABLE COSTS | | |
| Corn seeds<br>*(2,4 SJ per ha X 3.500,00 RSD per SJ)* | 8.400,00 | 73.20 |
| Mineral fertilizer *NPK 8:16:24*<br>*(200 kg per ha X 55 RSD per kg)* | 11.000,00 | 95.85 |
| Mineral fertilizer UREA<br>*(250 kg per ha X 47 RSD per kg)* | 11.750,00 | 102.39 |
| Protection agents | 4.900,00 | 42.70 |
| Fuel, lubricants and maintenance machinery | 15.093,00 | 131.52 |
| Services (with harvesting) | 10.500,00 | 91.50 |
| Other variable costs | 2.727,00 | 23.76 |
| Total | 64.370,00 | 560.91 |
| COVER MARGINS (GROSS MARGIN) | 40.630,00 | 354.04 |

**Source:** Author's calculation.

Based on data from the analytical calculation shows that after covering the variable costs in the production of corn still remains 40,630.00 dinars per hectare which should cover the fixed costs of production and achieve positive financial results.

The structure of the variable costs have the largest share costs for mineral fertilizers (NPK and urea), and then the cost of fuel, oil and maintenance of machinery. Also, an important point is the service side, or a combine harvesting corn.

## Conclusion

Based on the observed indicators, the territory of the Upper Danube region and municipalities that make this area one can conclude that the agricultural production of corn economically feasible for several reasons:

- On the territory of the Upper Danube region exist a natural, climatic and geographical conditions for the production of corn; Agriculture is intensive character.

- Although the observed period comes to the variation of total agricultural land, corn production is based on almost 50% of their land.

- The structure of the use of arable land and gardens, the share of maize (with the share of wheat) is the most important.

- Representation of different varieties and hybrids with high yield potential causes high yield per unit area, with the largest production in the Upper Danube region was recorded in the municipality of Sombor.

- Due to the stable and high yields obtained depend on the intensity of irrigation and the reclamation measure the phase advancing, so that it can not be expected in the future a more stable yield.

- Maize production is intensives, while corn yields in the companies and cooperatives are at a much higher level compared to the yields of family farms.

- The value of exported corn is higher than the value of exported corn, so the corn was in 2012. Was the most important agricultural product in the Republic of Serbia.

## References

1. Bekrić, V. (1980): Prerada i upotreba kukuruza u ishrani domaćih životinja. Kukuruz, 193-306, Beograd.

2. Census of Agriculture 2012, Agriculture in the Republic of Serbia, Statistical Office of the Republic of Serbia, Belgrade 2013.

3. Glamočlija Đorđe (2004): Posebno ratarstvo, žita i zrnene mahunarke. -311 str. ISBN 86-441-0538-8.

4. Kovačević, D. (1995): Sistemi obrade zemljišta u intenzivnoj proizvodnji kukuruza. Acta herbologica, Vol. 4 N$^{o}$ 2, Beograd.

5. Milisav Stojaković, Mile Ivanović, Đorđe Jocković, Goran Bekavac, Božana Purar, Aleksandra Nastasić, Dušan Stanisavljević, Bojan Mitrović, Sanja Treskić, Rajko Laišić (2011): Izbor hibrida kukuruza na osnovu multilokacijskih ogleda, Ratarstvo i povrtarstvo, 103-112, ISBN 978-86-80417-28-8, 45. Savetovanje agronoma srbije, Zlatibor, 30.01-05.02.2011.

6. Vesna Popović, Radojica Sarić, Marijana Jovanović (2013): Održiva poljoprivreda i ruralni razvoj – kocepcijska polazišta. Poglavlje u monografiji Stanje i mogućnosti razvoja održive poljoprivrede i ruralnog razvoja u Podunavlju. Institut za ekonomiku poljoprivrede, ISBN 978-86-6269-024-1, str. 7-37.

7. Vučković Savo (1999.). Krmno bilje. Poljoprivredni fakultet. 553 str.

8. Municipalities and regions in Republic of Serbia 2003-2013, NBS of Republic Serbia.

9. http://www.fao.org/news/story/en/item/175772/icode/

10. http://usda01.library.cornell.edu/usda/fas/worldag-production//2010s/2013/worldag-production-04-10-2013.pdf

11. http://www.stips.minpolj.gov.rs/stips/nacionalni

12. http://www.pks.rs/PrivredaSrbije.aspx?id=13&p=2&

13. http://pod2.stat.gov.rs/ObjavljenePublikacije/G2012/pdf/G20122007.pdf

14. http://pod2.stat.gov.rs/ObjavljenePublikacije/G2013/pdf/G20132010Knjiga.pdf

15. http://faostat.fao.org/site/535/DesktopDefault.aspx?PageID=535#ancor

# LABOUR FORCE AS A (NON)RENEWABLE RESOURCE IN AGRICULTURE OF SERBIA

*Milan R. Milanović*[1], *Simo Stevanović*[2]

## Abstract

*Agriculture in Serbia is in many features significantly different than the European one. General agricultural (in)efficiency can be explained to a large extent, through differences in size and structure of agricultural labour force. Non-renewability of labour force on family agricultural holdings is reflected in the decrease in the number of holdings and the size of households, i.e. decrease in number of members of holder's family and employed farm workers. The aim of this paper is to try to provide an objective insight into current situation in Serbian agriculture and the level of its intensity as regards the employment of labour force and agricultural holding production structure by using adequate regional analytical comparisons. At the same time, we start from the thesis that the change in agricultural ownership structure is making interregional differences deeper and is increasing the extenzification of production model and thus the inefficiency of the total agricultural production, which can also be indicative for the necessary modification of the agricultural development strategy and policy.*

**Key words:** *Agriculture, family agricultural holding, labour force, full-time employment, annual work unit, regional structure.*

## Introduction - methodological problems

The study of Serbia's agricultural labour force is burdened with a number of methodological problems and inconsistencies in available information. Analyses of socio-economic structure are most often based on comparative indicators on the share of agricultural population in the total population, i.e. share of active agricultural population in the total active population. On the other hand, analyses

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of labour force are often made according to estimates on employed, unemployed and inactive persons. Reliable data on agricultural population is collected through a census of population and a special census of agriculture. However, the results of the 2011 Census of Population (CP2011) do not contain data on "agricultural population", since such a statistical category does not exist! Even though Serbia had two major censuses in the past two years – Census of Population (beginning of October 2011) and Census of Agriculture (end of 2012), there is still one question to be answered – is there any valid data on a contingent of population which can be considered an agricultural labour force. In fairness, data on employed persons are collected through annual surveys and polls (labour force surveys) on the basis of which assessment of activities of basic contingents of population is carried out.

Apart for dynamic inconsistency of data sources, there are significant differences in the content of some similar features and indicators (depending on the source) that have been surveyed and analysed (Grbić, 2006). Differences occur in features which differentiate certain contingents, i.e. depending on whether certain contingent has been singled out by *activity* (in the past, along with agriculture, activity classification included forestry and water management, and now only "agriculture, forestry, hunting and fishing"), or by *occupation*, or by taking into account a formal status of persons or *employment status* - actual activity of certain persons.

Therefore, significant differences in data are detected, e.g. on active agricultural population and on persons employed in agriculture. Differences in data can only partly be explained by divergence in the definition of features (Milanović, 2009). *Economically active population in agriculture* (according to the International Standard Classification of Occupations) refers to all people aged 15 or over, having an occupation in the agricultural sector including forestry and fishing (market producers), agricultural producers (non market producers) or household labour force (in their own, family households or other) and are yielding income (censuses, statistical yearbooks). On the other hand, *persons engaged in agricultural activities* are people who were at least one hour per week (during the statistical reference period) engaged in paid work (labour force surveys). However, there are many more people in agriculture who belong to the category of "*workers assisting in a family farm*" who are by definition un-paid and thus cannot be categorised as "employed persons"
Estimates (according to surveys) of the number of people engaged in agriculture go considerably over the number of active population in agriculture. These differences in size of studied features are obviously

illogical, and thus cannot lead to precise and reliable conclusions with regard to socio-demographic structure, i.e. social potential, from the aspect of engaging labour force in agricultural activities. It required methodology and content alignment, i.e. a comprehensive adjustment and harmonisation of national statistical surveys with certain international and European statistical standards. In that respect, the results of the 2012 Census of Agriculture, having in mind that it was conducted in line with EU methodological recommendations, are much more compatible with referential European data on labour force in agricultural family holdings.

These surveys cover all persons employed in holdings, both those with farming as their main activity and those conducting other activities. It will enable us to measure employment more comprehensively in agricultural holdings (AH), both in family owned agricultural holdings (FAH) and holdings owned by legal entities (HLE), and will also provide for analysis of part-time employment in combination with other jobs. By converging the total number of employed persons into the equivalent of full-time employees - annual work unit (AWU), we are obtaining information about the real volume of work carried out in a farm, as a valid quantitative measure of labour in agricultural production processes. Interregional structural comparisons have been made on the level of territorial units for statistics NUTS 2.

## Manifestation of (non)renewable labour force resources in agriculture and its macroeconomic importance

It is understandable that workforce, as a biological resource, is a renewable economic category. However, due to current agricultural development conditions, it is evident that this resource is practically continuously decreasing, i.e. that it is to some extent exhaustible. Naturally, as long as the biological survival of the humankind depends on the basic nutrients (carbohydrates, proteins and fats) derived through agriculture, farm labour force will be indispensable, which means that this economic resource will be necessary and thus sustainable. (Non) renewability (exhaustibility) of the labour force resources in Serbian and European agricultural family holdings is manifested in the following ways:

- Fast decrease in number of family holdings, and consequently in total number of persons employed in agriculture,
- Decrease in number of persons employed in holdings of legal entities and the accelerated decline of a number of professionals employed in agricultural holdings,

- Decline of agricultural population share in economically active population,
- Decrease in size of households in general, especially in rural areas,
- Decrease in intensity of agricultural production in holdings, demonstrated through the structure of production,
- Production extensification measured in accordance with the amount of invested labour per unit of production capacity,
- Increase in the average age of members of the holding as well as managers (holders) of the holding.

In all features, average values for the whole territory of the Republic of Serbia are covering up major regional differences (NUTS 2), particularly between areas (NUTS 3) and local differences, both as regards the level and the dynamics of changes, examined in line with the nomenclature of territorial units for statistics. According to the results of the 2012 Census of Agriculture (CA2012)[3], there are 1 442 628 persons in total who live in AH – members of households and full-time employed.

The share of persons in AH compared to the total population of Serbia for the same year (7.199.077, СГС-2013, pg 412), makes up quite an important contingent of more than one fifth (20,04%). Of course, these are predominantly people in FAH (98, 18%), having in mind that in HLE (there are around 300 of holdings owned by legal entities) there were only 26 229 persons, i.e. 1, 82% of the total number of persons (including members and employed persons) in all agricultural holdings.

As regards the economic structure of population of Serbia, according to the reference data, the agricultural population still makes up one-fifth of the total population regardless of the differences in definition. At the same time, it means that the share of workers employed with agricultural legal entities in the total number of employed persons is practically negligible (only 1,52%).[4] It means that the absorption power of this sector is quite marginalised, as well as the importance of agriculture for the employment in general.

[3] 2012 Census of Agriculture in the Republic of Serbia –final results, Vol 1 and 2. http://webrzs.stat.gov.rs (20.12.2013).
[4] In 2012 Serbia there were 1 727 000 employed persons in total (SGS-2013. str. 412, tabela 20.1).

**Table 1.** *Labour force and intellectual capital in holdings owned by legal entities HLE*

| | 2002 | 2012 | Index (2002=100) |
|---|---|---|---|
| Number of HLE | 1059 | 3004 | 283,7 |
| Employed | 64509 | 24636 | 38,2 |
| Permanent workers | 44872 | 19629 | 43,7 |
| Agricultural experts | | | |
| - with a university or college degree | 3837 | 1983 | 51,7 |
| with a secondary school degree | 6474 | 2281 | 35,2 |
| Economic experts | | | |
| - with a university or college degree | 1095 | 655 | 59,8 |
| - with a secondary school degree | 4168 | 1247 | 29,9 |
| - Veterinarians | 2173 | 1245 | 57,3 |

**Source:** *SGS-2007, str.238; SGS-2003, str.226.*

Some of the most important indicators of non-sustainability of general labour force in agriculture and a highly qualified human capital, include data on changes in holdings owned by legal entities occurring during the course of past decade. Since 2002, when per 1 059 HLE (enterprises and cooperatives) there were 64 509 permanent agricultural workers, including 3 837 agricultural experts and 1 095 economic experts (with a university or college degree), as well as 2 173 veterinarians, the indicators more than halved until 2012, even though the number of HLE tripled in the same period! And thus today (2012), per one HLE, there is only 0, 7 agricultural experts with a university of college degree, while 10 years ago there were 3, 6 such experts or five times more.

## Extensification of production in holdings

If the total area of all agricultural holdings (631 552) in Serbia is 5 346 597 hectares (Census of Agriculture 2012), it means that the average size of a holding is 8, 51 hectares. It is the land area that was available in total, and not what was utilised. Namely, the results of the CA2012, within the category of available land, differentiate the utilised agricultural land (3 437 423 hectares), unutilised agricultural area, wooded area and other land. Having that in mind, it is quite a worning data that in the year of the census 424 thousand hectares of agricultural land was not utilised, as well as 462 thousand hectares of „other“ area.[5] Which means that in comparison to the

[5] We should point out that there is (in)reliability and/or inconsistency of different data sources. 2013 Statistical Yearbook for Serbia states that in 2012 (the year of the Census

utilised agricultural area, real average size of AH was 5, 44 hectares (and not 8, 51 hectares). One cannot but wonder why so much land is unutilised, is the agriculture slipping towards extensive instead of intensive production model, i.e. who and in what way is utilising agricultural land today. The first sign of extensification of production is cessation of livestock production in agricultural holdings. Holdings without livestock units (142.188) make up close to one-fourth (22, 5%) of the total number of AH. On the other hand, only 4, 5 AH have more than 10 livestock units. Hence, predominant number of AH (73%), with livestock breeding activities, have less than 10 livestock units. Holdings without livestock units (practically without livestock) are utilizing 1 042 000 ha or around 30% of the total utilized agricultural area. On average, there are only 0, 6 livestock units per 1 ha of utilized agricultural area.

**Table 2.** *Agricultural holdings in Serbia classified according to the area of land and number of livestock kept, 2012*

| | 0-2 ha | 2-5 ha | 5-10 ha | 10-20 ha | 20-50 ha | 50-100ha | Over100ha |
|---|---|---|---|---|---|---|---|
| Holdings, number | 294421 | 184936 | 89930 | 32675 | 13102 | 4382 | 1853 |
| Utilised land, ha | 265026 | 594681 | 617060 | 436843 | 388858 | 310255 | 747623 |
| Cattle, number | 75565 | 184844 | 233318 | 184070 | 108824 | 32409 | 78965 |
| per holding | 0,26 | 1,00 | 2,59 | 5,63 | 8,31 | 7,39 | 42,61 |
| Per hectare | 0,28 | 0,31 | 0,38 | 0,42 | 0,27 | 0,10 | 0,11 |
| Pigs, number | 585158 | 755724 | 677162 | 387431 | 229457 | 122131 | 446177 |
| per holding | 1,99 | 4,09 | 7,53 | 11,86 | 17,51 | 27,87 | 240,78 |
| Per hectare | 2,21 | 1,27 | 1,10 | 0,89 | 0,59 | 0,39 | 0,59 |

**Source:** *2013 Statistical Yearbook for Serbia, page 226 (adjusted by authors)*

While acknowledging different theoretical views on the nature and origin of the wealth of nations, it seems indisputable that income and profit cannot be attained in a FAH without year-round engagement of available workforce at the holding. Such engagement is not possible in practically monocultural production structure based on crop farming, i.e. production of wheat and corn (more and more for export), practically without vegetable and fruit growing, and obviously with less and less livestock breeding. At almost one-third of utilized agricultural area there is

of Agriculture) 5 052 thousand hectares of agricultural area was utilised, i.e. 3 282 thousand ha of arable land, with 3 060 thousand ha under crops, while (only) 219 thousand ha fallow land and unutilised arable land (NSO, СГС-2013, стр.218).

practically no livestock at all (less than one livestock unit) which means that these holdings are mostly oriented towards seasonal production (crop farming) which requires relatively little labour.

Our thesis regarding general extensification of production at AH is confirmed by the data on the number of main kinds of livestock (cattle and pigs) relative to holdings of various sizes. If we take the number of livestock heads per capacity unit as an indicator of production intensification, we can observe certain regularity – that the bigger the size of the holding the smaller the number of livestock heads per hectare. The most intensive cattle breeding is taking place in medium size holdings, 10-20 ha, while in holdings with more than 50 ha and those with over 100 ha, there is even four-times less livestock heads per hectare. As regards the production of pigs, it is most intensive in smaller holdings with less than 2 ha, and they have more than five times more livestock heads than larger holdings which are utilizing 50 ha and more.

Important indicator of AH extensification is the change in land ownership status of utilized capacities. The share of AH owners in the structure of utilized agricultural area is decreasing (70%) while the number of those who are renting the agricultural area is increasing. At the same time, the share of rented land is growing as the size of a holding increases, and thus, in holdings with 50 ha and more, ratio of owned to rented land is nearly equal (50:50). What is missing is the data on how much area is rented from the total share of agricultural area owned by the state. We can reasonably presuppose that those who are renting the land (and we do not know whether these are also owners of FAH or those involved with non-agricultural activities) have considerably larger working capital, agricultural machinery and equipment and depots, than the owners of agricultural area who are renting the land.

Those who are renting land are, as a rule, oriented towards crop farming, which can also be very intensive from the microeconomic position, but only as regards seasonal investment of machine labour and capital. However, if we take a macroeconomic perspective and analyse it from the aspect of expected outputs from the utilised agricultural area as the common good, it is an extensive production by its structure because it is not oriented towards the increase of livestock, bigger year-round engagement of labour, nor a sustainable increase of employment and thus creation of greater added value. Orientation towards crop farming, even when it is for export purposes, implies enormous opportunity cost in

Serbian agriculture and in this hidden macroeconomic cost, lies one of the main causes of its general inefficiency.

## Structure of labour force on agricultural holdings

Legislative tendencies towards decreasing the total number of agricultural, as well as the number of active agricultural population, and consequently the share of agriculture in total employment are still continuing, even though with different intensity. We have already presented most evident changes in property and ownership structure of agriculture in Serbia. Now we will move to analysing the scope of employment and structural characteristics of labour force engagement in AH, its regional distribution (NUTS 2) as well as its structure with the region, by various features: by number and gender of persons employed in holdings, by marital status of employed labour force, and finally, by work intensity, i.e. the amount of engaged work per capacity unit.

**Table 3.** *Regional distribution of holdings by size and number of members and persons employed on the holding (%)*

| | **Total** | **1-2** | **3-4** | **5-6** | **7 and more** |
|---|---|---|---|---|---|
| REPUBLIC OF SERBIA | 100 | 100 | 100 | 100 | 100 |
| SERBIA-NORTH | 28.6 | 32.7 | 20.4 | 13.8 | 27.8 |
| Belgrade region | 5.3 | 5.3 | 5.2 | 4.7 | 4.8 |
| Vojvodina region | 23.4 | 27.4 | 15.2 | 9.1 | 23.0 |
| SERBIA-SOUTH | 71.4 | 67.3 | 79.6 | 86.2 | 72.2 |
| Šumadija region and Western Serbia | 41.6 | 38.8 | 47.1 | 53.4 | 47.7 |
| Southern and Eastern Serbia | 29.7 | 28.5 | 32.5 | 32.8 | 24.5 |
| **Structure of holdings within the region** | | | | | |
| REPUBLIC OF SERBIA | 100 | 68.6 | 27.1 | 4.0 | 0.4 |
| SERBIA-NORTH | 100 | 78.5 | 19.3 | 1.9 | 0.3 |
| Belgrade region | 100 | 69.6 | 26.6 | 3.5 | 0.3 |
| Vojvodina region | 100 | 80.5 | 17.6 | 1.5 | 0.3 |
| SERBIA-SOUTH | 100 | 64.7 | 30.2 | 4.8 | 0.4 |
| Šumadija region and Western Serbia | 100 | 63.9 | 30.6 | 5.1 | 0.4 |
| Southern and Eastern Serbia | 100 | 65.8 | 29.6 | 4.4 | 0.3 |

**Source:** *National Statistics Office of the Republic of Serbia, 2012 Census of Agriculture, Vol. 1 and 2, Belgrade, 2013 (adjusted by authors)*

In the Republic of Serbia we can still witness the process of extreme regional and especially sub-regional polarisation according to various structural characteristics of all agricultural holdings. If we analyse regional distribution of agricultural holdings in Serbia we can see that most of the holdings are located in the southern parts of Serbia (71,4%) while somewhat less than one-fourth (23, 4%) is located in Vojvodina. As regards the regional distribution by AH size, number of holding members and employed labour force on the holdings, the situation is very similar, whereas holdings with more members are also located in the southern regions.

**Table 4.** *Regional distribution of holdings by total scope of holdings owned by public enterprises and the status of employed labour force (%)*

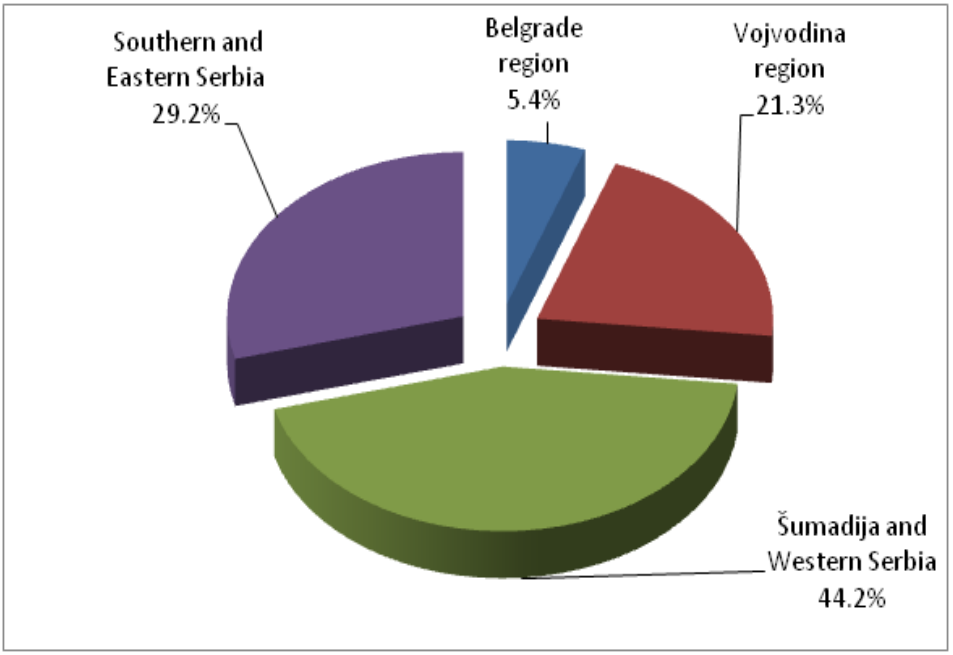
| | **Total** | **AH holders** | **Family members** | **Full-time employees** | **Seasonal workers** |
|---|---|---|---|---|---|
| REPUBLIC OF SERBIA | 100 | 100 | 100 | 100 | 100 |
| SERBIA-NORTH | 26.7 | 26.8 | 20.4 | 82.1 | 41.1 |
| Belgrade region | 5.4 | 5.2 | 4.9 | 12.8 | 3.1 |
| Vojvodina region | 21.3 | 21.7 | 15.5 | 69.3 | 35.9 |
| SERBIA-SOUTH | 73.3 | 73.2 | 79.6 | 17.9 | 58.9 |
| Šumadija region and Western Serbia | 44.2 | 43.7 | 48.1 | 10.1 | 37.8 |
| Šumadija region and Western Serbia | 29.2 | 29.4 | 31.5 | 7.9 | 21.1 |
| **Interregional structure of AWU** | | | | | |
| REPUBLIC OF SERBIA | 100 | 43.9 | 47.0 | 3.8 | 5.3 |
| SERBIA-NORTH | 100 | 44.2 | 36.0 | 11.7 | 8.2 |
| Belgrade region | 100 | 42.6 | 43.1 | 9.1 | 3.1 |
| Vojvodina region | 100 | 44.5 | 34.2 | 12.3 | 9.0 |
| SERBIA-SOUTH | 100 | 43.8 | 51.0 | 0.9 | 4.3 |
| Šumadija region and Western Serbia | 100 | 43.4 | 51.1 | 0.9 | 4.6 |
| Southern and Eastern Serbia | 100 | 44.3 | 50.8 | 1.0 | 3.9 |

**Source:** *National Statistics Office of the Republic of Serbia, 2012 Census of Agriculture, Vol. 1 and 2, Belgrade, 2013 (adjusted by authors)*

As regards the number of holding members and employed labour force, it is obvious that most AH belong to the category of small holdings with only one or two members. The relatively highest number of such holdings is located in Vojvodina region (80.5%) and the lowest in Šumadija region and Western Serbia (63, 9%). On the other hand, the number of holdings with 5 and more members is practically negligible (merely 1, 8% in

Vojvodina). These are mostly holdings with ageing members which probably will not be socio-economically reproduced.

**Graph. 1.** Regional distribution of holdings by total scope AWU (%)




**Source:** *Table 4. (creatted by authors)*

As regards the distribution of holdings by gender or legal status (family holdings – FAH or holdings of legal entities - LEH), we can reach some very interesting regional and intra-regional conclusions on their structure. Key feature refers to the fact that LEH, which make up only 1, 8% of the total number of holdings are mostly located in northern regions (78, 8%), i.e. Vojvodina (66, 3%), while there is only 8, 6% of such holdings in Southern and Eastern Serbia.

The explanation lies in relatively greater availability and main features of available agricultural areas, as well as the fact that in northern regions, those holdings that are registered as legal entity holdings are enlarged properties of more affluent family holdings, and particularly agricultural latifundias of new owners ("transitional business elite”), as new legal entities established on the ruins of once socially owned enterprises, cooperatives and farms, with the division of major regulated land complexes and accompanying infrastructure.

In contrast to the regional distribution of LEH, family holdings are mostly located in southern regions (75, 1%) However, there is one common trait shared by all holdings: as regards the gender structure of holding members and employed workers, we can detect male dominance, accounting for almost three fifths of the total number which means that the range of intraregional differences is quite small (56-60%).

In what way is the labour force engaged in Serbian agriculture regionally distributed? This is by all means one of the most important questions that will provide for more objective insight into current situation as well as the future of agriculture. It is quite obvious that there is a strong regional polarisation in Serbia according to all features.

**Table 5.** *Production intensity per annual work units for employed labour force in agricultural holdings, 2012*

| | AWU in total | AWU per holding | AWU per ha | Index levels (Serbia = 100) | |
|---|---|---|---|---|---|
| | | | | AWU/holding | AWU/ha |
| REPUBLIC OF SERBIA | 100,0 | 1.02 | 0.19 | 100 | 100 |
| SERBIA-NORTH | 26.7 | 0.95 | 0.10 | 93 | 52 |
| Belgrade region | 5.4 | 1.03 | 0.25 | 101 | 134 |
| Vojvodina region | 21.3 | 0.93 | 0.09 | 91 | 46 |
| SERBIA-SOUTH | 73.3 | 1.05 | 0.28 | 103 | 149 |
| Šumadija region and Western Serbia | 44.2 | 1.09 | 0.28 | 106 | 150 |
| Southern and Eastern Serbia | 29.1 | 1.00 | 0.28 | 98 | 148 |

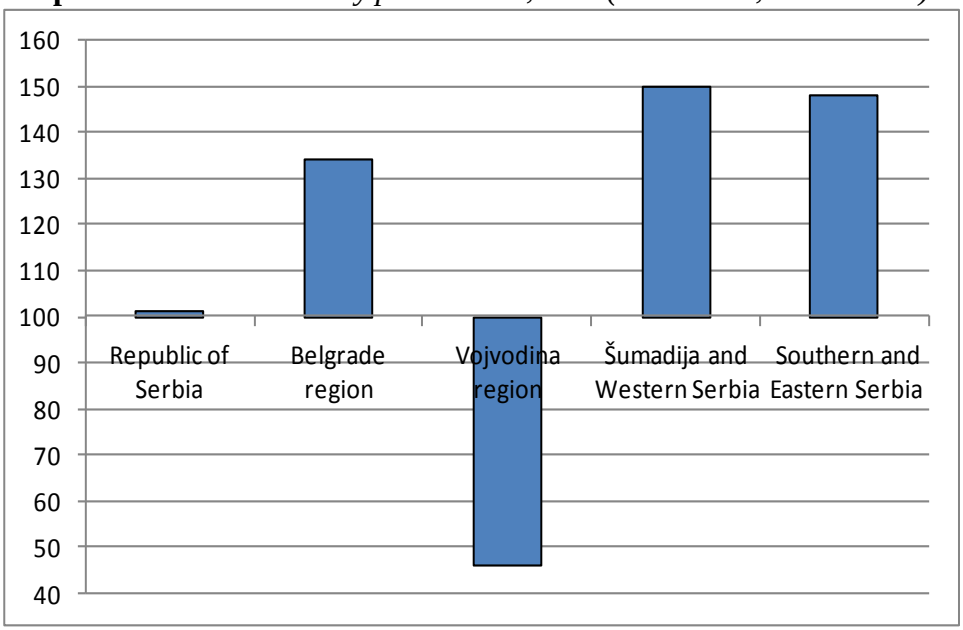
**Source:** *National Statistics Office of the Republic of Serbia, 2012 Census of Agriculture, Vol. 1 and 2, Belgrade, 2013 (adjusted by authors)*

If we observe the total amount of labour expressed in annual work units (AWU), it is interesting to note that three-fourths is engaged in households in southern and only one-fourth in northern regions. This disposition refers primarily to AH holders and family members. However, as regards the share of permanently employed (and to some extent seasonal workers) it is understandable that it is larger in northern regions having in mind that there are more holdings of legal entities in the north.

Nevertheless, inter-regional structure of AWU in holdings by employed labour force status, demonstrates considerably more similarities. In all

regions, in the labour force structure, the share of work of AH holders (42, 6-44, 5%) dominates uniformly, as well as engagement of family members with slightly bigger differences (34, 2-51, 1%). The share of work of permanently employed in holdings in southern regions is completely negligible (0, 9%) and the share of seasonal workers is marginal (4,3%).

**Graph. 2.** *Production intensity per AWU/ha, 2012 (Index levels, Serbia =100)*




**Source:** *Table 5. (creatted by authors)*

Surely, the most important indicator on labour force engagement in agricultural holdings is provided by data on annual work units (AWU) per holding (1), i.e. basic unit of production capacity in agriculture – per hectare of utilised area (2). It is interesting to note that according to first indicator (AWU per holding) there are no major regional differences, but it is even more interesting that in average, there is only one full-time worker per holding (with slight differences between northern and southern regions), regardless of the difference in ownership structure.

If, however, we analyse the intensity of production per other indicator or feature (AWU per ha), we shall perceive surprising regional differences. Namely, in average only one-fifth of AWU per ha is engaged in Serbia, and regional differences are observed in a ratio of 1:3. The least engagement of

labour force per capacity unit is occurring in Vojvodina (0,09 AWU), while in the southern regions it is 3 times more (0,28 AWU).

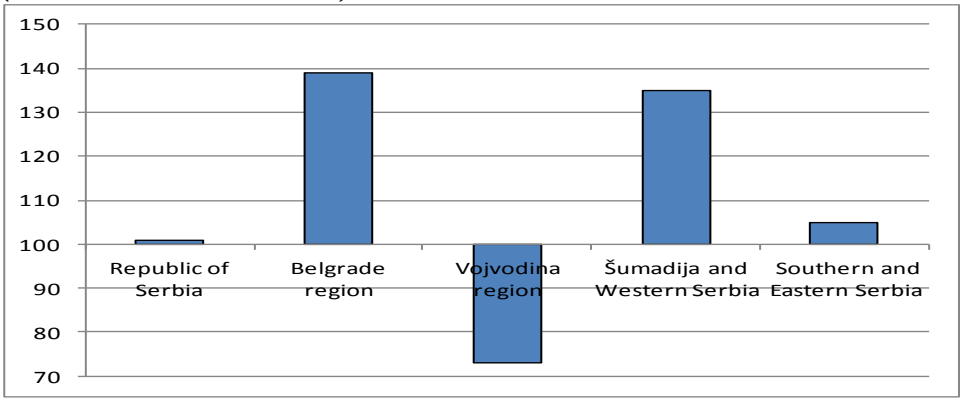
**Table 6.** *Production intensity per number of livestock units in holdings, 2012*

| Regions | Livestock units | | | Index levels (Serbia = 100) | |
|---|---|---|---|---|---|
| | % | Per AH | Per ha | Per AH | Per ha |
| REPUBLIC OF SERBIA | 100,0 | 3.20 | 0.59 | 100 | 100 |
| SERBIA-NORTH | 39,5 | 4.41 | 0.46 | 138 | 78 |
| Belgrade region | 5,5 | 3.35 | 0.82 | 105 | 139 |
| Vojvodina region | 34,0 | 4.65 | 0.43 | 145 | 73 |
| SERBIA-SOUTH | 60,5 | 2.71 | 0.72 | 85 | 123 |
| Šumadija region and Western Serbia | 39,8 | 3.06 | 0.79 | 96 | 135 |
| Southern and Eastern Serbia | 20,7 | 2.23 | 0.62 | 70 | 105 |

**Source:** *National Statistics Office of the Republic of Serbia, 2012 Census of Agriculture, Vol. 1 and 2, Belgrade, 2013 (adjusted by authors)*

Finally, the analysis of production intensity on the basis of livestock share, apart for very low general average (around 0, 6 livestock units per hectare), we can also perceive major regional differences. Firstly, it is surprising to see that in northern regions, which according to general economic development indicators (GDP per capita) are considered to be developed, even as regards the level of agricultural development, livestock breeding is almost 50% lower than in southern regions.

**Graph. 3.** *Production intensity per number of livestock units per ha, 2012 (Index levels, Serbia =100)*




**Source:** *Table 6. (creatted by authors)*

Vojvodina region and the region of Šumadija and Western Serbia are equal as regards the number of livestock units. But if we analyse the number of livestock units per capacity unit (per hectare of utilised area), it is even more surprising to see that the region with the least livestock is Vojvodina (0, 43 heads/ha); while Belgrade region has relatively the most (0, 82), which is of less significance for the general picture having in mind that this region makes up a tiny share (5, 5%) in the total number of livestock units in Serbia.

The results of the 2012 Census of Agriculture, especially data on the employed labour force and the number of livestock units per capacity unit are confirming our hypothesis, made more than ten years ago (Milanović, 2002), concerning major changes in territorial i.e. regional structure of agriculture. At the same time, in some regions which are traditionally considered to be regions of intensive production (such as Vojvodina) we can see the process of extensification of production and thus, the importance of agriculture in their general economic structure is continually decreasing. On the other hand, southern regions (before regionalisation and in previous statistics it was Central Serbia, and today it does not include Belgrade region) are becoming areas with not only relatively intensified agricultural production but what is more, the share of this sector in GDP structure is increasing, unfortunately, mainly due to the intensive process of industrialisation and practically complete closure of major industrial centres.

## Conclusion

In the economic structure of population in Serbia, agricultural population still makes up one-fifth of the total population; the number of holding members and employees in AH is dropping fast; most AH belong to the category of small holdings, with only one or two members (the number of holdings with 5 and more members is practically negligible), these are mostly holdings with ageing members which probably will not be socio-economically reproduced. The share of workers employed with agricultural legal entities is practically negligible (only 1,52%) compared to the total number of employed persons, which means that the absorption power of this sector is quite marginalised, as well as the importance of agriculture for general labour force employment This practically confirms the thesis on (non)renewability i.e. exhaustibility of labour force as a resource in agriculture production.

Serbian agriculture is uncontrollably slipping towards extensive instead of an intensive production model. It is clearly revealed by three groups of indicators: (a) *utilized land area* – in the year the Census of Agriculture was conducted (2012), there was 424 thousand hectares of utilized agricultural area, as well as 462 thousand hectares of "other" land area (not including wooded area), which makes up 16,6% of the total available area; (b) *labour force employment* – by annual work units (AWU), there is one employed member (worker) per holding, and only 0,2 full-time workers (members) per hectare of utilised area; (c) *livestock share* – there is only 0,6 livestock units per hectare of utilised area, and holdings without livestock units (practically without livestock) are utilising over million hectares, or around 30% of the total of utilised agricultural area.

Major regional differences (level NUTS 2) are evident in all features; in northern regions there is around 50% less livestock than in the southern; the region with the least livestock is Vojvodina (0,43 heads/ha), which is around 30% less than the average in the country); one can even perceive a certain regularity – the bigger the size of the holding the lower the number of heads per hectare; also, the least engagement of labour force per capacity unit is occurring in Vojvodina (0,09 AWU), while in the southern regions it is 3 times larger (0,28 AWU). And it all leads to an unexpected conclusion, that Vojvodina region is acquiring new agro-economic attributes according to which it cannot be considered as the area of intensive agriculture.

Having in mind the global economic crisis and very unfavourable economic position of primary agricultural producers, several questions are opening up and deserve attention: is it and if so why, land rent is a sufficient economic motive for land owners to rent it and not to cultivate it and earn income and yield profit; is it primarily due to the lack of labour force and/or adequate equipment in FAH; what is the relation of government subsidies per hectare and the height of rent paid to owners. All these issues require radical change of the model of streamlining, providing incentives and subsidies for production in AH. The new model of agricultural policy would generally imply the following: (a) ending of subsidies through agricultural area (as an abundant resource), (b) incentives for the changes in the structure and intensity of production, with bigger year-round engagement of labour force, sustainable increase of employment and the consequent creation of greater added value.

## References


1. Grbić, V.: (2006) *"Ekonomska analiza set-aside programa agrarne politike Evropske unije"*, Ekonomika poljoprivrede, Br. 2/2006. Beograd.

2. European commission, Directorate-General for Agriculture: "Prospects for agricultural markets and income 2005-2012."December 2005.

3. Lovre, K., Zekić, S. (2011): *Ekonomska analiza agrarnih programa*, Ekonomski fakultet, Subotica.

4. Milanović, M. (2002): „*Prehrambena industrija SR Jugoslavije: razvoj–proizvodnja–potrošnja–kvalitet–izvoz,1980-2000.“ (monografija),* IEP i DAE Jugoslavije, Beograd.

5. Milanović, M.: (2006) *"Približavanje Srbije Evropskoj uniji – novije komparacije poljoprivrede i agrarne politike"*, Ekonomika poljoprivrede, Br.2/2006. Beograd.

6. Milanović, M., Đorović M., Stevanović S. (2009): „*Human capital and sustainability of rural development”*, page 559-566. 113th Seminar of the European Association of Agricultural Economists (EAAE), Publisher: Institute of Agricultural Economics, Belgrade. December, 9th-11th 2009. Belgrade, Serbia.

7. Milanović, M., Vasiljević, Z., Njegovan, Z. (2006): „*Promene u zaposlenosti i strukturi radne snage u evropskoj i srpskoj poljoprivredi“*, Ekonomika poljoprivrede, 2/2006(53) TB(597-607). Beograd.

8. Milanović Milan, Stevanović S., Škatarić G. (2010): „*Comparative characteristics of some Balkan countries rural regions”,* International scientific meeting, Vrujci Spa, Serbia. December 2-3rd 2010, Economics of Agriculture, EP 2010 (57) SI-2 (518-527), Belgrade.

9. Milanović, Milan R. (2010): „Demografske promjene i ruralni razvoj jednog regiona u našem primorju“, Crnogorska akademija nauka i umjetnosti, Glasnik Odjeljenja društvenih nauka, Br. 20/2010. str.365-381,Podgorica.

10. Milanović, M., Stevanović, S. (2012): Models of Regression of the Scope of Sown Areas and Purchase Prices of Oil Crops in Serbia, Economics research, Pula, Croatia, Vol. 25, N$^{o}$ 4, pp. 628-647

11. Njegovan Z.: (2001) Evolucija Zajedničke agrarne politike Evropske unije kao osnova za redefinisanje agrarne politike SR Jugoslavije, rad u Zborniku SEJ: Jugoslovenska privreda i Evropska Unija- Izazovi i mogućnosti, 13-15.mart, Beograd

12. Statistical Office of the Republic of Serbia: Census of Agriculture 2012. AGRICULTURE IN THE REPUBLIC OF SERBIA,I,II, Belgrade, 2013.

# ECONOMIC ANALYSIS OF PEPER PRODUCTION IN REPUBLIC OF MACEDONIA

*Mile Peševski*[1], *Aleksandar Stojkov*[2]

## Abstract

*In this paper, we analyze the major economic indicators in the pepperproduction in R. Macedonia,based on statistical data and data from direct farmsurveys. The indicators show that with average yield of 10,945 kg/ha, Macedonia produces 151,737 tons of peppers. Home consumption participates with 34 % in the total produced quantities and the rest is exported to over 40 different countries. The average amount of export weighs over 33,917 tons, of which 34 % is export to the Republic of Serbia. The analysis showed that most of the costs are engaged in the production of pepper in greenhouses (700,000 EUR/ha), less inplastic tunnels (almost 50,000 EUR/ha), and the least on the open-field production pf pepers (6,300 EUR/ha). Gross margin, on the level of variable costs in the production of pepper in plastic tunnels is 60 %, and the open-field cultivation 53 % of the value of production.*

**Keywords:** *peppers, plastic tunnels, costs, gross margin, price*.

## Introduction

In the period 2007-2011, agricultural production in the Republic of Macedonia was organized at 1,079,200 hectares, most of which (24.3 %) in the Pelagonian region, and the slightest share of only 6.5 % least in the Skopje region. The same correlation is expressed in terms of the arable land. Notably, 21.9 % of the total 516,000 ha were used in Pelagonian region and 7.6 % from the total in the Skopje region. The majority of the fields and gardens are also situated in the Pelagonian the region (22.4 %

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of the total 421,000 ha) and the least (7.7 %) in the Polog region (State Statistical Office of the Republic of Macedonia).

Vegetables in the country is grown at an average area of 58,838 hectares, or 13 % of the arable fields and gardens. Here, most of the surface area (24.3 %) is cultivated by potatoes and peppers have 14.2 %.

It is well known that vegetables are grown both on open field, and in closed areas. The surface under vegetables in plastic tunnels and greenhouses varies on annual basis, and particularly those underplastic tunnel production. The surface under greenhouses is stabilized at about 250 ha. According to the unofficial data from the Ministry of Agriculture, Forestry and Water Economy, the area under greenhouses range between 3,800 and 4,000 ha. For example, in 2012, the vegetable production in closed areas without heating –plastic tunnels, was conducted on a total area of 3,910 ha. Tomatoes are the main vegetable (32.9%), then peppers (27.9%) and cabbage (27.1%), and less (around 20-40 ha) of the area is under potatoes, onion, garlic, green salad etc.

The value of fresh vegetables in the investigated period (2007-2011), amounted approximately 21,357 million or 348,5 million EUR[3], which is 42.6% of the total value of vegetable production (State Statistical Office of the Republic of Macedonia). There is no data on the value of the peppers, but as a comparison, the average value of tomato esequals 5,059 million MKD, and 2,078 million MKD was the value of potatoes.

Macedonia exports the excess production of the domestically produced peppers, nearly worldwide, or mainly in the neighbouring countries and in Australia, New Zealand, Canada, United States, Sierra Leone, Yemen, etc. Besides the import from Macedonia, our importing partners import peppers by different prices from other countries too. For example, U.S. imports of fresh pepper (over 99%), comes mainly from Mexico, with an average annual price of 1.06 $/kg (1.46 EUR), and from Canada for 0.57 $/kg (Singh RH, Rankine LB, Seepersad G., 2006). If the quality of peppers is estimated by the market price level, then the Macedonian pepper is relatively highly valorised on the U.S. market since peppers imported from Holland are importedat a price of 3.85 $/kg, and peppers form Macedonia are imported for 3.59 $/kg. As it is in the case of Macedonia, the movement of pepper prices during a half year period is

[3] 61,6 MKD/EUR, 1,38 $/EUR

also registered by the U.S. official statistics register. For example, in the Miami Terminal Market (one of the three relevant markets in the U.S.) the price in the first semester (May to October) amounted to 4.27 $/kg, and in the second semester 5.04 $/kg, which is 18% higher. The same is the case for one of two markets in Canada (Montreal Terminal Market), where the cost of fresh peppers in the period October-February, amounted to 5,92 $/kg or 17% higher than in summer (Singh RH, Rankine LB, Seepersad G., 2006).

Undoubtedly, most of the necessary resources for starting pepper production are needed for setting-up of greenhouses. For example, for pepper production in a VENLO type of greenhouse, it is necessary to provide around 700,.000 EUR/ha. With an average yield of 260 t/ha, the invested funds will be returned in 7 years. In contrast, the least resources are needed for the open field production of peppers. For example, in Georgia (USA), the annual costs for open field production of peppers amounted 6,733 $/ha (Esendugue Greg Fonsah, Cesar L. Escalante, Mark Byrd, 2005).

The purpose of this paper is to analyze the economic parameters in the greenhouse production of pepper, with special emphasize on the structure of the production costs.

## Source of data and method procedure

In order to realize the goal set in this paper, we mainly used statistical data for a five year period from 2007 to 2011. The structure of the production costs of peppers in plastic tunnels have been determined through a survey, conveyed on three producers of peppers in plastic tunnels from the Strumica region. The average values of the research are presented in the text. For this purpose, the local market prices, i.e. from the Strumica region are used. The choice of the region is based on the fact that almost 77 % of the produced peppers in plastic tunnels in Macedonia is located in that particular region.

In this paper we used multiple methods, with main use of the historical method, the comparative method, and the method of indexes and the balance method. The balance (Eq) of supply and demand of peppers, as well as of pepper products was calculated by the following formula:

$$\mathrm{Eq} = (\mathrm{Pr} + \mathrm{Im}) \leftrightarrow (\mathrm{CD} + \mathrm{Ex})$$

Pr – production of pepper, Im – pepper import, CD – domestic consumption of pepper, Ex – pepper export.
In determining the gross margin (GM), we used following formula:

$$GM = TI - VC,$$

where:TI – total income, and VC – variable costs.

## Results and discussion

### The pepper production in Republic of Macedonia

In the past period (2007-2011) the average yield of peppers on the national level was 18,104 kg/ha, which resulted in production of nearly 152,000 tons of peppers (Table 1), with estimated interval difference of 27,589 tons.

The highest level of production of peppers was achieved in 2010, mainly due to the fact that the yields were 8.2% higher, but also because production area was 4.1% larger than the previous year. The lowest production was in 2007 because the average yield of peppers for that year was the lowest yield (by 6.2%) of all the years that were observed for the purpose of this analysis.

**Table 1.** *Total production of peppers in Republic of Macedonia*

| Year | Production area (ha) | Total production (kg) |
|---|---|---|
| 2007 | 8331 | 140560632 |
| 2008 | 8199 | 141727914 |
| 2009 | 8438 | 154769796 |
| 2010 | 8474 | 168149582 |
| 2011 | 8465 | 153876770 |
| **Average** | **8381** | **151736866** |

**Source:** *St. Yearbook of the Republic of Macedonia, Skopje 2013*.

### Pepper producing areas

In Republic of Macedonia, the Southeast region has the largest pepper producing area - 25.86% of total surface area of the region (Table 2). The data shows that the Pelagonia region will assume leading position in the near future, because pepper producing areas in this region are increasing over the years.

**Table 2.** *Pepper producing areas per regions (ha)*

| Region | Year | | | | | Average | Participation % |
|---|---|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | | |
| Vardarski | 914 | 858 | 840 | 893 | 954 | 892 | 10,64 |
| East | 647 | 660 | 738 | 629 | 567 | 648 | 7,73 |
| Soutwest | 318 | 326 | 330 | 333 | 321 | 326 | 3,88 |
| Southeast | 2358 | 2222 | 2091 | 2088 | 2061 | 2164 | 25,82 |
| Pelagonia | 1772 | 1808 | 2120 | 2143 | 2141 | 1997 | 23,82 |
| Poloski | 1020 | 1044 | 924 | 903 | 872 | 953 | 11,37 |
| Northeast | 454 | 458 | 467 | 453 | 431 | 453 | 5,40 |
| Skopski | 848 | 823 | 928 | 1032 | 1118 | 950 | 11,33 |
| **Total** | **8331** | **8199** | **8438** | **8474** | **8465** | **8381** | **100,00** |

**Source:** *St. Yearbook of the Republic of Macedonia, Skopje 2013.*

There are certain tendencies toward changes in today's structure of participation percentages that are going in favour of Skopski region, because it has the highest rate of enlarging the pepper producing area in the period that was observed for this research. For the last two years of this period, the Vardarski region had experienced minor, but still positive, changes.

## Yield capacity per unit

The data that refer to realised yields for each of the Republic of Macedonia's regions (Table 3) show that the producers from Southeast region have the highest degree of intensity of pepper production in the state. One can say that because this region has the highest increase of average yields.

**Table 3.** *Average yields of peppers per regions (kg/ha)*

| Region | Year | | | | | Average |
|---|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | |
| Vardarski | 9317 | 12054 | 12324 | 10655 | 10296 | 10929 |
| East | 7655 | 9500 | 9191 | 7444 | 7524 | 8263 |
| Southwest | 2958 | 3023 | 3054 | 5162 | 3003 | 3440 |
| Southeast | 26145 | 25871 | 27847 | 32355 | 32004 | 28844 |
| Pelagonia | 15035 | 14223 | 16492 | 17088 | 15056 | 15579 |
| Poloski | 14528 | 14709 | 13778 | 14679 | 14436 | 14426 |
| Northeast | 5410 | 6510 | 5139 | 6204 | 6589 | 5970 |
| Skopski | 7747 | 6782 | 9962 | 11569 | 9168 | 9046 |
| **Average** | **10089** | **10520** | **11088** | **11907** | **11121** | **10945** |

**Source:** *St. Yearbook of the Republic of Macedonia, Skopje 2013.*

## Total production

Total production of pepper is calculated from the correlation between area of production and average yields. Annual changes are directly correlated with the degree of the changes in these two parameters.

The researches are shown that the quantity of peppers is mostly concentrated in three regions: Southeast, Pelagonia and Poloski (Table 4). Those three regions produce 80% of the total number of peppers in the country.

**Table 4.** *Total pepper production per regions (t)*

| Region | Year | | | | | Average | Participation (%) |
|---|---|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | | |
| Vardarski | 9851 | 10813 | 10963 | 10463 | 10566 | 10531 | 6,85 |
| East | 8317 | 12198 | 11617 | 7169 | 6747 | 9210 | 5,99 |
| Southwest | 1013 | 1084 | 1062 | 1077 | 1070 | 1061 | 0,69 |
| Southeast | 69827 | 65722 | 69126 | 83771 | 75442 | 72778 | 47,31 |
| Pelagonia | 26878 | 26449 | 37295 | 38522 | 34748 | 32778 | 21,31 |
| Poloski | 16581 | 16933 | 14048 | 14338 | 13813 | 15143 | 9,84 |
| Northeast | 2405 | 3210 | 2014 | 2556 | 3157 | 2668 | 1,73 |
| Skopski | 5686 | 5322 | 8652 | 10257 | 8303 | 7644 | 4,97 |
| **Total** | **140561** | **141728** | **154770** | **168150** | **153877** | **151737** | **100,00** |

**Source:** *St. Yearbook of the Republic of Macedonia, Skopje 2013*.

## Import of pepper

In order to scale down the deficit in demand for peppers, especially in winter period, the approximately 250 ha of greenhouses had been built over the course of years, across the Republic of Macedonia. According to several analyses, the estimation is that today there are 75% of functional greenhouses. Others didn't have proper maintenance and/or have obsolete equipment that can not satisfy the requirements of new technologies and scientific achievements.

Still, the new greenhouses have been built lately, especially in the proximity of natural springs and geo-thermal springs (area around cities of Gevgelija, Strumica and Kocani). Even so, the Republic of Macedonia imports peppers from 37 countries, mostly from European countries, but also from USA, Jamaica, Kenya, Malaysia, China, India, Egypt etc. Average quantity of imported peppers in the last period (2007-2011) is 640,170 kg for various pepper products. The quantity of imported peppers in the first three years of the observed period increased from 100,421 to 1,303,418 kg and then decreased to

614,985 kg in 2011. When comparing the average quantities of imported peppers per countries, the leading position goes to Kosovo with 23, 64% share in total import of pepper. On the second place is Bulgaria with 19, 45% share, Greece is on the third place with 19,18% share, Turkey has fourth biggest share (16,05%), and Serbia the fifth (8,67%). The sequence for values of import is different then the sequence of the countries that is based on the quantity of imported peppers. Here, the Bulgaria is at the first place with 27,89%, followed by Serbia with 20,37% and Greece with 17, 16%. The value of imported peppers from Kosovo is 39,561 € on average, i.e. the fourth value on the aforementioned list. This means that the Republic of Macedonia imports cheaper pepper products from Kosovo then from Bulgaria.

**Table 5.** *The quantities and the values for imported raw peppers*

| Country | 2009 | | 2010 | | 2011 | | Average | |
|---|---|---|---|---|---|---|---|---|
| | kg | EUR | kg | EUR | kg | EUR | kg | EUR |
| Egypt | 8674 | 9984 | 0 | 0 | 0 | 0 | 2891 | 3328 |
| Greece | 44773 | 35407 | 45649 | 30598 | 79111 | 72527 | 56511 | 46177 |
| Turkey | 6452 | 2452 | 850 | 265 | 1190 | 555 | 2831 | 1091 |
| France | 0 | 0 | 0 | 0 | 24 | 81 | 8 | 27 |
| Serbia | 0 | 0 | 2985 | 896 | 32900 | 8475 | 11962 | 3124 |
| Slovenia | 0 | 0 | 42820 | 18516 | 0 | 0 | 14273 | 6172 |
| Hungary | 0 | 0 | 0 | 0 | 21060 | 9716 | 7020 | 3239 |
| Kosovo | 0 | 0 | 0 | 0 | 3730 | 1119 | 1243 | 373 |
| **Total** | **59899** | **47843** | **92304** | **50275** | **138015** | **92473** | **96739** | **63530** |

**Source:** *(SSO) Commodity international exchange of the Republic of Macedonia, Skopje 2013.*

Only in the last three years of the observed period, the Republic of Macedonia had imported raw peppers from Greece, Serbia, Hungary, Slovenia, France, Egypt and Kosovo. Peppers are mostly imported from Greece (45-80 tons), predominately in the winter period (97-98%, from 15$^{th}$ November to 14$^{th}$ May). The price for the imported raw peppers went from 47,844€ to 92,273€ which is between 7.4% and 16.7% of the value of the total import.

## Domestic consumption of peppers

The total domestic consumption of peppers is the sum of the consumption in the households, i.e. individual and group consumption in offices, institutions and catering facilities. Determining the group consumption has its own difficulties which is why the data for this subject aren't

precise. This is the reason why this analysis will use only data for individual consumption.

**Table 6.** *Individual consumption of peppers*

| Year | Number of residents | kg/resident | Total (t) |
|---|---|---|---|
| 2007 | 2043559 | 25,8 | 52724 |
| 2008 | 2046898 | 25,5 | 52196 |
| 2009 | 2050671 | 28,5 | 58444 |
| 2010 | 2055004 | 23,8 | 48909 |
| 2011 | 2058539 | 22,1 | 45494 |
| **Average** | **2050934** | **25,1** | **51478** |

**Source:** *St. Yearbook of the Republic of Macedonia, Skopje 2013.*

Even though the number of residents in the Republic of Macedonia has 1.8% average annual growth rate, the individual consumption of raw peppers decreases with a rate in between 8% and 15%. The consumption of peppers, in comparison with neighbouring countries, is average. In Serbia, every resident consumes 41.9 kg on average, while in Bulgaria 8.0 kg on average (2007-2011). The households averagely consume 34% of total pepper production in the country.

## Export of peppers

The Republic of Macedonia has always been known as an export-country for peppers, even on the global level. Macedonia has exported peppers in 43 countries: Australia, New Zealand, Canada, USA, Russia, Mongolia, Surinam, Dominican Republic, Yemen etc.

Most part of the exported peppers go to European countries (98.7% of total export). In the countries of EU, Republic of Macedonia exports on average something around 19,205 tons, or 56.4% of total quantity of peppers and pepper products. First ten countries on the list receive almost 89% of total exported peppers. However, Republic of Macedonia has continuously been country that exports peppers, with average quantity of exports over 33,917 tons. Overall quantity of exported raw peppers, in the observed period, was on average 2,301 tons, out of which 75.6% was exported in the period between 15$^{th}$ May and 14$^{th}$ November. The analysis of the export per countries has shown that among 20 countries, Serbia is the most important market partner regarding the export of raw peppers. In the aforementioned period (May-November) 34% of the exported peppers goes to Serbia, immediately followed by Bulgaria with 28.2% share in export value. It is interesting to accentuate that, when considering relative participation in value of exported peppers, Serbia has been increasing its share to almost 47%, while

Buglarian share has been decreasing to nearly 10%. This is a result of significantly higher export prices in Serbia in relation to Bulgarian export prices.

**Table 7.** *Total export (top 10) of peppers and products from pepper*

| Countries | 2007 | 2008 | 2009 | 2010 | 2011 | Average |
|---|---|---|---|---|---|---|
| Bulgaria | 9044081 | 11081473 | 6787880 | 12187115 | 14526854 | 10725481 |
| Serbia | 5078854 | 7718453 | 3331269 | 4741069 | 5196936 | 5213316 |
| Kosovo | 0 | 0 | 3207252 | 3950672 | 4007882 | 3721935 |
| BiH | 1604917 | 2590471 | 3315970 | 3705844 | 2022507 | 2647942 |
| Croatia | 826946 | 1496293 | 4117700 | 3333937 | 2039990 | 2362973 |
| Slovenia | 1363862 | 2329245 | 2610932 | 2798222 | 2307829 | 2282018 |
| Greece | 1153540 | 647715 | 494045 | 953013 | 2336932 | 1117049 |
| Germany | 2604567 | 280519 | 1304999 | 602852 | 707033 | 1099994 |
| Poland | 1179016 | 38782 | 971152 | 878231 | 721333 | 757703 |
| Romania | 374374 | 948811 | 182690 | 1316419 | 815836 | 727626 |
| **Total** | **27870209** | **30110945** | **29573505** | **38585492** | **39206369** | **34557444** |

**Source:** ***(****SSO) Commodity international exchange of the Republic of Macedonia, Skopje 2008-2012.*

During the winter period (15th November-15th May), the Republic of Macedonia exports raw peppers in cca. 16 countries and, again, on the first place is Serbia with 75% share in total quantity of exported peppers. Serbian participation in the value is over 94%. The value of overall export is on average 14,042,000 € and it had been growing over the years observed by this analysis. On the other side, the value of the raw peppers is on average 1,251,000 €, or only 8.9% of total export. The quantity of Macedonia's most famous product made of peppers – ajvar, is 5,575 tons on average. The data show that the export of ajvar is constantly increasing. For example, the increase during the whole observed period (2007-2011) was up to 174%, i.e. from 4,015 tons in 2007 to 6,984 tons in 2011. The increase in the export value is by 1.3 index points higher, which means that in this period there was slight increase of export prices. The realised income from foreign currencies based on export of ajvar revolves between 5,725,000 in 2007 to 10,031,000 € in 2011, which is 8,392,000 € on average. The first place on the list based on export values is, again, Serbia with 24.5% average share in total quantity and with 22.5% share in value of export.

## The balance of supply and demand of peppers

The balance of supply and demand is determined by the correlation between the sum of the produced and imported peppers on one side, and the sum of the domestic consumption and export on the other side.

The data in Table 8 show that the supply market in the Republic of Macedonia has constantly growing quantity of raw peppers (99%) satisfied almost completely by domestic production.

**Table 8.** *Balance sheet for the peppers market (t)*

| Number | Indicator | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| 1 | Production | 140561 | 141728 | 154770 | 168150 | 153877 |
| 2 | Import | 0 | 0 | 60 | 92 | 138 |
| **I** | **Supply** | **140561** | **141728** | **154830** | **168242** | **154015** |
| 3 | Consumption | 52724 | 52196 | 58444 | 48909 | 45494 |
| 4 | Export | 27870 | 30111 | 29574 | 38585 | 39206 |
| **II** | **Demand** | **80594** | **82307** | **88018** | **87494** | **84700** |
| **III** | **Balance (I-II)** | **59967** | **59421** | **66812** | **80748** | **69315** |

**Source:** *(SSO) Commodity international exchange of the Republic of Macedonia, Skopje 2008-2012.*

Along with the supply, the demand is also increasing. Relatively similar tendency for change appear for both elements of demand – domestic consumption and the export of raw peppers on foreign markets. Still, if the dynamic of these changes is more closely observed, the invrease is higher on the supply side of the market, than on the demand side. That indicates that the part of pepper production which is designated for processing industry has had constant growth. The quantity of raw peppers is 66 000 tons on average.

## Analysis of the market prices of peppers

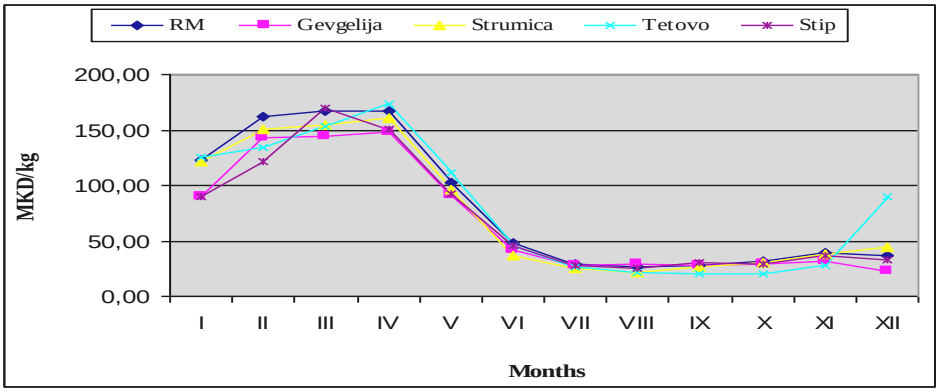
The State Statistical Office publishes monthly prices for peppers based on the prices presented on the 13 small green markets in the Republic of Macedonia. The data is collected on daily basis, during "green market day" specially designated to each of the green markets. During that day, the highest, the most common and the lowest price are taken into the consideration with which one can calculate the most common price for the peppers. The most common price is the one that repeats the most for certain product, on the certain market, no matter the quality of the product.

When determining the price of peppers, one takes green, red and Babura peppers into consideration. Also, the State Statistical Office publishes data for most common prices in large sales and for approximate quantity of peppers supply for those markets, as well as for the redemption prices of peppers that come from business subjects and from family agricultural economies.

The average prices of green peppers in the observed period are 78.73 MKD/kg. The highest monthly price was 167.38 MKD/kg for March and the lowest (26.8 MKD/kg) in August (Chart 1).

The price of green peppers on the wholesale markets for in the researched period decreased from 76.58 MKD/kg in 2007 to 50.58 MKD/kg in 2011. This is the result from increase in the supply of the market. The comparison of the prices for green markets and the prices for large sales show that the peppers in the green markets were sold at 19.5% higher prices in relation to prices for large sales.

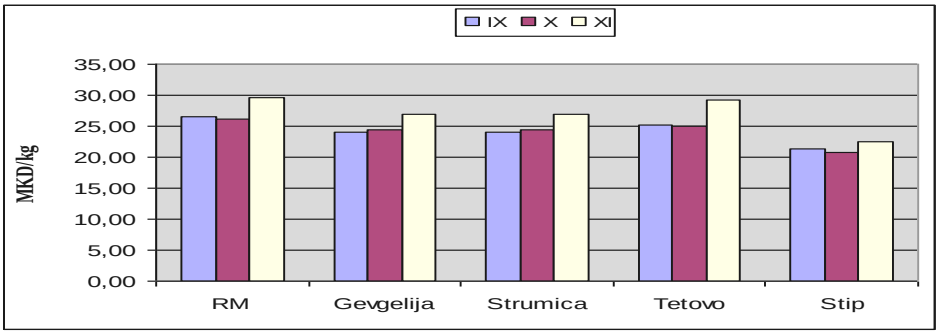
**Chart 1.** *Dynamics of the small-sale prices for green peppers*




**Source:** *(SSO) Prices of agricultural products on retail, wholesale and livestock markets, Skopje 2008-2012.*

The red peppers are mainly sold during September, October and November. The average price on the market was 22.62 MKD/kg, i.e. 17.6% less than the average small-sale price of 27.45 MKD/kg (Chart 2).

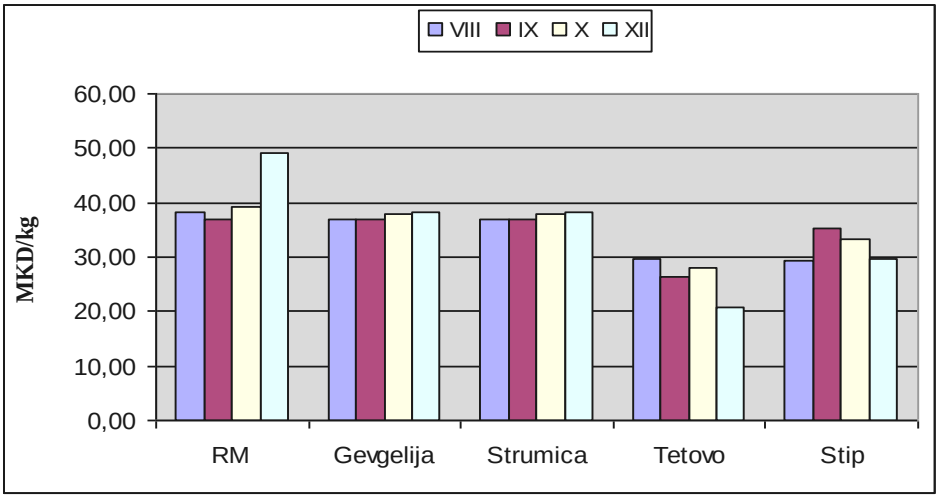
**Chart 2.** *The dynamic of the small-sale prices of red peppers*




**Source:** *(SSO) Prices of agricultural products on retail, wholesale and livestock markets, Skopje 2008-2012.*

The small-sale prices of Babura was on average 40.92 MKD/kg (Chart 3), and during observed years between 38.63 MKD/kg in 2010 and 43.95 MKD/kg in 2008.On the other side, large-sale prices were between 17.97 MKD/kg in 2011 and 48.75 MKD/kg in 2008. Buy-out prices were higher during the observed period, especially in the case of purchasing from business entities and particularly in 2009 when the price of purchase from the family households was 3.4 times higher than the purchase from business entities. On average, the redemption price of peppers is 2.1% higher when purchasing from business subjects in comparison to the purchase from family businesses.

**Chart 3.** *The dynamics of the small-sale prices for Babura*




**Source:** *(SSO) Prices of agricultural products on retail, wholesale and livestock markets, Skopje 2008-2012.*

## The production and overhead costs in pepper production

The production costs were determined with the help of direct questionnaire made for the producers from Strumica region. Production costs stand as a function of the quantity of the used materials or the number of repetition of service and unit price on the local market for purchases in 2011.

The Table 9 shows parallel costs of the pepper production in the greenhouses, particularly one greenhouse or the area covering 155m$^2$ and 1 ha where the 93% of the total surface is productively used.

The results have shown that the costs for basic material have the dominant share in the structure of the total costs. In these cases the basic material, i.e. seadling,

was bought from another producer at the price of 5 MKD/root. On the second place are the costs for greenhouse's plastic covering, i.e. PVC sheets. To cover one greenhouse, one needs 30kg of PVC sheets.

The third and fourth places in the structure of total costs are shared by the costs for protection of the plants and the costs for amortisation of the irrigation and heating system. They are followed by the costs for the packaging of peppers. The peppers are packed in boxes with capacity of 10kg.

The overhead cost for producing peppers, when total cost is 3,073,772 MKD/ha, is 58.22 MKD/kg.

The value of production is a function of realised yield and selling price of the pepper. When calculated, the yield in the heated greenhouses amounts to 52,800 kg/ha. In Strumica region, assuming these conditions for production, the peppers are ready for picking mainly between 15$^{th}$ February and 31$^{st}$ March and 15$^{th}$ April and 1$^{st}$ May. During this time (February, March, April), according to statistical data (2008-2012), the average price of the pepper on the large-sale markets in the Republic of Macedonia was 143.94 MKD/kg. With this selling price, the value of production was 7,600,032 MKD/ha.

Gross margin or the difference between the value of production and the production costs was 59.56% of the gross income.
There is no doubt that pepper production in heated greenhouses leads to higher yields, but to ensure that, one needs relatively high amount of financial means so it could cover the production costs. For open-field pepper production costs are significantly lower.

For the comparison, this analysis will present the results from the research conducted by National extension agency that encompassed 73 family businesses that produced peppers on the open-fields in 2011. The average land area was 0.44 ha. The data presented in the Table 10 show that during the arrangement of costs, different method was used. However, it is obvious that pepper production in the open field requires almost 8 times less means in comparison to the means necessary for pepper production in heated greenhouses.

The necessary means are relatively small, but the gross income is also relatively low. This comes as a result from low selling price (17.10 MKD/kg) because yields aren't that different. The yields from the pepper production in the open field were on average 48,357 kg/ha, which is only 9.2% lower in comparison with the realised yields from pepper production in heated greenhouses.

The absolute amount of gross margin (average of 438,755 MKD/ha) is also lower by more than 10 times. But the relative gross margin value is almost the same (53.06%) as for the pepper production in heated greenhouses.

**Table 9.** *The structure of the production costs for greenhouse pepper production*

| Number | The type of cost | Amount (MKD) | | Structure (%) |
|---|---|---|---|---|
| | | Per 155 $m^2$ | Per ha | |
| 1. | Ploughing in the fall | 83,33 | 5000 | 0,16 |
| 2. | Covering the soil with manure | 500 | 30000 | 0,98 |
| 3. | Manure | 666,67 | 40000 | 1,30 |
| 4. | Ploughing in the spring | 83,33 | 5000 | 0,16 |
| 5. | Building greenhouses | 160 | 9600 | 0,31 |
| 6. | Iron arcs | 680 | 40800 | 1,33 |
| 7. | PVC sheets | 3150 | 189000 | 6,15 |
| 8. | Treating the land with rotary cultivator | 500 | 30000 | 0,98 |
| 9. | Transplanting the plants | 166,67 | 10000 | 0,33 |
| 10. | Seadling | 31250 | 1875000 | 61,00 |
| 11. | Building the irrigation system | 80 | 4800 | 0,16 |
| 12. | Setting up the irrigation system | 80 | 4800 | 0,16 |
| 13. | Cultivating (2 times in a season) | 1000 | 60000 | 1,95 |
| 14. | Irrigation (12 times in a season) | 1000 | 60000 | 1,95 |
| 15. | The protection of the plants | 500 | 30000 | 0,98 |
| 16. | Pesticides | 3000 | 180000 | 5,86 |
| 17. | Nourishment (2 times in a season) | 70 | 4200 | 0,14 |
| 18. | Mineral fertilizers | 105 | 6300 | 0,20 |
| 19. | Picking | 1410 | 84600 | 2,75 |
| 20. | Packaging | 2288 | 137280 | 4,47 |
| 21. | Transport and sale | 200 | 12000 | 0,39 |
| 22. | Energy | 1500 | 90000 | 2,93 |
| 23. | Amortisation of the basic means | 2756,53 | 165392 | 5,38 |
| **Total costs** | | **51229,53** | **3073772** | **100,00** |
| Value of production | | 126667,2 | 7600032 | |
| Gross margin | | 75437,67 | 4526260 | |
| Overhead cost (MKD/kg) | | | 58,22 | |

**Source:** *Our calculations based on data from a survey*

**Table 10.** *The structure of production costs for pepper production in open fields*

| Number | The type of the cost | Amount (MKD) | | Structure (%) |
|---|---|---|---|---|
| | | Per 0,44 ha | Per ha | |
| 1. | Seeds | 12778 | 29041 | 7,48 |
| 2. | Manure | 33764 | 76736 | 19,77 |
| 3. | Mineral fertilizer | 20328 | 46200 | 11,90 |
| 4. | Protection | 16062 | 36504 | 9,40 |
| 5. | Fuel and oil | 20209 | 45929 | 11,83 |
| 6. | Mechanization services | 8206 | 18650 | 4,80 |
| 7. | Workers on lease | 20849 | 47384 | 12,21 |
| 8. | Irrigation | 9919 | 22543 | 5,81 |
| 9. | PVC sheets | 3359 | 7634 | 1,97 |
| 10. | Packaging | 4448 | 10109 | 2,60 |
| 11. | Transport | 7598 | 17268 | 4,45 |
| 12. | Other costs | 13267 | 30152 | 7,77 |
| **Total cost** | | **170787** | **388150** | **100,00** |
| Value of production | | 363837 | 826905 | |
| Gross margin | | 193050 | 438755 | |
| Overhead cost (MKD/kg) | | | 8,03 | |

**Source:** *National extension agency, Bitola 2012.*

## Conclusion

Based on the results of the analysis, several conclusions can be made:

1. The peppers have important place in agricultural production, and especially in the garden production in the Republic of Macedonia. Family businesses are main factors in the pepper production, because they own 99% of the total pepper producing land area (8,381 ha).
2. The largest part (3/4) out of total pepper production (151,700 tons) is sold within the country, while small portion is exported. The value of export of raw peppers is over 14 million €. The main trade partner is Serbia with 34% share in total export.
3. In balancing supply and demand for raw peppers, the Republic of Macedonia constantly has surplus. The surplus from raw peppers (66,000 tons on average) is processed into products that include peppers.
4. For pepper production one needs relatively high financial means. The highest amount is needed when building glass greenhouses (cca 700,000 €/ha) and the smallest when producing peppers in open fields (cca 6,300 €/ha). The cost of building greenhouse for pepper production (with heating system) is around 50,000 €.

5. Even though one needs relatively large amount of financial means for pepper production in greenhouses (plastic covered), this kind of pepper production brings relatively high profit.

## References


1. Esendugue Greg Fonsah, Cesar L. Escalante, Mark Byrd (2005): *Economics analysis of pepper production, marketing and management in Georgia*. The University of Gorgia, Colege of Agricultural & Environmental Sciences. Agecon – 05-106, September 2005, pp 1-20.

2. National extension agency. (2012): *Report – Management of farm*, Bitola.

3. Singh R. H., Rankine L. B., Seepersad G. (2006): *The CARICOM Regional Transformation Programme for Agriculture: Competitivness of Hot Pepper*. Market Intelligence Report, December 2006, Georgetown, Guyana, pp 1-75.

4. State Statistical Office of the Republic of Macedonia. (2013). *Statistical Yearbook of the Republic of Macedonia*, Skopje.

5. State Statistical Office of the Republic of Macedonia. (2013): *Commodity international exchange of the Republic of Macedonia*, Skopje.

6. State Statistical Office of the Republic of Macedonia. (2013): *Prices of agricultural products on rentail, wholesale and livestock markets*, Skopje.

# SOME ECONOMIC INDICATORS OF ORGANIC AGRICULTURE*

*Mirela Tomaš-Simin, Jovo Miloradić*[1]

## Abstract

*The authors discuss the concept of organic farming in terms of its profitability for producers. The concept of profitability is relatively complex, so in the paper, the authors analyze yields, prices, costs and government grants (subsidies) as the main factors for achieving the appropriate level of profits in the production system. The aim of the study was to analyze the impact of these factors on the profit, and differences between organic and conventional production. The authors comes to the conclusion that the yields in the organic production system are relatively lower, as variable costs, and fixed costs are higher - mainly due to higher labor costs. Prices affect the ultimate economic result (profit), but premium prices for organic products are not always available to producers. Government grants and assistance is extremely important in organic agriculture, especially in the period of conversion and the first years of production. Consequently, the authors conclude that these factors, in certain circumstances, have a positive impact on profit of organic farmers, but can also lead to losses if it is not paid particular attention to their specifics.*

**Key words:** *organic agriculutre, profitability, yield, prices, costs, subsidies.*

## Introduction

In today's market conditions it is important to take into account all aspects of production, especially the economic performance indicators. Unlike conventional agriculture, where the main objective is to increase profits at any cost, according to Sredojević (2002), the goal of doing business in

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organic production is to achieve maximum overall economic results of the farms with achieving ecological optimum. Analysis of economic indicators of effectiveness and efficiency is very similar in organic and conventional production. However, there are certain differences that makes economic analysis of organic production more complex - the application of different crops used in the rotation (to improve soil fertility), and the calculation of the cost of inputs from own production such as animal feed and manure (Wehinger, 2011).

Serbia still has a relatively small number of farmers engaged in organic production, mainly individual farms where production is organized on small areas. They generally do not have adequate record on the economic effects of their production. There is still no obligation for bookkeeping on family farms, with the exception of those that are in the VAT system. Furthermore, Serbia is still in the process of implementing a system of regular collection of economic data. Pilot project FADN (Farm Accountancy Data Network - a system of accounting data on agricultural holdings in the EU Member States) was launched in late 2011 as IPA 2010 program cycle. For now, the data are monitored for only 40 conventional farms. In addition, farmers have traditionally been suspicious and very hard on provideing information on farm business, especially those of an economic nature (Pejanović et al, 2009).

So, given the underdevelopment of organic productions, as well as the difficulty of providing reliable data, analyses of the economic characteristics of organic production are rare in Serbia.

Gain or profit is the main indicator in determining the net effect of any business entity, or any of the products individually (Tomaš et al, 2011). It expresses the size of the economic efficiency achieved within a period of one year. The main goal of every producer, including those who are engaged in organic production is to achieve the highest possible yield and price, with the lower cost per unit area, ie to achieve the largest gain (profit). Differences in the amount of return, sales/purchase prices of organic products, organic production costs and certain government grants that encourage this type of production are the main factors influencing the level of economic efficiency, and the profitability of organic farming (Pejanović et al, 2012).

## Yields in organic agriculture

The technologies used in organic production have a significant impact on the current level of yields. Since this system of production excludes the use of synthetic fertilizers and chemical plant protection products and genetically modified organisms, it is not possible to fully exploit the genetic potential of plants. This certainly affects the level of returns that are achieved in this system of cultivation, and they are, in general, lower than in conventional production, but there are differences depending on the type of crop, region or country. However, studies have shown that with the extension of the period in organic production the differences are reduced, because of the increasing biological capacity of land (Tomaš-Simin and Popović-Vranješ, 2013).

In some European countries such as Great Britain, Germany, Denmark and the Netherlands, the reduction in yield in 1990 was as high as 40%, while in Australia, Canada and the United States reduction was 10-20%, and in some cases yields that were even higher than in conventional production were reported (Lampkin and Padel, 1994).

Results of a 21-year study in Central Europe (1978 - 1999) showed that yields in organic production were 20% lower than in conventional production (Mader et al., 2002).

According to research of Offermann and Nieberg-a (2000), crop yields in Europe are on average lower by 30-40%, while the yield of vegetables are at the level of those achieved in conventional production. Despite lower total yield, some individual crops had the same or even a higher yield in comparison to the crops cultivated in the conventional production.

Due to lower yields in the production of organic livestock feed, changes in diet (increased use of forage plants in relation to the concentrated feed), the price of feed and other specifics of the methods of organic livestock production, growth stocks are on average 20-40% lower than in conventional production (Offermann Nieberg, 2000). Therefore the production of livestock products per hectare of arable land is also slightly lower, while the production per head is pretty similar to the conventional system (Pejanović et al, 2013).

In Europe, milk production per cow is on average lower by 0-20%. It moves in the range from 80% (France, Norway) to 105% compared to the

level of the conventional farms (Belgium, the Czech Republic, Italy). Milk production per hectare is lower and is 70 to 80% of conventional milk production (Offermann and Nieberg, 2000).

Although there are no precise figures, given that in Serbia the use of agrochemicals in conventional production is far more modest than in the developed countries the decline in yields in organic production in our country is lower, and the period of conversion and certification is easier.

## Price efects

An important aspect of the profitability of organic producers is certainly the fact that certified organic products have their own brand and significantly better sales (purchase) price compared to products from conventional production. Prices vary considerably between different marketing channels.

Increased awareness of the importance of healthy food and a healthy environment, contributed to steady growth in organic product demand (Tomaš-Simin and Popović-Vranješ, 2013). On the other hand, there is still a relatively modest supply of these products on the domestic and foreign market. That fact makes it possible to have significantly higher sales (purchase) price of organic products. Of course, the price level in developed countries is influenced by high purchasing power of a large part of the consumers.

The so-called premium price that organic producers can achieve in the market depends on competitiveness, the supply and demand, the purchasing power of citizens, consumers' willingness to pay higher prices for organic products, but also on the ability of organic producers marketing activities.

Offermann and Nieberg (2000) have reviewed the market prices of organic products in 18 European countries. They concluded that it is difficult to calculate the average price of a premium, even within a country because there are a number of sales channels for organic products (with great prices variation) where manufacturers have unequal access.

In most European countries, wheat is sold at an average price that is 50 to 200 % higher than the conventionally produced wheat, while potato ranged from 50 to as much as 500%. The average premium price for

organic livestock products are less. Often a significant share of organic products must be sold at conventional prices, and thus the average price of a premium for organic livestock products is lower. According to the same source, for organic dairy products in Europe they are in the range of 8 to 36%, beef production 20 to 30 %, pork 20 to 70 %, provided that the data vary considerably depending on the country and analyzed region.

The importance of the realization of organic products at higher prices for organic producers profitability is high. This is confirmed by research carried out in Germany and the UK to which 40-75% of the profits of organic vegetable farms were achieved on the basis of achieved higher prices, while for the farms engaged in organic milk production this share is between 10-50% (table 1).

**Table 1.** *The influence of premium prices on organic farms revenues*

| **State** | **Premium prices in profit (%)** | |
|---|---|---|
| | **Crop production** | **Dairy farms** |
| Germany | 75 | 48 |
| Great Britain | 40 | 10-17* |
| Denmark | / | >45 |

* In the UK, the price difference between organic and conventionally produced milk increased in 1998, due to the drastic fall in the price of conventionally produced milk after the revaluation of the British pound.
**Source**: *Nieberg and Offermann, 2003.*

According to research by GIZ conducted on 140 farms that are engaged in organic production in Serbia, the price that these producers achieve on the market is only 10 to 20% higher compared to conventional products (März at all, 2013). Sredojević (2002) states that in Serbia prices for products obtained on the farm with an environmentally sound production system should be 10 to 30% higher than the prices of the same products obtained in terms of conventional production. These are the lowest rates that would be economically viable for manufacturers to be able to achieve the same gain as in terms of conventional production methods.

## Influence of costs

Producers who want to seriously engage in the competition must, before establishing organic production, look at how much will this production cost starting from cultivation to harvest.

They can not affect the sales price of their products, since price is established according to supply and demand, but they can affect the costs of products and services (Vasiljević and Subić, 2010). So, one of the main ways to increase the profitability of organic production is to reduce unnecessary costs, which is manifested through a reduction in the cost per unit of goods or services.

It is the accepted view that the total costs of organic production are higher compared to conventional production. Fixed costs are mostly higher while variable are lower than in conventional agriculture. However, the experience of some EU countries shows that often the costs per area unit of organic farms are even lower than the cost of conventional farms.

As already mentioned, in organic production the use of certain inputs such as fertilizers, pesticides, concentrated feed, is limited and a part of these inputs can be provided on the farm, which has preconditions for the entire cycle of livestock and crop production. Bearing that in mind organic production is achieving lower variable cost (Pejanović et al, 2013).

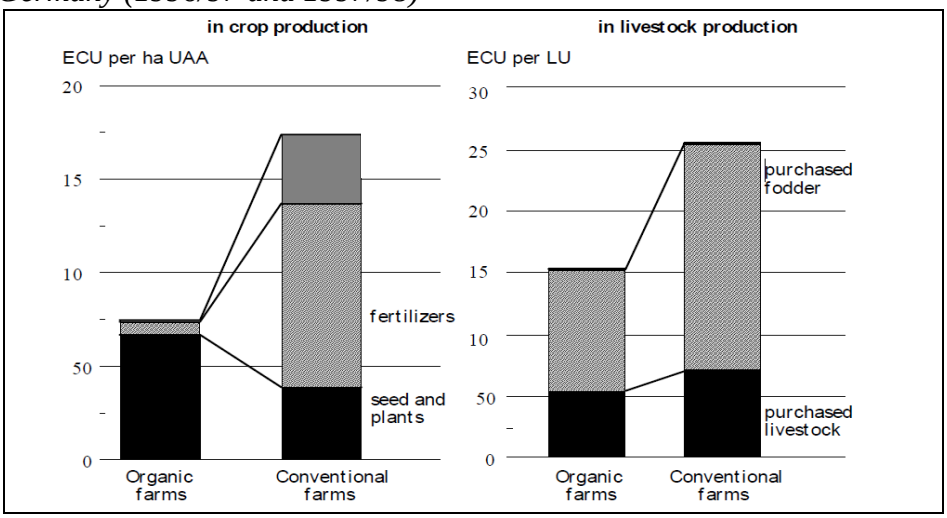
On the other hand, given a relatively modest presence of organic products, the prices of organic inputs (seeds or seedlings, concentrated nutrients produced according to methods of organic production[2], purchased livestock, etc.) are higher, which reduces the above mentioned advantages. Therefore, it is important to combine plant and animal production on farm to provide as many of these inputs, as they are expensive if purchased on the market.

Mäder et al. (2002) in a 21-year study in Europe have found that the use of fertilizer on organic farms (nitrogen, phosphorus, potassium) and power is lower by 34 to 53%, whereas the use of pesticides is 97% lower than in conventional farms.

Comparison of certain categories of variable costs in crop and livestock production on organic and conventional farms in Germany is shown in graph 1, where characteristics of variable costs can be observed.

[2] However, for the organic production there is a limited use of concentrated feed, unlike the bulky. Therefore, the influence of this factor is not great.

**Graph 1.** *Comparison of variable costs in crop and livestock production i Germany (1996/97 and 1997/98)*




**Source:** *Offermann and Nieberg, 2000.*

On the other hand, this is accompanied by an increase of the physical operation, and therefore increased cost of labor, which have the most significant effects on the higher fixed costs of organic production. Depreciation of machinery may be lower due to reduced operations in the application of fertilizers and plant protection products, although the increased importance of mechanical control may in some cases lead to an increase in the machinery cost. Stricter rules regarding the accommodation of domestic animals have an impact on the increase in depreciation of buildings. Increasing importance of marketing and processing on organic farms may involve greater investment in appropriate facilities, and lead to an increase in depreciation of buildings (Offermann and Nieberg, 2000). Also, additional fixed costs of organic production are related to the cost of certification of these products.

Organic producers can influence on the decrease of production costs, and thus increase of profits on following ways:

**a) The recycling of the greatest possible amount of material on the farm -** an effective way to lower the prices of fertilizers used in organic production is the maximum recycling of organic materials from farms - eg. plant and animal residues originating from the garden and the kitchen as well as the remains of vegetables, fruits, leaves, stems, cut grass, straw, ash, pieces of food, and the like that can be converted into compost. The twigs and leaves can be used for mulching.

**b) Minimizing external inputs -** lower costs, and hence better economic results are achieved when the largest number of inputs can be provided on farms. Thus, for example, it is important to create a closed cycle of production (the unity of crop and livestock production). The animal husbandry on one hand uses the products of farming (fodder-feed) and on the other hand provides nutrients for plant production and organic matter of soil fertility (manure). Likewise, the reduction of costs may be affected by the production of own seeds and seedlings, preparing own pesticides using a mixture of various local herbs (nettle, comfrey, valeria, chamomile, dandelion, wormwood, etc.), usage (sharing) of equipment and machinery with other manufacturers, instead of insisting on the purchase of own equipment and machinery and so on.

**c) Reducing the workload -** use of preventive measures against diseases, pests and weeds can reduce labor costs.

**d) Inclusion in associations, cooperatives, clusters and other forms of organizing -** In this way, organic producers can increase the scope and range of products; reduce production costs and promotion, as well as the purchase of inputs.

Research in Korea (Kim, 2003) have shown that, on average, the savings due to the limited use of chemical fertilizers and pesticides covered only about 40% of losses or additional expenses incurred as a result of lower yields and higher labor costs in organic agriculture.

Lampkin and Padel (1994) found that in Europe, the variable costs of organic production on average are usually 50 to 60% lower in organic farming of cereals and legumes, 10% to 20% in potato and horticulture and 20% to 25% in dairy cows mainly due to the decrease in the use of concentrates. Fixed costs are generally higher than in the conventional production due to the high share of labor costs, while other categories of fixed costs are alike in most countries.

Comparative analysis of the average cost of production at 7 organic and 176 conventional dairy farms in Britain in the period 1991-1994 is shown in table 2.

**Table 2.** *The average cost of production in organic and conventional dairy farms in the UK three years after conversion (1991-1994) (ECU/ha)*

| Costs elements | Organic farms | | Conventional farms | |
|---|---|---|---|---|
| | **Value** | **Structure** | **Value** | **Structure** |
| **Total costs** | **1303** | **100,00** | **1421** | **100,00** |
| ***Variable costs*** | ***438*** | ***33,61*** | ***648*** | ***45,60*** |
| Seeds and seedlings | 25 | 5,70 | 31 | 4,78 |
| Fertilizers | 24 | 5,50 | 106 | 16,35 |
| Other costs in crop product. | 36 | 8,22 | 64 | 9,88 |
| Purchased concentrate | 211 | 48,17 | 282 | 43,52 |
| Concentrate from farm | 16 | 3,65 | 22 | 3,40 |
| Other nutrients | 23 | 5,25 | 20 | 3,08 |
| Veterinarian and drugs | 45 | 10,27 | 44 | 6,80 |
| Other | 58 | 13,24 | 79 | 12,20 |
| ***Fixed costs*** | ***865*** | ***66,39*** | ***773*** | ***54,40*** |
| Earnings | 280 | 32,37 | 251 | 32,47 |
| Occasional work | 4 | 0,46 | 15 | 1,94 |
| Contracted work and Leasing | 101 | 11,67 | 45 | 5,82 |
| Repair services and insurance | 79 | 9,13 | 77 | 9,96 |
| Fuel | 29 | 3,35 | 33 | 4,27 |
| Depreciation (machinery, equipment) | 49 | 5,66 | 121 | 15,65 |
| Overheads | 142 | 16,42 | 128 | 16,56 |
| Lease | 140 | 16,20 | 65 | 8,41 |
| Other land costs | 41 | 4,74 | 31 | 4,01 |

**Source:** *Haggar R. and Padel S. (1996): Conversion to Organic Milk Production. IGER, Technical Review no. 4., according to Offermann and Nieberg (2000)*

The data shows that the average total cost of organic farms is lower than the conventional. Variable costs on organic farms are lower by 32.41%, while fixed costs increased by 11.90% compared to the same achieved on conventional farms (primarily due to higher labor costs).

In Serbia, the negative impact on the profitability of domestic organic producers have a constant problem of lack of organic inputs - reproductive materials, fertilizers and plant protection products and given the limited offer, the problem is the high price of these inputs. For this reason, manufacturers are forced to import the relevant inputs. Also, unresolved problem is the harmonizations of regulations in this field with other existing laws (Tomaš, 2011).There are administrative barriers to import - these inputs are not on the approved list, and can not be imported legally.

Therefore, it is expected that the cost of organic supply, distribution and other services for local organic farmers are significantly higher compared to conventional production, and also in relation to the production of organic food in neighboring countries (Curić and Ceranić, 2011). This certainly has a negative impact on the profitability of local organic producers.

Another problem faced by Serbian producers of organic products is the fact that the certificate from the authorized inspection bodies[3] is sufficient only for the domestic market, while the export of organic products need to have a certificate of recognition in foreign markets (EU, USA, Japan). Serbian representative offices of foreign companies also can not issue a certificate for the export to the EU. This fact increases the cost of production, which has a negative impact on profitability. As long as our organic producers are not able alike to certify and produce organic food, they will not be competitive in foreign markets.

## State subsidies

As the organic farming system integrates manufacturing of high quality food that is based on best environmental practices, which is both socially acceptable and economically viable and therefore important for the sustainable development of the whole society, the state should encourage this type of production. Many countries have access to organic production, supported by adequate financial resources and appropriate legal, institutional and systemic measures. In this regard, particular the European Union, Latin America and Australia stands out, where this form of production is much more common than in Serbia.

Experience shows that without state aid at the beginning, this production can hardly withstand the competition of conventional production, but the effects of this production can not be seen in the short term, because only after couple of years organic production system provides real effects (Bogdanov et al., 2005).

[3] For the 2013 six control organization were authorized by the MoA, "Control Union Danube" doo Belgrade, "Ecocert Balkan" Ltd. Belgrade, "Organic control system" Ltd. Subotica, "Suolo e salute Balkan" Ltd. Belgrade, "Etko Pannonia" doo Novi Sad and "TMS CEE" doo Belgrade ("RS Official Gazette", No. 36/13 of 19.04.2013.).

Organic production is supported by all member states of the European Union, in the framework of agri-environmental programs in accordance with the decree of the Council of Europe, 1257/99 Regulative. For a minimum of five years of dealing with this form of production financial support ranges in the interval from 600 euros/ha for annual crops to 900 euro/ha for perennial crops. However, there are still large differences in the level of support among some EU member states. Thus, for example, in 2003 payment for annual crops varied between 44 € ha in England to 600 €/ha in some parts of Italy (Nieberg at al., 2007).

Studies have shown that on average state benefits in some European countries make up 15-26% of the profits (table 3). There have also been cases of organic producers whose production without these payments would not be economically viable. It certainly speaks of the great influence that state aid has on the profitability of organic production, and therefore the economic viability of the production system.

**Table 3.** *The impact of government payments on the revenue of organic farms*

| State | The share of government payments in profit (%) | The average payment (EUR/ha) |
|---|---|---|
| **Germany (1995-1999)** | 26 | 130 |
| **Denmark (1996-1999)** | 15 | 123 |
| **Austria (1996)** | 18 | 218 |
| **Switzerland (1996)** | 24 | 490 |

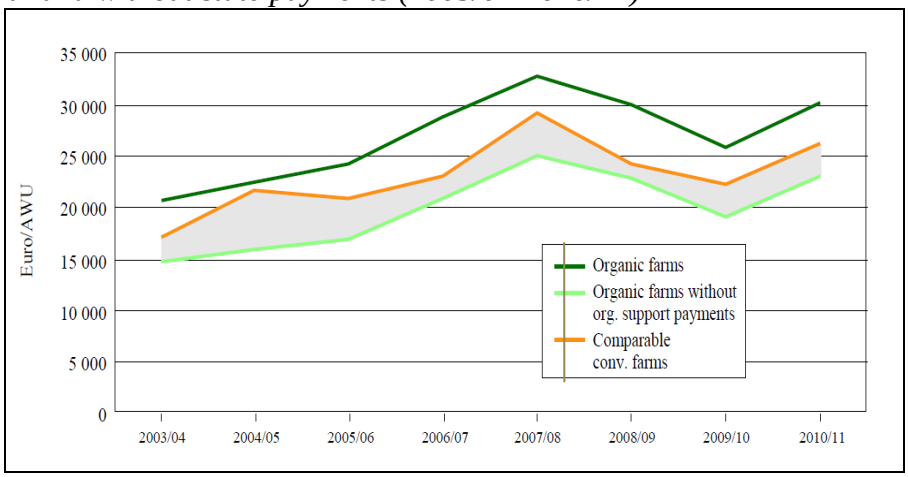
**Source:** *Nieberg and Offermann, 2003.*

According to research of Nieberg et al (2007) in 2001 the share of extra payments for organic production accounted for an average of 4-6% of gross production in Western Europe, and 4-19% in Eastern Europe. Their share in profits (as an indicator of profitability in this case farm income plus wages per unit of agricultural labor is used[4]) in Western Europe interval from 10-32%, and in the countries of Eastern Europe, this share amounts to 75%. Research in Germany has shown that organic farms in Germany without public sector support would not be profitable compared to conventional (graph 2).

[4] It serves as an indicator of the economic return of work. Used for comparison of farm income with different legal status (eg family farm and joint-stock companies or limited liability company in which there is no domestic work), which is important, especially for the analysis of organic farms in the new EU member states.

So, foregoing is talking about the great impact that state aid has on the profitability of organic farming in the EU, and therefore the economic viability of the production system.

**Graph 2.** *Profitability of conventional and organic farms in Germany - with and without state payments (2003/04-2010/11)*




**Source:** *Institute of Farm Economics of the vTI, based on FADN data, year 2003/2004-2010/2011.*

In Serbia, the financial support to the sector of organic farming was introduced into the structure of the agricultural budget in 2005/06, when it provided the sum of 19,000 euros for incentives in the form of reimbursement of costs of certification. In 2007/08 funds were planned to cover the costs incurred during the period of conversion, and in the 2008 11,000 euros was paid. In 2009 MoA approved 27 grants to organic producers in the amount of 46,000 euros. In 2010, out of 98 requests for subsidies for organic agriculture MoA has approved 53 requests, and the total amount paid was € 200,000. Next year 239 requests were submitted, and the total sum paid was around 400,000 euros (March et al., 2013). From a competent ministry plan the incentives for year 2012 were omited; participants were only able to refund 50% of the total cost of certification, but not for the costs incurred during the period of conversion.

Law on incentives in agriculture and rural development ("RS Official Gazette" no. 10/2013) long-regulated subsidies in agriculture, as well as in organic production. Article 38 of mentioned law provides incentives for organic production, which are 40% higher than the incentives for conventional production, both in the conversion period, and for those

producers who are already certified in crop or livestock production. Recently, on the basis of this Law, the Regulations on the use of incentives for organic production ("RS Official Gazette" no. 38/13 of 26 April 2013) defines the conditions for exercising the right to use the funds for organic production.

Pursuant to the Regulation on the allocation of subsidies in agriculture and rural development in the 2013 ("Official Gazette of RS", No. 20/13), the amount of funds for the encouragement of rural development measures amounted to 1,202,721,780 dinars allocated for incentives for sustainable rural development in the amount of 220 million dinars, of which 200,000,000 dinars are earmarked for organic production. The importances of the organic sector have been realized by some local authorities. Thus, for example city government of Novi Sad in the 2011 and 2012 set aside a total of 20 million to improve organic agriculture. These funds were used for financing the certification of new areas for organic production, training of producers, as well as visits to specialized fairs that promote healthy safe food[5]. In the municipalities and local communities where the agricultural budget envisages a share for organic production, new organic food producers are developing, because it certainly contributes to profitability. Obtaining the title of state candidates for membership in the European Union in the mart 2012 Serbia was given the option of opening the fifth component of IPA[6] funds relating to rural development (IPARD). For the organic sector of particular importance is second axis within the IPARD program, which includes a set of agri-environmental measures for organic production.

## Conclusion

In the analysis of the economic efficiency of producers in the organic production system, it can be said that the most critical period for producers in terms of profitability is the conversion period, or the time it takes to move from conventional to organic production methods[7]. During this period a

[5] Taken from: http://poljoprivreda.info/?oid=25&id=1055.

[6] IPA (Instrument for Pre-Accession Assistance) is an instrument of financial support for the EU 2007-2013 budget which is primarily intended for countries that are candidates, and potential candidates in the process of joining the EU. The total budget of IPA for the observed period amounted to 11.468 billion euros.

[7] According to our legislation, the length of the conversion period in crop production is: annual crops - two years before sowing, in pastures and perennial forage crops - at least two years before use as feed from organic agriculture, for perennial plant that are not forage crops - at least three years before the first harvest of organic products.

lower production value are achieved. The manufacturer invests in production, but still does not have a certified organic product for which he can achieve larger, so-called premium price. On the other hand, the yields achieved in this period are lower, but they increases over time.

The yields achieved in organic production are, in general, lower than in conventional production. However, despite higher labor costs in organic production, some studies have shown that this production can even achieve a lower total cost of production. Also, organic products on markets achieve higher sales (purchase) price, while many states measures of economic and agricultural policies stimulate this production. These facts are base of the profitability of organic production.

Analysis of the economic situation of organic farms in Europe (Offermann and Nieberg, 2000) shows that, on average, profits are similar to those on comparable conventional farms, the ratio is in the range of +/- 20% of the profits of similar conventional farms, but variations within the samples are high. Profitability varies between surveyed countries, and between different types of farms. While organic farm profits per unit of family labor are equal to or greater than comparable conventional farms in all analyzed European countries, profits per hectare of used agricultural areas are often lower. This is due to the fact that, in almost all samples, less family labor is used per hectare on organic than on conventional farms - increased demand for work is covered by paid workforce.

However, it is worth noting that the average reflects only a part of reality, and in addition, there are large variations within the samples. Accordingly, the production of the organic can generally be described as more profitable than the conventional. It is necessary to make a detailed analysis in order to reach the right conclusions.

## References


1. Bogdanov N., Sredojević Z., Rodić V. (2005): *Ekonomski aspekti organske poljoprivrede u Srbiji*. Poglavlje u monografiji Organska poljoprivredna proizvodnja (ed. Kovačević D. i Oljača S). Poljoprivredni fakultet, Beograd-Zemun, str. 261-301.

2. Curić J., Ceranić S. (2011): *Lanac vrednosti organske hrane u Srbiji*. Zbornik naučnih radova Instituta PKB Agroekonomik, 17(3-4): 185-191.

3. Institute of Farm Economics of the vTI - Johann Heinrich von Thünen-Institut*:* Analysis of the economic performance of organic farms.

4. Kim C. (2003): *Economic perspectives of Korean organic agriculture***.** In Organic agriculture: sustainability, markets and polices. OECD workshop on organic agriculture, Washington, U.K., USA, pp. 157-170.

5. Lampkin N., Padel S. (eds) (1994): *The Economics of Organic Farming – An International Perspective*. CAB International, Wallingford.

6. Mäder P., Fliebach A., Dubois D., Gunst L., Fried P., Niggli, U. (2002): *Soil fertility and biodiversity in organic farming*. Science 296 (5573):1694–1697.

7. März U., Kalentić M., Stefanović E., Simić I. (2013): *Organska poljoprivreda u Srbiji 2013.* Nacionalna asocijacija za organsku proizvodnju "Serbia Organica".

8. Nieberg H., Offermann F. (2003): *The profitability of organic farming in Europe*. In Organic agriculture: sustainability, markets and polices. OECD workshop on organic agriculture, Washington, U.K., USA, pp. 141-152.

9. Nieberg H., Offermann F., Zander K. (2007): *Organic Farms in a Changing Policy Environment: Impact of Support Payments, EU-Enlargement and the Luxembourg Reform*, in Organic Farming in Europe: Economics and Policy, Vol. 13. University of Hohenheim, Stuttgart, Germany.

10. Offerman F., Nieberg H. (2000): *Economic Performance of Organic Farm in Europe*. Organic Farming in Europe: Economics and Policy, Vol. 5, University of Hohenheim, Stuttgart, Germany.

11. Pejanović, R., Popović-Vranješ Anka, Maksimović, G., Tomaš Mirela, Petrović, D. (2009): *Agroeconomical analysis and organic agricultural production*. Contemporary agriculture, Agricultural Faculty, Novi Sad, Vol. 58, br. 3-4, str. 157-164.

12. Pejanović, R., Tomaš, Mirela, Popović-Vranješ, Anka, Glavaš-Trbić, Danica (2012): *Some economic indicators of organic plant production.* The Forth Joint UNS – PSU International Conference on BioScience: Biotechnology and Biodiversity, Conference Proceedings, University of Novi Sad, pp. 220-225.

13. Pejanović, R., Tomaš-Simin, Mirela**,** Glavaš-Trbić, Danica, Popović-Vranješ, Anka (2013): *Economics of Organic Milk Production.* 23rd International Symposium "New Technologies in Contemporary Animal Production". Book of Proceedings, University of Novi Sad, Faculty of Agriculture, June 19-21, Novi Sad, pp. 31-33.

14. Pravilnik o korišćenju podsticaja za organsku proizvodnju. „Službeni glasnik Republike Srbije", Beograd br. 38/13.

15. Spisak ovlašćenih kontrolnih organizacija za obavljanje poslova kontrole i sertifikacije u organskoj proizvodnji za 2013. godinu. „Službeni glasnik Republike Srbije", Beograd broj 36/13.

16. Sredojević Z. (2002): *Ekonomski problemi ekološke poljoprivrede*. Monografija. Poljoprivredni fakultet, Beograd-Zemun.

17. Tomaš M. (2011): *Organska proizvodnja i sertifikacija*, monografija, Zadužbina Andrejević, Beograd.

18. Tomaš M., Pejanović R., Glavaš-Trbić D., Njegovan Z. (2011): *Organska poljoprivreda u podunavskom regionu*. Međunarodni naučni skup „Održiva poljoprivreda i ruralni razvoj u funkciji ostvarivanja strateških ciljeva Republike Srbije u okviru dunavskog regiona – razvoj lokalnih zajednica". Ekonomika poljoprivrede, tematski broj: 220-227.

19. Tomaš-Simin, M., Popović-Vranješ, A. (2013): *Organic agriculture as a factor of rural development in Serbia*, International Scientific Conference „Sustainable Agriculture and Rural Development in Terms of the Republic of Serbia Strategic Goals Realization Within the Danube Region", thematic proceedings, December 5-7, Topola, Serbia, pp. 1042-1058.

20. Uredba o raspodeli podsticaja u poljoprivredi i ruralnom razvoju u 2013. godini, „Službeni glasnik Republike Srbije ”, Beograd broj 20/13.

21. Vasiljević Z., Subić J. (2010): *Upravljanje troškovima u agroprivredi Srbije – činilac povećanja konkurentnosti*. Tematski zbornik „Agroprivreda Srbije i evropske integracije - (ne)prilagođenost obostranoj primeni Prelaznog trgovinskog sporazuma“. Društvo agrarnih ekonomista Srbije i Privredna komora Vojvodine, Beograd, str. 77-94.

22. Wehinger T. (2011): *Ekonomija organske poljoprivrede.* Poglavnje u knjizi Priručnik za orgasnku proizvodnju – za osoblje savjetodavne službe. (ed. Mirecki N., Wehinger T., Repič R.) Biotehnički fakultet Podgorica.

23. Zakon o podsticajima u poljoprivredi i ruralnom razvoju. „Službeni glasnik Republike Srbije“, Beograd broj 10/2013.

# AGRICULTURAL PRODUCTION AND PROCESSING SECTOR IN TERMS OF RURAL ECONOMY DEVELOPMENT

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## Abstract

*Liberalization of trading relations and capital balance has made easier inclusion of Serbian economy into the international commodity and financial flows. Started changes in the field of agriculture, although under the influence of many factors, which have an amortization effect on them, have took on the character of irreversible processes. A reform of agricultural sector can hardly return to a starting position, but it is more likely to speak on its vacillating rhythm and instruments of agrarian policy, which often should set up the balance between diametrically opposed goals. The agriculture is one of the pillars of economic development of the Republic of Serbia, and its significance for the national economy, besides the economic, has also the social and the ecological component. However, beside a great potential in the sector of agricultural production, which is the result of favourable climatic conditions, natural land and available water resources characteristics, it has not been optimally used. Just due to such potential, the agriculture in Serbia does not represent a common economic branch, since it has been defined as one of the strategic development directions in all municipal or regional strategies.*

**Key words:** *primary agriculture, processing sector, competitiveness, rural economy.*

## Introduction

The Republic of Serbia has favourable natural conditions, for development of diverse agricultural production, since it has been located on the most favourable area of north latitude, which has been

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characterized by four seasons and four climatic areas. In accordance to it, there was provided development of diverse plant and livestock production: cereals, industrial plants, fruits and vegetables, seed and planting material, medicinal plants, neat and small-size cattle. Together with the climate, soil represents the most important natural condition for development and agriculture allocation. It represents a loose top soil of the Earth's crust, which is characterized by fertility, i.e. ability for development of natural vegetation and agricultural cultures' production. Soil fertility is also susceptible to changes and is under the direct impact of climatic, hydrological and biological changes, as well as people's activities. Arable land is mostly (90%) in private ownership – farmers, while the rest of 10% is in the state property and enterprises' property.[3] The most of the arable land is acidified, which is a result of uncontrolled use of chemical means, and in Vojvodina it is saliferous, which, in summary observed, diminishes productive possibilities of agriculture and, at the same time, increases the production costs. Accordingly, there is necessary agro-technical measures aiming to improve the land structure – calcification, as well as better use of organic fertilizers, etc. At the same time, there are natural conditions in Serbia for development of organic agriculture, which reflect, first of all, in unpolluted agricultural areas, as well as in husbandries in mountain regions with encircled cycle of plant and livestock production. Production, processing and market sale of the organic food must be in harmony with the international standards and the Law on the Organic Food Production in Serbia. The area on which collect wild plants in their natural habits by the organic production method in 2009 was amounted around 1.000,000 hectares, while the arable land on which apply the organic production methods was amounted around 1.200 hectares.[4] The organic production is based on an essential link between agriculture and nature, with focus on natural balance estimation. By the organic production and supply of healthy-safe food create the pre-conditions for motivation of export and improvement of social-economic position of rural area and the national economy.

Based on population income trend and supply-demand trends on the world market of agricultural-food products, in the following ten-years-lasting period, anticipates increase of the agricultural products' consumption. Due to an expected income growth, the consumption of

[3] http://www.pks.rs

[4] *Altered and supplemented national program for integration of the Republic of Serbia into the European Union*, Government of the Republic of Serbia, Belgrade, December 2009, p 278

agricultural products for human nutrition will grow faster in the countries, non-members of the OECD. Simultaneously, in developing countries, will come to change of habits in consumption, where will increase a share of products of animal origin, meat and dairy products, as well as of sugar and vegetable oils consumption. All this will cause increase of a derived demand for fodder, like grains, except wheat, soy and sunflower ground grains.

The national policy of the Republic of Serbia bases on membership in the European Union (EU) and the World Trade Organization (WTO). In accordance to it, Serbia must accept their rules, but also to tend to better positioning in negotiations. In compliance with such policy, Serbia is giving up the self-sufficiency strategy for any product, which implies the market liberalization and free trade with other countries. Since Serbia aims to become the EU- and the WTO-member, the agriculture should be prepared for competition on developed, free of trade barriers. The existing bilateral agreements in free trade, with surrounding countries, Serbia has replaced in 2006 with the one within the CEFTA (Central European Free Trade Agreement) agreement, by which it has accessed the market of 27 million people and has accepted responsibility to realize it to promote the trade in this region. Also, the Stabilization and Association Agreement (SAA) provides quantitatively new level to preferential relations Serbia agriculture exchange with agriculture of the European Union, because it provides asymmetry in favour of Serbia, according to which the European Union determines and continues its duty free import of agricultural and food products from Serbia, while Serbia gradually decreases its customs and other customs duties, during the transitional period of 5 years, for the most of these products.[5]

The Serbian agriculture characterizes a gradual liberalization, since the protection level will reduce in phases, according to negotiations with the WTO and the SAA. The agriculture sector has already stamped down a solid path towards the European Union market, because almost half of the total export directs to the EU market and realizes a significant surplus in exchange. The agriculture in the SAA comprises the primary agricultural products, fishes and fish products and all food products, as well as the products immanent in the Annex I of the WTO's Agreement on

[5] Group of authors (2008): *Economic guideline through the Stabilization and Association Agreement*, ISAC Fund, Belgrade, p 45

Agriculture.[6] The free trade zone of agricultural products forms gradually during the transitional period of six years. This is the period in which agricultural producers in Serbia should improve their competitiveness, and support to this process should be agrarian policy of the national economy. Establishing the free trade zone with the EU, as a result of the SAA, will influence to decrease in prices of raw materials and production materials, which import from the EU, for the need of agriculture. At the same time, the economic effects of the SAA will manifest through safe and long-term determined amounts for a preferential placement. The modern market chains in Serbia are not sufficiently built. In such conditions is necessary to include small producers in a modern market chain, because they are not enough competitive, they trade in informal channels, and their cost of standard introduction is high. There is also necessary to improve the competitiveness on processing capacities level, which would by that find new markets and increase the consumption. In the field of the primary production, there notices a great competition, while on the processing level there is a low competition, which is a result of unattractive area for investing, due to a high tariff protection. The changes in buyers' requirements, their demand or habits, provoke also the changes in market chains functioning. It is expected that, during the global crisis, these changes to be more expressed.[7] According to the same source, owing to decreased demand on some markets, the producers have to adopt their production to new demands, the tradesmen have to find new markets and to adjust to new sales conditions with a long delay in payment, or to find new points of sale or new financing sources.

**Performances of the primary production sector and the processing sector**

The most important elements of reform processes in the Serbian agrarian sector, until now, have surely been: market liberalization, privatization of processing industry, activating the agrarian financial market, as well as starting the new institutional forms at all levels.[8] The primary agricultural production is still an important factor of the total national economy, first

[6] Group of authors (2008): *Economic guideline through the Stabilization and Association Agreement*, ISAC Fund, Belgrade, p 31

[7] Group of authors (2009): *Impact of the global economic crisis on Serbian agriculture,* USAID, April-May

[8] Bogdanov, N., Volk, T., Rednak, M., Erjavec, M. (2008): *Analysis of a direct budgetary support to agriculture and rural development of Serbia,* Government of the Republic of Serbia, Team of the Government's Vice-presidents for implementation of the Poverty Reduction Strategy, July-September, p 14

of all, due to its share in the GDP and total employment. The primary agricultural production share in realized GDP has constantly decreased since the beginning of 2000, so it had amounted in 2007 8.7%, and the share of food industry, beverages and tobacco production in the realized GDP (2001-2008) had amounted 5.5%, with obvious permanent decrease tendency.[9] Although, in this sector, comes to a reduction of share in the GDP, it significantly contributes to other industrial sectors of Serbian economy, which directly depend on the raw materials from agriculture, then inputs industry for agriculture, as well as the related service activities. In structures of sown areas in spring sowing in 2009, the highest share is of cereals, while relatively low share is of vegetables. The analysis of realized production of early crops and berries, in 2009, points out that the highest total yield have wheat and raspberry, and sour cherry regarding early fruits. In production of late crops, the highest is maize production, and regarding fruits and grape production, the most important is plum production, and then follows grapes and apples. As regarding the livestock production, in 2009 was mostly produced pork, then beef, poultry and mutton (*table 1*).

**Table 1.** *Livestock production*

| | | Republic of Serbia | | |
|---|---|---|---|---|
| | | **Total** | **Central Serbia** | **Vojvodina** |
| ***Livestock production, 2009 – primary products*** | | | | |
| Weight gain, t | Cattle | 177.447 | 129.990 | 47.457 |
| | Pigs | 385.827 | 213.680 | 172.147 |
| | Sheep | 42.558 | 36.988 | 5.570 |
| | Poultry | 116.047 | 48.950 | 67.097 |
| Milk [1)], mill. liters | | 1.478 | 1.133 | 346 |
| Wool, t | | 2.403 | 1.961 | 442 |
| Eggs, mill. pcs | | 1.026 | 659 | 368 |
| Honey, t | | 4.577 | 4.142 | 434 |
| ***Produced meat, 2009*** | | | | |
| Meat, t | Beef | 100.199 | 73.568 | 26.631 |
| | Pork | 252.188 | 139.541 | 112.647 |
| | Mutton | 24.517 | 21.427 | 3.090 |
| | Poultry | 80.204 | 35.055 | 45.149 |

[1)] Milked cow's milk used for human nutrition or processing

**Source:**
www.*webrzs.stat.gov.rs/axd/drugastrana.php?Sifra=0003&izbor=odel&tab=95*

[9]Republic Office for Statistics, http://webrzs.stat.gov.rs/axd/index.php

If there makes a comparative analysis with other European transitional countries, ***the share of agriculture in the total employment in Serbia is still relatively high***. In agriculture are employed 21.4% of employees, which represents around 18% of active population. Increased dependence of the agriculture is a result of unfavourable trends on the labour market, i.e. reduced possibility for employment and low investment activity. However, the unfavourable trends affect also to employment in the agricultural sector, because almost 5% of the totally employed, in August 2008, do not work in agricultural activity anymore. It is hard to evaluate what is the crisis impact in this, since the employment decrease can also be a consequence of technology improvement in agricultural production, which necessarily requires less engagement of labour. However, a tempo of labour reduction is higher than usually, and there is noticeable also decrease of investments in new technologies, since the crisis have started.[10] According to data of the Statistical Office of the Republic of Serbia (*table 2*), ***the costs of food, beverages and tobacco, besides a continuous decrease of share are still highly proportioned in the costs of family budgets in Serbia***. This share was amounted 54.0% in 2000 and in 2008 45.8%.

**Table 2.** *Macro-economic indicators of agriculture of Serbia*

| | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|
| Share of agriculture, forestry and fishery | | | | | | | | | | |
| in GDP | % | 18.7 | 18.0 | 13.3 | 11.4 | 11.9 | 10.3 | 9.6 | 8.7 | |
| in employment (ARS) | % | | | | | 23.9 | 23.2 | 20.5 | 20.8 | 21.4 |
| Share of food industry, beverages and tobacco in GDP | | 6.2 | 5.7 | 5.3 | 4.9 | 4.7 | 4.4 | 4.7 | 4.4 | |
| Total | | 87 | 119 | 97 | 93 | 120 | 95 | 100 | 92 | 108 |
| Plant production | | 73 | 150 | 96 | 83 | 144 | 94 | 97 | 82 | 123 |
| Livestock breeding | | 95 | 99 | 102 | 98 | 100 | 101 | 97 | 100 | 97 |
| Share of food, beverages and tobacco in family budget costs | % | 54.0 | 58.4 | 49.0 | 47.7 | 45.0 | 41.7 | 43.4 | 45.1 | 45.8 |
| Trade with agri-food products | mil. € | 63.,0 | 854.1 | 1.133.3 | 1.086.2 | 1.316.2 | 1.353.7 | 1.713.1 | 2.035.5 | 2.327.1 |
| Export | mil. € | 319.7 | 347.4 | 554.9 | 509.4 | 628.7 | 731.7 | 991.9 | 1.217.9 | 1.327.3 |
| Import | mil. € | 311.3 | 506.8 | 578.3 | 576.7 | 687.5 | 622.0 | 721.1 | 817.6 | 999.8 |
| Foreign trade balance | mil. € | 8.3 | -159.4 | -23.4 | -67.3 | -58.8 | 109.7 | 270.8 | 400.2 | 327.5 |
| Share of agri-food products in: | | | | | | | | | | |
| Total export | % | 19.0 | 18.3 | 25.3 | 20.9 | 22.2 | 20.3 | 19.4 | 18.9 | 31.3 |
| Total import | % | 8.6 | 10.7 | 9.8 | 8.8 | 8.0 | 7.4 | 6.9 | 6.1 | 6.4 |

**Source:** *Statistical Office of the Republic of Serbia – various publications*

[10] Group of authors (2009): *Impact of the global economic crisis on Serbian agriculture,* USAID, April-May

This state points out to still low life standard of population and thereby insufficient life quality, since insufficient assets stay for satisfying other needs of non-existential nature. It is a consequence of insufficiently liberalized market and a monopoly position of processors and tradesmen. This state has changed during 2010, in which follows the market liberalization based on obligations within the *CEFTA* Agreement (countries-members have obliged to a further liberalization and removal of non-tariff barriers in trade), implementation of the free trade agreement with Turkey (since January 2010) and the second year of implementation of the Stabilization and Association Agreement between the EU and the Republic of Serbia (SAA).[11]

This is why this period is very important for structural changes in domestic agriculture, where the realization of some measures, due to their character, is possible only in the transitional period when it is possible to achieve the best effect of their implementation. After this period, the measures will be modified and synchronized with the mutual EU policy (*CAP*) and the rules and procedures of the WTO.

Accordingly, of Serbian agriculture is expected to increase a common competitiveness level in regard to quality and prices of products, along with simultaneous adjustment of production, processing and sale with the international standards. Aiming to fulfil these requirements, it is necessary to motivate restructuring in agriculture, in order to amortize negative effects of changes on the agriculture production stability, and economic actors in this field to train for the competitive business.

***The private husbandries dominate in Serbian agriculture and use more than 90% of agricultural land***, while the rest 10% of agricultural land use state/public enterprises and cooperatives.[12] There also assess that there is around 871.000 of private husbandries in Serbia, where the majority have small landed property, divided in several separated plots. However, there are registered 441.893 agricultural husbandries (*table 3*).[13]

[11] Program of distribution and use of subsidies in the field of incentives of agriculture and agricultural production in 2010

[12] *Rural development in the Republic of Serbia*, Exchange2, Mutual support to local authorities, Standing Conference of Towns and Municipalities, the project is financed by the EU, 2008

[13] Ministry of Finances of the Republic of Serbia, the Treasury, http://www.trezor.gov.rs/rpg-statistika-cir.html

**Table 3.** *Number of registered agricultural husbandries by branches of the Treasury*

| Ordinal number | Branch | 31.12.09 |
|---|---|---|
| 1 | SUBOTICA | 22.517 |
| 2 | ŠABAC | 21.391 |
| 3 | NOVI SAD | 20.767 |
| 4 | VALjEVO | 20.168 |
| 5 | NIŠ | 19.839 |
| 6 | KRAGUJEVAC | 19.523 |
| 7 | LESKOVAC | 19.460 |
| 8 | ZAJEČAR | 19.237 |
| 9 | UŽICE | 18.741 |
| 10 | ZRENjANIN | 17.118 |
| 11 | KRUŠEVAC | 16.852 |
| 12 | SREMSKA MITROVICA | 16.842 |
| 13 | PANČEVO | 15.783 |
| 14 | JAGODINA | 15.693 |
| 15 | ČAČAK | 14.769 |
| 16 | SOMBOR | 13.875 |
| 17 | KRALjEVO | 13.589 |
| 18 | PROKUPLjE | 12.704 |
| 19 | POŽAREVAC | 12.310 |
| 20 | VRANjE | 12.170 |
| 21 | NOVI PAZAR | 11.633 |
| 22 | LOZNICA | 10.920 |
| 23 | VRBAS | 10.900 |
| 24 | SMEDEREVO | 10.703 |
| 25 | PIROT | 8.282 |
| 26 | PRIJEPOLjE | 8.259 |
| 27 | NOVI BEOGRAD | 6.933 |
| 28 | KIKINDA | 6.812 |
| 29 | ČUKARICA | 6.606 |
| 30 | VRŠAC | 6.281 |
| 31 | VOŽDOVAC | 5.542 |
| 32 | PALILULA | 2.988 |
| 33 | KOSOVSKA MITROVICA | 2.363 |
| 34 | STARI GRAD | 323 |
| | **TOTAL** | **441.893** |

**Source:** *Ministry of Finances of the Republic of Serbia, the Treasury*, http://www.trezor.gov.rs/rpg-statistika-cir.html

The most of the registered husbandries have landed properties of 2-5 ha, and the least of husbandries have the properties of 15-20 ha and over 20 ha. Big husbandries (over 10 ha) are mostly registered in South-Banat and South-Backa district, and the least in Nisava and Pcinj district; the most of husbandries with mid-size properties (5-15 ha) are in Macva and South-Banat district, and the least in Pirot and Pcinj district.[14] Observing by a number of the registered agricultural husbandries, according to the

[14] *Rural development in the Republic of Serbia,* Exchange2, Mutual support to local authorities, Standing Conference of Towns and Municipalities, the project is financed by the EU, 2008

Treasury's branches, the largest number is registered in: Subotica (22.517), Sabac (21.391), Novi Sad (20.767), Valjevo (20.168) and Nis (19.839).

***Cooperatives and other forms of association*** of the agricultural producers (cooperatives; clusters; contracting community of arable farmers, livestock breeders and other producers; machinery rings, etc.) represent a significant factor for improvement of agricultural production and agrarian performances of Serbia. The official data on number of the registered cooperatives differs depending on a question if a cooperative was registered only as agricultural, or it had registered the agriculture as one of the activities. In Serbia is registered totally 3.435 legal entities (which, besides the cooperatives and cooperative associations, comprise also the other legal entities, which in its name have a word like – „cooperative", i.e. abbreviations as „coop" or „cop") 3.067 or 89.3% are the cooperatives, 25 or 0.7% are the cooperative associations, and the rest 343 or 10.0% are the other legal entities, which in their firms' title use some of the mentioned terms.

In the past, t***he agricultural enterprises*** had based their business on size economy, which had made conditions for implementation of modern techniques and technology and establishment and development of seed production. As such, they were a stimulating factor for occurrence and development of food industry in the same organizational frames of combine type. Through the state, and later on the public property, there was assigned a role of cheap products' producers, which goal was to keep self-sufficiency of basic agricultural products, which in fact provides a strategic stability of a country and social security of population. According to this concept of agriculture development, which implied a direct administrative control of flows in agriculture, the agricultural enterprises had a role of an intermediary between the agricultural husbandries and inputs producers of food industry. As distinguished from the individual husbandries, a size of a property of agricultural enterprises is not a limiting factor, so, thanks to it, they have a high level of agro-technical measures use.

Organizational design of these enterprises is complex and determinated by a number of business functions, specialization of agricultural production, but also formal-legal status, since that, owing to unfinished privatization, some enterprises have undefined status, and in some cases, owing to a bad privatization, the enterprises are in accounts

blockade. On the other hand, successfully privatized enterprises are insufficiently active regarding investments, since there is present a continual decreasing trend of share of the Gross Domestic Product (GDP), realized in agriculture and the total GDP, which is, among other things, a consequence of decreasing share of agriculture in totally realized investments. The agricultural enterprises in Serbia still have specific facilities for storing and finishing of agricultural products, since their development has implied the construction of big business systems of combine type. It assumed also the food industry development within the agricultural enterprises, where a significant part of food industry had organizationally separated from the agricultural enterprises' structure, into special business systems. Nevertheless, a certain part of storing, finishing facilities and the agricultural products primary processing capacities have kept within the agricultural enterprises.

The complex business systems in Serbian agriculture provide higher production, implementation of scientific solutions, i.e. technical-technological inventions. Those systems have more organizational units, for which is characteristic relatively large range of autonomous business decision making. Thereby, those systems are composed of numerous specific economic entities, i.e. the enterprises which have special legal and economic status.

**The growth of the primary agricultural production affects directly to food production development.** This growth in long term has contributed to increase of food industry share in the total industrial production from 10% in '80s of XX Century to 35% in the beginning of this century. In past years, decrease of the primary production affects to exploitation of food industry capacities, so there can be concluded that construction and a level of technical-technological equipment of food industry mostly is not a limiting factor of the agricultural production increase.

**In the food industry, the construction and the level of technical-technological equipment is very heterogeneous.** The most was invested in oil, milk, sweets production and in water processing industry, while, on the other hand, less investments and poorer technological equipment are registered in industry for processing of sugar, meat, fruits and vegetables. At the same time, there is relatively low exploitation of food industry capacities, which ranges 30%-50%. The highest exploitation level is regarding the capacities for mineral water production, oil plants, mills,

facilities for fruits and vegetables processing, for sweets production, breweries, dairy plants and sugar refineries.

**The lowest exploitation level is regarding the capacities for processing of animal feed (fodder) and slaughterhouses**. It is evident that there is a surplus of capacities in processing industry, since they were projected for the ex-SFRY market. Exactly with signing the *CEFTA* Agreement makes a chance for increase of the capacities exploitation, which will be, at the same time, a test of our price and non-price elements of competitiveness. The food industry structure in Serbia has been uneven regarding the technological equipment and knowing the marketing logic. On one side, there are the enterprises which have high technical-technological equipment and have adequate qualification structure of employees, while, on the other hand, there are the enterprises which stagnate regarding new technological and marketing trends.

In the Republic of Serbia, dominant branches of food industry are: production of flour and flour products, production of edible oil and oil products, production of sugar, production and processing of vegetables and fruits, production of milk, production of meat, production of sweets, and production of alcoholic and non-alcoholic beverages.

Successful inclusion on the international market limits insufficient assortment of food products in regard to an actual supply in developed world, where has been neglected the research for better exploitation of the existing capacities, through introduction of new lines and products. As a limiting factor points out the quality oscillation of market products, as due to non-existence of standards, as well as due to disrespect and insufficient control of the current standards. There is also a slow adjustment to the market business criteria, which base on the introduction of modern management and marketing systems. Insufficient predictability in food industry business has been caused by absence of long-term contractual relations between the food industry and the raw materials producers[15], as well as the absence of the market integration, the primary agricultural production and industry, which uses exactly the agricultural products as its input.

The foreign market requires the production of healthy-safe food of high quality, for which there are much potential in Serbia, so the food industry should direct to such production programs. A basic assumption for this

[15] Husbandries, cooperatives and agricultural enterprises.

production, as well as the sale on the foreign market, is introduction of the standards *ISO* 9000 and *ISO* 14000, as well as the introduction of the *HACCP* quality system. In such circumstances, developmental policy of a country must pay a special attention to the food industry, but this policy has to be compatible with the global trends, which reflect in the capacities concentration and developed technology. The domestic food industry, objectively, has great chances to be a leader in this sector on the territory of south-east Europe.

A perspective of the food industry supposes the industry development, which has been focused at the consumers' needs and desires satisfaction, with an accent on innovations, quality, high level of food hygiene and food safety standards. A developmental role is based on natural potentials, characteristics of the national demand, which absorbs the most of the family budget for nutrition, dynamics of demand in the world, the existence of the processing capacities which require, mostly, only reconstruction and modernization and price competitiveness for some, the most important, export products.[16]

## Rural areas

Division of settlements on rural and urban is done in compliance with the specific conditions and needs, according to which the countries choose specific criteria for classification of settlements types, since there are no common criteria in this field. *According to the OECD definition of rurality, there are two levels of territorial units: 1. Local, 2. Regional*. The OECD determines rural areas at the local level in accordance with population density: those are the settlements with population density under 150 inhabitants/km². On the other hand, at the regional level, the OECD recognizes bigger functional and administrative units, depending on share of population, which live in rural communities in the total population of the specific region:

- Regions in which over 50% of population live in the rural communities – predominantly rural regions,
- Regions in which 15-50% of population live in the rural communities – significantly rural regions or transitional regions,

[16] *National Strategy of Economic Development of the Republic of Serbia, 2006-2012*, p 47 http://www.srbija.gov.rs/extfile/sr/62206/strategija_privrednog_razvoja163a_cyr.zip

- Regions in which less than 15% of population live in rural communities – predominantly urban regions.[17]

The Republic of Serbia has no official definition of rural areas, since there was not still done synchronization with a geo-code standard of the European Union, according to which Europe has been divided into the administrative regions (so called, NUTS regionalization). The Statistical Office of the Republic of Serbia does not use the rurality indicators, familiar to the international practice, as: number of inhabitants, population density, share of agricultural population, etc. In accordance with this approach, the rural areas represent parts of the country as a residual of urban, so this classification is based, first of all, on municipal decisions to assign a status of urban settlement to a specific settlement, according to if it has a done general urban master plan. By that is made heavier the analysis of the rural areas' statistical indicators in Serbia. Consequentially, until completely does not implement the NUTS regionalization, there is necessary the implementation of modified SORS categorization, after which in the rural areas belong all territories except 24 towns, which status has been defined by the Law on Territorial Organization of the Republic of Serbia.[18] Since the agricultural production registers also in some municipalities of Belgrade and Nis, in these two cities were implemented previously mentioned *OECD* rurality classification.[19]

***The rural areas economy*** is, nevertheless, based exactly on exploitation of natural resources and high dependence of the primary sector, and especially agriculture. The rural areas of Serbia encircle 85% of the Serbian territory, in them lives 55% of population, and forms 41% of the GDP of a country.[20] The economic structure of Serbian rural areas is, according to the data of the SORS, as follows: primary sector (32.48%); secondary sector (41.12%); tertiary sector (26.06%); public sector (0.34%); unknown (0.34%). Thereby, the share of agriculture in the GDP of rural areas amounts 29.81%, which is significantly higher in regard to the other transitional countries, since Serbia has significant resources for

[17] Bogdanov, N. (2007): *Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija*, UNDP, Belgrade, p 39

[18] Law on territorial organization of the Republic of Serbia, passed on 28th December 2007, Official Gazette 129/07

[19] In rural areas are included the municipalities Barajevo, Sopot and Surcin near Belgrade, and Niska Banja near Nis.

[20] Bogdanov, N. (2007): *Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija*, UNDP, Belgrade, p 31

the agricultural production. However, a low life standard of agricultural producers is a consequence of low productivity and intensity of Serbian agriculture. After the SORS methodology (Serbia=100%), the productivity in the primary sector of rural areas is 87%, in the secondary 74.93% and in the tertiary 62.48%, so it is noticeable a significant lag behind the productivity at the republic level.

The share of agriculture in the total employment in Serbia amounts around 20%, so it classifies Serbia in exceptionally agrarian country.[21] There is present a decrease of this indicator, but not equally as in other transitional countries, which is a consequence of slow restructuring of enterprises in Serbia and reforming of the national economy, which had resulted with unfavourable trends on the labour market, i.e. a high unemployment. Besides, the labour market in Serbia has been characterized by a large disguised unemployment and poor mobility of labour. On the other hand, the labour market in rural areas is characterized by: modest proportion of the private sector, unfavourable age and educational structure in regard to the total population, higher unemployment of working population, employment in the primary sector is high and in the tertiary – low.

That is to say, the sector structure of employment in Serbian rural areas is as follows: the primary sector (32.98%); the secondary sector (30.69%); the tertiary sector (18.60%); the public sector (14.84%); unknown (2.89%). In the structure of small rural households' income in Serbia, the most are represented the non-agricultural incomes, from the sale of agricultural products and pension incomes.[22] The structure of employment and income of the rural population point out that in Serbia dominates "pressed by affliction" diversification of income, as a consequence of unfavourable economic environment and poverty. Thereby, the highest share in the total incomes of rural population of all areas have the employees' earnings, and right behind are incomes in agriculture. This data shows a disproportionate relation of employees in agriculture (45%) and its share in the total households' incomes (25%), which, once more, testifies low realized agriculture productivity. Economic development of the rural areas implies much wider field than the agriculture, and the policy goals and the measures of rural development do not refer only to

[21] Survey on labour, 2008, Republic Office of Statistics of RS

[22] Bogdanov, N. (2007): *Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija*, UNDP, Belgrade, p 32

the farms and the producers. According to the clause 12 of the Law on Agriculture and Rural Development, the *"measures of rural development are a kind of incentives in which stimulates the competitiveness improvement in agriculture and forestry (investing in agriculture and forestry and introduction of new standards in production and turnover of the agricultural products), improvement of the environment protection program, preservation of biodiversity and program of rural economy diversification and life quality improvement in the rural areas*".[23] The rural development supposes different socio-economic activities, defined by the rural policy and directed to the rural areas. They should contribute to improvement of the life quality and business in the rural areas, first of all, through investments in means of agricultural production, construction and reconstruction of rural infrastructure, training and education of the rural population, affirmation of traditional and cultural values, the environment protection, development of the rural tourism, etc.

## Conclusion

The agriculture, together with the agro-industry, is an indisputable developmental chance of Serbia, and its role and significance in the national economy will not decrease. However, in order for the agriculture to use its chances and enable itself for the intensive production and higher export, two essential and structural problems on the agro-food products market, look for a constructive solution and coordinated role of all government institutions:

- strengthening the competition on the repurchase market and agricultural products retail and sanctioning of a dominant position abuse, by a number of companies (at the moment, the market is characterized by olygopsony market structure, i.e. a strong negotiating power of small number of companies in purchase),

- Redirecting the repurchase flows from "grey" economy into regular channels; the grey economy leads to unequal conditions of firms competition, which do business according to the law and the ones which circumvent the law, and domination of the grey economy has been noticeable not only in sale of products, but also in business of the firms, employment of workers, etc.

[23] *Law on Agriculture and Rural Development*, "Official Gazette of RS", no. 41/09

Thereby must emphasize that, no matter how good they are, isolated activities of the MAFWM of the Republic of Serbia in this segment are not sufficient for changes and inclusion of all institutions, especially jurisdiction and legislative – it can lead to solution of evident problems in functioning of the agricultural products' market.

## References


1. *Anketa o radnoj snazi 2008*, Republički zavod za statistiku RS.

2. Bogdanov, N. (2007): *Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija*, UNDP, Beograd.

3. Bogdanov, N., Volk, T., Rednak, M., Erjavec, M. (2008): *Analiza direktne budžetske podrške poljoprivredi i ruralnom razvoju Srbije*, Vlada Republike Srbije, Tim potpredsednika Vlade za implementaciju Strategije za smanjenje siromaštva, jul-septembar.

4. Grupa autora (2008): *Ekonomsko-privredni vodič kroz Sporazum o stabilizaciji i pridruživanju*, ISAC Fond, Beograd.

5. Grupa autora (2009): *Uticaj svetske ekonomske krize na poljoprivredu Srbije*, USAID, april-maj.

6. *Izmenjeni i dopunjeni nacionalni program za integraciju Republike Srbije u Evropsku uniju*, Vlada Republike Srbije, Beograd, decembar 2009.

7. Ministarstvo finansija Republike Srbije, Uprava za trezor, http://www.trezor.gov.rs/rpg-statistika-cir.html

8. *Nacionalna strategija privrednog razvoja Republike Srbije od 2006. do 2012. godine*, http://www.srbija.gov.rs/extfile/sr/62206/strategija_privrednog_razvoja163a_cyr.zip

9. *Program raspodele i korišćenja sredstava subvencija u oblasti podsticanja poljoprivrede i poljoprivredne proizvodnje u 2010. Godini.*

10. *Republički zavod za statistiku RS*, http://webrzs.stat.gov.rs/axd/index.php

11. *Ruralni razvoj u Republici Srbiji***,** Exchange2, Zajednička podrška lokalnim samoupravama, Stalna konferencija gradova i opština, Projekat finansira EU, 2008.

12. *Zakon o teritorijalnoj organizaciji Republike Srbije*, izglasan 28. 12. 2007., Službeni glasnik: 129-07;

13. *Zakon o poljoprivredi i ruralnom razvoju*, "Sl. glasnik RS", br. 41/09.

# INVESTIGATION OF THE EFFECT OF WEIGHT AND MEATINESS OF PIGS ON BUSINESS PROFITABILITY IN THE MEAT PROCESSING INDUSTRY[1]

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## Abstract

*Trial testing of chosen parameters was conducted on 30 Landrace pigs, raised on the farm "Žitište" in Banatski Karlovac and slaughtered in the slaughterhouse and meat processing plant "Kosanović". The paper presents slaughter results, i.e. the results of a slaughter balance of three pig categories, when it comes to meatiness and weight of the fattened pigs (live weight 97 kg, 105 kg and 125 kg), where 10 pigs from each category were tested to make a quantitative assessment of carcass (halves) value. The parameters of meatiness[4] were obtained by processing the pork carcass halves ("cut" shoulder blade), and cutting into parts, and they were expressed in kilograms and as percentage (Table 5, 6 and 7). The aim of this trail testing was to prove the causal relation between pig weight and meatiness and their effect on business profitability in the meat processing industry. In order to give a more comprehensive and depictive overview of the causal relation between the current situation in livestock production, the slaughter industry and the analysed parameters, this paper gives the analysis of livestock and slaughtering production in Serbia.*

**Key words:** *pig slaughter balance, economic rules, profitability, meat processing industry.*

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[4] Meat content determined according to the *Rulebook on the Quality of Slaughtered Pigs and Pork Categorisation* (Official Gazette of the SFRY, No. 2/85, 12/85 and 24/86).

## Introduction

In the last two centuries, livestock has been the leading export product of Serbia. That is the reason why it can be said that meat production in Serbia has a long tradition, so the success of Serbian agriculture is due to this industry. Pigs fed on acorns in oak woods were especially demanded on markets all across the Habsburg monarchy. Livestock trade was very important to the Serbian business elite of the 18th century. Miloš Obrenović used to go to Zadar with herds even before the First Serbian Uprising. Nevertheless, in the period of the Customs War (1905-1911) the meat processing industry started to grow in Serbia and in only couple of years it changed the foreign trade orientation completely, increasing the trade with Great Britain by 8500%. Serbia, however, was not seen yet as an important factor, since there were only slightly more than 16,000 people (less than 1%) in Serbia who worked in the industry sector[5]. Therefore, it was very difficult for Serbia to create a product that would make it recognisable worldwide. At the time, investments in Serbian industry were so little that at one point almost 15% of money came from the Serbian Class Lottery Fund for Industrial Goals[6].

The beginning of the development of industrial meat processing in Serbia dated from the late 19th and early 20th century, and it was related to building slaughter and cooling facilities. Important slaughter facilities were built in Zemun, Belgrade, Mladenovac, Jagodina, Velika Plana, Kragujevac, Banatski Kralovci and Niš[7]. An important stage in the development of the slaughter industry in Serbia is considered the period 1950-1960, when the existing slaughterhouses were reconstructed and new ones built.

Years of crisis and a transition from public to private ownership were very hard to the meat processing industry. All plants were part of large systems until 1991, and after the SFRY fell apart, the market has significantly decreased.

Many social and economic factors caused a decrease in numbers of slaughtered livestock heads, when compared to the 90s – 4,040,000 pigs and 1,575,000

[5] In their complaint to Duke Miloš, guild associations in 1823 wrote: "A peasant woman would come with a jar of milk, some cheese, or an egg or two, and they would meet her at the gate and collect the tax". Source: Vladislav Milenković, *the Economic History of Belgrade*, 1932, Belgrade.

[6] Antić, Čedomir (2007): feuilleton in the weekly publication "Evropa", No. 186, pp. 13-15, Belgrade.

[7] Kosanović, Nada (2009): *Food Quality as a Competitiveness Factor of Agribusiness of the Republic of Serbia*, PhD thesis, University of Novi Sad, Faculty of Agriculture, Novi Sad.

bullocks per year slaughtered in slaughterhouses, changing the structure of slaughter animals. Moreover, meat consumption per capita has also decreased, from 65 kg in the late 20th century to 47 kg today (in the EU 87 kg).

Before the UN Security Council imposing an embargo, the slaughter industry in Serbia was equipped with modern machines and technology. Back in 1968, the level of equipment of slaughterhouses was one of the conditions for export to EU countries, and Serbia had three export-oriented slaughterhouses. Before falling apart, Yugoslavia even had 47 slaughterhouses registered for meat export to the EU, among which 25 slaughterhouses from Serbia. Sixteen slaughterhouses in Yugoslavia, among which 12 slaughterhouses from Serbia, had a licence for exporting to the USA. The export of canned ham to the USA (about 19,000 tons), mostly from Serbian slaughterhouses, generated about 57 million USD of revenue. Before the embargo, Yugoslav exports amounted to 486 million USD and Serbian exports more than 300 million USD. The export was organized by the STOFO association (the Fund for Improving Livestock Production and Marketing Livestock and Livestock Products). STOFO exporters negotiated on conditions every Friday since the EU used to determine the levy system every Monday.

Export stimulations changed – on average from 31% to 20% prior to the embargo. Imposing the embargo made the stimulations decrease to 3-5.7%. Moreover, the Federal Government adopted a decision to ban relevant organisations to negotiate on minimum export prices, which resulted in an unfair competition and lowering export prices, losing the markets and narrowing the range of export products.

During the embargo, exports stopped and the slaughter industry began to decay together with the primary production, which resulted in only eight slaughterhouses in Serbia that had a licence to export beef in the EU[8], and none to export to the USA. Not only did Serbia lose previous export markets but today it has also lost a major share of ex-YU markets, very important for the pork industry in the past. Losing the market share and bad economic conditions in the last two decades have forced Serbian processors to stop financing and contracting farmers for their fattening service.

[8] There are eight slaughter and meat processing facilities in Serbia that have the export number for exporting meat to the EU: "Big-Bull" Bačinci, "IM Topola" Bačka Topola" "Đurđević" Subotište, "Juhor" Jagodina, "IMES Knjaževac", "Kolbis" Novi Sad and "Carnex" Vrbas.

Before the embargo, Serbian exports of meat, meat products and live animals amounted to more than 300 million USD, which reflected on developing livestock production and the slaughter industry. Today Serbia cannot achieve the EU quote of 8.700 tons[9] and it is still far away from EU standards that allow countries to export to this market. Since large pig exports before the World War II and beef exports of the SFRY, much has changed in the structure and ways of production, as well as in the functioning of the market in Serbia.

Serbian meat production today deals with many structural problems, and has constantly been recording negative trends for several decades. Of all CEFTA countries, Serbia is the biggest producer, exporter and consumer of all kinds of meat, but its production is small when compared to EU production. Serbian pork production is almost seven times smaller than Danish[10], and cattle production almost five times smaller than Dutch. When it comes to its presence and productivity, Serbian livestock production has long been lagging behind most of EU countries, which is expressed as a small share of number of livestock units per hectare of arable land. For instance, in 2009 there were 30 livestock units per 100 hectares in Serbia, 78 in Italy, 78 in Austria, 96 in Switzerland, 172 in Denmark, 275 in Belgium and 335 in Holland[11]. The competitiveness of meat production is also greatly affected by availability of animal feed, genetic material and hygiene and energy inputs, which are closely related to the quality of a production facility. A big part of the problems in meat production lies in an inadequate breeding structure of basic herds and parent flocks because of:

1) closing the market for exports (firstly due to the embargo, and then due to non-tariff barriers as a result of zoonosis in exporting countries);

2) inadequate breeding, especially on family farms;

3) farmers' structure and difficulties of breeding on small farms.

The breeding structure is not satisfactory, and the development of this industry is greatly affected by importing hybrids from countries with developed livestock production. In cattle production, domestic spotted breed Simmental type prevails, while pure Simmental and Holstein breeds are much less present. The presence of fattening breeds is negligible[12].

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[9] EU Directive No. 2016/2005 from December 9th prescribed tariff-rate quotas for "baby beef" for 2006.

[10] Meat quantity in meaty pig carcasses in the Republic of Serbia is 45-50%, whereas in Western Europe it is 50-60%. The highest rate is in Denmark, 55% on average.

[11] Draft Agricultural and Rural Development Strategy of the Republic of Serbia for 2014-2024.

[12] Source: Draft Agricultural and Rural Development Strategy of the Republic of Serbia for 2014-2024.

In commercial industrial production, pigs are raised in big herds, with more than 1,000 heads in 80% of cases. Big commercial production amounts up to 45% of total pig production, while the rest are small herds on small family farms. Production in big commercial enterprises is conducted according to the breeding pyramid system, so each enterprise consists of a nucleus, reproductive and commercial part of a herd. The most common breeds in Serbia are Landrace and Yorkshire, but there are also a number of terminal meaty breeds (Duroc, Hampshire and Pietren). The breeding structure is mostly constituted (58%) with crossbreds of $F_1$ and $F_2$ generations of noble breeds. Besides crossbreds, Sweden Landrace (30-34%), big Yorkshire (3-5%), Hampshire, Duroc, domestic meaty pigs and other Landrace breeds (3%) are also present. Therefore, noble breeds and crossbreds for meat and fat production prevail, while the share of very meaty breeds (Hampshire, Duroc and Pietren) is only 3% and they are used as terminal breeds for crossing with crossbreds of $F_1$ и $F_2$ generations to get the material for meat production. It is typical that there are a great number of crossbreds due to unplanned breeding, as well as a variety of genetic material, but generally, that material is of poor quality. Planned breeding on small-scale farms is explained by the fact that artificial insemination amounted to less than 15%.

## Livestock production analysis

Serbian livestock production is characterised by a constant decline, especially in cattle, pig and sheep production. Only in the last decade, a number of livestock units per hectare have decreased from 0.34 to 0.27, which shows the extensiveness of the total agricultural production in Serbia. In the EU, it is several times higher and it amounts to 0.98 livestock units per area unit. This extensiveness is due to relatively poor productivity, inefficient land management policies, obsolete technical and technological equipment and a low level of business organisation. Consequently, a decrease in livestock heads has led to a decrease in meat production, from 645,000 tons in 1990 to about 600,000 tons today, alongside with a decrease in meat consumption. On average, 65.1 kg of meat and meat products (about 43 kg of meat solely) per capita is consumed in Serbia, which is quite little, when compared to some other European countries. The annual meat consumption per capita in the EU amounts to 87.4 kg (in Hungary 92 kg, Slovakia 65.7 kg, Czech Republic 73.5 kg, Bulgaria 62.3 kg, and Slovenia 90 kg). Livestock production amounts to only 37.9% of the total agricultural production, which implies there is a decline in extensiveness of this

industry[13]. That particularly refers to cattle production that constitutes 42.6% of Serbian livestock production, and 22-25% of meat production, whereas pig production constitutes 38.1% of the total livestock production and 50% of meat production. The Statistical Office of the Republic of Serbia has published data on number of livestock units, with balance as of the 1st December 2013. Compared to the previous balance, the total number of cattle, sheep, goats horses and poultry has decreased by 0.8%, 1.2%, 2.9%, 7.7% and 3.0%, respectively, while the total number of pigs has increased by 0.2%[14] - from 3,139,000 pigs in 2012 to 3,144,000 pigs at the end of 2013.

When compared to the ten-year average (2003–2012), the total number of cattle, pigs and horses has decreased by 11.7%, 10.7%, and 16.9%, respectively, while the total number of sheep, goats and poultry has increased by 4.1%, 42.8% and 25.4%, respectively. The market share of this production, traditionally prevailing on Serbian family farms, amounted to only 20%.

**Table 1.** *Number of livestock units in the Republic of Serbia (in thousands)*

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | 1,516 | 1,553 | 1,529 | 1,571 | 1,631 | 1,602 | 1,578 | 1,540 | 1,475 | 1,442 | 1,437 |
| **Cattle** | 921 | 913 | 904 | 917 | 891 | 882 | 863 | 817 | 765 | 766 | 755 |
| **Horses** | - | - | - | - | 17 | 17 | 15 | 13 | 13 | 10 | - |
| **Pigs** | 384 | 411 | 395 | 415 | 477 | 447 | 443 | 454 | 436 | 413 | 395 |
| **Sheep** | 138 | 152 | 154 | 158 | 160 | 167 | 168 | 156 | 153 | 150 | 168 |
| **Goats** | - | - | - | - | 12 | 11 | 12 | 11 | 11 | 10 | - |
| **Poultry** | 73 | 77 | 76 | 81 | 74 | 78 | 77 | 89 | 97 | 93 | 118 |

**Source:** *Statistical Office of the Republic of Serbia*

[13] 1.83 billion RSD /Source: The Statistical Office of the Republic of Serbia/

[14] Cattle is mostly produced in Šumadija and Western Serbia (44.7% of the total number of cattle in Serbia), and pigs in Vojvodina (38.1%). Source: The Statistical Office of the Republic of Serbia.

**Table 2.** *Number of livestock units in the Republic of Serbia*

| | Cattle | Pigs | Sheep | Poultry |
|---|---|---|---|---|
| **1990** | 1,559 | 4,238 | 2,120 | 23,405 |
| **1991** | 1,483 | 4,263 | 2,127 | 23,997 |
| **1992** | 1,367 | 3,752 | 1,812 | 21,327 |
| **1993** | 1,411 | 3,998 | 1,884 | 19,871 |
| **1994** | 1,228 | 3,599 | 1,792 | 19,073 |
| **1995** | 1,354 | 4,086 | 1,852 | 22,256 |
| **1996** | 1,335 | 4,344 | 1,834 | 22,806 |
| **1997** | 1,318 | 4,119 | 1,758 | 22,365 |
| **1998** | 1,280 | 4,058 | 1,645 | 22,600 |
| **1999** | 1,283 | 4,293 | 1,598 | 23,278 |
| **2000** | 1,246 | 4,066 | 1,611 | 20,373 |
| **2001** | 1,162 | 3,615 | 1,489 | 19,290 |
| **2002** | 1,128 | 3,587 | 1,448 | 18,804 |
| **2003** | 1,112 | 3,634 | 1,515 | 16,677 |
| **2004** | 1,102 | 3,439 | 1,586 | 16,280 |
| **2005** | 1,076 | 3,165 | 1,576 | 16,631 |
| **2006** | 1,096 | 3,212 | 1,609 | 16,595 |
| **2007** | 1,087 | 3,832 | 1,606 | 16,422 |
| **2008** | 1,057 | 3,594 | 1,605 | 17,188 |
| **2009** | 1,002 | 3,631 | 1,504 | 22,821 |

**Source:** *Statistical Office of the Republic of Serbia, agricultural statistics*

**Table 3.** *Number of pigs in Serbia, 1996-2008 (in thousands)*

| | 1996. | 2000. | 2001. | 2002. | 2003. | 2005. | 2006. | 2007. | 2008. |
|---|---|---|---|---|---|---|---|---|---|
| **Number of pigs** | 4,344 | 4,056 | 3,615 | 3,587 | 3,634 | 3,165 | 3,999 | 3,832 | 3,594 |

**Source:** *Statistical Office of the Republic of Serbia, agricultural statistics*

Regarding the above mentioned, we can conclude that Serbian livestock fund has reached bottom, below which it really should not go. There is no doubt that livestock production, and especially pig production in Serbia has constantly been declining in the last 30 years. The reason for this is reduced livestock funds on former public farms, a constant decline in fattening livestock units in Vojvodina, as well as a decline in numbers of sows and pregnant gilts. This is due to an unfavourable production environment, reflecting mostly in inadequate parity pricing of live animals and inputs (invested in the production), slow harmonisation with EU market standards, a decline in consumption because of a low living standard, a negative impact of the financial crisis, etc.

The supply chain in meat production is mostly unorganized and short, since a large part of production ends on farms or local markets – both official and unofficial. Individual pig production amounts to more than 80%. This is mostly

done by small-scale farmers, i.e. family farms with about 10 bullocks or a hundred of pigs, having predominately extensive but price competitive production, which implies a short supply chain. Therefore, there are constant fluctuations and declines in the scope of production, alongside with a serious deterioration of profitability. Most of production is delivered to slaughterhouse directly or indirectly, which elongates the chain and achieves "added value". Small quantities, either in the form of carcasses or meat products are exported to CEFTA countries (mostly in Bosnia and Herzegovina, the FYR of Macedonia and Montenegro). Since Serbian livestock production is in a crisis, it is clear that both citizens and livestock growers need help. What is needed is a higher living standard – for citizens to buy meat, and for livestock growers to sell it. One cannot go without the other, or hardly does.

## Meat content standards

A need for an objective identification of livestock prices by growers on the one side and meat processors on the other starts from the very beginning of breeding animals for meat. For more than a century, leading countries in livestock production have been developing national standards for assessing the quality of slaughter animals. From the beginning, those standards were set to assess the value of animals on both quantitative and qualitative indicators, and today they can give almost 100% correct assessments of meat quality and quantity based on which growers are paid. This ensures that all stakeholders are reliable and objectively paid for their work and stimulated to work better, more rational and cost efficient. The first Yugoslav standard for meaty pigs for industrial processing was put into practise in 1973, initiating the work on control and assessing meatiness in almost all slaughterhouses across the SFRY. Nowadays "the Rulebook on the Quality of Slaughtered Pigs and Pork Categorisation" (Official Gazette of the SFRY, No. 2/85 и 12/85) is still operative and partially in use in the Republic of Serbia[15]. This rulebook prescribes quality conditions minimally required for pork carcasses and halves, basic carcass parts and edible parts of pig, as well as for conditions of keeping, packing and transporting meat and those edible parts. Numerous researches agree on the fact that results on meat yield (kg, %) in carcass halves, determined according to the Rulebook, are

[15] *Parameters and Criteria for Assessing the Quality of Pork Carcasses,* pp. 121-139, Institute of Meat Hygiene and Technologies, Belgrade. Authors: Petrović Ljiljana, Džinić Natalija, Tomović Vladimir (University of Technology in Novi Sad), Tasić Tatjana, Ikonić Predrag (Institute of Food Technologies in Novi Sad): Plenary lecture at the 55th Meat Industry Conference on 15-17th June 2009 on Tara.

completely unreliable, and probably this is the reason why we stopped grading of pork on the slaughter lines and selling graded carcass halves. Moreover, it can be said that Serbia is one of few or maybe the only country in Europe that sells ungraded pork carcasses, which has a negative consequences for Serbian pig production and meat industry.

## Materials and methods

As a material for investigating the effect of weight and meatiness in pigs on business profitability in the meat processing industry, we used 30 Landrace pigs[16], 145-160 days of age, weighing 97, 105 and 125 kg. The pigs were delivered to the slaughterhouse and meat processing plant "Kosanović" in Martinci from the pig farm "Peščara" in Banatski Karlovac. After delivery, the pigs were classified by their weight and placed in different pens. They underwent a 24-hour rest period in the slaughterhouse, since the farm they were delivered from is 200 km away from the slaughter facilities. Slaughtering was conducted in a regular way on the slaughter line. Before bleeding out, the pigs were stunned with electricity (80V, 0.3 A) for three seconds. Bleeding out, scalding and removing organs were conducted in a regular way. The carcasses of the slaughtered and scalded pigs were cut vertically, in a regular way, on the evisceration line, using an electrical saw. After the evisceration and removing the organs and inedible parts, the carcass sides were transported to the cooling line, i.e. in the cooling chamber, using a semi-automatic conveyer. After 12-hour cooling, the carcass halves were transported into the cutting division, where they were cut into basic carcass parts (basic carcass parts – Tables 6, 7 and 8). All the necessary measurements for determining the share of basic carcass parts were conducted by using an electronic scale, and calculated in a regular way, by using mathematical methods.

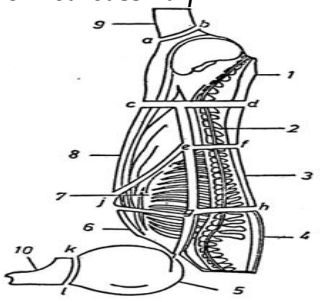
The paper presents slaughter results, i.e. the results of a slaughter balance of three pig categories, when it comes to the weight, where each category comprised 10 pigs tested to make a quantitative assessment of carcass value. The parameters of meatiness[17], obtained by processing the pork carcass halves

[16] Landrace pigs in different countries are a result of crossbreeding of Danish Landrace. Those are pigs with a long tail and particularly developed back, light head and downright ears. It is one of the most common white meaty pigs. Daily gain of boars ranges 750-914 g. Conversion 2.58-3.14 kg. The carcass halves of Landrace pigs had more than 53-60% of lean meat. www.stocarstvo.info/rase-za-proizvodnju-mesa

[17] Meatiness was determined according to the *Rulebook on Quality of Slaughtered Pigs and Pork Categorisation* (Official Gazette of the SFRY, No. 2/85, 12/85 and 24/86).

("cut" shoulder blade), from the "French" method to cutting into all parts, were expressed in kilograms and as percentage (Table 5, 6 and 7). Processing parameters were obtained by processing the carcass halves 40 minutes after slaughtering, and the weight of a cold carcass/half was calculated by decreasing the weight of a hot carcass by 2%. The carcass parts are used for further processing or they can be further tailored on request of the customer and go to wholesale/retail markets. In order to give a comprehensive overview of this subject matter, Image 1 shows a chart of cutting a pig carcass half into the basic parts.[18]

**Image 1.** *Chart of cutting a pork carcass half*



1-leg[19], 2-loin[20], 3-back[21], 4-neck, 5-shoulder, 6-breast, 7-ribs, 8 belly, 9-shank, 10-second thigh[22].

**Source:** *The Rulebook on Quality of Slaughtered Pigs and Pork Categorisation (Official Gazette of the SFRY, No. 2/85 and 12/85).*

## Results and discussion

The results were obtained by processing the Landrace pigs, divided into three categories by their live weight - 97, 105, and 127 kg pigs (Tables 5, 6, and 7).

[18] Source: the *Rulebook on Quality of Slaughtered Pigs and Pork Categorisation* (Official Gazette of the SFRY, No. 2/85, 12/85 and 24/86).

[19] Lean meat percentage in certain carcass cuts: dorsal and caudal regions have more meat than ventral and cranial regions. Most lean meat is located at thighs and backs (70-80%), shoulders, necks and withers (60-70%), and breasts (50-60%), while minimum lean meat is located at second thighs (40-50%).

[20] Backfat thickness serves as an indicator of the ratio between meat and fat content.

[21] Neck muscle cross-sectional area (*M.longissimus dorsi*) between $13^{th}$ and $14^{th}$ vertebrae (EU) and $11^{th}$ and $12^{th}$ vertebrae (USA) can be used as an indicator of meatiness, ranging on average 30-50 $cm^2$ in meaty pigs.

[22] Side length can also be used when assessing the quality of a pig carcass. It is measured in a straight line from the forward edge of the aitchbone to the forward edge of the first rib, just under the vertebral attachment. The authors did not measure the halves.

**Table 5.** *Slaughter balance of 97 kg pigs*

| | |
|---|---|
| Pre-slaughter pig weight (kg) | 97 |
| Price of pigs (RSD) | 170 |
| Pig value (RSD) | 16,490.00 |
| Coefficient of utilisation (%) | 71.93% |
| Loss at cooling (%) | 2% |
| Cold carcass weight (kg) | 68.38 |
| Cold carcass (RSD/kg) | 250 |
| Cut value (RSD) | 18,023.54 |
| Difference in value (RSD) | 1,533.54 |

| | | Share | Weight | | | No. of heads | Total | Total |
|---|---|---|---|---|---|---|---|---|
| **Basic carcass parts** | **Unit of measure** | **% cold carcass** | **kg cold carcass** | **Cut price RSD** | **Cut value RSD** | **1** | **kg** | **RSD** |
| Cutlet | kg | 3.72 | 2.550 | 220.000 | 561.00 | 1 | 2.550 | 561.00 |
| Shank | kg | 1.93 | 1.305 | 180.000 | 234.90 | 1 | 1.305 | 234.90 |
| Spare ribs | kg | 1.38 | 0.950 | 200.000 | 190.00 | 1 | 0.950 | 190.00 |
| Ribs | kg | 0.36 | 0.250 | 170.000 | 42.50 | 1 | 0.250 | 42.50 |
| Firm fatty tissue | kg | 16.86 | 11.530 | 110.000 | 1,268.30 | 1 | 11.530 | 1,268.30 |
| Leg, boneless | kg | 12.84 | 8.784 | 440.000 | 3,864.96 | 1 | 8.784 | 3,864.96 |
| Shoulder, boneless | kg | 7.48 | 5.116 | 405.000 | 2,071.98 | 1 | 5.116 | 2,071.98 |
| Neck, boneless | kg | 3.65 | 2.500 | 540.000 | 1,350.00 | 1 | 2.500 | 1,350.00 |
| Smoked ham | kg | 4.25 | 2.910 | 540.000 | 1,571.40 | 1 | 2.910 | 1,571.40 |
| Fillet | kg | 0.86 | 0.587 | 520.000 | 305.24 | 1 | 0.587 | 305.24 |
| Loin meat, I class | kg | 5.02 | 3.433 | 370.000 | 1,270.21 | 1 | 3.433 | 1,270.21 |
| Loin meat, II class | kg | 8.54 | 5.840 | 320.000 | 1,868.80 | 1 | 5.840 | 1,868.80 |
| Hamburg bacon | kg | 11.41 | 7.800 | 300.000 | 2,340.00 | 1 | 7.800 | 2,340.00 |
| Jowl | kg | 3.12 | 2.138 | 160.000 | 342.08 | 1 | 2.138 | 342.08 |
| Meaty bones | kg | 4.95 | 3.380 | 70.000 | 236.60 | 1 | 3.380 | 236.60 |
| Skin | kg | 3.27 | 2.240 | 40.000 | 89.60 | 1 | 2.240 | 89.60 |
| Loin meat, IV class | kg | 0.48 | 0.330 | 180.000 | 59.40 | 1 | 0.330 | 59.40 |
| Head, boneless | kg | 2.84 | 1.942 | 135.000 | 262.17 | 1 | 1.942 | 262.17 |
| Feet | kg | 1.80 | 1.235 | 40.000 | 49.40 | 1 | 1.235 | 49.40 |
| Industrial bones | kg | 4.97 | 3.400 | 0.000 | 0.00 | 1 | 3.400 | 0.00 |
| Wastage | kg | 0.27 | 0.180 | 250.000 | 45.00 | 1 | 0.180 | 45.00 |
| **Total:** | kg | **100.00** | **68.400** | | **18,023.54** | | **68.400** | **18,023.54** |

Table 5 shows the result of slaughtering the first category of the Landrace pigs, average live weight 97 kg. The price of a pig as of the 20th January 2014 amounted to 170 RSD. The coefficient of utilisation of a warm carcass half amounted to 71.93%, loss at cooling 2% and weight of a cold carcass half amounted to 68.28 kg. Boneless ham weight was 8.784 kg, and it accounted

12.84% of weight of a cold carcass half. The average shoulder weight in a slaughtered Landrace pig of 97 kg amounted to 5.116 kg and it accounted 7.48% of weight of a carcass half. The weight of ribs and spare ribs amounted to 0.250 and 0.950 kg, i.e. 0.36 and 1.38%, when expressed in a relative value. Back weight amounted to 2.910 and 0.414 kg (fillet) and it accounted 5.28 and 0.86% of weight of a carcass half. Neck weight amounted to 2.5 kg and constituted 3.65% of weight of a carcass half. The average weight of a boneless head was 1.942 kg, and it constituted 2.84%. Bacon accounted 7.8 kg of weight of a carcass half, which was 11.41%. Meat of I and II grade amounted 3.433 and 5.840 kg of a cold carcass half, which accounted 5.02 and 8.54%, respectively. From these data one can see the share of high quality meat (leg, shoulder and back) amounted to 8.784 kg, 5.116, back 2.910 and 0.587 kg, which was 25.43%.

If we take these carcass parts, expressed in kilograms, and multiply by selling prices as of the 20th January 2014, we would obtain a value difference of 1,533.54 RSD.

**Table 6.** *Slaughter balance of 105 kg pigs*

| | |
|---|---|
| Pre-slaughter pig weight (kg) | 105 |
| Price of pigs (RSD) | 170 |
| Pig value (RSD) | 17,850.00 |
| Coefficient of utilisation (%) | 76% |
| Loss at cooling (%) | 2% |
| Cold carcass weight (kg) | 78.204 |
| Cold carcass (RSD/kg) | 270 |
| Cut value (RSD) | 20,771.41 |
| Difference in value (RSD) | 2,921.41 |

| | | Share | Weight | | | No. of heads | Total | Total |
|---|---|---|---|---|---|---|---|---|
| **Basic cuts** | **Unit of measure** | **% cold carcass** | **kg cold carcass** | **Cut price RSD** | **Cut value RSD** | **1** | **kg** | **RSD** |
| Cutlet | kg | 2.83 | 2.213 | 220.000 | 486.,90 | 1 | 2.213 | 664.40 |
| Shank | kg | 1.69 | 1.322 | 180.000 | 237.90 | 1 | 1.322 | 337.32 |
| Spare ribs | kg | 1.02 | 0.798 | 200.000 | 159.54 | 1 | 0.798 | 263.60 |
| Ribs | kg | 2.57 | 2.010 | 170.000 | 341.67 | 1 | 2.010 | 47.60 |
| Firm fatty tissue | kg | 21.55 | 16.853 | 110.000 | 1,853.83 | 1 | 16.853 | 1,918.40 |
| Leg, boneless | kg | 15.,30 | 11.965 | 440.000 | 5,264.69 | 1 | 11.965 | 6,300.80 |
| Shoulder, boneless | kg | 7.07 | 5.529 | 405.000 | 2,239.25 | 1 | 5.529 | 3,473.28 |
| Neck, boneless | kg | 4.02 | 3.144 | 640.000 | 2,012.03 | 1 | 3.144 | 2,451.60 |
| Smoked ham | kg | 5.28 | 4.129 | 640.000 | 2,642.67 | 1 | 4.129 | 2,527.20 |
| Fillet | kg | 0.53 | 0.414 | 520.000 | 215.53 | 1 | 0.414 | 470.08 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Loin meat, I class | kg | 2.17 | 1.697 | 370.000 | 627.90 | 1 | 1.697 | 1,435.60 |
| Loin meat, II class | kg | 6.74 | 5.271 | 320.000 | 1,686.70 | 1 | 5.271 | 1,126.40 |
| Hamburg bacon | kg | 7.81 | 6.108 | 300.000 | 1,832.32 | 1 | 6.108 | 3,366.00 |
| Jowl | kg | 3.40 | 2.659 | 160.000 | 425.43 | 1 | 2.659 | 363.20 |
| Meaty bones | kg | 5.99 | 4.684 | 70.000 | 327.91 | 1 | 4.684 | 337.12 |
| Skin | kg | 2.08 | 1.627 | 40.000 | 65.07 | 1 | 1.627 | 151.68 |
| Loin meat, IV class | kg | 0.08 | 0.063 | 250.000 | 15.64 | 1 | 0.063 | 36.00 |
| Head, boneless | kg | 2.48 | 1.939 | 120.000 | 232.74 | 1 | 1.939 | 300.51 |
| Feet | kg | 1.85 | 1.447 | 60.000 | 86.81 | 1 | 1.447 | 61.20 |
| Industrial bones | kg | 5.46 | 4.270 | 0.000 | 0.00 | 1 | 4.270 | 0.00 |
| Wastage | kg | 0.08 | 0.063 | 270.000 | 16.89 | 1 | 0.063 | 0.00 |
| **Total:** | kg | **100.00** | **78.204** | | **20,771.41** | | **78.204** | **25,631.99** |

Table 6 shows the result of slaughtering the second category of the Landrace pigs, average live weight 105 kg. The price of a pig as of the 20th January 2014 amounted to 170 RSD. The coefficient of utilisation of a warm carcass half amounted to 71.93%, loss at cooling 2% and weight of a cold carcass half amounted to 78.204 kg. Boneless ham weight was 11,965 kg, and it accounted 15.30% of weight of a cold carcass half.

The average shoulder weight amounted to 5.529 kg and it accounted 7.07% of weight of a carcass half. The weight of ribs and spare ribs amounted to 0.798 and 2.010 kg, i.e. 1.02 and 2.57%, when expressed in a relative value. Back weight amounted to 4.129 and 0.414 kg (fillet) and it accounted 5.28 and 0.53% of weight of a carcass half. Neck weight amounted to 3.144 kg and constituted 4.02% of weight of a carcass half.

The average weight of a boneless head was 1.939 kg, and it constituted 2.48%. Bacon accounted 6.108 kg of weight of a carcass half, which was 7.81%. Meat of I and II grade amounted 1.697 and 5.271 kg of a cold carcass half, which accounted 2.17 and 6.74%, respectively. From these data one can see the share of high quality meat (leg, shoulder and back) amounted to 11.965 kg, 5.529, back 4.129 and 0.414 kg, which was 28.18%. If we take these carcass parts, expressed in kilograms, and multiply by selling prices as of the 20th January 2014, we would obtain a value difference of 2,921.41 RSD.

**Table 7.** *Slaughter balance of 125 kg pigs*

| | |
|---|---|
| Pre-slaughter pig weight (kg) | 125 |
| Price of pigs (RSD) | 170 |
| Pig value (RSD) | 21,250.00 |
| Coefficient of utilisation (%) | 77.31 |
| Loss at cooling (%) | 2% |
| Cold carcass weight (kg) | 94.74 |
| Cold carcass (RSD/kg) | 250 |
| Cut value (RSD) | 25,631.99 |
| Difference in value (RSD) | 4,381.99 |

| | | Share | Weight | | | No. of heads | Total | Total |
|---|---|---|---|---|---|---|---|---|
| **Basic carcass parts** | **Unit of measure** | **% cold carcass** | **kg cold carcass** | **Cut price RSD** | **Cut value RSD** | **1** | **kg** | **RSD** |
| Cutlet | kg | 3.19 | 3.020 | 220.000 | 664.40 | 1 | 3.020 | 664.,40 |
| Shank | kg | 1.98 | 1.874 | 180.000 | 337.32 | 1 | 1.874 | 337.32 |
| Spare ribs | kg | 1.39 | 1.318 | 200.000 | 263.60 | 1 | 1.318 | 263.60 |
| Ribs | kg | 0.29 | 0.280 | 170.000 | 47.60 | 1 | 0.280 | 47.60 |
| Firm fatty tissue | kg | 18.43 | 17.440 | 110.000 | 1,918.40 | 1 | 17.440 | 1,918.40 |
| Leg, boneless | kg | 15.12 | 14.320 | 440.000 | 6,300.80 | 1 | 14.320 | 6,300.80 |
| Shoulder, boneless | kg | 9.05 | 8.576 | 405.000 | 3,473.28 | 1 | 8.576 | 3,473.28 |
| Neck, boneless | kg | 4.79 | 4.540 | 540.000 | 2,451.60 | 1 | 4.540 | 2,451.60 |
| Smoked ham | kg | 4.94 | 4.680 | 540.000 | 2,527.20 | 1 | 4.680 | 2,527.20 |
| Fillet | kg | 0.95 | 0.904 | 520.000 | 470.08 | 1 | 0.904 | 470.08 |
| Loin meat, I class | kg | 4.09 | 3.880 | 370.000 | 1,435.60 | 1 | 3.880 | 1,435.60 |
| Loin meat, II class | kg | 3.71 | 3.520 | 320.000 | 1,126.40 | 1 | 3.520 | 1,126.40 |
| Hamburg bacon | kg | 11.84 | 11.220 | 300.000 | 3,366.00 | 1 | 11.220 | 3,366.00 |
| Jowl | kg | 2.39 | 2.270 | 160.000 | 363.20 | 1 | 2.270 | 363.20 |
| Meaty bones | kg | 5.08 | 4.816 | 70.000 | 337.12 | 1 | 4.816 | 337.12 |
| Skin | kg | 4.02 | 3.792 | 40.000 | 151.68 | 1 | 3.792 | 151.68 |
| Loin meat, IV class | kg | 0.21 | 0.200 | 180.000 | 36.00 | 1 | 0.200 | 36.00 |
| Head, boneless | kg | 2.35 | 2.226 | 135.000 | 300.51 | 1 | 2.226 | 300.51 |
| Feet | kg | 1.61 | 1.530 | 40.000 | 61.20 | 1 | 1.530 | 61.20 |
| Industrial bones | kg | 4.47 | 4.234 | 0.000 | 0.00 | 1 | 4.234 | 0.00 |
| Wastage | kg | 0.10 | 0.100 | 250.000 | 0.00 | 1 | 0.100 | 0.00 |
| **Total:** | kg | **100.00** | **94.740** | | **25,631.99** | | **94.740** | **25,631.99** |

Table 7 shows the result of slaughtering the third category of the Landrace pigs, average live weight 125 kg. The price of a pig as of the 20th January 2014 amounted to 170 RSD. The coefficient of utilisation of a warm carcass half amounted to 71.93%, loss at cooling 2% and weight of a cold carcass half

amounted to 94.74 kg. Boneless ham weight was 14.320 kg, and it accounted 15.12% of weight of a cold carcass half. The average shoulder weight amounted to 8,576 kg and it accounted 9.05% of weight of a carcass half. The weight of ribs and spare ribs amounted to 0.280 and 1.318 kg, i.e. 0.29 and 1.39%, when expressed in a relative value. Back weight amounted to 4.680 and 0.904 kg (fillet) and it accounted 4.94 and 0.95% of weight of a carcass half. Neck weight amounted to 4.540 kg and constituted 4.79% of weight of a carcass half. The average weight of a boneless head was 2.226 kg, and it constituted 2.35%. Bacon accounted 11.84 kg of weight of a carcass half, which was 11.84%. Meat of I and II grade amounted 3.880 and 3.520 kg of a cold carcass half, which accounted 4.09 and 3.71%, respectively.

From these data one can see the share of high quality meat (leg, shoulder and back) amounted to 14.320 kg, 8.576, back 4.680 and 0.904 kg - the total of 28.48 kg, which was 30.06%. If we take these carcass parts, expressed in kilograms, and multiply by selling prices as of the 20th January 2014, we would obtain a value difference of 4,381.99 RSD.[23]

## Conclusion

The scope of production is one of the most important indicators of realisation of the planned activities when identifying the achieved quality of business economics. Pre-defined by the law of profits, production is valorised on the market, when selling products. Having technologically quality products, the room for product realisation expands, enhancing the competitiveness of a business subject. It means that economic rules for the organisation of a business subject are based on laws and principles of economics.

[23] In the research of Djokić Aleksandar, Karabasil Nedjeljko, Baltić Ž. Milan, Kilibarda Nataša, and Jovanović Slobodan, who studied the indicator of meatiness on 82 pigs in the slaughterhouse "Koteks" in Surčin, the quantity of meat present in the halves of the slaughtered pigs, expressed in percentages, was from 38.44% to 45.53%. On average, it was 43.12 ± 1.67%. The average mass of the carcass was 74.06 ± 5.80 kg; the mass of the head was 3.90 ± 0.08 kg, thus its relative presence within the carcass was 5.26%. The mass of the bacon was 16.20 ± 0.66 kg (21.83%), lard 1.00 ± 0.03kg (1.35%), feet 1.33 kg ± 0.03 kg, firm fatty tissue with skin (shoulder and thigh) 1.76 ± 0.21 kg (2,37 %), firm fatty tissue with skin 7.42 ± 0.61 kg (10.02 %), lower neck 1.71 ± 0.04 kg (2,31 %), meaty cut-offs ("ficla") 1.27 ± 0.03 kg (1,71%), tails 0.30 ± 0.01 kg (0.04 %) and „French cut" 39.88 ± 3.74 kg(53.84 %). From the above mentioned, one can conclude that the average quantity of meat in the carcasses, expressed in percentages, was 38.44 %-45.53%, i.e. on average 43.12±1.67 %.

The following conclusions could be made from the results of this research:
When it comes to the Landrace pigs of 97 kg live weight, high quality meat, such as leg, shoulder and back accounted 17.397 kg of a carcass half, i.e. 25.43%, and the difference in value amounted to 1,533.54, when compared the price of a live Landrace pig and the price of cuts. As for the Landrace pigs of 105 kg live weight, high quality meat, such as leg, shoulder and back accounted 17.397 kg of a carcass half, i.e. 28.18%, and the difference in value amounted to 2,921.41 RSD, when compared the price of a live Landrace pig and the price of cuts. When it comes to the Landrace pigs of 125 kg live weight, high quality meat, such as leg, shoulder and back accounted 28.48 kg of a carcass half, i.e. 30.06%, and the difference in value amounted to 4,381.99 RSD, when compared the price of a live Landrace pig and the price of cuts. From the all above mentioned, one can conclude that the share of high quality meat parts in a carcass half of Landrace pigs increases in both absolute and relative value along with pig weight. The highest share had 125 kg pigs, and at the same time, they brought a higher profit. Therefore, it is more cost-efficient for a slaughterhouse to purchase pigs that weigh more than 120 kg, since their meat is more mature and thus better for selling and further processing into dry meat products.

Having high potentials for pork production and exports of pork products, Serbia can enhance its role on the market of meat products. However, to be able to compete with other suppliers, the meat processing industry in Serbia needs to modernize, improve its marketing and harmonize meat quality to EU standards. In the conditions of full market liberalisation, the scope of production and product quality are the most important indicators of achievement of previously planned activities of business subjects, needed to identify business quality and the level of competitiveness. Pre-determined by the law of profits, production achieves its economic valorisation on the market, by selling products. Having technologically quality products, the room for product realisation expands, enhancing the competiveness of a business subject. It means that economic rules for the organisation of a business subject are based on laws and principles of economics. Only slaughterhouses and meat processing plants with high quality products will win a high market share and gain a higher profit than enterprises with poor quality products. Investments in livestock production, breeding pigs and modernizing the network of slaughterhouses will enable better production of meat and meat products, and contribute to the development of economics, both on the local and national level.

## References


1. Antić Čedomir (2007): feuilleton in the weekly publication *"Evropa",* No. 186, pp. 13-15, Belgrade.

2. Petrović Ljiljana, Džinić Natalija, Tomović Vladimir; Faculty of Technology in Novi Sad, Tasić Tatjana, Ikonić Predrag, Institute of Food Technology in Novi Sad: *Parameters and Criteria for Assessing the Quality of Pork Carcasses*, pp. 121-139, Institute of Meat Hygiene and Technologies, Belgrade, Plenary lecture at the 55th Meat Industry Conference on 15-17th June 2009 on Tara.

3. Djokić Aleksandar, Karabasil Nedjeljko, Baltić Ž. Milan, Kilibarda Nataša, Jovanović Slobadan, who studied 82 pigs to investigate the parameters of meatiness in the slaughterhouse "Koteks"in Surčin.

4. Kosanović Nada (2009): *Food Quality as a Competitiveness Factor of Agribusiness of the Republic of Serbia*, PhD thesis, University in Novi Sad, Faculty of Agriculture, Novi Sad.

5. *Draft Agricultural and Rural Development Strategy of the Republic of Serbia for 2014-2024*.

6. *Rulebook on the Quality of Slaughtered Pigs and Pork Categorisation*, Official Gazette of the SFRY, No. 2/85, 12/85 and 24/86.

7. *Statistical Office of the Republic of Serbia.*

8. www.stocarstvo.info/rase-za-proizvodnju-mesa

# FRUIT PRODUCTION ANALYSIS IN REPUBLIC OF SERBIA IN THE FUNCTION OF RURAL DEVELOPMENT[1]

*Nataša Kljajić, Predrag Vuković*[2]

## Abstract

*Fruit growing is one of the most profitable branches of agriculture. During recent years, despite the difficulties that accompanied the production of fruit such as winterkill, drought, disease and pest attack, poor production technology, inadequate structure of varieties, etc., in the foreign trade export of fresh and processed fruit represent an important factor in the economy of Serbia. Fruit growing is economically very significant as agricultural segment showing a significant inflow of foreign funds which can achieve exports of fruits and fruit products. As a highly intensive production hires a lot of human labor which influences rather increase national income, especially if production is organized with the application of new scientific knowledge enabling cost-efficient and cost-effective operations. This paper presents the movement of fruit production volume (apple, pear, plum, strawberry, raspberry) in our country for the period 2000 -2013 as well as some of the measures for the intensive development of the fruit market in the country for the upcoming period.*

**Key words:** *apple, pear, plum, strawberry, raspberry, production, measures for improvement.*

## Introduction

Natural conditions of our country, especially some of the regions, are very favorable for the cultivation of fruit. In hilly - mountainous regions fruit production is significantly greater than the profitability of other crops because of

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natural conditions and it affection on this production, and in these areas, no other production can bring so much profit as fruit production. In hilly - mountainous regions the value which might be achieved is 10-15 times bigger, comparing to the production of corn and wheat per hectare, for example (Keserović, 2004).

The advantage of our fruit is also in the spatial and biological diversity, favorable climate and tradition in the production of fruit. There is an ongoing interest of farmers for fruit production, which, along with state incentives and the establishment of cooperatives (farmers' association), can achieve good results. However, despite the favorable natural and economic conditions, our agricultural production in the area is characterized by extensive fruit character, as can be inferred from the relatively low and irregular income. In order to achieve a higher level of finalization of the product, and thus raise the competitiveness of the market, it is necessary to intensify the production and processing of fruit. By raising the intensive planting state it should keep the volume of orchards area and fruit production intensification should expect an increase in the yield of certain areas, and in a development that increase the volume of fruit production. At the same time it is necessary to perform a gradual change of structure of production fostering deficient fruits, which have the greatest chance for the realization of the world market. Priority should be given to plantations for the production of fruit without the use of pesticides and fruit intended for certain types of processing.

## Apple production

Apple is the most widely used and most useful types of fruits. It is considered as the most important type of fruits in the world and the leading type of fruit in Europe. It has a continuous season of consumption and is therefore very important from the economic point of view. Well adapted to different climates and thrives on wide expanses, it can also grow on 1000 m above sea level, but the optimal altitude for its successful cultivation is 200-700 m .

In mature apple fruit there is 85 % water existing, 14 % carbohydrates, 0,1-0,6 % of oil and protein, 7 mg of calcium, 10 mg of phosphorus, 110 mg of calcium, 40 mg of vitamin C, vitamin A, E B1, B23, B6 and beta-carotene and others. The volume of production of apples in the Republic of Serbia is given in Table 1.

**Table 1.** *The volume of apple production in the Republic of Serbia in the period 2000 – 2013.*

| Year | Rep. of Serbia | | | Central Serbia | | | AP Vojvodina | | |
|---|---|---|---|---|---|---|---|---|---|
| | Area planted apple (ha) | Total yield (t) | Yield (t/ha) | Area planted apple (ha) | Total yield (t) | Yield (t/ha) | Area planted apple (ha) | Total yield (t) | Yield (t/ha) |
| 2000 | 14 265 | 197 490 | 13 | 9 706 | 120 805 | 12 | 4 559 | 76 685 | 16 |
| 2001 | 14 176 | 135 374 | 9 | 9 638 | 80 478 | 8 | 4 538 | 54 896 | 12 |
| 2002 | 14 445 | 95 584 | 6 | 9 882 | 72 747 | 7 | 4 563 | 22 837 | 5 |
| 2003 | 14 688 | 246 138 | 16 | 9 981 | 163 419 | 16 | 4 707 | 82 719 | 17 |
| 2004 | 14 889 | 183 571 | 12 | 10 123 | 110 116 | 10 | 4 766 | 73 455 | 15 |
| 2005 | 14 805 | 198 030 | 13 | 10 024 | 109 038 | 11 | 4 781 | 88 992 | 19 |
| 2006 | 14 658 | 240 320 | 16 | 9 980 | 147 132 | 15 | 4 678 | 93 188 | 20 |
| 2007 | 15 037 | 245 228 | 16 | 10 311 | 161 637 | 16 | 4 726 | 83 591 | 18 |
| 2008 | 15 224 | 235 601 | 15 | 10 204 | 152 910 | 15 | 5 020 | 82 691 | 17 |
| 2009 | 15 600 | 281 868 | 18 | 10 213 | 177 325 | 17 | 5 387 | 104 543 | 19 |
| 2010 | 15 880 | 239 945 | 15 | 10 362 | 135 284 | 13 | 5 518 | 104 661 | 19 |
| 2011 | 16 042 | 265 676 | 17 | 10 518 | 157 644 | 15 | 5 524 | 108 032 | 20 |
| 2012 | 16 904 | 178 713 | 11 | 10 559 | 100 109 | 9 | 6 345 | 78 604 | 12 |
| 2013 | 18 296 | 332 255 | 18 | 10 612 | 171 260 | 16 | 7 684 | 160 995 | 21 |
| Aver. | 15350.6 | 219 699.5 | 13.9 | 10150.9 | 132 850.3 | 12.9 | 5199.7 | 86 849.2 | 16.4 |

**Source:** *Authors' calculations based on data of the National Statistics Institute, Belgrade.*

The average area under apple orchards in Serbia for the research period is 15 350.6 ha. On the surface the average yields are 219 699.5 t which represents 13.9 t per ha. The highest production was recorded in 2013 representing 332 255 t in an area of 18 296 ha and the lowest production (95 584 t) was in 2002 on an area of 14 445 ha. In central Serbia an average production of 132 850.3 t on an area of 10,150.9 ha was achieved, which implies an average yield of 12.9 t per ha of apple production area. The highest production of the amount generated 2013. 171 260 t on an area of 10 612 ha. The yield was 12.9 t/ha. Conversely, the minimum output is generated in 2002 the (72 747 t ) on the surface of 9 882 ha. The yield was 7 t / ha. District of Vojvodina is characterized by slightly lower production of apples in relation to central Serbia. The average yield of apples for the period amounted to 86 849.2 t on the average area of 5 119.7 hectares, which means an average yield of 16.4 t/ha. The highest production was recorded in 2011. 108 032 t in an area of 5 524 ha. The yields per ha was 20 t. The lowest yield was recorded in 2002 (22 837 t) over an area of 4563 ha. The yield per ha was 5 t.

## Production of pears

Pear is one of the oldest, best and most profitable fruits. Chemical composition, usually dependent on the variety of ecological conditions of cultivation, of agricultural practices in the rearing and the like, include following: 80.4 to 87.9 % of lead, 11.85 % of carbohydrates, 0,1-0,6 % of total acid, 0.8 to 1.45 % of cellulose, 0.1-0.7 % of pectic substances, etc. One kilogram of ripe pear fruits has 400-610 calories, depending on the variety (Milić et al., 2003). Areal distribution of pear is very wide. This fruit grow best at an altitude of 600 m but can manage up to 900 m above sea level. It is nenefiting from the deep, loose soil type alluvium, minor smonica, agro red soil and chernozem. Pear production is mainly focused on family households dominated by autochthones varieties that have generally lower yield potential, and are grown on relatively extensive way, with limited use of agro-technical measures (Vlahović et al., 2006).
Movement of pear production in the Rep. of Serbia is shown in Table 2.

**Table 2.** *The volume of production of pears in the Republic of Serbia in the period 2000 – 2013.*

| Year | Rep. of Serbia | | | Central Serbia | | | AP Vojvodina | | |
|---|---|---|---|---|---|---|---|---|---|
| | Area planted pear (ha) | Total yield (t) | Yeald (t/ha) | Area planted pear (ha) | Total yield (t) | Yeald (t/ha) | Area planted pear (ha) | Total yield (t) | Yeald (t/ha) |
| 2000 | 5 872 | 57 672 | 9 | 4 072 | 42 069 | 10 | 1 800 | 15 603 | 8 |
| 2001 | 5 384 | 43 431 | 8 | 4 014 | 33 634 | 8 | 1 370 | 9 797 | 7 |
| 2002 | 5 277 | 33 645 | 6 | 3 958 | 29 122 | 7 | 1 319 | 4 523 | 3 |
| 2003 | 5 243 | 68 752 | 13 | 3 957 | 56 301 | 14 | 1 286 | 12 451 | 9 |
| 2004 | 5 130 | 58 575 | 11 | 3 855 | 46 952 | 12 | 1 275 | 11 623 | 9 |
| 2005 | 4 958 | 46 739 | 9 | 3 743 | 36 633 | 10 | 1 215 | 10 106 | 8 |
| 2006 | 4 788 | 57 717 | 12 | 3 669 | 45 759 | 13 | 1 119 | 11 958 | 11 |
| 2007 | 4 723 | 60 523 | 13 | 3 682 | 49 935 | 14 | 1 041 | 10 588 | 10 |
| 2008 | 4 404 | 61 886 | 14 | 3 550 | 51 107 | 14 | 854 | 10 779 | 13 |
| 2009 | 4 471 | 67 771 | 15 | 3 510 | 55 414 | 16 | 961 | 12 357 | 13 |
| 2010 | 4 414 | 47 501 | 11 | 3 423 | 35 510 | 10 | 991 | 11 991 | 12 |
| 2011 | 4 528 | 65 289 | 14 | 3 489 | 51 767 | 15 | 1 039 | 13 522 | 13 |
| 2012 | 4 296 | 39 112 | 9 | 3 191 | 29 059 | 9 | 1 105 | 10 053 | 9 |
| 2013 | 4 355 | 68 121 | 16 | 3 142 | 45 621 | 15 | 1 213 | 22 500 | 19 |
| Aver. | 4845.9 | 55481.0 | 11.4 | 3661.1 | 43491.6 | 11.9 | 1184.9 | 11989.4 | 10.3 |

**Source:** *Authors' calculations based on data of the National Statistics Institute, Belgrade.*

The average yield of pears in the Rep. of Serbia amounted to 55 481 t in the average area of 4 854.9 ha. The average yield per 1 ha amounted to 11.4 and this production has surpassed in 2003 when it was recorded a total yield of 68 752 t pears in an area of 5 243 ha, while the lowest yield was recorded in 2002 (33 645 t) over an area of 5 277 ha with the actual average yield of 6 t/ha. In central Serbia, where the pear production is mostly concentrated, a realized average yield was 43 491.6 t on the average area of 3 661.0 ha. Yield per 1 ha of production area was amounted to 11.9 t. The greatest production of pears was achieved in 2003 and it went to 56 301 t in the area of 3 957 ha, and the lowest was in 2012 on an area of 3 191 ha. In Vojvodina, the average total yield pears amounted to 11989.4 t on the average area of 1 184.9 ha. Yield per 1 ha was 10.3 t. The largest volume of output was in 2013 – 22 500 t on an area of 1 213 ha and the smallest 2002nd year (4 523 t) over an area of 1 319 ha.

## Plum production

In the structure of fruit plantations Serbian plum is the dominant fruit specie mainly grown in the hilly and mountainous areas. In our country there is a tradition of a very long plum. It is very adaptable fruit specie and can be successfully grown on as many as 1 000 m above sea level. This fruit is very rich in energy, protection, diet and therapeutic values. Contains 7-8 g / kg of proteins, 99-153 g / kg of carbohydrate , 1-2 g/kg of the fat, followed by vitamin C, B1, B2, B6, A, E, and minerals (K, Ca, Na, Mg, Fe), and water . Plum is used in a fresh state, but is used for processing of a greater number of products. Plum provides approximately 30 products in our country.

In the observed period (2000-2013) the average production of plums in the Republic of Serbia amounted to 497 359.7 t on the average area of 41,768.1 ha. Production per 1 ha of production area amounted to 11.7 t. Lately the increase plums production is noticed. The largest production was in 2013. Quantities of 738 278 t were noticed in an area of 39 530 ha. The lowest production was achieved in 2002 (197 486 t an area of 42 383 ha). In Central Serbia in the examined period, the average yield of 452 017.8 t was noticed in an area of 39 154.4 ha. Realized average yield was 11.2 t / ha. The highest production was recorded in 2013. (661 534 t in an area of 36 822 ha) and the lowest in 2002 (180 726 t over an area of 39 841 ha). In the area of Vojvodina an average of total production of plums was 45 341.9 t on an area of 2 613.7 ha. The average yield was 17.1 t / ha. The highest production was achieved by 2013. (76 744 t over an area of 2 708 ha) and the lowest in 2002 (16 760 t in the area of 2 542 ha). The volume of production is given in Table 3.

**Table 3.** *The volume of plum production in Serbia in the period 2000-2013.*

| Year | Rep. of Serbia | | | Central Serbia | | | AP Vojvodina | | |
|---|---|---|---|---|---|---|---|---|---|
| | Area planted plum (ha) | Total yield (t) | Yeald (t/ha) | Area planted plum (ha) | Total yield (t) | Yield (t/ha) | Area planted plum (ha) | Total yield (t) | Yeald (t/ha) |
| 2000 | 43 104 | 351 307 | 8 | 40 515 | 318029 | 7 | 2 589 | 33 278 | 12 |
| 2001 | 42 597 | 333 106 | 7 | 40 106 | 295138 | 7 | 2 491 | 37 968 | 15 |
| 2002 | 42 383 | 197 486 | 4 | 39 841 | 180726 | 4 | 2 542 | 16 760 | 6 |
| 2003 | 42 454 | 570 913 | 13 | 39 865 | 524845 | 13 | 2 589 | 46 068 | 17 |
| 2004 | 42 514 | 561 199 | 13 | 39 905 | 515423 | 12 | 2 609 | 45 776 | 17 |
| 2005 | 42 582 | 304 351 | 7 | 39 950 | 263267 | 7 | 2 632 | 41 084 | 16 |
| 2006 | 41 796 | 556 227 | 13 | 39 195 | 505746 | 10 | 2 601 | 50 481 | 19 |
| 2007 | 41 885 | 680 566 | 16 | 39 268 | 635872 | 16 | 2 617 | 44 694 | 17 |
| 2008 | 41 885 | 606 767 | 14 | 39 254 | 555606 | 14 | 2 631 | 51 161 | 19 |
| 2009 | 41 601 | 662 631 | 16 | 38 960 | 605775 | 16 | 2 641 | 56 856 | 22 |
| 2010 | 41 171 | 426 846 | 10 | 38 523 | 380098 | 10 | 2 648 | 46 748 | 18 |
| 2011 | 40 822 | 581 874 | 14 | 38 192 | 529317 | 14 | 2 630 | 52 557 | 20 |
| 2012 | 40 429 | 391 485 | 10 | 37 765 | 356873 | 9 | 2 664 | 34 612 | 13 |
| 2013 | 39 530 | 738 278 | 19 | 36 822 | 661534 | 18 | 2 708 | 76 744 | 28 |
| Aver. | 41 768.1 | 497 359.7 | 11.7 | 391 54.4 | 452017.8 | 11.2 | 2613.7 | 45 341.9 | 17.1 |

**Source:** *Authors' calculations based on data of the National Statistics Institute, Belgrade.*

## Strawberry production

Strawberry production in the country has a long tradition. Strawberry is characterized by early entry into rod, rapid return on investment in the establishment Jagodnjak modest requirements in terms of natural conditions of production, then a wide -range of distribution, easy process of growing, large utility value, high economic effects on production and so on (Milić et al., 2009). Strawberry flavor is sweet and very juicy, usually red but can be yellow depending on the variety. The fruits of strawberry have a value of low-calorie (27 g per 100 calories), containing 0.6 g of protein, 6.2 g of carbohydrates, without fats. Containing 1% of free organic acids which include malic, citric, tartaric and salicylic, and flavonoids. From vitamins contain carotene, vitamins of the B group, vitamin C and vitamin E, tannin, essential oil. From mineral substances they are containing potassium, calcium, iron and phosphorus (Štrbac, M., 2009).

Significantly larger areas planted with strawberries are located in Central Serbia in relation to Vojvodina but in Vojvodina can be seen higher growth rates of return strawberries in relation to central Serbia.

In recent years in our country is increasingly raising modern strawberries planting as outdoors, as well as different types of enclosures. Strawberry market is one of the most lucrative one for manufacturers of fruit. Only a small percentage of the total produced strawberries are exported. Most goes to the domestic market, due to the widespread consumption of fresh fruit and strawberry products since the strawberries used in the manufacture of jams, marmalades, fruit juice, canned fruit, candy, fruit yogurt supplement and the like.

Table 4 shows the movement of production volume strawberries for a research period from 2000 to 2013. The average value of the area planted with strawberries for the mentioned period was 8 038.9 ha. At least planted area was in 2013 (6 747 ha) and the highest in 2003 (9 116 ha).

**Table 4.** *The volume of production of strawberries in the Republic of Serbia for the period 2000-2013.*

| Year | Rep. of Serbia | | | Central Serbia | | | AP Vojvodina | | |
|---|---|---|---|---|---|---|---|---|---|
| | Area planted strawberries (ha) | Total yield (t) | Yeald (t/ha) | Area planted strawberries (ha) | Total yield (t) | Yield (t/ha) | Area planted strawberries (ha) | Total yield (t) | Yeald (t/ha) |
| 2000 | 8 642 | 24 910 | 2,9 | 8 088 | 23 945 | 3,0 | 554 | 965 | 1,7 |
| 2001 | 8 294 | 34 696 | 4,2 | 7 733 | 33 654 | 4,4 | 561 | 1 042 | 1,9 |
| 2002 | 8 880 | 34 577 | 3,9 | 8 399 | 33 810 | 4,0 | 481 | 767 | 1,6 |
| 2003 | 9 116 | 29 868 | 3,3 | 8 565 | 29 222 | 3,4 | 551 | 646 | 1,2 |
| 2004 | 8 572 | 33 855 | 3,9 | 8 025 | 32 701 | 4,1 | 547 | 1 154 | 1,2 |
| 2005 | 8 354 | 32 299 | 3,9 | 7 890 | 31 421 | 4,0 | 464 | 878 | 1,9 |
| 2006 | 8 173 | 34 324 | 4,2 | 7 641 | 33 036 | 4,3 | 532 | 1 288 | 2,4 |
| 2007 | 7 829 | 33 129 | 4,2 | 7 263 | 31 741 | 4,4 | 566 | 1 388 | 2,4 |
| 2008 | 7 923 | 37 924 | 4,8 | 7 351 | 36 091 | 4,9 | 572 | 1 833 | 3,2 |
| 2009 | 7 916 | 35 799 | 4,5 | 7 189 | 33 827 | 4,7 | 727 | 1972 | 2,7 |
| 2010 | 7 603 | 32 973 | 4,3 | 6 929 | 30 472 | 4,1 | 647 | 2 501 | 3,7 |
| 2011 | 7 425 | 36 161 | 4,9 | 6 716 | 34 064 | 4,7 | 709 | 2 097 | 3,0 |
| 2012 | 7 071 | 26 507 | 3,7 | 6 348 | 24 229 | 3,8 | 723 | 2 278 | 3,2 |
| 2013 | 6 747 | 28 929 | 4,3 | 6 086 | 26 468 | 4,3 | 661 | 2 461 | 3,7 |
| *Aver.* | 8 038.9 | 32 567.9 | 4,1 | 7 444.5 | 31 048.6 | 4,2 | 592.5 | 1 519.3 | 2,4 |

**Source:** *Authors' calculations based on data of the National Statistics Institute, Belgrade.*

The average yield was 32 567.9 t including 4.1 t/ha. The highest yield was achieved in 2008 (37 924 t) from 4.8 t/ha, while the lowest was in 2000 (24 910 t) from 2.9 t / ha. These figures relate to the whole territory of Serbia.

On the other hand, in Central Serbia the production of strawberries in respect of Vojvodina is dominated, and the average area planted with strawberries was 7 444.5 ha, with an average production of 31 048.6 t and an average yield of 4.2 t/ha. The biggest production volume of strawberries was realized in the 2002 (33 810 t) over an area of 8399 ha with an average yield of 4.0 t/ha. In contrast, the lowest yields were obtained in 2000 (23 945 t) on the surface of 8 088 ha with an average yield of 3.0 t/ha. On the territory of AP Vojvodina, strawberry production for the previous research period 2000-2013, varied in the range from 646 t in an area of 551 ha (2003) with a average yield of 1.2 t/ha, up to 2 501 t in 2010 on the surface of 647 ha with a recorded average yield of 3 7 t/ ha . The total average production of strawberries was 1 519.3 t at an average area of 592.5 ha with actual average yield of 2.4 t / ha.

## Raspberry production

Raspberry is our most profitable fruit specie. Its commodity production in Serbia began after World War I (around 1920) and a large volume in production was reached during the last twenty years. It is very appreciated and sought fruit because of its attractive fruits containing a wide variety of inorganic and organic components, which are very tasty, with excellent flavor, juicy, high nutrition, diet and technological values . Because of the specific chemical composition, especially due to the high content of vitamins, mineral substances, trace elements and some other, raspberries have a significant therapeutic effect. In folk medicine it is used as a blood and kidney cleanser, as a remedy to relieve rheumatic pain and as a mild sedative. Raspberry leaf is also used, particularly root. Raspberry leaf can replace some tea, such as Indian, Georgian and Russian. Raspberry has a number of advantages compared to other types of fruit. It is easy to replicate, it starts to give birth in the first or second year after planting in the third year comes to a lot of fruiting, and reaches full yield. The favorable agro - ecological conditions, is the use of modern agricultural measures, raspberry achieves extremely high yields. Light and easy to grow, production risk is much lower than that of large fruit per unit area because it employs a lot of manpower, especially in the affairs of the harvest. Investments in raising plantations are relatively high, but the invested funds come back quickly, as the raspberry quickly enters the race, copiously and regularly produces a fruit achieved a high price in the domestic and international market (Petrović et al., 1997).

In Serbia, 95 % of the area is cultivated with raspberry cultivar Willamette (Willamette), and the remaining 5 % belongs to Meeker, Tulameen, Polana and more. In recent years, the variety Willamette slowly pushes Meeker, and other

fruiting varieties (Nikolić et al., 2011.). The economic importance of raspberries is reflected in a very high degree of market ability and competitiveness of the European Union where increased demand for frozen raspberries produced in our geographical - ecological conditions is noticed. Consumer confidence in the quality of imported raspberries from Republic of Serbia follows a long tradition of production and specific environmental conditions of the area in which it is grown. Special economic importances of raspberry are determined by the following stakeholder groups:

1) the relatively large value of production, income and profit per unit of invested capital and labor;
2) labor-intensive character of production, which significantly alleviates the problem of unemployment in the big part of the Republic of Serbia;
3) the impact of raspberry on the overall economic development, which is achieved by building and expanding the capacity of the food industry, an indirect influence on the development of supporting economic activity, significant net foreign exchange effect, a very significant allocation of storage for the construction of infrastructure (particularly local roads) as a basic prerequisite for overall socio-economic development (Misić et al., 2004).

Specific economic significance of raspberries is determined by the following factors: high and varied use-value fruit; relatively high rate of return in favorable agro-ecological conditions; high marketability of the product; additional employment of labor and indirect impact on the overall socio- economic development; as raspberry nectar and others (Petrović et al., 2002). Serbia in the cultivation of raspberries has existed for over a century. Raspberries has begun to be breed before 1880, but initially only as an ornamental plant. Commodity production began after World War I, specifically in 1920, when the raspberries were produced for the local market; it was mainly for the sweet syrup and pulp. After World War II, the demand for raspberries has become greater, and it was followed by the higher prices of fruits. Department of raspberry production in Serbia reached a large volume at the end of the twentieth century, when the Serbian raspberry become the most important export product. Serbia in Europe became known for" raspberry as a national product," fighting with bigger competition in the selective western market (Popovic et al., 2003).

Each period in raspberry production in the country is characterized by certain peculiarities. By the mid-seventies raspberry production in Serbia had extensive character. In the mid-seventies the production intensified, first in Arilje a few years later in Valjevo, introduced by high productivity and high quality varieties, row system of growing, processing, care, fertilization and phytosanitary protection plantations.

A multi-year period from 1981 -1990 was characterized by high annual growth rate of 16.3 %. Markedly increase production in this period was caused by multiple factors: 1) an increase in demand for raspberries in the world market depending on its quality in comparison to other countries as producers of raspberries; 2) changes in varieties and technologies in our raspberry; 3) modernization of existing and construction of new refrigerator as storage facilities; 4) economic motivation of producers for this type of production and so on.

The period from 1990 – 1996 was characterized by extreme volatility in production, first, because of the very low purchase price in 1990s. Then, in due to the high cost of fertilizers and plant phytosanitary caused by hyperinflation and extreme weather conditions since 1993. Than in 1996. again begun overproduction of raspberries , which is held to this day with some varying of each year (Petrović et al., 2003). Several factors influenced the development of this segment of the fruit production in Serbia.

It is primarily a rich tradition of growing raspberries in rural parts of Serbia, which for generations are grown on small rural farms with plots of the average area of 0.36 ha. The second condition is soil composition (by physical, chemical and water features) and specificity of microclimate conducive to the cultivation of raspberries. The third and probably the most important factor are price trends on the world market, as growth in demand occurred, prices have contributed to this production and growing became extremely profitable.

So specific morphological, soil and microclimate conditions, uniform varieties, a special "culture of growing raspberries" and high yields of high quality fruits are the factors that make our country special for raspberries growing. Because of the very significant place raspberry has in a total market value and the exercise of great value production in small areas, the interest of producers rose and large areas were planted with raspberries, and still is, and its production is increasing. However, during the latest years the concurrencies of the better organized producers are presented (Nikolić et al., 2008).

The largest area planted with raspberries (as much as 98 %) in Serbia is carried out in central part of Serbia, consequently, since it is the most successfully grown in the hilly-mountainous areas. Region of Vojvodina is not represented with the raspberry growth compared to central Serbia. The values of raspberry in Serbia for the period 2000 – 2013 are shown in Table 5.

**Table 5.** *The volume of raspberry production in Serbia for the period 2000-2013.*

| Year | Rep. of Serbia | | | Central Serbia | | | AP Vojvodina | | |
|---|---|---|---|---|---|---|---|---|---|
| | Area planted raspberry (ha) | Total yield (t) | Yeald (t/ha) | Area planted raspberry (ha) | Total yield (t) | Yield (t/ha) | Area planted raspberry (ha) | Total yield (t) | Yeald (t/ha) |
| 2000 | 13 519 | 55 999 | 4,14 | 13 238 | 55 530 | 4,20 | 281 | 469 | 1,67 |
| 2001 | 14 753 | 77 781 | 5,27 | 14 385 | 77 068 | 5,36 | 368 | 713 | 1,94 |
| 2002 | 15 293 | 93 982 | 6,15 | 14 943 | 93 572 | 6,26 | 350 | 410 | 1,17 |
| 2003 | 16 354 | 78 974 | 4,83 | 15 987 | 78 664 | 4,92 | 367 | 310 | 0,85 |
| 2004 | 15 995 | 91 725 | 5,73 | 15 589 | 90 861 | 5,83 | 406 | 864 | 2,13 |
| 2005 | 15 413 | 84 331 | 5,47 | 15 063 | 83 777 | 5,56 | 350 | 554 | 1,58 |
| 2006 | 15 024 | 79 680 | 5,30 | 14 672 | 78 929 | 5,38 | 352 | 751 | 2,13 |
| 2007 | 14 496 | 76 991 | 5,31 | 14 116 | 76 185 | 5,40 | 380 | 806 | 2,12 |
| 2008 | 14 680 | 84 299 | 5,74 | 14 174 | 83 335 | 5,88 | 506 | 964 | 1,91 |
| 2009 | 14 957 | 86 961 | 5,81 | 14 441 | 85 302 | 5,91 | 516 | 1 659 | 3,21 |
| 2010 | 15 174 | 83 870 | 5,53 | 14 709 | 81 240 | 5,52 | 462 | 2 630 | 5,70 |
| 2011 | 15 354 | 89 602 | 5,80 | 14 874 | 88 372 | 5,94 | 480 | 1 230 | 2,60 |
| 2012 | 15 748 | 70 320 | 4,50 | 15 278 | 69 408 | 4,54 | 470 | 912 | 2,00 |
| 2013 | 15 433 | 68 458 | 4,43 | 14 976 | 67 334 | 4,50 | 457 | 1 124 | 2,46 |
| Aver. | 15 157 | 80 212 | *5,29* | 14 746 | 79 256 | *5,37* | 410 | 651 | 2,25 |

**Source:** *Authors' calculations based on data of the National Statistics Institute, Belgrade.*

The average area planted with raspberries for the observed multi-year period in the Republic of Serbia amounted to 15,157 ha. Central Serbia, with an average area of 14,746 ha, accounting for about 97.4 % of the total acreage planted with raspberries in Serbia and Vojvodina, with an average area planted with raspberries from 410 ha, to participate in the total production of only 2.6 %.

Apart from minor deviations analyzed, the average surface covered with raspberries showed a slight tendency to increase in Serbia. In Vojvodina, the increase in the area under raspberry is slightly more pronounced in relation to central Serbia. Raspberry production expressed in tons on average for the period 2000 - 2013 in the Republic of Serbia was 80.212t , with the lowest production observed in the initial year of the year (55 999 t), and the highest in 2002 (93 982 t). Central Serbia with an average production of 79 256 t takes a share of 98.9 % in the total production of raspberries in Serbia. The remaining 1.1 % is the share of AP Vojvodina in the total production of raspberries in Serbia. Total raspberry production in Serbia is increased in the analyzed period, with the intensity of output growth much more pronounced in Vojvodina in relation to central Serbia.

The average yield of raspberry expressed in t/ha, in the period 2000 - 2013 in the Republic of Serbia amounted to 5.29 t / ha. The central Serbia yield per unit area was significantly higher (5.37 t/ha) as compared to Vojvodina (2.25 t / ha). The largest and most famous raspberry area is Arilje - Pozega (which includes the area Moravice and Dragačeva) and Valjevo. Municipalities that stand out in raspberry production are Kosjerić , Uzice, Arilje, Pozega, Valjevo, Mionica, Osečina, Koceljeva, Krupanj, Ljubovija, Gornji Milanovac, Cacak, Lucani, Bruce, Aleksandrovac. In these areas native raspberry with a variety of types that represent the wealth of genetic resources for this type of fruit are represented. Of great importance is that the native material has outstanding adaptability to soil and climatic conditions of the environment in which it is located. Diverse genotypes have some important features that stand out, especially the aroma of fruits and specific pleasant taste.

**Problems associated with fruit production in Serbia and measures to improve**

Fruit production as plant production is characterized by a number of comparative advantages in relation to other branches of agriculture. In addition to employment opportunities for large numbers of workers, fruit can be attractive not only for farmers, but for the enterprising people of all other occupations (Milić and Radojević, 2003).

Growing assorted as fruit trees in backyards, in gardens and along road sides, paths, channel and land areas can achieve far greater benefits than to allow to those areas to remain empty. It also allows the use of areas with different climatic conditions, local character and use of soil of less productive capacity, and land less productive and less favorable in terms of physical, chemical and other properties, and land on steeper slopes.

The importance of fruit as food is reflected in the fact that it contains within itself important amount of essential vitamins (A, B, C. ..) and mineral which are deficient in the human diet (Milić et al., 2009) According to Vlahović ( 1999) one of the fruits categorization is :

- Fruits rich in water (lemon, grape, raspberry, cherry, apple…) containing up to 95 % water, low energy value, fats and proteins in small amounts. It consists of significant amounts of minerals and vitamins (A, C. ..) , and
- Fruits rich in fats (walnuts, almonds, peanuts, hazelnuts, chestnuts ...) with high energy value, with significant amounts of fat, protein, carbohydrates and a small amount of water.

The economic importance of fruit production is reflected in the following:

1) Fruit and its manufactures provide significant funds in the Serbian economy, which can be further increased in modern conditions of production;
2) Fruit has a very important role in the human diet, perhaps even more of importance compared to other foodstuffs;
3) The planting of fruit can be used on various terrains (sandy, eroded, hilly, mountain, etc.) which, due to the configuration and other characteristics, are not suitable for growing other crops and plants;
4) The fruit is employing a large number of skilled labors which reduces or relieves unemployment in some regions. At the time of pruning and harvesting free labor force is usually engaged, manufacturing production is activated along with transportation equipment, and the like;
5) Development of fruit indirectly affect the development of other economic sectors , such as machinery and tractor industry, fruit processing , packaging industry, wood industry, etc.;
6) Than fruit production increases the value of land, as in raising plantations are invested a large sums of money per unit area (especially in highly intensive plantations), and so on. (Milić et al., 2013).

On the whole, regardless of the favorable natural conditions, fruit production in Serbia is in pretty bad shape. Fragmentation of land under plantations of fruit hampers the implementation of more productive machinery and performs the necessary agro-technical measures. The high share of obsolete (outdated) varieties and a large variety of cultivars are significant difficulties with the supply of standard quality fruit. Many other outstanding issues (production of quality planting material, the necessary funding for the establishment and regular production of fruit, etc.) are also serious obstacles to stop long-term stagnation of fruit production.

On the other hand, the production of fruit has great prospects for development due to favorable natural conditions for pulling off almost all continental species of fruit as well as due to the increasing demand in the domestic and in the world market. It could be argued that a large part of total agricultural trade deficit (about 60 %) in the rich countries of Europe and North America just comes from fruits and vegetables. Natural conditions in Serbia, and especially some regions, have climate and soil very favorable for the cultivation of fruit. Temperate continental climate, highly productive soil, high production capacity, very favorable physical, chemical and water - air properties, as well as good water resources , unfortunately, still untapped enough, all very favorable for fruit production.

Great damage in fruit can cause inadequate tillage, poor care, inappropriate use of fertilizers and the like. One of the most important factors that significantly influence the improvement of fruit production is the production of quality planting material. In Serbia to raise parent base plant for the production of surface coil and twigs and it is of great importance. Genetic resources that Serbia has in fruit are very important. The production program should not rely on the old varieties that have potential for the development of high-quality fruit, and the world market should appear with organic production, which is very popular. Serbia has long tradition in fruit production. However, there are weaknesses in terms of adapting to the new assortment, new manufacturing technology of the production, as well as restraint in adopting new ideas and technologies. The plot on which fruit production is carried is fragmented and need to make their augmentation to increase production.

Also one of the problems is the increasing number of elderly households with the need to create conditions for the return of young people in the village. Workforce to perform unskilled positions is enough but it is still in the process of harvesting labor imported from Bulgaria and Romania because they are young in our uninterested in performing these tasks. It is necessary to organize seminars to educate producers, especially for the cost-effective production planning in order to achieve secure and higher yields of high quality fruits.

The potential of fruit in Serbia is just the quality of fruits and fruit products. It is necessary to invest more in marketing and brand creating. The big problem is too broad representation of foreign companies in the domestic market. Association of the manufacturer is supposed to represent the interests of all growers which have to be realized with the general advice, pricing, promotion, etc. The main motifs of the association are:

- Legal support and security;
- Awareness of the inputs;
- Rational development of production processes;
- Easier handling and storage of finished products;
- Faster and more efficient marketing of products;
- Financial support (loans, grants, etc.)
- Better infrastructure;
- Better utilization of capacity;
- Education on quality improvement (standards, etc.)
- Higher labor productivity;
- Loss of smaller and more efficient production;
- Better and greater profitability, etc.

## Suggestions for fruit production improvement

Serbia has a very favorable fruit growing conditions, and good prospects for their exports. In order to improve their production and marketing, it is necessary to take appropriate organizational measures. It is necessary to:

- to develop a National program of fruit production in Serbia;
- to make zoning and form registers manufacturer of fruit;
- to encourage the introduction of good agricultural practices in the production;
- to encourage the pooling of small producers and organize the financial and institutional support to the product purchasing;
- to modernized technology - from primary production to processing and packaging, and to continue with the introduction of European standards;
- to analyze the global and European market for better positioning of Serbian producers and processors;
- introduce better investment support for building new modern plantation and better varieties; application of modern machinery and irrigation systems;
- to support with money and organizational performances producers and processors of fruits on the most important international trade fairs;
- to promote fruit products and manufacturers in the domestic and international markets and support the joint performance of companies in foreign markets.

For successful production, it is necessary to obtain attraction of foreign customers and secure placement of fruit, essential quality, quantity and continuity. It is necessary to develop a long-term strategy in orchards in order to provide guidance to avoid or mitigate possible risks when raising seedlings, as well as the implementation of management practices. That would be risky in growing fruit to a minimum, and manufacturers would be motivated to engage in these productions. Despite the problems plaguing the fruit production in Serbia, trends, growth areas, yield, production and export of this fruit in the analyzed period were positive. Elimination or reduction of the above mentioned problems might lead toward the even more positive trends. All this would contribute to greater profits for producers, processors and exporters, and therefore improvement of fruit production.

## Conclusion

Natural conditions in Serbia and especially in some regions, climate and soil are very favorable for the cultivation of fruit. None of the agricultural sector can bring so much profit as fruit growing, especially in mountainous areas. It is one

of the most productive agricultural industries, which is significantly greater than the profitability of other agricultural industries. Fruit growing is one of the few branches of agriculture which has undergone a major shift in the introduction of new technologies and the changing structure of varieties, which is a great merit of science, art and manufacturers have embraced the new technology. The fact that the fruit is one of the most important export products says that this branch should be given much more attention. In general, regardless of the favorable natural conditions, fruit Serbia is in pretty bad shape. Fragmentation of land under plantations of fruit hampers the implementation of more productive machinery and perform the necessary agro-technical measures. The high share of obsolete (outdated) varieties and a large variety of cultivars are significant difficulties with the supply of standard quality fruit. Many other outstanding issues (production of quality planting material, the necessary funding for the establishment and regular production of fruit, etc..) Are also serious obstacles to stop long-term stagnation of fruit production. The yields from year to year vary widely. Such a variation in yield from year to year, the most affected by winterkill low winter temperatures, especially from late spring frosts, but was also influenced by many other factors: the city, the attack of pests and diseases, drought, high temperature. For faster improvement of fruit one of the most important factors is the production of quality planting material. It is good that Serbia started with raising the stem base plantations for the production of substrates and graft branches. On the other hand, the production of fruit has great prospects for development due to favorable natural conditions for pulling off almost all continental species of fruit as well as due to the increasing demand in the domestic fruit but more on the world market. It could be argued that a large part of total agricultural trade deficit (about 60%) in the rich countries of Europe and North America just comes from fruits and vegetables.

## References


1. Keserović Z., (2004): „*Savremene tendencije u proizvodnji jabuke i kruške*“, Zadružna biblioteka, Zelena sveska 4, Zadružni savez Vojvodine, Novi Sad. str. 22-35.

2. Kljajić N., Vuković P., Arsić, S. (2013c): „TENDENCIES RELATED TO THE PRODUCTION OF RASPBERRIES IN THE REPUBLIC OF SERBIA“, časopis/journal Ekonomika poljoprivrede/Economics of Agriculture, No.1., str. 39-48.

3. Kljajić, N., (2014) „Efikasnost investicija u proizvodnji maline“. Institut za ekonomiku poljoprivrede, Beograd.

4. Kljajić, N., Grujić, B., Roljević, S., (2013): *"Voćarska proizvodnja Gornjeg Podunavlja prema obliku svojine"*, Ekonomika, 3/2013, Društvo ekonomista "Ekonomika", Niš, Srbija, UDK: 338 (497,1), YUISSN 0350-137X, str. 57-64.
5. Milić D., Sredojević Zorica, Vukoje V. (2009): „*Economic Determinants Quality of Fruits*". PTEP-časopis za procesnu tehniku i energetiku u poljoprivredi (Jurnal on processing and energy in agriculture), Vol. 13, $N_0$ 1, pp. 88-91.

6. Milić, D., Radojević, V. (2003): „Proizvodno-ekonomskai upotrebna vrednost voća i grožđa", Novi Sad.

7. Mišić P., Tešović Ž., Stanisavljević M., Milutinović M., Nikolić M., Milenković S. (2004): „Malina u Srbiji i Crnoj Gori-prošlost, sadašnjost i budućnost". Jugoslovensko voćarstvo, vol. 38, br. 145-146, str. 5-22.

8. Nikolić, M., Ivanović, M., Milenković, S., Milivojević Jasminka, Milutinović, M., (2008): „The State and Prospects of Raspberry Production in Serbia", ISHS Acta Horticulturae 777: IX International Rubus and Ribes Symposium. Pucón, Chile, number of article 83, Vol. 1.

9. Nikolić, M., Milivojević Jasminka (2011): „*Jagodaste voćke-tehnologija gajenja*". Monografija. Univerzitet u Beogradu, Poljoprivredni fakultet.

10. Petrović S., Milošević T. (2002): „Malina-Tehnologija i organizacija proizvodnje". Agronomski fakultet, Čačak. str. 215-219.

11. Petrović S., Milošević T., Zornić Biljana, Leposavić A., Glišić I. (2003): „Analiza proizvodnje maline u Republici Srbiji u periodu 1971-2002. godine". Ekonomika poljoprivrede. Specijalni broj: „Ekonomika i tržište maline". God. L, br. 3, Beograd, str. 243-254.

12. Popović V., Kalanović B., Živković V., (2003): „Malina u proizvodnji i izvozu poljoprivrede Srbije". Ekonomika poljoprivrede. Specijalni broj: „Ekonomika i tržište maline". God. L, br. 3, Beograd, str. 267-275.

13. Štrbac M., (2009): „*Analiza proizvodnje voća i grožđa u republici Srbiji*". Institut za ekonomiku poljoprivrede, Beograd.

14. Vlahović B. i sar. (2006): „*Agrarna proizvodnja u Republici Srbiji*". Novi Sad.

# CROP INSURANCE AS SUPPORT TO RURAL DEVELOPMENT IN THE REPUBLIC OF SERBIA

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## Abstract

*Crop insurance should make an important contribution to sustainable agriculture and rural development in any country. It protects food production, which is to a great extent subject to numerous and sometimes devastating natural hazards. It is widely known that Serbia is a country with very good natural conditions for food production. The level of development of the Serbian crop insurance has been evaluated in this paper using several parameters, common for this type of research, comparing it to the selected European countries. The values of most indicators point to a very low level of development of the crop insurance in Serbia and its still insufficient support to rural development. Experiences of both developed countries and countries in transition indicate that the contribution to improving this state of affairs must be provided simultaneously by the state and insurance companies, each from their respective points of view.*

**Key words:** *crop insurance, rural development, hail insurance, insurance in Serbia.*

## Introduction

In Serbia, agriculture is of great importance, and hence the importance of the crop insurance. Agriculture usually involves open and unprotected areas, which means that it is exposed to various risks. These hazards occur almost annually, with greater or lesser force, causing major damage and often reaching catastrophic proportions. Therefore, the crop insurance, which plays an important role in the economic protection and development of agriculture, i.e. rural development, is one of the riskiest types of insurance.

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The size of the risk is further influenced by a proportionately long production cycle, characteristic for crop production. Climate changes also have a significant influence on crop production. When the demand variations for crops and the influence of the state, which is not always favourable to farmers, are added to numerous natural disasters agricultural production is exposed to, it is obvious that crop production is exposed to a significant volume of financial risk. There are several risk management options available in agriculture. One of the options in each program of risk management will inevitably be the purchase of an insurance policy.

Crop insurance has existed for nearly three centuries. Hail insurance first appeared on the European soil (in Germany in 1719, France in 1802, and Great Britain in 1840), then in America (in the United States in 1870). Today, crop insurance is primarily offered either for the restricted range of specified perils such as hailstorm, fire and lightning or as comprehensive, i.e. multi-peril crop insurance, which, in addition to weather-related perils, also includes production losses caused by other reasons such as low yield or poor quality of crops.

A significant position also belongs to new crop insurance products. The essence of the crop-revenue insurance products is that they combine production and price risks as determinants of the total profit from a particular crop. Index-based insurance products are based on meteorological measurements in the wider area in which the insured area is located. According to this approach, claims will be paid, for example, if a certain minimum temperature lasts for the minimum period of time, or if a certain amount of rainfall is recorded in a given period, which is used to prove the actual risk of drought or excessive rain. After developed countries, these products have successfully started to be used in some developing countries as well.

## Research methods and materials

The starting point for this paper was data on the crop insurance in Serbia. According to the Insurance Law of Serbia, it is classified as the insurance of other property, together with insurance against machinery breakdown, construction insurance, household insurance, animal insurance etc. The National Bank of Serbia only provides information on the total premiums and claims according to the type of insurance. We have collected data on the insured areas, sum insured of crop production, damaged insured areas

and loss ratios in this type of insurance, from companies which provide crop insurance. Data on the total, agricultural and arable land in Serbia, the number of farmers and the basic climatic data are taken from the Statistical Yearbook of the Republic of Serbia. Together with data for Serbia, we used reliable data for other countries for international comparisons.

Quantitative and qualitative analysis was conducted in this paper. As figures are concerned, we have researched the degree of insured coverage of agricultural land, the production value on the insured areas, gross written insurance premiums, damaged areas, claims and the loss ratio. The analysis was carried out for the period from 2008 to 2012. All amounts in Serbian dinars have been converted into Euros starting from its average annual exchange rates. During the interpretation of the results, by the method of comparative analysis, the current state of the crop insurance in Serbia was related to the most important findings of researchers in this field in the global scientific studies.

Due to the similarity of climate and soil as natural preconditions for the development of agricultural production and the similarity of economic and political development, we compared some of the indicators in the crop insurance in Serbia to Bulgaria, the Czech Republic, Hungary, Romania, Slovakia, Slovenia and Ukraine. In this process, we used the results of studies supported by the World Bank and the European Commission.

## Insurance options and main features of the insurance procedure

The Republic of Serbia covers an area of 8,840,000 ha. Agricultural land covers 5,110,560 ha, i.e. 58%, of which 3,679,603 ha is arable land. The difference of 1,430,957 ha is mainly meadows and pastures. From the standpoint of insurance and its contribution to sustainable agriculture and rural development, the importance belongs to arable land, while meadows and pastures are usually not insured.

In the period observed in this paper, the average value of harvested crops and fruits harvested per hectare in farmers' fields ranged in level of about 900 €. The value of total crop production on arable area was about 3.3 billion €. The total premium that could be achieved by providing the crop insurance on arable land, with the current composition of crop production is about 130 million €.

Serbia currently has 11 insurance companies that deal exclusively with non-life insurance, while six also deal with both non-life and life insurance. By far the largest portion of the premium of the crop insurance is realized by two insurers - Dunav and DDOR Novi Sad. Of the other 15 companies only a few of them insure crops and fruits.

Crop nsurance in Serbia is voluntary. It is implemented according to the principle of specified perils, the main risk being hail, with the risk of fire and thunder added. Additional risks are storms, spring frost, autumn frosts and floods. Under the influence of climate changes, an insurance company has recently introduced drought as an additional risk as well. Comprehensive crop insurance does not exist in Serbia and we estimate that there is no likelihood for the introduction of new crop insurance products such as index-based insurance products and crop-revenue insurance products. The concept of agricultural risk management, whose part is insurance, is not present enough in Serbia. Its use is gradually affected by enlargement of property and prospects of large landowners, which was initiated after the commencement of the privatization process fifteen years ago.

At the conclusion of the insurance contract, the percentage-of-loss deductible is usually applied. For each crop, except for field crops, it is started from the 5% of the franchise, and depending on the contract it rises to as much as 50%. It is understood that with the increase in the franchise, the insurance premium is simultaneously reduced. Serbian farmers are reluctant to take franchise, because when it comes to the claim they expect to be paid the full amount of compensation. Insurers, in turn, insist on arranging at least 10-20% of the franchise for fruit, where the damage in relation to the insured area is by far the largest.

In 2007, the state introduced subsidizing of insurance premiums, but only for registered farms for which agriculture is the only source of income. During the first two years, subsidies amounted to 30% of premiums, with aid increased to 40% since 2009. Approximately the same amount of subsidies exists in other European countries to which we have made comparisons, and in half of them this form of state aid was not introduced. Additional subsidies can be approved by municipalities as well, according to their capabilities, which is a practice that may be encountered in other countries with agricultural development even remotely comparable to ours. It is estimated that there are about 450,000 registered farms in Serbia, but a very small percentage is insured against

the risks that threaten crop production. Although in this country computerization is not at a low level, we still do not have a list of the insured agricultural farms.

## Insured areas

From the Table 1, which presents insured areas in Serbia, we notice that the year 2008 is the year with the largest insured area. After a sharp fall in the following year there is an improvement, and in the last analyzed year the insured area encompassed approximately 8% of the total arable land.

**Table 1.** *Total insured areas in Serbia 2008-2012*

| Year | Hectares |
|---|---|
| 2008 | 302,957 |
| 2009 | 231,482 |
| 2010 | 254,846 |
| 2011 | 252,980 |
| 2012 | 284,602 |

**Source:** *Authors' own calculation.*

The percent of the insured areas compared to the total agricultural and the total arable area in Serbia can be seen in the Table 2.

**Table 2.** *Percent of the insured areas in the total agricultural and the total arable areas in Serbia 2008-2012*

| Year | Percent in the total agricultural areas (%) | Percent in the total arable areas (%) |
|---|---|---|
| 2008 | 5.93 | 8.23 |
| 2009 | 4.53 | 6.29 |
| 2010 | 4.99 | 6.93 |
| 2011 | 4.95 | 6.88 |
| 2012 | 5.57 | 7.73 |

**Source:** *Authors' own calculation.*

The level of insurance coverage of agricultural areas in Serbia is extremely low. It is in the range of 4.5% to 6.0%. The level of agricultural development is rather poor, with the predominant extensive way of performing business operations. The farmers are not very interested in the insurance of their production. It is characteristic that the areas which are regularly insured in recent years are not increased, and that simultaneously their market redistribution is performed between insurers.

The level of insurance of only 7-8% of arable areas just serves to show how much potential there is in this branch of insurance. Increase in the insured areas under crops and fruits can be expected only with a larger share of the state, which would stimulate development through loans and subsidies. Producers will show greater interest in the crop insurance only due to the desire to protect the resources invested in the production.

## Sum insured

The sum insured is the amount at which a crop is insured. It is determined by the insured personally and the premium is calculated according to it. Usually, the sum insured is equal to the value of the insured crops, and is obtained when the expected yield in kilograms per hectare is multiplied by the actual, market price. The sum insured is expressed per unit of surface measurement and presents the maximum obligation of the insurer.

The total sum insured is influenced by several factors:

- the total insured area,
- structure of the insured crops,
- yield according to which crops are insured and
- prices of agricultural products.

**Table 3.** *The total sum insured in the crop insurance in Serbia 2008-2012*

| Year | Millions of € |
|---|---|
| 2008 | 387 |
| 2009 | 219 |
| 2010 | 229 |
| 2011 | 304 |
| 2012 | 358 |

**Source:** *Authors' own calculation.*

From the data in Table 3, it can be concluded that along with the increase in area covered by insurance, the value of the insured crops rose as well. From 2009 to 2012 the amount of insurance on the insured areas was on the rise. The total value of crop production (sum insured) is not only the result of coverage, or insured area, but in many ways the price of agricultural products dictated by the market. This can be concluded by analyzing comparative data on the insured areas and the sum insured especially in 2008 and 2011. In 2008 compared to the previous year, the sum insured increased by over 74 % and the insured area by only 4%. In 2011 compared to the previous year, the sum insured has increased by

nearly 33% while the insured area decreased by 1%. This discrepancy between the insured area and the sum insured is a direct result of prices of agricultural products which have risen sharply in recent years, while the structure of the insured crops in area did not change significantly.

**Table 4.** *Average value of the insured crops and fruits in Serbia 2008-2012*

| Year | Sum insured €/ha |
|---|---|
| 2008 | 1,279 |
| 2009 | 947 |
| 2010 | 900 |
| 2011 | 1,202 |
| 2012 | 1,257 |

**Source:** *Authors' own calculation.*

Starting from the data on the total insured areas and the sum insured, i.e. the value of the insured crop production, we have come to the value of the insured crops and fruits per hectare, as shown in Table 4.

## Insurance premium

Insurance is such an activity on the basis of which the insurer agrees, for a certain specified amount of money (in the form of the paid insurance premium) to pay out a claim amount to the insured in case of an insured event. Insurance premium is the price of the service provided by the insurer to the insured. Its amount is directly proportional to the size of the risk, the value of the sum insured and the duration of insurance. The total premium realized in the crop insurance in Serbia in the observed period has the same line of movement as the sum insured (Table 5).

**Table 5.** *The crop insurance premium in Serbia 2008-2012*

| Year | Millions of € |
|---|---|
| 2008 | 13.6 |
| 2009 | 8.0 |
| 2010 | 7.7 |
| 2011 | 9.5 |
| 2012 | 10.0 |

**Source:** *National Bank of Serbia, Number of insurances, policyholders and premiums by type of insurance tariff in Serbia, http://www.nbs.rs/export/sites/default/internet/english/60/60_2/izvestaji/god_T1_2012.pdf (visited 11/3/2014).*

A significantly higher insurance premium in 2008 occurred due to a number of factors which include high grain prices, the introduction of government premium subsidies, and a new tariff rating developed by the leading agricultural insurance company. After this, the volume of premium has fallen, in part due to the reduction of grain prices, and partly because of the economic crisis in agriculture which caused bankruptcies and missed premium payments. However, we note that in recent years the situation has been gradually improving and the premium has been increasing.

We have researched the participation of crop insurance premium in the total premiums for all types of non-life insurance (Table 6).

**Table 6.** *Significance of the crop insurance premium in the total premium of the non-life insurances in Serbia 2008-2012*

| Year | Premium of non-life insurances (millions of €) | Percent of the crop insurance (%) |
|---|---|---|
| 2008 | 641.1 | 2.12 |
| 2009 | 570.1 | 1.39 |
| 2010 | 548.7 | 1.40 |
| 2011 | 463.9 | 2.05 |
| 2012 | 438.5 | 2.27 |

**Source:** *National Bank of Serbia, Number of insurances, policyholders and premiums by type of insurance tariff in Serbia, http://www.nbs.rs/export/sites/default/internet/english/60/60_2/izvestaji/god_T1_2012.pdf (visited 11/3/2014).*

The data obtained shows that the share of the crop insurance is almost negligible compared to the total premiums in non-life insurance companies and that at its best it is around 2%. One indicator that is also important to explore is the amount of the average crop insurance premium per insured area (Table 7).

**Table 7.** *Average crop insurance premium per insured area in Serbia 2008-2012.*

| Year | Average premium €/ha |
|---|---|
| 2008 | 45 |
| 2009 | 34 |
| 2010 | 30 |
| 2011 | 38 |
| 2012 | 40 |

**Source:** *Authors' own calculation*.

From the calculated amount in the Table 7, it can be seen that the realized average premium per hectare in the given period ranges similarly to the majority of other indicators.

## Claims

The fewest number of claims concerning insured crops and fruits in the observed preiod was in 2012, while 2010, and then 2008 were the years with the highest number of claims (Table 8).

**Table 8.** *Total claims in the crop insurance in Serbia 2008-2012*

| Year | Millions of € |
|---|---|
| 2008 | 7.3 |
| 2009 | 5.7 |
| 2010 | 8.9 |
| 2011 | 6.7 |
| 2012 | 3.7 |

**Source:** *National Bank of Serbia, Number and amount of claims by types of insurance and tariff 1) for Serbia,* http://www.nbs.rs/export/sites/default/internet/english/60/60_2/izvestaji/god_T2_2012.pdf *(visited 11/3/2014).*

Hail is the largest cause of damage, although it is usually local in character. However, there are certain exceptions. Such an example is the hail, i.e. the storm that affected the entire municipality Arilje in central Serbia in 2011, where a considerable part of the total production of raspberries in the country is grown, and at the worst possible time - a few days before fruit harvest when the damage was the greatest. The minimum of damaged areas was in 2012, and the maximum in 2010 (Table 9).

The reason for the discrepancy between the damaged area and the amount of claims, which is especially noticeable in 2008 and 2012, can be found in the structure of the damaged area. The structure of damaged crops is important because their value is different. Field crops, in contrast to the fruit crops, have a significantly lower value. It follows that when the damaged crops are dominated by field crops, the amount of claims will be less than if the damage affected a larger area under fruit crops.

**Table 9.** *Total damaged insured area in Serbia 2008-2012*

| Year | Hectares |
|---|---|
| 2008 | 34,053 |
| 2009 | 37,865 |
| 2010 | 51,764 |
| 2011 | 35,083 |
| 2012 | 29,829 |

**Source:** *Authors' own calculation.*

Table 10 provides data on the average amount of claim in the crop insurance in Serbia in the observed 5 year period.

**Table 10.** *Average claim amount in the crop insurance in Serbia 2008-2012.*

| Year | € / ha |
|---|---|
| 2008 | 213 |
| 2009 | 151 |
| 2010 | 172 |
| 2011 | 192 |
| 2012 | 123 |

**Source:** *Authors' own calculation.*

The extent to which the amount of the claims will follow the increase, i.e. the decrease of the coverage of crop insurance depends primarily on the structure of the insured area i.e. on the presence of different types of insured crops. The reasons for the fluctuation of the amount of claims should be sought in the business policy of the insurer (the choice of the insured and the application of deductibles), insurance coverage (risk dispersion) and the sum insured (yield and price at which the crops are insured).

## Loss ratio

The determined loss ratio as the quotient of claims and technical premiums is also important for the insurer and the insured. The insurer cannot do long-term business with a persistently high loss ratio, since it would mean that the amount paid out for claims is higher than the amount of technical insurance premiums collected. For the insured it is also important to monitor the loss ratio achieved in order to choose the optimal insurance coverage at the conclusion of the insurance contract.

**Table 11.** *Loss ratio in the crop insurance in Serbia 2008-2012.*

| Year | % |
|---|---|
| 2008 | 76 |
| 2009 | 103 |
| 2010 | 165 |
| 2011 | 101 |
| 2012 | 53 |

**Source:** *Authors' own calculation.*

In addition, the loss ratio is an indicator of adequacy of premium rates for the accepted risks. During the observed period (Table 11) it can be seen that in 2012 and 2008 the loss ratio achieved was positive, that the insurance in 2009 and 2011 was on the verge of positive operating results, and in 2010 it had a negative result.

## Comparisons to selected European countries

When it comes to the way of crop insurance and government support, we would like to emphasize that the Serbian insurance companies offer very similar products as insurers from other countries. Together with hail as the main risk, a few additional risks are covered. None of the countries which we have compared to Serbia (Bulgaria, Czech Republic, Hungary, Romania, Slovakia, Slovenia, Ukraine) have a comprehensive crop insurance. The state provides subsidies in most cases. In all the countries mentioned, the crop insurance is offered by private companies, while in Serbia, together with these providers there is one company and it is the leading publicly owned company, which sells these types of insurance policies.

International comparison points to the conclusion that the arable land covered by insurance protection in Serbia is much smaller than in other countries. In Ukraine a nine fold larger area than in our country is insured. However, it is an absolute indicator whose utility is still limited. Even more important is the indicator of the rate of insurance coverage of the total arable land, which was also explored. Compared to other countries included in the analysis, in Serbia the coverage of arable land by insurance is at the minimum. In Hungary and the Czech Republic, this indicator is six times higher, which means better, and in Bulgaria as much as seven times.

From the standpoint of international comparisons of the amount of insurance premiums in the crop insurance, we point out that it the only one lower than in Serbia is in Bulgaria. In the Czech Republic and

Hungary it is up to four or five times higher than in this country. Likewise, we would like to emphasize that Serbia is the only one among the observed countries in which the loss ratio in crop insurance is negative on average, because for the five-year period it is exactly 100%. In order for it to be advantageous it should not exceed 80%. It follows that Serbian insurers must realize profit in other branches of insurance - specifically, from the standpoint of agriculture, the low loss ratio of motor vehicle insurance, buildings, equipment, and people employed in the industry spills over and covers persistently high loss ratio in the crop insurance.

## Discussion

The given data indicate that the insurance protection of plant production in Serbia does not give satisfactory contribution to sustainable agriculture and rural development, because it is at a very low level of development. This comes from the forms of insurance protection applied as well as the insurance coverage of arable land. It is obvious that awareness of the need for insurance is not developed sufficiently for both farmers and farm households. Crop insurance in this country is mostly used by professional farmers and agricultural companies. Unfortunately, a huge percentage of small farmers with small property simply avoid insurance although their income is dependent on weather conditions. It is necessary for insurance to have importance in this country as it does in modern, developed countries. It can be encouraged either by the state or credit institutions which help the development of agriculture, the insurers, as well as by the farmers themselves.

A particular question is the question whether the crop insurance should be voluntary or mandatory. We pointed out that in the vast majority of countries this insurance is voluntary. In Serbia, occasionally proposals can be heard on the introduction of mandatory crop insurance by adoption of appropriate legislation. We do not think that it would be a good move, because in this type of insurance, relationships should not be built by force, but based on the economic interests of all parties interested. If a mandatory insurance were required for farmers it would be perceived just another duty imposed on an already impoverished agriculture.

Crop insurance can best be performed only by insurance companies with large capital, good reinsurance protection, numerous and skilled personnel, and claim assessment based on scientific and technical knowledge. As the crop insurance is seasonal work, many producers

insure their crops during spring works. Due to the volume of business, the insurer often concludes a contract failing to examine the subject of insurance, which is a big mistake. Their duty is to determine the state of the crops in the field – first of all if there are any crops, and then assess whether the expected yield is realistic for the area. In Serbia, the amount of premium rates within the same class of risk differs significantly among insurance companies. Insurers, in order to secure a place in the market, offer a variety of discounts that have no basis. In this unfair competition between companies, the insureds with high loss ratio generally profit, while insurance companies fail to balance the amount of the actual premiums with paid out claims.

It is a fact that many farmers in this country do not opt for crop insurance, because the taxes for agriculture are high. For this reason, insurance is the least important for them. For farmers who barely manage to provide funds for investment in production (seeds, fertilizers, pesticides), crop insurance is often a cost they can do without. The result of this situation, which has been putting pressure on our agriculture for a long time, is the very low yield compared to other countries with developed agriculture. With such yield there is no interest in insurance protection unless the price of the insurance is low.

Insurance companies are forced to reduce their premiums by giving various types of discounts in order to motivate producers to insure their crops. However, this policy leads insurers into a situation where the actual premiums cannot provide a large enough fund to cover the claims. Therefore, as we have pointed out, their business operations in this area of insurance are often negative.

For several years now the state has been trying to stimulate the crop insurance by the application of subsidies, in a way that the insured will be returned a part of the premium, in order to improve the situation in this area. This measure certainly gives good results and is supported by both the insureds and the insurers, but progress is still small. We present the data that in 2012 only 14,871 insurance policies were concluded in Serbia.

Farmers have always expected the state to be liable for damages to crops, by declaring a natural disaster. The state, however, tends to shift the burden of responsibility for the disastrous consequences of natural disasters to insurance companies. With growing awareness of the population about insurance the state is excluded and the decision whether

to purchase the policy is left to the producers. In our situation, the state satisfies a form of behaviour, but puts producers at a disadvantage. Producers to whom crop production is not the only source of income are not encouraged to insure their crops because the 40% of the premium for which they do not receive a subsidy makes them non-competitive, increasing their costs of production.

Lack of information and indifference of farmers in Serbia is also a major impediment to greater spread of insurance protection as an important element of support to rural development. Farmers are not aware of the possibilities offered by crop insurance, so the insurance is often perceived as an unnecessary expense. Performance of insurance is seen only in years when there is damage to crops. Then it is considered justified and there is a growing interest of farmers for this type of protection of crop production. In years when there is no damage to crops or it is small, interest in insurance in the following period is low. Therefore, insurers have to work much more on familiarizing farmers with the benefits provided by crop insurance. In Serbia, only a small percentage of arable land is insured, mostly in hail-prone areas where damages occur regularly, almost annually. Since insurance is chosen mainly by farmers who suffer frequent damage and where risk is certain, the results in this branch of insurance are generally negative.

Drought is a natural phenomenon that covers a wide area, usually the entire state, and can lead to a significant drop in the yield of agricultural crops, thus significantly affecting the overall food production. Currently in Serbia, only one insurance company provides protection from drought, with a rather controversial method of estimating damage. The extent of drought is established on the basis of meteorological parameters, but it is also confirmed by the claim assessor, because the realized yield should be reduced in relation to the insured yield. Reduction of yield due to drought is difficult to prove, because it can occur not only due to the lack of rainfall, but also due to the non-application of the prescribed manufacturing technology. Therefore, the assessor can always reject the claim using this explanation. It would be much more objective if only meteorological data were observed and decisions made solely based on such data.

The role of prevention is to reduce the probability of risk occurrence, i.e. to prevent the occurrence of loss events on the insured crops and fruits. Directions of preventive action depend primarily on the risk threatening crop production. They should be focused on the cause of the damage from

the prevalent risks. Since hail causes the most damage, the most effective protection is a hail net whose setup is too expensive for many producers. Antifreeze systems or foils are also beneficial. Apart from frost protection, this also enables harvest of crops even when it rains and crops are protected from hail. Preventive measures should be far more included in agricultural risk management in Serbia than they have been so far.

If we include in the observation the indicators from selected European countries that we have covered in this paper, it clearly emerges that the crop insurance in Serbia is one of the least developed on the continent, but with significant growth potential. In particular, we emphasize a very low insurance coverage of the total arable land, which prevents the application of probability and the law of large numbers as a fundamental determinant of insurance protection.

## Conclusion

We believe that insurance companies must offer a much greater contribution to sustainable agriculture and rural development in Serbia. They should primarily be far more present on the field. Their marketing activities have to be boosted, both those carried out during the pre-season (winter period) and during the season (March-July). There is a need for constant cooperation between insurers in order to monitor market conditions and undertake joint actions in order to create a healthy competitive environment. Farmers should be acquainted with the terms of crop insurance and covered risks. It is particularly important to emphasize the obligations of the contractual parties during the insurance period.

From the standpoint of the insured, it is especially important to know when the insurer should assess the damage and pay out the insurance claim. When damages occur, they have to be realistically and objectively assessed. It is imperative that the insurance companies which operate in the same area have general rules adhered by all on how to assess the damage, so that the amount of paid claims is uniform. In case of total damages, it would be necessary to reduce the total amount of claims for the costs of unexecuted agricultural works for all crops and fruits.

Insured areas in this country are quite small and concentrated mainly in the hail-prone regions. Only with the expansion of coverage to other parts of the country a greater dispersion of risk will be achieved, which will have a positive impact on the achieved loss ratio of the insurer. In

addition to getting a mandatory survey of the crops before the conclusion of the contract, the insurance company is required to insure crops according to a realistic crop yield and market prices. Yield must not be insured in the amount which is unrealistically high, because in case of claims, the amount will be paid only up to the amount of actual yield, which means that the insured pays unnecessarily high premiums. In contrast, if a small amount of yield is insured, the insurer loses a part of the possible premium. A part of the risk should be taken on by the producers. With a realistic application of deductible, the insured would reduce the cost of insurance for a part of claim which he would compensate personally. We are committed to the greater application of deductible, especially in the area of fruit production, where the sums insured and the risks are high.

Serbian farmer is economically weak and tends to reduce production costs in order to be competitive in the market. As insurance is only one of the costs which he wants to eliminate, it is necessary to adjust the amount of premium to the economic possibilities of the producer. In any case, this is positively affected by the state which provides subsidies. We do not believe, however, that subsidies for insurance premiums should be awarded only to registered agricultural farms for whose members agriculture is the only source of income. Each food producer, whether it is their main or additional activity, whether they are a natural person or a legal entity, should likewise receive this form of state aid. At the same time, the state should stop directly helping farmers after devastating natural disasters, thus clearly referring them to insurance protection.

In addition, it is up to insurance companies to offer new products whose coverage would be more comprehensive and more acceptable to producers. These products should take into account the fact that climate changes in Serbia have an increasingly negative impact on crop production, because of the growing threat of droughts, storms and floods. Collection of premiums should be even more proportional to the purchasing power of farmers than before, which means the priority should be given to payment of premiums in installments and payment upon the completion of fruit and crop harvest.

## References

1. AXCO (2014): *Insurance Market Report Serbia: Non-Life (P&C)*, London.

2. Carter C. and Smith A. (2007): *Estimating the market effect of a food scare: The case of genetically modified starlink corn*, The Review of Economics and Statistics, 89 (3), 522-533.

3. Chambers R.G. and Quiggin J. (2004): *Technological and financial approaches to risk management in agriculture: an integrated approach*, Australian Journal of Agriculture and Resource Economics, 48 (2), 199-223.

4. Costello R.M. (2012): *Crop insurance: Iowa license exam manual*, CreateSpace, Seattle, WA.

5. Diaz-Caneja et al. (2009): *Risk management and agricultural insurance schemes in Europe*, European Commission, The Institute for the Protection of the Citizen, Ispra, Italy.

6. Mahul O. and Stutley C.J. (2010): *Government support to agricultural insurance: challenges and option for developing countries*, World Bank Publications, Washington DC.

7. Morgan W., Cotter J. and Dowd K. (2012): *Extreme measures of agricultural financial risk*, Journal of Agricultural Economics, 63 (1), 65-82.

8. National Bank of Serbia, *Insurance Sector in Serbia – Third Quarter Report*,http://www.nbs.rs/export/sites/default/internet/english/60/60_6/insurance_III_2013.pdf (visited 14.3.2014).

9. Roberts R. A. J. (2005): *Insurance of crops in developing countries*, Food and Agriculture Organization of the United Nations, Rome.

10. Statistical Office of the Republic of Serbia (2012): *Statistical Yearbook of the Republic of Serbia*, Belgrade.

11. Swiss Re (2011): *Product innovation in non-life insurance markets*, Sigma, 4, 1-36.

12. Swiss Re (2011): *Insurance in emerging markets: growth drivers and profitability*, Sigma, 5, 1-35.

13. Wright B. D. and Hewitt J. A. (1994): *All-risk crop insurance: lessons from theory and experience*. In: Hueth D.L. and Furtan W.H. (Editors), Economics of agricultural crop insurance: theory and evidence, Springer, New York.

14. Zarkovic N. (2013): *Glossary of Insurance Terms*, Skonto, Novi Sad.

15. Zarkovic N., Toscano B., Mrksic D. and Lisov M. (2014): *Key features of crop insurance in Serbia*, Bulgarian Journal of Agricultural Science, 20 (1), 23-33.

# STATE REGULATION OF THE RURAL LABOR MARKET IN THE REPUBLIC OF BELARUS: THE WAYS OF MODERNIZATION

*Oksana Noskova*[1]

## Abstract

*The article highlights the issues of rural labor market at the local level and identifies a number of problems: instability of the labor market development, low labor mobility and strengthening regional differences in employment. Proposed methodology of complex analysis of the rural labor demand based on econometric models: the model of employment formation and the model of wage formation. The methodology allowed to prove the necessity of modernization of the ways of state regulation of the rural labor market, including: the use of competitive advantages of the remote local labor markets in combination with compensatory regional policy focused on the smoothing of social, demographic and other regional differences; stimulating of advanced economic development of the base local labor markets which will increase the mobility of the rural labor force.*

**Key words:** *rural labor market, labor mobility, rural employment, modernization of state regulation*.

## Introduction

The modern labor market policy of the Republic of Belarus and in rural areas in particular, is characterized by a low percentage in the employment structure of the private sector, maintaining a low wage differentiation, and preserving maximum employment. The consequences of this policy implementation are inefficient allocation of labor resources, low mobility of labor, poor motivation of workers, the presence of non-competitive jobs, and poor efficiency of labor.

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This means that the problem of providing employment does not guarantee the efficiency and competitiveness of the labor force. On the contrary, it can suppress the normal functioning of the labor market. Today we understand the necessity of modernization of state regulation of the rural labor market based on comprehensive research on its functional structure.

## Research aim

Based on the methodology of complex analysis of the rural labor demand, to identify the problems of formation of local labor markets and justify the ways to modernize state regulation of the rural labor market.

## Basic material

The labor market is one of the most difficult elements of market economy, which are closely network interests of worker and employer, reflected almost all socio-economic parameters. In rural areas, the process of the labor market formation and development is slower than in urban areas, and the negative effects associated with the existence of the labor market, have their own specifics.

World experience shows that the labor market is the foundation of market relations. Without it, the equilibrium economy can not be built, as the economy management requires the employment management. Therefore the questions of economics and sociology of labor (the relationship between wages and employment opportunities, motivation and efficiency of investments in education and training) are considered through the prism of the labor market.

In our research we assume that the labor market it's a multi-level economic category, covering a set of employment conditions, and socio-economic and labor relations. Its essence lies in the economic relations on exchange the labor force on real wages based on the laws of supply and demand, labor productivity and competitiveness.

The labor market has a complex structure, which, depending on the purpose of the analysis it may be disclosed on different grounds. In our research we start from two main features: functional structure and territorial structure of the labor market. That is, we distinguish the components that are necessary and sufficient for its appearance and function, and those that characterize its regional features.

The rural labor market is developing in accordance with the laws of the labor market as a whole. It's driving force: jobs competition, income providing, and the competition of skilled labor between employers. The system of economic instruments, legal norms creates the self-regulation mechanism of labor which reflected directly on the formation and functioning of the labor market [1, p. 72]. However, the functioning of this mechanism meets several problems in the rural labor market. Among them:

– low level of rural employment (especially among women), compared with the urban;

– imbalance in age structure of the rural working population (predominance of pre-retirement or retirement age persons) (picture 1);

– high level of rural unemployment, and part-time employment;

– high degree of rural self-employment (mostly smallholders);

– outflow of rural youth, which negatively affects on the innovation and entrepreneurship development in rural areas (pictures 2, 3);

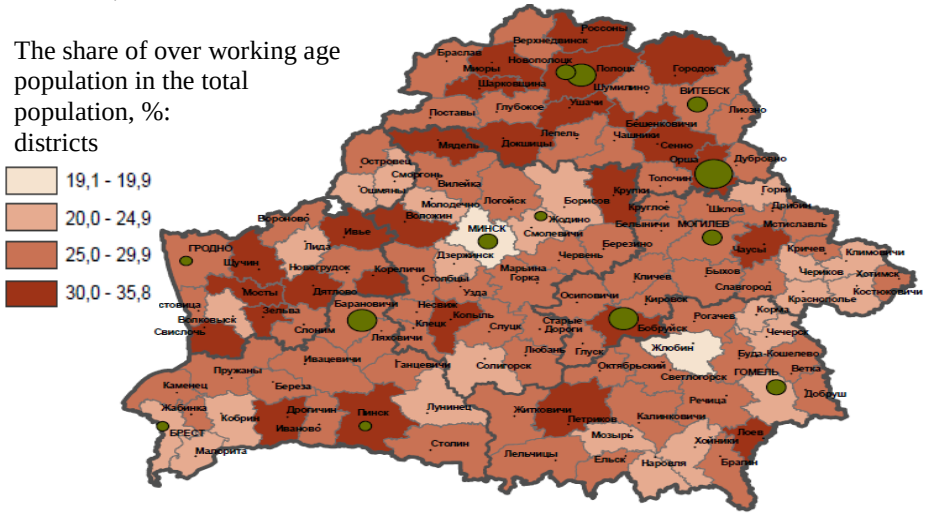
– remoteness of rural areas, lack of jobs and problems with the creation of new working places;

– predominance of single-industry employment (picture 4);

– lack of the development of knowledge-intensive industries, and insufficient level of education and training of rural population;

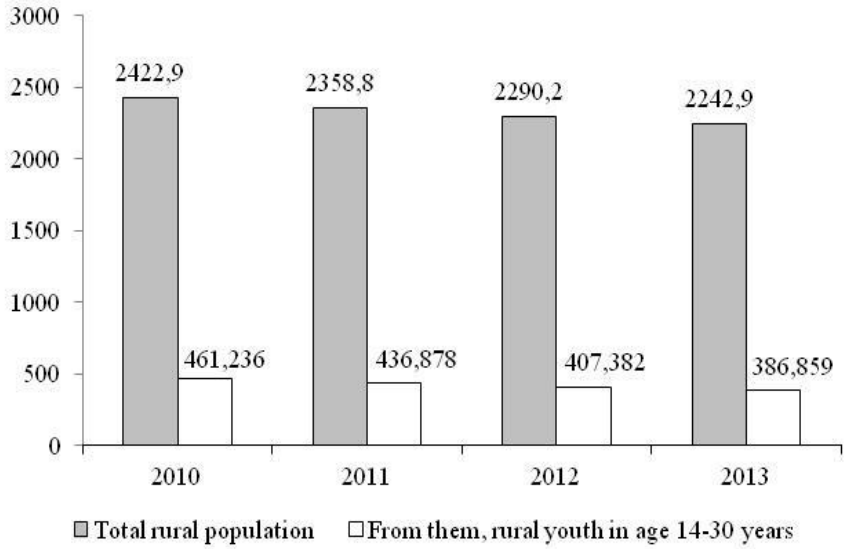
– low attractiveness of rural areas for entrepreneurs (slow capital turnover, poor rural infrastructure, seasonality of agricultural production and long-term implementation of investment).

**Picture 1.** *The share of over working age population in the Republic of Belarus, 01.01.2013*



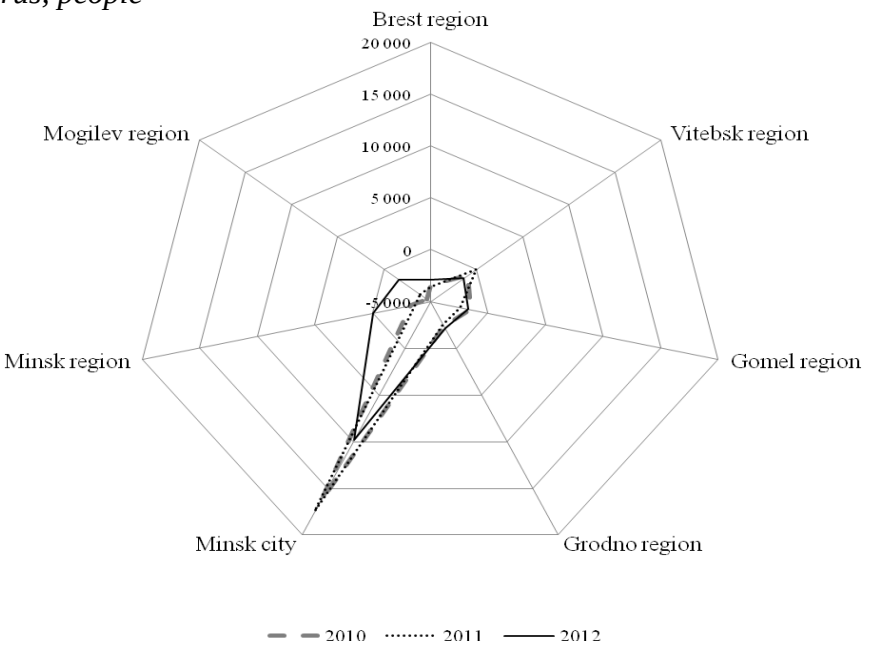

**Source:** *National statistical committee of the Republic of Belarus, 2013.*

**Picture 2.** *The dynamics of rural population in the Republic of Belarus, thousands of people*



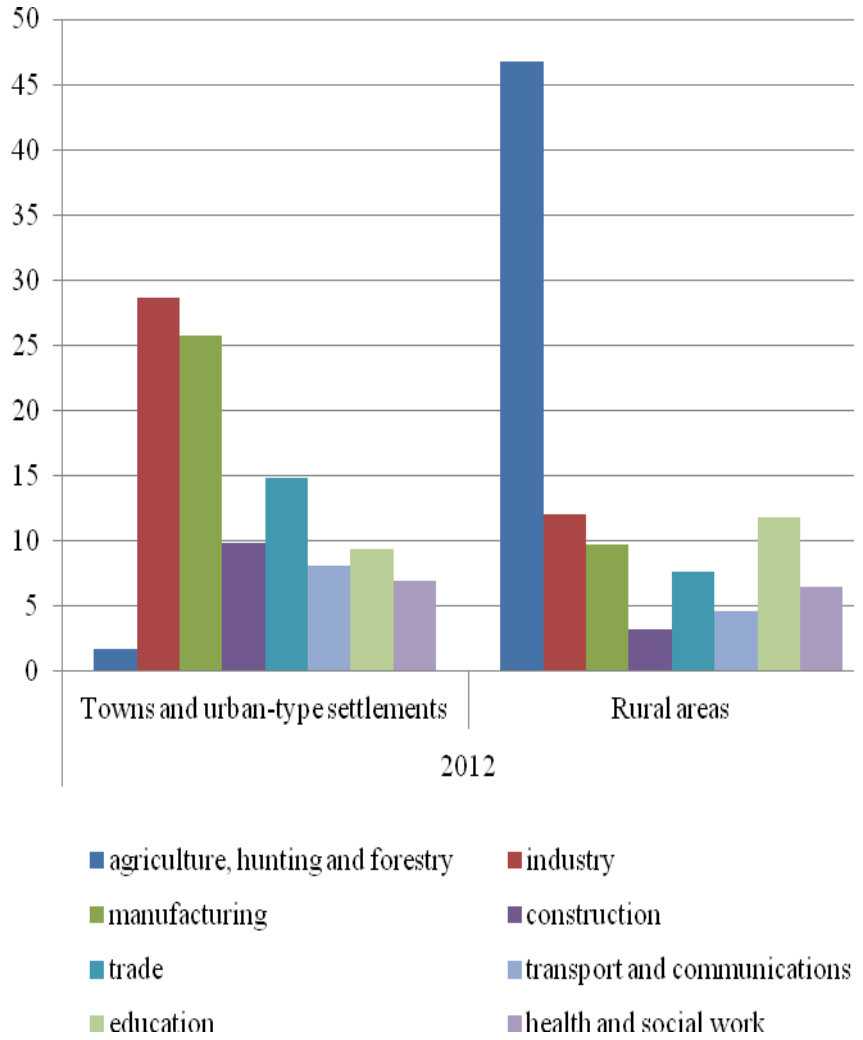

**Source:** *National statistical committee of the Republic of Belarus, 2013.*

**Picture 3.** *The dynamics of migration inflow, outflow (-) in the Republic of Belarus, people*




**Source:** *National statistical committee of the Republic of Belarus, 2013.*

**Picture 4.** *Urban and rural employment by economic activity, 2012*




**Source:** *National statistical committee of the Republic of Belarus, 2012.*

Scientists note that the alternative employment opportunities and the ability of the rural economy to absorb labor force are largely dependent on the level of agricultural production, rural economic development and rural labor mobility. Therefore, our study investigates the functional structure of the rural labor market.

According to the functional structure of the rural labor market its main components are: actors, institutions and mechanisms of the labor market.

The main actors of the rural labor market are workers and their associations (unions), employers (entrepreneurs) and their associations, and the state. The rural labor market institutions include formal and informal rules and norms limiting and challenging behavior of market participants. The mechanism of the rural labor market is based on the principles of cost linkages and coordination of different interests of various groups of employers and the working-age rural population. It includes price, demand and supply of labor. The price of rural labor is expressed in the form of labor cost, which depends on the intensity of labor, cost of mental and physical energy workers, their qualification and historical conditions of the labor force formation, the level of socio-economic development of the country and the region, natural and climatic conditions. Rural labor demand is the existing total number of occupied and vacant working places in the rural economy. While, rural labor supply is depending on the development of economic, demographic and social conditions and formed by the total number of workers in the economy and the number of unemployed (the economically active rural population).

In our research we assume that the rural labor market is a set of local labor markets, the main characteristic of which is monopsony structure of market. The main subject of labor demand on local rural labor markets is agriculture, which defines its leadership in rural employment.

However, a particular feature in the territorial structure of the rural labor market is the closeness of the local labor market to the center (core) of regional development, the district center.

Therefore, in the research of problems of formation of local rural labor markets two groups are identified (nearest periphery, distant periphery). The nearest periphery is formed by agrarian enterprises located close to the district center ($\leq 16$ km). Distant periphery is composed by agrarian enterprises, which are located farther from the district center ($> 16$ km).

Formation of the equilibrium level of employment in the rural economy is influenced by: the labor demand characterized by the size of the sales revenue of the agrarian enterprise; the level of motivation of the worker described by the size of the average monthly wage; capital cost; the size of the agrarian enterprise characterized by the area of agricultural land; geographical location of the local labor market which is expressed by the

groups of agrarian enterprises (nearest periphery, distant periphery); and local unemployment rate (district unemployment rate).

According to the theory of dynamic labor demand, enterprises aim to minimize their future discounted costs provided by volume of production and sales [2, p. 34]. Thus, the econometric model (1) will have the form:

$$L_t = a_0 L_{t-1}^{a_1} \times Q_t^{a_2} \times Q_{t-1}^{a_3} \times w_t^{a_4} \times w_t^{a_5} \times K_t^{a_6} \times S_t^{a_7} \times d^{a_8} \times v_t^{a_9} \times \omega_t^{a_{10}} \quad , (1)$$

where $L_t$ – employment (annual average number of agricultural workers) in the period *t*, number of people;

$Q_t$ – revenue from sales of agricultural production in the period *t*, millions of rubles;

$w_t$ – average monthly wage of agricultural worker in the period *t*, thousands of rubles;

$K_t$ – capital cost in the period *t*, millions of rubles;

$S_t$ – area of agricultural land in the period *t*, hectares;

*d* – distance from the local labor market to the district center, km;

$v_t$ – local unemployment rate in the period *t*, %;

$\omega_t$ – alternative wage in the period *t*, thousands of rubles;

$a_0$ – free term characterizing the influence of unaccounted factors (form of ownership, specialization of agrarian enterprise, influence of state (state share in the capital of agrarian enterprise, volume of state support for agrarian enterprises));

$a_1$, $a_2$ … $a_{10}$ – elasticity coefficients reflecting the level of influence on the result of factor indicators.

Alternative wage defined by the formula (2):

$$\omega_t = (1 - \rho_t) \times \overline{\omega_t} + d_t \times \rho_t \times \overline{\omega_t} \quad , (2)$$

where $\omega_t$ – alternative wage in the period *t*, thousands of rubles;

$\rho_t$ – coefficient characterizing district unemployment rate in the period *t*, %;

$(1 - \rho_t)$ – probability to be employed in the district in the period *t*;

$d_t$ – coefficient characterizing the share of unemployment benefit against to wage in the district in the period *t*;

$\overline{\omega_t}$ – average wage in the district in the period *t*, thousands of rubles.

The value of total capital is defined as the sum of fixed and current assets of the agrarian enterprise, expressed in comparable units, as the return on

these two resources are different. [3, p. 520]. We used the following correction coefficient to bring the value of current assets of agrarian enterprises in comparable units [4, p. 113] (3):

$$K_i = \frac{a_1}{a_2} \quad , (3)$$

The regression coefficients $a_1$ and $a_2$ are obtained from model (4):

$$\begin{aligned} y_x &= a_1 x_1; \\ y_x &= a_2 x_2, \end{aligned} \quad , (4)$$

where $y_x$ – revenue from sales of agricultural production, millions of rubles;

$x_1$ – average cost of fixed agricultural assets, millions of rubles;

$x_2$ – average cost of current assets of agrarian enterprise, millions of rubles.

It is necessary to estimate both econometric models: the model of employment formation and the model of wage formation. While, on wage formation in agriculture have an impact following factors, such as: the wage in a particular agrarian enterprise; average worker productivity, the level of unemployment in the district; alternative wage.

Then, econometric model has the form (5):

$$w_t = a_0 \times w_{t-1}^{a_1} \times P_t^{a_2} \times P_{t-1}^{a_3} \times v_t^{a_4} \times \omega_t^{a_5} \quad , (5)$$

where $P_t$ – productivity of worker in the period $t$, millions of rubles.

Proposed methodology of complex analysis of the rural labor demand tested on 221 agrarian enterprise of Mogilev region for the period 2001-2009.

After screening of insignificant factors of econometric model of employment formation has the form (6):

$$L_t = a_0 \times L_{t-1}^{a_1} \times Q_t^{a_2} \times w_t^{a_4} \quad , (6)$$

For a quantitative assessment of factors affecting the level of employment in the local labor markets the entire set of indicators is divided into two groups (nearest periphery (n=123), distant periphery (n=98)). We

$$\omega_t = a_0 \times \omega_{t-1}^{a_1} \times P_t^{a_2} \times v_t^{a_4} \quad , (7)$$

construct the econometric model of the employment formation.

After screening of insignificant factors of econometric model of wage formation has the form (7):

Using the information of agrarian enterprises related to selected group of local labor markets, we calculate the parameters and characteristics of econometric models: of employment formation and of wage formation (table 1, 2).

**Table 1.** *Characteristics of econometric model of employment formation on the local labor markets*

| **Model characteristics** | **Groups of local labor markets** | | **Total** |
|---|---|---|---|
| | **I** | **II** | |
| **1** | **2** | **3** | **4** |
| 2008-09 | | | |
| Free term, $a_0$ | 0,267 | -0,637 | 0,138 |
| t-statistics: $ta_1$ | 19,374 | 12,675 | 23,704 |
| $ta_2$ | 4,777 | 1,979 | 5,126 |
| $ta_4$ | - | -1,016 | - |
| Index of multiple correlation, R | 0,964 | 0,939 | 0,953 |
| The coefficient of determination, D | 92,9 | 88,2 | 90,9 |
| Fisher coefficient, F | 389,9 | 113,2 | 728,2 |
| 2007-08 | | | |
| Free term, $a_0$ | 2,138 | 0,985 | 1,384 |
| t-statistics: $ta_1$ | 9,817 | 5,775 | 11,175 |
| $ta_2$ | 6,838 | 4,205 | 7,675 |
| $ta_4$ | -4,639 | -1,283 | -3,631 |
| Index of multiple correlation, R | 0,954 | 0,902 | 0,933 |
| The coefficient of determination, D | 91,0 | 81,4 | 87,0 |
| Fisher coefficient, F | 237,2 | 101,8 | 288,3 |
| 2006-07 | | | |
| Free term, $a_0$ | 0,516 | 0,655 | 0,618 |
| t-statistics: $ta_1$ | 17,787 | 25,310 | 28,977 |

| | | | |
|---|---|---|---|
| $ta_2$ | 6,474 | 3,329 | 7,406 |
| $ta_4$ | -1,926 | -3,146 | -3,288 |
| Index of multiple correlation, R | 0,956 | 0,963 | 0,958 |
| The coefficient of determination, D | 91,5 | 92,8 | 91,8 |
| Fisher coefficient, F | 253,5 | 303,5 | 486,2 |
| 2005-06 | | | |
| Free term, $a_0$ | -0,381 | 0,945 | -0,236 |
| t-statistics: $ta_1$ | 11,157 | 9,127 | 14,613 |
| $ta_2$ | 3,95 | - | 2,700 |
| $ta_4$ | - | -2,115 | - |
| Index of multiple correlation, R | 0,934 | 0,929 | 0,928 |
| The coefficient of determination, D | 87,3 | 86,5 | 86,2 |
| Fisher coefficient, F | 160,5 | 96,9 | 270,1 |
| 2004-05 | | | |
| Free term, $a_0$ | 3,143 | 2,130 | 2,900 |
| t-statistics: $ta_1$ | 4,598 | 5,255 | 6,456 |
| $ta_2$ | 11,249 | 16,158 | 18,683 |
| $ta_4$ | -6,015 | -7,058 | -8,582 |
| Index of multiple correlation, R | 0,937 | 0,943 | 0,936 |
| The coefficient of determination, D | 87,7 | 89,0 | 87,6 |
| Fisher coefficient, F | 167,7 | 123,0 | 305,2 |
| 2003-04 | | | |
| Free term, $a_0$ | 1,999 | 1,234 | 1,548 |
| t-statistics: $ta_1$ | 5,331 | 8,650 | 10,324 |
| $ta_2$ | 5,759 | 2,352 | 9,094 |
| $ta_4$ | -3,708 | -2,838 | -4,956 |
| Index of multiple correlation, R | 0,873 | 0,964 | 0,908 |
| The coefficient of determination, D | 76,2 | 93,0 | 82,4 |
| Fisher coefficient, F | 127,6 | 245,9 | 340,4 |
| 2002-03 | | | |
| Free term, $a_0$ | 1,265 | 0,478 | 0,949 |
| t-statistics: $ta_1$ | 8,853 | 4,459 | 9,782 |
| $ta_2$ | 5,974 | 3,293 | 6,675 |
| $ta_4$ | -2,432 | -1,040 | -2,408 |
| Index of multiple correlation, R | 0,930 | 0,862 | 0,893 |
| The coefficient of determination, D | 86,6 | 74,3 | 79,8 |
| Fisher coefficient, F | 190,6 | 67,2 | 214,2 |
| 2001-02 | | | |
| Free term, $a_0$ | -0,420 | 0,551 | -0,265 |

| | | | |
|---|---|---|---|
| t-statistics: $ta_1$ | 11,194 | 7,443 | 12,887 |
| $ta_2$ | 4,580 | 2,155 | 4,719 |
| $ta_4$ | -1,085 | - | - |
| Index of multiple correlation, R | 0,919 | 0,844 | 0,889 |
| The coefficient of determination, D | 84,4 | 71,2 | 79,0 |
| Fisher coefficient, F | 127,2 | 57,6 | 204,2 |

**Source:** *calculated by author.*

**Table 2.** *Characteristics of econometric model of wage formation on the local labor markets*

| **Model characteristics** | **Groups of local labor markets** | | **Total** |
|---|---|---|---|
| | **I** | **II** | |
| **1** | **2** | **3** | **4** |
| 2008-09 | | | |
| Free term, $a_0$ | 1,249 | 2,097 | 1,924 |
| t-statistics: $ta_1$ | 16,196 | 11,427 | 19,292 |
| $ta_2$ | 1,072 | – | – |
| $ta_4$ | – | 1,283 | -1,884 |
| Index of multiple correlation, R | 0,848 | 0,794 | 0,817 |
| The coefficient of determination, D | 71,9 | 63,2 | 66,8 |
| Fisher coefficient, F | 101,8 | 39,9 | 145,9 |
| 2007-08 | | | |
| Free term, $a_0$ | 1,640 | 0,918 | 1,048 |
| t-statistics: $ta_1$ | 6,817 | 10,187 | 12,872 |
| $ta_2$ | – | – | – |
| $ta_4$ | – | 1,979 | 1,996 |
| Index of multiple correlation, R | 0,764 | 0,824 | 0,788 |
| The coefficient of determination, D | 58,4 | 67,9 | 62,2 |
| Fisher coefficient, F | 41,5 | 38,9 | 88,8 |
| 2006-07 | | | |
| Free term, $a_0$ | 0,190 | 2,124 | 1,298 |
| t-statistics: $ta_1$ | 9,137 | 8,650 | 13,526 |
| $ta_2$ | 4,590 | 3,278 | 3,691 |
| $ta_4$ | 1,099 | -1,660 | – |
| Index of multiple correlation, R | 0,885 | 0,738 | 0,800 |
| The coefficient of determination, D | 78,3 | 54,4 | 64,1 |
| Fisher coefficient, F | 143,5 | 27,8 | 76,9 |
| 2005-06 | | | |

| | | | |
|---|---|---|---|
| Free term, $a_0$ | 1,715 | 1,532 | 1,538 |
| t-statistics: $ta_1$ | 8,475 | 9,104 | 13,765 |
| $ta_2$ | 7,049 | 5,096 | 8,582 |
| $ta_4$ | -3,654 | – | -2,909 |
| Index of multiple correlation, R | 0,893 | 0,828 | 0,860 |
| The coefficient of determination, D | 79,8 | 68,6 | 74,1 |
| Fisher coefficient, F | 116,5 | 40,2 | 154,5 |
| 2004-05 | | | |
| Free term, $a_0$ | -0,083 | -1,314 | -0,581 |
| t-statistics: $ta_1$ | 10,426 | 5,240 | 9,544 |
| $ta_2$ | 8,197 | 8,020 | 12,314 |
| $ta_4$ | -3,217 | – | -2,863 |
| Index of multiple correlation, R | 0,921 | 74,9 | 0,838 |
| The coefficient of determination, D | 84,8 | 56,1 | 70,3 |
| Fisher coefficient, F | 222,3 | 29,7 | 171,3 |
| 2003-04 | | | |
| Free term, $a_0$ | 0,681 | -0,168 | 0,412 |
| t-statistics: $ta_1$ | 8,858 | 3,442 | 7,700 |
| $ta_2$ | 4,914 | 2,896 | 5,259 |
| $ta_4$ | -3,112 | – | -1,656 |
| Index of multiple correlation, R | 0,877 | 56,0 | 0,734 |
| The coefficient of determination, D | 76,9 | 31,4 | 53,9 |
| Fisher coefficient, F | 78,1 | 14,3 | 63,2 |
| 2002-03 | | | |
| Free term, $a_0$ | -0,772 | -2,521 | -0,981 |
| t-statistics: $ta_1$ | 4,617 | 4,396 | 6,405 |
| $ta_2$ | 5,882 | 4,467 | 7,387 |
| $ta_4$ | -3,689 | -2,676 | -4,816 |
| Index of multiple correlation, R | 0,788 | 0,781 | 0,778 |
| The coefficient of determination, D | 62,2 | 61,0 | 60,5 |
| Fisher coefficient, F | 38,5 | 28,8 | 66,1 |
| 2001-02 | | | |
| Free term, $a_0$ | 0,673 | 0,085 | 0,680 |
| t-statistics: $ta_1$ | 20,512 | 12,273 | 24,013 |
| $ta_2$ | – | 2,643 | 1,164 |
| $ta_4$ | – | 1,038 | – |
| Index of multiple correlation, R | 0,898 | 0,822 | 0,861 |
| The coefficient of determination, D | 80,7 | 67,5 | 74,2 |
| Fisher coefficient, F | 123,7 | 48,4 | 155,7 |

**Source:** *calculated by author.*

Characteristics of econometric models R, D, F indicate an adequate description of the simulated processes [5]. So the parameters of models can be used for quantitative analysis (table 3, 4).

**Table 3.** *Characteristics of the rural labor demand*

| | **2001 - 2002** | **2002 – 2003** | **2003 - 2004** | **2004 - 2005** | **2005 - 2006** | **2006 - 2007** | **2007 - 2008** | **2008 - 2009** |
|---|---|---|---|---|---|---|---|---|
| **Employment elasticity by sales** | | | | | | | | |
| *Short-term elasticity* | 0,292 | 0,398 | 0,334 | 0,708 | 0,028 | 0,116 | 0,296 | 0,205 |
| **Employment elasticity by wage** | | | | | | | | |
| *Short-term elasticity* | – | -0,176 | -0,254 | -0,625 | – | -0,239 | -0,335 | – |
| **Wage elasticity by worker productivity and by the level of unemployment** | | | | | | | | |
| *Sort-term elasticity* | 0,047 | 0,345 | 0,319 | 0,497 | 0,265 | 0,220 | 0,018 | 0,024 |
| *Local unemployment* | – | -0,240 | -0,104 | -0,110 | -0,100 | -0,004 | 0,064 | -0,053 |

**Source:** *calculated by author.*

**Table 4**. *Characteristics of the labor demand on the local labor markets*

| | 2001-2002 | | 2002-2003 | | 2003-2004 | | 2004-2005 | | 2005-2006 | | 2006-2007 | | 2007-2008 | | 2008-2009 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Groups of local labor markets | | | | | | | | | | | | | | | |
| | I | II | I | II | I | II | I | II | I | II | I | II | I | II | I | II |
| **Employment elasticity by sales** | | | | | | | | | | | | | | | | |
| *Sort-term elasticity* | 0,355 | 0,221 | 0,325 | 0,516 | 0,376 | 0,183 | 0,623 | 0,830 | 0,059 | 0,010 | 0,144 | 0,074 | 0,318 | 0,262 | 0,213 | 0,169 |
| **Employment elasticity by wage** | | | | | | | | | | | | | | | | |
| *Sort-term elasticity* | -0,131 | – | -0,185 | -0,146 | -0,375 | -0,128 | -0,581 | -0,645 | – | -0,266 | -0,248 | -0,253 | -0,544 | -0,134 | – | -0,149 |
| **Wage elasticity by worker productivity and by the level of unemployment** | | | | | | | | | | | | | | | | |
| *Sort-term elasticity* | -0,015 | 0,218 | 0,323 | 0,433 | 0,312 | 0,387 | 0,374 | 0,562 | 0,370 | 0,216 | 0,230 | 0,330 | – | – | 0,030 | 0,023 |
| *Local unemployment* | 0,039 | 0,076 | -0,242 | -0,213 | -0,172 | – | -0,116 | -0,022 | -0,152 | -0,038 | 0,043 | -0,126 | 0,025 | 0,112 | – | -0,066 |

**Source:** *calculated by author.*

## Conclusion

1. Instability of the rural labor market development were found, which is expressed by the low efficiency of agricultural production, weak adaptation to the changing conditions of modern economy of rural labor market. The evidence is in the reduction of employment elasticity by sales, as well as employment elasticity by wage and the decrease in wage elasticity by worker productivity and the level of unemployment (table 3). The reason of instability of the rural labor market development is artificial protection of jobs and maintaining employment in agriculture, labor productivity growth by additional production capacity and extensive increase in labor resources (the increase of working time fund per worker).

2. The problems of local labor markets formation were identified, such as: strengthening of the regional differences and low labor mobility.

Our research has shown that the closeness of the local labor market to the center of regional development (district center) increases the possibility of alternative employment and promotes the growth of labor mobility. While the remoteness of the local labor market from the district center makes the problem of local labor market formation more relevant (due to the lack of conditions for free territorial mobility of labor, such as housing, transport and communication infrastructure). This results in a lower level of employment elasticity by sales and by wage in the local labor markets of the second group in comparison with the first group (table 4).

3. There are scientifically justified and developed ways of modernization of state regulation of the rural labor market, including:

– the use of competitive advantages of the remote local labor markets in combination with compensatory regional policy focused on the smoothing of social, demographic and other regional differences. It is suggested at the stage of formation of the State Program for sustainable rural development of the Republic of Belarus that a new approach based on assessment of the development level of the local labor markets be used, taking into account the general situation and the regional features of rural employment development;

– stimulating of advanced economic development of the base local labor markets which will increase the mobility of the rural labor force. While, under base local labor market we understand rural area, characterized by competitiveness, reflected in high level of socio-economic development, including infrastructure improvement, sufficiency and quality of human potential, favorable economic and geographical location (closeness of the local labor market to the center regional development).

## References


1. Eliseeva I.I., Kurysheva S.V., Kosteeva T.V. (2006) *Econometrics: manual*; Edited by I.I. Eliseeva. – Moscow. – 576 p.

2. Filiptsov, A.M. (2003) *Production function: construction and analysis applied to the agricultural sector of the Republic of Belarus* // Economic bulletin. – Minsk. – No 3. – P. 517–531.

3. Kovelj, P.V. (2008) *The basics and methods of research of agrarian economy: textbook*. – Gorki: Belarussian State Agricultural Academy. – 376 p. (P. 113).

4. Leschilovsky, P.V. (1998) *Rural labor force: problems and ways of solving: monograph.* – Minsk: Belarussian research institute of agriculture and rural economy. – 154 p. (P. 72)

5. Shakhnovich, R., Yudashkina, G. (2004) *The impact of the local labor market to the labor demand formation in terms of economic growth //* Social policy: the reality of the XXI century. – Moscow. – 464 p. (P. 34–59).

# CLUSTERS IN THE FUNCTION OF DEVELOPMENT OF ORGANIC AGRICULTURE IN THE REPUBLIC OF SERBIA

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## Abstract

*The authors in this paper discuss the function of the cluster as a modern form of association of farmers in the function of development of organic agriculture in the Republic of Serbia. Clusters are today in developed and developing countries the driving force for economic progress. In developed countries in Europe clusters proved to be one of the best solutions to the problems within the organic food production and beyond - to increase the competitiveness of the economy, solving the problems of rural areas and the problems of local economic development. The main obstacle to the development of organic clusters lies in the business policies of our manufacturers and entrepreneurs, which are in contrast to all the principles on which cluster should be based. The authors conclude that in creating a favorable climate for the development and survival of clusters in the field of organic agriculture is crucial state concrete support. If the basic barriers to cluster development are mitigated or eliminated and role of the state increased that would have positive effect for cluster for the production and marketing of organic products and would improve the condition of organic production in Serbia.*

**Keywords:** *Cluster, Organic agrculture, Development, Competitiveness, the Republic of Serbia.*

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## Introduction

Rural development and local economic development of rural areas in the Republic of Serbia are essentially related to the development of agriculture. The problems of agriculture and therefore organic food production in Serbia and AP Vojvodina are numerous and to overcome them, it is necessary to take a number of organizational, economic and institutional arrangements in order to achieve strategic objectives. Serbia has great potential, but on the one hand, support for rural areas is small and on the other hand the concept of agrarian development is underdeveloped *(Glavaš-Trbić et al., 2010).* Agriculture of the Republic of Serbia is in many of its segments extremely uncompetitive. Land fragmentation, low yields and lack of investment in new technology are just some of the facts that most of our primary producers get in unfavorable position *(Pejanović et al., 2009).* Also, agricultural production is unorganized, characterized by the low rate of diversification, efficiency and productivity of production is small, insufficient standardization, poor economic performance, which all directly affect the standard of living and the development of rural areas. A major problem is the insufficient number of processing capacities, storage spaces, cold storages, adequate transportation system, as well as the uncertainty of the final product placements. The economy of the country is dominated by small and medium-sized enterprises, which by itself, alone, do not have a big impact and cannot pursue their interests and their optimal solution is association *(Glavaš-Trbić et al., 2011).*

The situation is no better in organic food production. In the past there was a lot of investment on organic farms, in equipment, planted fields are old, and stores are hard to reach, a land lease or purchase of materials and equipment on credit practice only a very small part of the organic food producers. The solution for such a situation can be found and many problems could be solved by creating new organizational forms and systems of association, such as a merger in the cluster. Through organizing and mergers could be achieved impact that is even greater than the impact of big companies *(Glavaš-Trbić, 2012).*

According to Porter, clusters are geographic concentrations of interconnected companies, specialized suppliers, service suppliers, firms in related industries and associated institutions, for example Universities, agencies and trade associations that compete but also cooperate *(Porter, 1998).* He believes that clustering has countless benefits and that

competitive advantages at the national level can be better developed within the cluster, but within the same growing number of companies within a national economy.

## The role of clusters in economic development

Clusters through horizontal and vertical networking of enterprises and strengthening the links and relationships between these companies strengthen the competitive advantage of companies and institutions involved in the cluster. In this way, it improves the cooperation of related, complementary and supplementary businesses. In addition to manufacturing and trading companies are associated various research institutions, insurance companies, financial institutions, other agencies and government institutions and non-governmental organizations *(Glavaš-Trbić, 2012).* This concept was first introduced in Theory of economy professor Michael Porter at Harvard Business School and he defined cluster *as geographic concentrations of interrelated group of companies and institutions in a particular sector (Porter, 1998).* According to Porter, it is a "bunch" of related companies involved in the production of certain highly specialized production in a particular area and which share the same market where they performed. They are similar or complementary businesses, with active channels for business transactions, communications and collaboration. So far, both in theory and in practice, clusters proved to be one of the crucial factors for improving the competitiveness of the area in which it is formed. In developed countries, clusters are formed to improve small and medium-sized enterprises and at the same time they are a key factor in regional economic development, as well as an important factor in rural development.

The main difference between the cluster and the association is as follows: associations give members certain roles, certain information, while clusters act strategically. In the cluster is all precisely defined and bound by common needs and interests in the area of procurement, customer, specialized services, personnel and other resources. The objectives of clustering are numerous. Some of them are: (1) Achieving greater competitiveness and better marketing of products, expanding and establishing positions on international market, (2) Faster and more efficiently achievement of the objectives of small and medium-sized enterprises, (3) A better use of the natural resources and other potentials; (4) The establishment of better relations, cooperation and partnerships

between businesses, (5) Exchange of experience, (6) Education, specialization, knowledge transfer and training of the workforce, (7) Social infrastructure, (8) Facilitating the process of introducing of innovation and new technologies (technology transfer), (9) Affection on the policy, lobbying and better dialogue between industry, educational institutions, governments and others, through strong clusters; (10) Grouping of operations. Of all these, the broader goals include: increasing competitiveness, support the development of small and medium-sized enterprises as well as support of regional economic development policy.
Nowadays, small and medium-sized enterprises and sometimes even big companies are not able to independently meet the demands of the market. SMEs are now more difficult to fight and cope with competition from large companies. Competitive equality of SMEs with large companies today is only enabled by connectivity, associations, merging into larger projects as clusters *(Glavaš-Trbić et al., 2011).*

The success of clusters depends on the ability of its members to develop mutual trust, to function together, forge partnerships, collaborate and use the offered possibilities. Clusters provide insight into the vulnerabilities and the ability to overcome them. Through the process of conducting business manufacturers should be aware of the importance of continuous improvement, the use of new knowledge and technologies, increasing productivity and quality, the introduction of EU standards, the conquest of new markets. Cluster initiatives are promoting innovative activities and enhance the quality through the work which is based on a shared partnership. A key role in the formation of clusters has so called "social capital". An important characteristic of clusters arising from its essence is - knowledge. The wealth of knowledge in business, affect on growing competition and the importance of researchers, consultants and laboratories in one location and thus increases the possibility to create such innovation, value and quality of the offer, that distant rivals cannot easily copy or overcome *(Paraušić and Cvijanović, 2006).*

A well-organized and properly managed cluster, with the efficient management, will use the competitive advantages of clusters and will ensure him a place in the market and facilitate its growth and development *(Glavaš-Trbić et al., 2011).* In their functioning all of operations are precisely defined - what will be produced, what will be the quantity and quality of the unites, what is a target market and what are a target customers in order to easily achieve the demands and needs of all target groups and cluster members. The cooperation includes that kind of

relationship where participants retain independence and they are partners and also competitors in the same time. For cooperation to be successful necessary preconditions are trust, flexibility, simultaneous competition and cooperation, and others.

The advantages of a cluster can be divided into measurable and immeasurable, where measurable benefits are the result of more efficient transactions, wiser investment, reduced costs, while the immeasurable come from learning, setting reference points and activities that lead to innovation and quality improvement. Measurable positive results are reflected in the concentration of resources necessary for the business. Immeasurable benefits of clusters include intangible assets, such as the flow of knowledge between enterprises through formal and informal discussions between producers, suppliers and customers. Upgrade of the social capital and trust is one of the biggest advantages of clusters and comes from a planned co-operation and networking. Both of these advantages, measurable and immeasurable, are contributing to the strengthening of the regional economy and increase the standard of living of all those who are associated with a certain cluster.

Through clustering companies become more productive, innovative and competitive, but it could be achieved when operating independently. On the one hand, companies retain their independence, individuality, their production, and on the other hand operate within clusters and achieve common interests. A successful cluster development involves a developed network of supportive activities, especially in the segment of international market research, product development, its brand, logistics activities, etc. *(Paraušić and Cvijanović, 2006).*

In regions where this kind of association is not taken root it is necessary to provide financial support for cluster to be organized. On the other hand, for the companies are also necessary knowledge, culture and good institutional framework (laws, regulations). Although the advantage of clustering is entering to the international market, it is also essential to ensure the functioning of the clusters within the national market. It is necessary for Serbia, guided with experience of developing countries, to apply the concept of clusters in agriculture, especially in organic food production, in order to overcome the problems that led to the decline of the domestic product and national income and to successfully cope with international competition.

## Problems of organic agricultural in Serbia

Despite the fact that conventional farming remains the basis of the food industry in all developed countries of the world, organic farming is gaining in importance and occupies an increasingly important position. However, organic production is a new concept of agricultural production in Serbi and as such is still adapting to condictions at the macroeconomical level. On the other hand, it is a concept that could partially solve the existing problems in rural areas (fragmentation properties and senility) because it relies on traditional production methods using modern scientific approaches. On the global scale, the organic market has shown continuously growth and resistant to negative economic trends, which proved its prosperity despite the global economic crisis *(Tomaš-Simin and Popović-Vranješ, 2013).* The development of organic production in Serbia refers to the 90 years of the last century, when a non-governmental organization Terra's founded promotional network to which they involve many stakeholders, from producers to the academic and technical staff in the field. Today, the network is supported by many national and international institutions, ministries, agencies, experts, academics, investors and others.

Opportunities for development of organic production in Serbia are particularly in mountainous areas, where agricultural production is extensive. Households are characterized by small plots, diverse crop rotations, small livestock and domestic labor. These surfaces may, preferably, be used for the production of organic food, because it has a short period of conversion *(Pejanović et al., 2007).* Broadly speaking, the importance of organic farming and its possibilities in AP Vojvodina can be seen primarily through: the protection of natural resources from pollution, conservation of biodiversity, long-term maintenance and increase soil fertility, obtaining products with documented production procedures, consumer protection, ensure sustainable socio-economic rural development *(Pejanović et al., 2011).*

Organic plant production is currently significantly more developed in Serbia than animal production, has a longer tradition, great export potential and high demand in European countries. The following table gives a detailed overview of the structure of the area under organic plant production in Serbia, according to the data from January till September 2013.

**Table 1.** *Areas by plant protection categories (until September 2013)*

| | ORGANIC PLANT PRODUCTION until September 2013 | | |
|---|---|---|---|
| | Areas under conversion (ha) | Organic farming areas (ha) | Total (ha) |
| Crop production | 2973 | 2360 | 5333 |
| Fruit production | 357 | 1527 | 1884 |
| Vegetable production | 115 | 123 | 238 |
| **TOTAL** | **3445** | **4010** | **7455** |

**Source:** *Organic Agriculture in Serbia, GIZ, 2014.*

The following table provides an overview of organic animal production according to the latest statistic data in 2013.

**Table 2.** *Organic animal production (until September 2013)*

| | ORGANIC ANIMAL PRODUCTION (until September 2013) | | |
|---|---|---|---|
| | **Conversion period** Number of heads of livestock, units of poultry, beehives | **Organic status** Number of heads of livestock, units of poultry, beehives | **Total** Number of heads of livestock, units of poultry, beehives |
| Large livestock (cattle, buffalos, horses, donkeys) | 481 | 2.972 | 3.453 |
| Small livestock (sheep, goats, swine) | 3.473 | 708 | 4.181 |
| Poultry (hens, geese, ducks, turkeys, heleted guineafowl) | 1.432 | 183 | 1.615 |
| Beehives | 764 | 1.273 | 2.037 |

**Source:** *Organic Agriculture in Serbia, GIZ, 2014.*

In the total production crop production is the most common, followed by fruit and vegetable production. According to the latest data from GIZ research, the organic plant production takes place at the near 7.500ha, thereby excluding the area for collection of wild berries, mushrooms and herbs. Crop production represents about 72% (meadows and pastures), 25% of the area is under fruits, and vegetables are produced in only 3% of the total area under organic plants.

Organic animal production has just started its serious development in Serbia over the past few years. The reason for this is higher involvement in the production of a large number of farms with a high number of cattle for milk and dairy products, while at the same time demand is increased for certified organic eggs and poultry meat. This led to an increase not only of cattle but also poultry production. In the total organic animal production is the most common large and small livestock with a total of 68%, beehives are represented with 18% and poultry with 14%.

According to research by GIZ characteristics of organic farms differ in production regions in Serbia, so in AP Vojvodina the average household is larger than 10ha and is specialized in a small number of plant species such as cereals, industrial crops and vegetables, while in Central Serbia the majority of households produce on small areas or collect products from natural habitats and they are related to private processing facilities. In Central Serbia, buyers are the suppliers of inputs at the same time, while education is very poor. The third group of organic producers is a small number of large farms that produce for more than 500ha, still in the phase of large investments in equipment and machinery, but trained workers they have are modest. The equipment which is used is old, greenhouses and organized warehouses are only available to a small number of producers, land lease, purchase of raw materials or machinery on loan is practiced only by 5-20% of farmers.

Most of the plant products are exported to the EU countries, because the domestic market is underdeveloped due to lack of purchasing power. Serbia has great ecological, climatic and technical conditions to produce not only traditional fruit but also vegetable products, grains and oilseeds from organic farming, which are highly demanded in the international food market.

To be sustainable, organic production must always bear in mind the high interdependence and interaction of plant and animal production. As noted, in its scope organic animal production is small, but the organic plant production depends precisely on these small farms and production of manure on them. In the absence of manure, farmers depend on the purchase of commercial fertilizers which directly affects on the cost of production. In the weed control organic producers apply mainly classical cropping practices, less mulch and almost certainly do not use bio-herbicides and weed control through the flames. Also, irrigation and irrigation infrastructure is one of the major problems, especially in fruit production.

According to studies of GIZ and research of authors, as one of the key problems in the development of organic farming are following: (1) Providing inputs for organic production is considered to be a challenge for all producers of organic products; (2) Certified organic products are usually sold wholesale or processing companies. Retail or sales directly to the markets by the producers themselves is almost nonexistent; (3) Offered products often do not meet market requirements; (4) Storage, packaging and transportation are also significant problems; (5) Difficult economic situation is not motivating for farmers; (6) Low level of association.

Producers involved in organic plant production as a major problem in the development of their business see the lack of certified or eligible inputs, due to the small market and strict procedures of the trade. In regard to this is the above mentioned problem of manure and commercial fertilizers. In comparison to the previous period it is more accessible seed of grains, corn, soybeans, important vegetables, but still there is not enough planting material for potato, fruits, grape vines. For this reason further research should be based on plant breeding for organic production, development of resources for plant nutrition, disease control, pests and weed control in organic production.

GIZ in their research summarizes the reasons why the great potential for the development of organic production in Serbia is still insufficiently exploited and highlights the following *(GIZ, 2013)*:

(1) sector has serious problems with lack of funding, producers receive a negligible amount of subsidies;
(2) despite the association of organic producers at the national, regional and local level, the sector is still insufficiently organized;
(3) productivity is quite low, mainly due to the lack of inputs, modern technologies, strategies for processing and marketing;
(4) control system in the organic sector is not fully developed and implemented, which resulted in insufficient protection of the producers and consumers of abuse;
(5) low level of knowledge and lack of systematic collaboration and connection of the private sector and science and research.

On the global, especially the Western European market, demand is increasing for agrarian products produced in unpolluted natural and environmental conditions under the control of professional services, using the achievements of science and technology *(Paraušić and Cvijanović, 2006)*. Demand for organic products in the world is growing much faster

than supply to the market. It should encourage also Serbian economy to constantly research market, monitor trends and adapt their offer to requirements and preferences of consumers. It is obvious that there are many reasons to invest in organic agriculture in Serbia, as these products have a place where could be sold. State and producers just need to find an efficient way to sell them and to create a good development strategy in order to become competitive in the world market. Serbia (Vojvodina in particular) has a lot of land, favorable natural and climatic conditions and even legislation in the field of organic agriculture, all of which are good prerequisites for organic food production and bigger sale on foreign markets. Globally, the market for organic products has shown continuous growth and resilience of the regional economic trends, as seen in the prosperity of this section despite the global economic crisis *(Tomaš - Simin and Popović - Vranješ, 2013)*.

Since the EU has recognized the potential in this kind of production, there are significant incentives and financial resources to invest in this sector. There are significant subsidies to achieve general interests, environmental protection, resource conservation and sustainable development, rural development and rehabilitation of neglected regions. The first incentives were given by the Ministry of agriculture, forestry and water management of the Republic of Serbia in 2005-2006 when the producers reimbursed certification costs in the total amount of 19,000 euro, in 2007 were covered the costs of the conversion, in 2009 were approved 27 grants to producers of organic products in the amount of 46,000 euro, in 2010 were approved 53 requests in a total amount of 200,000 euro, while in the 2011 were paid 400,000 euro of subsidies. Incentives were absent in the 2012 year.

Serbia can with certainty count that the existing opportunities for organic production will very quickly turn into a major export opportunity. According to research by GIZ, organic products in Serbia are mainly sold to wholesalers and processing companies, with which nearly 70% of primary producers enter into contracts before the season. Direct selling through markets or retail outlets practiced with only 20% of farmers. Price to achieve is about 10-20% higher for organic products, but it does not create additional value at the farm. A large number of the product is imported which means that there is not enough organic products from local production to meet current needs. Domestic production has only some types of vegetables, whole grains, less fruits and products like pasta, flour, juices, jams, oils and preserves. For now, the market of certified animal products has in small quantities only eggs and honey and since 2013 year

for the first time dairy products: fresh milk, yogurt and sour cream *(GIZ, 2014).* On the other hand, domestic producers are not sufficiently informed about organic products, are not educated enough, do not recognize or do not have confidence in the integrity of organic products.

Despite all of the above problems that organic production encountered in Serbia, unlike other forms of production, organic agriculture with the small investment can expect large revenues, which is one of the biggest advantages when investing in organic production. Over the past years, efforts have been made, indicating the strengthening of public support for the development of organic agriculture - the enactment of the proper Law, the establishment of the National Association for the development of organic agriculture, the establishment of Centers for the development of organic agriculture in Selenča, Valjevo, Svilajnac and Leskovac, allocating subsidies for organic producers. However, at the level of farmers as individuals, must be noted and identified a greater need of education on the economic effects of starting organic compared to conventional farming *(Birovljev i Ćetojević, 2013).*

## Clusters in organic agriculture

The first steps of the development of organic agriculture in Serbia refer to the 90 years of the last century. The development of the NGO sector in Serbia in this area is also linked to the 90 years of the last century, with the establishment of the Terra's in the municipality of Subotica, which has conducted a number of campaigns to promote organic farming in accordance with the standards of the International Federation of Organic Agriculture Movements (IFOAM). One of the important activities is that Terra's was in 1997 host of the IFOAM Conference on Organic Production of Central and Eastern Europe. With years other organizations were established and other formal and informal associations for promotion of this form of agricultural production across Serbia, while Terra's stayed as ground and a large driving force in this sector. One of the positive effects is that many companies and organizations from developed European countries, like the Netherlands, Sweden and Germany, have begun to invest in Serbia, many grants came in Serbia, and many projects were designed and implemented for promotion of organic farming. GIZ has greatly helped the establishment of cooperation between domestic and foreign producers and organizations and supported the first appearance of Serbian traders and processors in the international trade fair *BioFach* organic production in Germany in 2004. In the coming

years, the support was received from the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia, SIPPO from Switzerland and the United States Agency for International Development (USAID). In 2006 the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia has gave additional efforts to develop organic farming association with the Network for Mediterranean Organic Production and getting projects financed by the EU. The Austrian Development Agency (ADA) has focused on regional development activities in rural areas of AP Vojvodina and Sandžak through which influenced the development of organic farming and the Swiss Development Corporation (SDC) has conducted a project for the introduction of food safety standards. International organizations have recognized the potential for organic production in Serbia and facilitate the formation of new associations engaged in organic production, primarily at the local and regional level. According to research by GIZ, after nearly two decades the sector of organic production in Serbia has reached a remarkable level *(GIZ, 2014)*:

(1) Establishment of the National Association for organic production "Serbia Organica" five years ago brought together participants and systematically and continuously works on complete development of the sector;

(2) Several associations participate in the development and promotion of the organic production sector;

(3) Government agencies, led by the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia, manage the sector and take care of his needs;

(4) Around 20 institutes, faculties, institutions for research and development of related bodies helps in the creation and promotion of the most appropriate production system;

(5) Six control organizations, working in the field of control and certification of organic production, are responsible for complying with local and international regulations on the basis of which is delivered the certificate for organic products.

The following table provides an overview of the current state of the organization and association in the field of organic production in Serbia.

**Table 3.** *Business associations and national NGOs active in organic sector in the Republic of Serbia*

| Name | Website |
|---|---|
| **National Association „Serbia Organica"** | www.serbiaorganica.org |
| **Terra's** | www.terras.org.rs |
| **Green Network of Vojvodina** | www.zelenamreza.org |
| **Vitas** | |
| **Serbian Association for Biodynamic Production** | www.biodinamika.org |
| **Association for Organic Production Development Biobalkan** | |
| **Toppas** | |
| **Ecoland Serbia** | |
| **Regional Centers for organic production in Selenči, Valjevu, Svilajncu, Leskovcu, Negotinu, Užice** | www.organiccentar.rs (Selenča) www.centarzarazvoj.org (Leskovac) |

**Source:** *Organic Agriculture in Serbia, GIZ, 2014.*

National Organization for organic food production "Serbia Organica" was established in 2009. Its aim is to bring together all the actors operating in the sector of organic food production. It currently brings together about 80% of the participants in organic sector and activities are aimed at promoting and improving organic production, improving the interaction between the actors of the sector and other related organizations and associations. Since 2011 six Centers for the development of organic farming were established in Selenča, Leskovac, Silajnac, Valjevo, Užice and Negotin, with the support of the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia. However, despite the great progress that has been made over the past two decades, organic production is still difficult to achieve a satisfactory level of results. As already mentioned, one of the key problems in the development of organic farming is a low level of association of individual producers in this part of agriculture. The organic producers are the part of other clusters in the field of food production. But still has not established any of independent and highly specialized cluster of organic producers in Serbia. There are associations of organic producers which formally nor are essentially clusters. The only progress was made in December 2013 with inauguration of the association "Cluster of organic producers - South". Cluster joins nine primary producers, four organic food processors, three secondary agricultural schools and the Center for the Development of Jablanički and Pčinjski district.

Only 5 % of producers are organized into associations and only 30 % in business associations such as Serbia Organica, Terra's and Topas. On one hand, the negative effect had valid legal regulations that are somewhat constrained efficient association of organic producers and food processors. *Law on associations* until 2009 restricted the formation of strong interest groups and associations. After 2009 that constraints have been reduced because of the new law, which allowed for associations to create their own capital reserves. The situation is further complicated by the fact that non-adopted amendments to the existing Law on Organic Production ("Official Gazette of RS", no. 33/10), which were prepared in the 2012 year and are aimed at harmonization with EU legislation in this area. The sector is still poorly organized, although there has been development of a number of different, locally active, associations, organizations, cooperatives and interest groups *(GIZ, 2014).*

Clusters as *geographically concentrated groups of interconnected companies and institutions at certain activity*, as defined in the National Action Plan for the development of organic farming in Serbia, can significantly contribute to the development of organic agriculture. In many developed countries in Europe, clusters creation gave positive results in improving the productivity and competitiveness of the players involved in cluster and also the region in which the cluster is formed. Despite multiple attempts to establish a cluster of organic food producers in Serbia, or at least at the level of AP Vojvodina, these efforts have so far remained unsuccessful and had no obvious results. So far, only a small number of organic producers included as part of another type cluster from conventional agricultural production or clusters in the field of tourism.

Clusters in Serbia would be able to solve many current problems in agricultural production, which is carried over from year to year, from decade to decade. Prerequisite for the creation of successful clusters for the production and marketing of organic products is the removal or mitigation of the main barriers to their development - change of mindset of producers, processors and exporters and adequate state assistance.

The National Action Plan for the development of organic farming in Serbia emphasizes that particular attention should be paid to the fact that development of organic farming must be seen in terms of European integration. In this context, the role of government is to identify production programs based on the concepts of modern technology for the production of health and safety food and to provide support for the use of

new production technologies. Also, support is needed for compliance with quality control standards, through the formation of specialized national laboratories for control of organic food and accreditation of relevant institutions, recognized in the EU, which will control and monitor production in this area *(Paraušić and Cvijanović, 2006)*. It must be noted that investing in the development of organic food production will not solve all of the problems that affected agriculture of the Republic of Serbia, but may contribute to alleviating and reducing them, job creation, exploitation of resources, increasing exports of domestic products, increase revenues and other producers involved. A major problem is also the fact that in our country there is no serious program in the field of training of professional staff, who are able to organize and implement this type of production, and the role of the state (primarily through education of producers) is crucial for success. The current situation of organic production in Serbia is the result of misunderstanding the essential character of this type of agricultural production.

## Conclusion

Today, the association according to the concept of clusters become dominant and leads to an increase in productivity, innovation, competitiveness and economic development of a country as a whole. Undeveloped countries their competitiveness base on cheap labor and natural resources, while developed countries their competitive advantage base on innovative technologies. Agricultural policy of a country should enable the balanced growth and development of all sectors, enhance the offer in the domestic market, as well as agricultural exports, for which there is a comparative advantage. Our country competitiveness is still understood in the conventional way, which, among other things, leads to the fact that in the international market is not competitive on any grounds. Bearing all this in mind, well-developed clusters that work well are a very important step and a link to the economic development of a country. Clusters are today in both developed and developing countries the driving force for economic progress. Building clusters in developed countries in Europe proved to be one of the solutions to the problem in the framework of organic food production. In the process of business networking farmers as well as all agricultural entities need to drive awareness that business must constantly be improved, to use new knowledge and new techniques and technologies to increase the productivity and quality, to introduce EU standards and to conquer new markets. All this can be achieved through business networking.

In Serbia, for now there is not an established cluster of organic production. The main obstacle to the development of organic clusters in Serbia lies in the business policies of our manufacturers and entrepreneurs which are contrary to all the things on which to cluster should be based. Given all the above, as well as the existing experience of the developed countries in this regard, it can be concluded that the state plays a major role for development of organic production cluster. The initiative for the establishment of clusters has become an important part of the industrial, agricultural, regional and innovation policy of the state. If the main barriers to the development of clusters were mitigate or eliminate and role of the state increased, cluster for the production and marketing of organic products could be successfully created. In this regard, the government should identify the production programs based on the concepts of modern technology for the safe and secure food production and to provide concrete and not merely declarative support for the development of organic clusters.

## References


1. Birovljev, Jelena, Ćetković, Biljana (2013): *Organic production and permaculture as concepts of preserving of the unique environmental features of rural areas*, Thematic Proceedings, International Scientific Conference „Sustainable Agriculture and Rural Development in Terms of the Republic of Serbia Strategic Goals Realization within the Danube Region – achieving regional competitiveness“, 5-7. December 2013, Topola, Institute of Agricultural Economics, Belgrade, Serbia, pp. 973-990.
2. GIZ (2013): *Nacionalna istraživačka agenda za sektor organske proizvodnje*, Novi Sad.
3. GIZ (2014): *Organic Agriculture in Serbia, At a Glance*, Novi Sad.
4. Glavaš – Trbić Danica (2012): *Klasteri u funkciji ruralnog razvoja*, monografija, Zadužbina Andrejević, Beograd.
5. Glavaš – Trbić, D., Maksimović, G., Pejanović, R. (2011): *Impotrance and role of clusters in organic food production*, Book of proceedings, 22nd International Symposium „Food safety production“, Faculty of Agriculture, Novi Sad, Trebinje, Bosnia and Herzegovina, 19 – 25 June 2011, pp. 175-177.

6. Glavaš-Trbić, D., Pejanović, R., Maksimović, G. (2010): *Ruralni razvoj i lokalni ekonomski razvoj Srbije*, Agroekonomika, Poljoprivredni fakultet, Novi Sad, Vol. 47-48, br. 47-48, str. 80-92.

7. Grupa autora (2003): *Konkurentnost privrede Srbije*, Jefferson Institute, Beograd.

8. *Nacionalni akcioni plan razvoja organske proizvodnje u Srbiji*, Ministarstvo poljoprivrede, šumarstva i vodoprivrede Republike Srbije, Beograd, 2009.

9. Njegovan, Z., Pejanović, R., Marković, Katarina (2011): *Rural development, multifunctionality and organic agriculture with the function of sustainability and health safety*, Book of proceedings, 22nd International Symposium „Food safety production", Faculty of Agriculture, Novi Sad, Trebinje, Bosnia and Herzegovina, 19 – 25 June 2011, pp. 166-168.

10. Paraušić, Vesna, Cvijanović, D. (2006): *Značaj i uloga klastera u identifikaciji izvora konkurentnosti agrarnog sektora Srbije*, Industrija, no. 1-2, str. 81-90.

11. Pejanović, R., Njegovan, Z. (2011): *Ruralni razvoj i lokalni ekonomski razvoj AP Vojvodine*, monografija, Poljoprivredni fakultet, Novi Sad.

12. Pejanović, R., Njegovan, Z., Tica, N.: *Tranzicija, ruralni razvoj i agrarna politika*, monografija, Univerzitet u Novom Sadu, Poljoprivredni fakultet, Novi Sad, 2007.

13. Pejanović, R., Tomaš, Mirela, Vučković, Jovana, Stefanović, Emilija, Glavaš-Trbić, Danica, Kalentić, Marija (2011): *Organic agriculture and rural development in AP Vojvodina*, Contemporary agriculture, Faculty of Agriculture, Novi Sad, vol. 60(1-2), pp. 231 – 239.

14. Pejanović, R. (2013): *Ogledi iz agrarne i ruralne ekonomije*, monografija, Poljoprivredni fakultet, Novi Sad.

15. Porter, M.E. (1990): *The Competitive Advantage of Nation*, The Macmillan Press, Londons.

16. Porter, M.E. (1998): *Clusters and the New Economics of Competition*, Harvard Business Review.

17. Tomaš-Simin, Mirela, Popović-Vranješ, Anka (2013): *Organic agriculture as a factor of rural development in Serbia*, Thematic Proceedings, International Scientific Conference „Sustainable Agriculture and Rural Development in Terms of the Republic of Serbia Strategic Goals Realization within the Danube Region – achieving regional competitiveness“, 5-7. December 2013, Topola, Institute of Agricultural Economics, Belgrade, Serbia, pp. 1042-1058.

18. *Zakon o organskoj proizvodnji*, „Službeni glasnik Republike Srbije“, Beograd, br. 30/10, 2010.

# AGRICULTURAL PRODUCTION SUSTAINABILITY: MACRO AND MICRO ECONOMIC IMPLICATIONS OF INSURANCE

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## Abstract

*Agriculture in the region has a special social and economic significance, taking into consideration its share in gross domestic product, export and population's employment. Climatic changes, genetic engineering, organic food production are just one of the factors which lately make potential possibilities, but also emphasize increasing risks for the inadequate results in agricultural production. In such conditions, the insurance of agricultural production, which comprises the insurance of crops, yields and animals, appears as a necessity. The insurance becomes a basic assumption for ensuring the agricultural production sustainability in Serbia, as well as in all other countries, which national economies substantially depend on agriculture success.*

**Key words:** *insurance, economics, sustainable production, agriculture, South-East Europe, Serbia.*

## Introduction

Agricultural production has been exposed to numerous risks effects. Starting from the assumption that a risk in agriculture is a variability function of inputs' and outputs' prices, realized yields and size of land and/or number of livestock heads and the mentioned risk share, all risks of agricultural production can divide in three groups: 1) regulatory or institutional, 2) market or price, and 3) production risk (Pejanović and Njegomir, 2011). Generally observed, human beings have no flair for risk, and prefer more a safe thing than uncertain levels of consumption: people prefer outcomes with less uncertainty and with identical average values (Samjuleson and Nordhaus, 2009: 209).

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Although most of people dislike the risk, taking into consideration a theory of marginal usefulness, a reasonable reaction on a risk exposure must not always mean its avoidance, but only consideration during decision-making. The variability in the respected results is not necessarily bad, if a company can provide an advantage in reacting to it in regard to a competition, but it has to be anticipated, calculated and controlled, and this exactly means the essence of the risk management. Managing the risk, thus, represents a discipline by which manages the uncertainty, in organized manner, based on information from the past and projection of possible future alternatives, aiming to make better, information-based decisions. A basic goal of the risk management is to increase a probability for success and to decrease a probability of failure and uncertainty of realizing the set goals in agricultural production.

There are different forms of risk management in agriculture. All measures that can apply regarding the risks management, by which has been exposed the agricultural production, can divide into: 1) common applicable management measures for all risks (e.g. diversification, vertical integration, contracts on agricultural production, creation of individual savings accounts, forming cooperatives and joining the farmers resources in funds), 2) measures of the price risk management (e.g. the contracts on agricultural products sale, futures, options, swaps, forwards), 3) measures of the production risk management (e.g. measures of prevention and insurance).

Apply of some forms of the risk management is limited by their availability on some market. Although there are differences between some forms of the risk management, as well as the limitation of apply for some types of risks, there should take into consideration that their application should never realize in isolation, but there is necessary, if possible, depending on ratio between the risk and the yield in every individual case, to combine different approaches in managing the same types of risks. Researches show that the approaches of the risk management of the entire agricultural husbandries, i.e. the approaches which comprise at the same time multiple risks and activities of farmers, are more efficient than the individual approaches (Huirne, Meuwissen, and Asseldonk, 2007). In the following presentation, we focus our attention to the production risk and the insurance role in managing this risk of agricultural production.

## The role of agriculture insurance in managing the risk in agricultural production

The modern insurance, as a form of the risk management, appears and develops with a private property development and with development of mathematics and statistics, although a basic characteristic of insurance, joining risks, meets yet in the primordial human community, when people had, joining in groups, tribal communities, endeavoured to share the risk mutually. According to the term of the Commission for Insurance Terminology of the American Association for Risk and Insurance, an insurance represents joining the risks of accidental losses by transferring such risks to insurance underwriters concurrent to remunerate the insured persons for such losses, to ensure other financial benefits when damages appear, or to provide services connected to such risks (Rejda, 2005).

Observed from the perspective of the risk management, the insurance represents a technique of risk transfer from physical persons and legal entities to insurance companies which professionally deal with the risk management activities in exchange for a specific premium amount. Therefore, observed from the perspective of agricultural producer, in exchange for some amount of small fixed cost in form of a premium, the insurance as a form of the risk management provides protection from significantly greater damage, which emergence is uncertain, and anticipated by conditions of the insurance contract. It provides joining the agriculture production risks, as damages on crops due to a hail or a fire, theft of property of agricultural husbandry, death of diseases of animals, as well as death or impairment of health of an agricultural producer.

Joining risk is a base in which the insurance companies base their business, in regard to a fact that it provides anticipation of possible future damages with higher reliability, where there is a rule that together with increase of an equivalent risks in an insurance underwriter's portfolio, there increases also their possibility of more precise determination of future aggregate damage, i.e. there is less relative variability of real damage than the expected one. So, observed from the perspective of the insurance companies, the larger number of risks in the portfolio – the better reliability in determined amount of the insurance premium, which will provide payoff of all damages and reimbursement of costs, along with profit realization. A key role of insurance in agricultural production and society in general is an indirect economic protection of property and life from the effects of forces of nature and accidents.

The insurance improves the agricultural production, in a way it makes entrepreneurial activities of agricultural producers steadier and more certain. The insurance reduces the uncertainty of agricultural producers, but also a need of creating the individual savings accounts or funds, in regard that a need for money reserves is reduced. By eliminating a need for accumulation of financial resources surpluses, which can be profitably engaged thanks to the insurance, the insurance additionally supports the agriculture development. Also, besides the provided indirect economic protection for destructive effects of forces of nature and men's acting, the insurance represents also a form of a pledge (collateral) which provides to agricultural producers to get easier a capital, through credits with lower costs. With sudden price rises of agricultural and food products during the years 2007 and 2008, there was emphasized a significance of safety in supplying of food products, where the Intern-American Institute for Cooperation in Agriculture has pointed out to the food safety, as the most important issue of the present time.

A similar attitude has also the World Bank, which points out that a lack of approach to agriculture insurance, which represents one of ten key factors in solving a problem of food safety crisis, represents a serious barrier to productivity, investments and efficiency of marketing systems in agriculture (World Bank, 2008). On the significance of insurance in agriculture testifies also the exclusion of state subsidies for paying the insurance premium from the free trade agreement in 1994 of the World Trade Organization, provided that the insurance secures a financial indemnity for the climatic and natural catastrophes (Baez and Simon, 2007).

The agriculture insurance represents a special form of insurance, which belong to property insurances. Appopriating the agriculture insurance comes out from the peculiarities which characterize it. A key peculiarity of the agriculture insurance is a reduced possibility of diversification due to a high correlation among risks. Under the correlated risks we imply the risks which negative impact, at the same time, realizes regarding numerous agricultural producers. For example, the crops are in geographic fields which are under the effect of the same type of natural forces risk, where the probability of emergence of numerous minor damages or a catastrophe from accomplishment of one detrimental event has been significantly increased.

A high correlation level between some risks of agricultural production, as well as a need for determination of exposure to risks of each individual agricultural husbandry, often geographically dispersed, causes high operational and administrative costs, significantly higher in comparison with other insurance forms.

In the risk management, to the insurance underwriters helps the application of a model which by the exposure quantification to some risks provide determination of the insurance premium. For example, the model of ERA Company Guy Carpenter provides to the insurance companies the hail risk management in Italy. By this model is provided a comparison of hail insurance portfolio exposure for several years, simulation of possible future damages, evaluation of the risk level in various geographic areas and evaluation of the risk exposure limit (Guy Carpenter, 2006). Despite of the existence of modelling, thanks to information asymmetry, which appears in relation an insured person – the insurance company, in the agriculture insurance appears a negative selection, moral hazard and frauds, behaviours of an insured person, which cause additional increase of transaction costs.

The negative risk selection in insurance represents a tendency of the insured person with the probability of risk realization higher than the average one, to place their risk in insurance cover after the average insurance price, which results with actual losses, larger than the expected. An extreme case of the negative risk selection would be, if only would be insured those agricultural producers, which are more exposed to the risks.

A moral hazard is a situation in which individuals and legal entities, thanks to the existence of the insurance cover, have less aversion towards the risk acceptance. Therefore, the existence of the insurance can lead to changes in the insured person's behaviour, which cause increase of the probability of emergence and/or size of damage. For example, the existence of the insurance cover causes more crops leaving by the agricultural producers, than it would be if it was insured (Chen and Miranda, 2007).

A special case of the moral hazard represent frauds which imply deliberately cover-up of facts or their false representation, in order to provide an insurance coverage, which otherwise the insurance company would not accept.

Aiming to eliminate and reduce negative selection, moral hazard and frauds, the insurance companies apply measures which include, for example, limitation of the risk acceptance in the insurance cover, apply of discounts and extra-payments (additional premium - bonuses and maluses), introduction of franchise and precise determination of insuring conditions, for example, requirement of the preventive measures apply (Njegomir, 2006). However, in spite of the measurements apply, aiming to prevent the negative selection and the moral hazard emergence, they still appear, while their appearance cause increase of the transaction costs, which results increase of the insurance premium, which discourage, or completely eliminates demand.

A special problem in the agriculture insurance is catastrophes, caused by a destructive effect of forces of nature. The natural catastrophes can appear as a result of time-dependent risks, like hail, draught or flood or can be caused by pests or epidemiological diseases, like, for example, avian influenza or swine influenza. It is about damages which have been significantly mutually correlated, which are of large amounts individually, and which probability for realization is relatively small and often without sufficient statistical data for a reliable determination of a premium.

The realization of such damages causes the capacities limitation of the insurance companies, which, consequentially, charge prohibitively high premiums or completely cease supply of some special types of the insurance cover, for example, from the flood risks. In such situations, when market mechanisms fail, there appears a need for a direct government intervention on the insurance market. Such support mostly realize through the subsidies (for example in Italy and France) and/or by taking the role of quasi re-insurance underwriter. In the countries of East Europe, including Czech Republic, Slovakia, Russia, Ukraine, Romania and Croatia, the state intervention on the insurance market brings down to the subsidies, which range from 15% to 75% of the insurance premium. The average size of the subsidies in the European Union, during 2004, had amounted around 32% of the premium, and the highest subsidies for the agriculture insurance are in Portugal and they range up to 68% of the insurance premium value.

Historically observed, the agriculture insurance had evolved from city insurance, when, during the last century, the agricultural producers had joined the associations for risk sharing, aiming to protect their crops from the fire risk.

In time, the extent of cover has expanded regarding the risk, but also regarding the types of the agriculture insurance. The insurance premium of agriculture has attained, globally, 18.5 milliard USD in 2008, of which the most (around 62%) has originated from North America, 18% from Asia, 16% from Europe and the rest from Latin America, Africa and Australia. Developing market, in totally realized insurance premium of agriculture in 2007, had participated with less than 20% (Baez and Simon, 2007).

## Agriculture insurance in the south-east European countries

Taking into consideration the significance of agricultural production in general, the governments tend to affect to the negative risk impact reduction to the agricultural producers. These measures can vary from direct *ad hoc* payments from the budget, the role of the state as a direct insurance underwriter or a quasi re-insurance underwriter (as it is in China), to *ex ante* supporting measures to the preventive measures apply, as are the construction of irrigation systems or support for signing a private insurance (Pejanović and Njegomir, 2011).

In some countries, like India and Brazil, the state has very important role. In all East-European countries, the state impact is present, but significantly less, while in some countries like Argentina and South-African Republic, the state intervention is not present (Baez & Wong, 2007).

In regard to a fact that the researches point out that in the most of countries, the private insurance of agricultural production can hardly survive without the state subsidies (Skees, Hazell and Miranda, 1999), their amount increase continuously.

By the year 2007, the subsidies of the insurance premium for agriculture, had achieved almost 12 milliard USD (Mahul & Stutley, 2010), while in 2011, only in USA they had attained 7.4 milliard USD, i.e. 62% of the total agriculture insurance premium (GAO, 2012). Similar as it is worldwide, in all region countries, there are subsidies for crops and yields insurance and animal insurance (see table 1).

**Table 1.** *Comparative review of subsidies' amount of agriculture insurance in the south-east European countries*

| Country | Amount of a subsidy in % of insurance premium | Bylaw act by which is regulated a subsidy amount |
|---|---|---|
| **Montenegro** | 50% | Agro-budget for the year 2012. Ministry of Agriculture and Rural Development of Montenegro, Podgorica |
| **Federation BH** | 50%, maksimalno do maximum up to30000KM | Rulebook on conditions and methods of realizing the financial benefits by a model of other financial benefits in agriculture, „Gazette of FBH", no. 56/12 |
| **Croatia** | 25%, maximum up to500000HRK additional up to 25% | Rulebook on realizing rights to insurance benefits from possible damages in production, „Official Gazette", no. 33/12 Rulebooks of some districts |
| **Macedonia** | 60%, maximum up to200000MKD | Law on agriculture and rural development, „Official Gazette of the Republic of Macedonia", no. 49/10 |
| **Republic of Srpska** | 50%, maximum up to25000KM | Rulebook on conditions and way of realizing the financial subsidies for agriculture and village development „Official Gazette of the Republic of Srpska", no. 18/12 |
| **Slovenia** | 40% for crops and yields, 30% for animals, with municipal subsidies to 50% | Decree on co-financing of insurance premiums of agriculture production and fishery in the year 2008, Official Gazette of Republic of Slovenia, No. 110/07 |
| **Serbia** | 40%, along with possibility of additional subsidies in some municipalities | Decree on conditions and way of using the resources for subsidizing insurance of animals, crops, yields, nurseries and yound perrenial plantations in 2012, „Official Gazette of the Republic of Serbia", no. 38/12 |

**Source:** *authors' compilation*

Insurance density for the total insurance premium, despite some cross country differences, shows that all countries of former Yugoslavia are lagging behind European peers as average insurance per capita in the region in 2010 was in a range between 1808.27 EUR in Slovenia and 92.47 EUR in Macedonia. Thus, it would be unusually to expect agricultural insurance density to be greater. Even in the case that total insurance premium is larger the small share of agricultural insurance premium in total insurance premium is a useful indicator of agricultural insurance importance. When agricultural insurance density is compared with total insurance density we can conclude that agricultural insurance is relatively neglected in comparison to other types of insurance.

The basic aim of business activities of insurance companies is to achieve profit. Profitability of insurance companies can be determined similarly to how it is determined for companies in other industries, as the difference between revenues and expenditures. However, insurance companies' profitability is usually determined separately for insurance underwriting and investments.

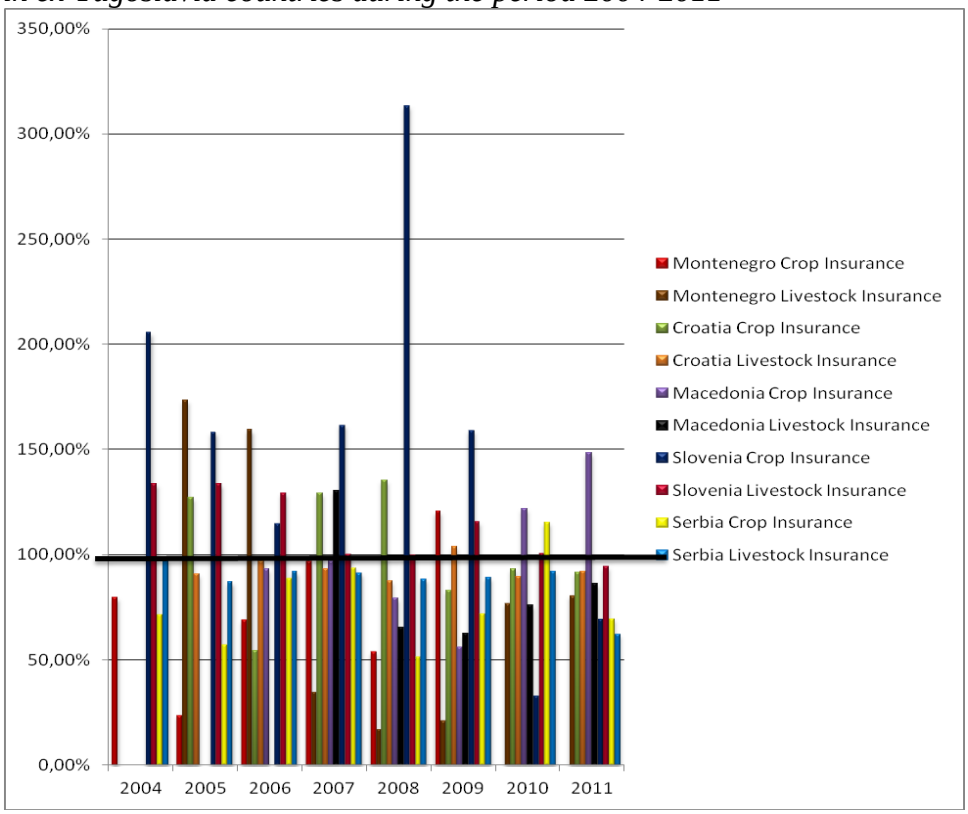
The main revenue from underwriting activities is insurance premiums that have to be sufficient to cover costs of loss payments, operating expenses, reserves and profit. Sometimes investment earnings can be used to offset insufficient premium for claims payments but such practice should be rather extraordinary than normal as lower available investment returns, such as in current investment environment, could cause net losses in both activities.

The most important factor that affects insurance profitability is the underlying risk. This risk essentially depends on insurer's experience regarding loss payments. The most important indicator of insurance company profitability is loss ratio, which measures the proportion of incurred losses to earned premiums.

Essentially, loss ratio shows the amount of the insurance premium that is used for coverage of loss payments to insureds. If this ratio is less than 1 (or 100%) the insurance premiums cover the costs of claims and related expenses, if it is equal to 1, insurance premiums are equal to costs of claims and if it is greater than 1 premiums are not sufficient to cover the costs of losses. In business practice of insurance companies in countries of the region loss ratio is usually referred to as technical result of insurance companies.

Figure 1 shows the development of loss ratios in crop and livestock insurance in countries of former Yugoslavia during the period 2004-2011.

**Figure 1.** *The development of loss ratios in crop and livestock insurance in ex-Yugoslavia countries during the period 2004-2011*




**Source:** *authors' calculations. Data on premiums and losses are obtained from individual countries' regulatory bodies – insurance agencies and National bank of Serbia and insurance associations. Data for Bosnia and Herzegovina were not available.*

Figure 1 indicates that agricultural insurance, including both crop and livestock insurance, are generally very problematic for insurance companies as loss ratios are very often above 100% and almost always above 50%. In each year when loss ratio is above 100% insurance companies in regional countries has suffered underwriting loss. Sometimes it is so extreme, as it was with Slovenian crop insurance in 2008, that losses are two or three times larger than premiums.

It must be emphasized that European average loss ratios in agricultural insurance ranges from 60% to 70% and are still considered unprofitable. Thus, even loss ratios below 100%, such as those in Serbia, does not guarantee underwriting profit because insurance companies should cover operating expenses and achieve profit.

## Micro-insurance

Majority of population in developed countries accept the approach to quality and diverse financial services, like mortgage credit and credit account, investment and pension funds and insurance, as something that implies. On the other hand, in developing countries, and especially in under-developed countries or, so called, "third world countries", the approach to financial services, offered by the formal financial institutions, has been limited and often completely unavailable. A key reason is in assumption of the classical financial institutions that people of poorer financial opportunities represent less attractive clients.

However, ensuring sustainable and even growth and development imply a universal approach to the financial services. Aiming to provide the universal approach to financial services in '70s of the 20$^{th}$ Century, there occur micro-finances, which name origins from a fact that it provides the financial services in small amounts to individuals, which have badly financial resources and which will have no approach to the financial services in other case. Within the micro-finances, in time develops a micro-insurance, which provides a financial indemnity in case of damage realization and avoidance of other cost-ineffective mechanisms of protection from damage, which ultimately result as poverty reduction (Njegomir, 2011).

The International Association of Insurance Supervisors (IAIS) determines the micro-insurance as the insurance to which can approach the population with low incomes, provided by numerous institutions, but by which is operated by the generally accepted insurance practices, which point out that the risks accepted for cover on the basis of the micro-insurance manages by the principles pervasive in the insurance, and that those risks finance by the collected premiums.

A term "micro-insurance" got its name not because of the risk size, institutions or delivery channels, to which points out Churchill (2006), but due to a fact that this kind of insurance form has been adjusted to needs of

the people with lower incomes. The term micro-insurance is of recent date and is connected to the older term – micro-finances. The term started to use in the literature at the beginning of '90s, and in mid-'90s has started to use by the International Labour Organisation and UNCTAD. However, a concept of insurance products sale with small premiums is well known from before. In Great Britain, for example, within the "industrial life insurance" of the company Prudential Life Assurance Society, in the late XIX Century had been selling life insurance-policies of small amounts, while weekly premiums had been collected door-to-door. In Sweden, there is the insurance company Folksam General Mutual, founded by the cooperative movement, has ensured the insurance from fire to workers with low incomes and cooperative shops (Njegomir, 2011).

The micro-insurance is efficient also on the markets where there is some experience with the insurance activities, i.e. as long as the products, procedures and insurance policies are simple, the premiums low, the administration efficient and distribution channels – innovative. Taking into consideration these characteristics, according to data of Lloyd's and Microinsurance Centre, in 2009, the micro-insurance had comprised 135 million people or around 5% of market potentials with recorded annual growth rate of 10% and more percentages in many countries (Lloyd's $360^0$, 2009).

Entering the market, the insurance underwriters, and especially the commercial insurance underwriters starts with a supply of the simplest and, at the moment, the most wide-spread types of insurance – life insurance in case of a credit user's death, and then, gradually, introduce other micro-insurance services. Besides the life insurance, in supply of the micro-underwriters are also present the accident insurance, the property insurance and the less represented is health insurance. The property insurance is the least represented, taking into consideration the least demand manifested for this kind of the insurance cover. Non-profit micro - under writers mostly avoid non-life insurances and tend to specialize for health and life insurances. Taking into consideration that the insurance sums and the premiums are small, the costs of necessary controls during signing and during the insurance duration, and especially in conditions of damages realization and damage claims, make this type of the insurance cover long-term unsustainable.

In the group of the property insurances, the most significant is the application of micro-insurance in agriculture. Due to bad, and very often, also negative technical results, heavy possibilities of risks and damages evaluation, when they appear and high transaction costs in traditional insurance of agricultural production, the insurance under writers in developing countries are not interested for developing such insurance type, especially not in cases of small agricultural husbandries of poor economic power, bad rural distributive network and low awareness on the insurance significance.

However, with two the most wanted types of insurance cover, in the field of the property insurances, there are significant barriers for development. In case of crops insurance, administration costs are extremely high, and damage claims, if appear, are hard to prove. Similar problems are also in domestic animals insurance, where there is a special threat from frauds and moral hazard.

We consider, however, that provision of the insurance cover in agricultural production, which is based on the micro-insurance principles, can be long-term sustainable. However, in order to realize the micro-insurance services, they must be complex, offered to the market by relatively low premiums and along with obligatorily participation of all agricultural producers. Distribution has to be realized via set networks, as the agricultural cooperatives, aiming to minimize the transaction costs, and sale was realized on a collective basis.

In supply on the micro-insurance market, the services have to be adjusted to local habits and cultures, to which points out, for example, a data from South Asia, where women are more interested for life insurance of their husbands, than their own. Besides the simplicity of services, which especially refer to the simplicity of insurance conditions and language which uses, education of a local market, fast payoff of the damage claims, it is necessary to select a distribution channel, which has already gained confidence of clients, on a specific market. For example, in Bangladesh and India, the insurance underwriter's agents visit families by door-to-door principle, concerning those women there leave their homes rarely. Finally, for success of the micro-insurance application in crops, yields and animal insurance, there must inevitably be present the state support.

## Conclusion

The agricultural production has enormous social and economic significance in the AP Vojvodina and the Republic of Serbia. For example, in 2009, it has participated with 10.8%, i.e. if includes also food industry, with 18% in gross domestic product of the republic, it employs 23% of the total number of employees, i.e. 17% of active population, and in export it has participated with 23.3%. However, as well as in the world, the agricultural production has been jeopardized by numerous risks, including also the risks like natural catastrophes, variable weather conditions, uncertainty of yield and price.

The insurance belongs to the most important and the most exploited form of managing the production risks of agricultural producers worldwide and in the south-east European region. The insurance risk protection, which jeopardizes the agricultural production, should be primarily secured by the private insurance companies. We consider that the state role should be limited to creation of favourable regulatory and institutional ambience for the private initiative development. Direct state intervention in case of the catastrophic events should be always mixed with other forms of risk management. Historical experience points out that, if there is an availability of free government protection, there comes to discourage of not only the private initiative in the field of agriculture insurance, but also to disinterest of agricultural producers for application of various forms of risks management, by which neglects a primary responsibility of farmers for a profit size, i.e. for selection of an optimal combination of risks management form.

Observed short-term and mid-term, aiming to faster development of agriculture insurance in Serbia and the region, a focus should be on the state intervention. Taking into consideration Serbia's effort to access to the World Trade Organization, which forbids a direct intervention, but not the subsidies, aiming to faster development of agricultural insurance, in the domicile condition, as a key form of the state intervention, imposes subsidizing. It should be limited to the initial development phases of the risk insurance, characterized by significant damages, but which fulfil the insurance conditions, and the direct intervention is justified only when the market mechanisms fail, i.e. in case of the production risks, which do not fulfil the insurance conditions.

## References


1. *Agro-budget for the year 2012*. Ministry of Agriculture and Rural Development of Montenegro, Podgorica.

2. Baez, M.S. and Wong, S. (2007), *Insurance in emerging markets: sound development*; Greenfield for agricultural insurance, Sigma No 1/2007, Swiss Re, Zurich.

3. Chen, S. and Miranda, M.J. (2007) *"Effects of Insurance on Farmer Crop Abandonment"*, paper presented at the American Agricultural Economics Association Annual Meeting, Portland, OR, July 29-August 01, str. 39.

4. Churchill, C. (2006) *"What is insurance for the poor?"*, Churchill C. (ed.), Protecting the poor: A microinsurance compendium, International Labor Organisation, Geneva.

5. GAO (2012), *Crop Insurance: Savings Would Result from Program Changes and Greater Use of Data Mining*, GAO-12-256, Report to the Ranking Member, Permanent Subcommittee on Investigations, Committee on Homeland Insurance and Governmental Affairs, U.S. Senate, United States Government Accountability Office, Washington, DC.

6. Guy Carpenter (2006) *Guy Carpenter Introduces Industry's First Agricultural Risks Exposure Model for Italy's Hail Insurance Market*.

7. Huirne, R., Meuwissen, M. and Asseldonk, M.V. (2007) *"Importance of Whole-Farm risk Management in Agriculture"*, in: Weintraub, A., Romero, C., Bjorndal, T., Epstein, R. and Miranda, J. (eds.) Postponement Strategies in Supply Chain Management, Springer, New York, str. 3-15.

8. Lloyd's $360^0$ Risk Insight: *Insurance in Developing Countries: Exploring Opportunities in Microinsurance*, Lloyd's and MicroInsurance Centre, 2009

9. Mahul O., Stutley C. J. (2010), *Government Support to Agricultural Insurance: Challenges and Opportunities for Developing Countries*, World Bank, Washington DC.

10. Njegomir, V. (2006) *„Negativna selekcija rizika, moralni hazard i prevare u osiguranju"*, Svijet Osiguranja, 9(7): str. 40-44.

11. Njegomir, V. (2011) *„Mikroosiguranje"*, Industrija, 39(3): str. 295-314
12. Pejanović, R. i Njegomir, V. (2011) „Problemi upravljanja rizicima u poljoprivredi", Ekonomika poljoprivrede, 58(1): str. 91-103.

13. *Pravilnik o ostvarivanju prava na potporu osiguranja od mogućih šteta proizvodnji u poljoprivredi*, „Narodne novine", br. 33/12.

14. *Pravilnik o uslovima i načinu ostvarivanja novčanih podsticaja za razvoj poljoprivrede i sela*, „Službeni glasnik Republike Srpske", br. 18/12.

15. *Pravilnik o uvjetima i načinu ostvarenja novčanih potpora po modelu ostalih vrsta novčanih potpora u poljoprivredi*, "Službene novine FBiH", br. 56/12.

16. Rejda, G.E.(2005) *Principles of Risk Management and Insurance*, Pearson Education, Inc., str. 20.

17. Skees, J., Hazell, P. and Miranda, M. (1999), *"New Approaches to Crop Yield Insurance in Developing Countries"*, EPTD Discussion Paper 55, International Food Poliy Research Institute, Washington, DC.

18. *Decree on co-financing of insurance premiums of agriculture production and fishery in the year 2008*, Official Gazette of Republic of Slovenia, No. 110/07.

19. *Uredba o uslovima i načinu korišćenja sredstava za regresiranje osiguranja životinja, useva, plodova, rasadnika i mladih višegodišnjih zasada u 2012. godini*, „Službeni glasnik Republike Srbije", br. 38/12

20. World Bank (2008) *"Framework document for proposed loans, credits, and grants in the amount of US$1.2 billion equivalent for a global food crisis response program"*, Washington, DC.

21. *Zakon za zemjodelstvo i ruralen razvoj*, „Službeni Vesnik na R. Makedonija", br. 49/10.

# EVALUATION OF THE AGRICULTURAL PRODUCE MARKET AND DETERMINING THE DEVELOPMENT PERSPECTIVES OF THE RURAL AREA ENTREPRENEURSHIP

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## Abstract

*The article gives an evaluation for the market for agricultural products, and the main directions of development of entrepreneurship in the agricultural sector on the example of the Stavropol region of the Russian Federation on the basis of data analysis of the balance resources and their use in the context of product groups. It allowed to determine that the Stavropol region is self-sufficient in grain, meat and milk, and the most dependant on the export of fruit, but the share of imported food supply decreases annually. The application of the BCG Matrix of the investment strategic positions of commodity groups of agricultural products of the Stavropol Territory has allowed to establish the priority sub-sectors for the development of entrepreneurship in agriculture.*

**Key words:** *agrarian sector, agriculture, investors, entrepreneurship, business, food products.*

## Introduction

The Food Doctrine of the Russian Federation's strategic objectives highlights the formation of socio-effective national market for agricultural products, which is influenced by the particular features of the regional markets and global trends. All numerous factors affecting the development of the market for agricultural products can be united in groups: - economic - social; - scientific- technical and narural- climatic factors. As an object of investigation we allocated markets in the following main groups of agricultural products: grain; meat and meat products; milk and dairy products; potatoes; vegetables and melons; fruits and berries; eggs and egg products; fish and fish products.

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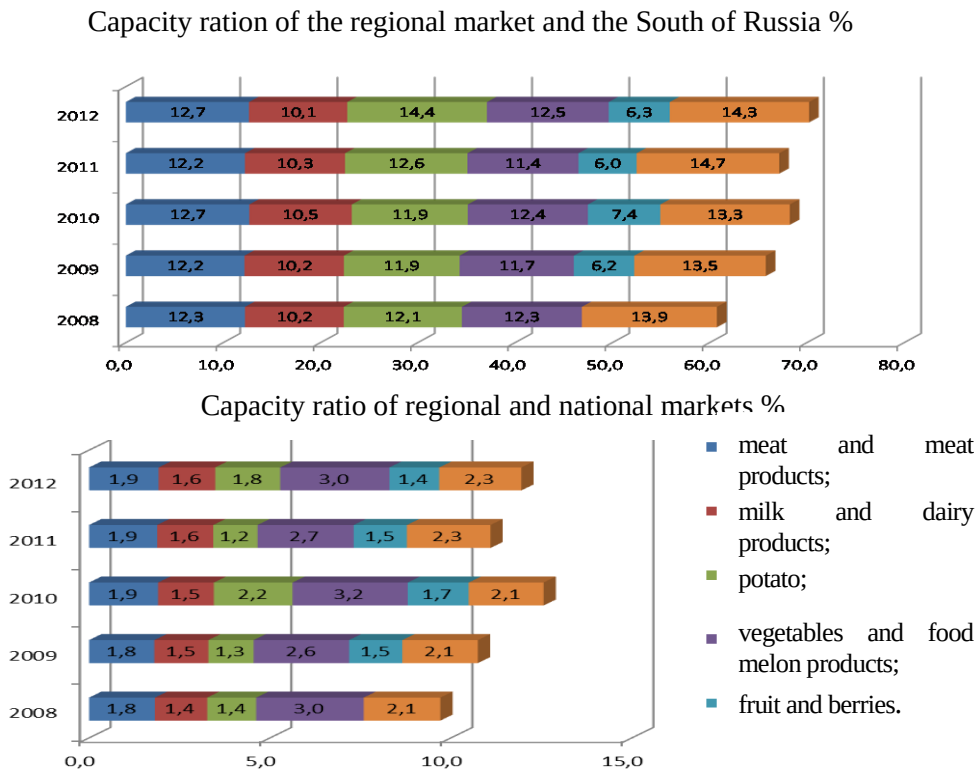
## Discussion

The total volume of market demand for any given time was evaluated with the indicator of the market capacity as possible volume of goods' sales at a certain price level. During the last 5 years in all considered markets the growth of their capacity at the regional level with the highest growth rate was observed, excluding the year 2010, when there was a significant reduction in the size of markets of crop products in 2010 due to unfavorable climatic conditions during this period. The concentration of the North Caucasian and Russian markets is considered relatively stable, which is defined as the ratio of the capacity of the regional market to the average regional and nationally ones, respectively. So, the share of the regional market accounted for from 12.3 in 2008 to 12.7% in 2012, the capacity of the regional market from 1.8 to 1.9% of the national average, or 12.4% and 1.86%. The average level of concentration for milk constituted 10.3% and 1.5%, potatoes - 12.6% and 1.6%, vegetables - 12.1% and 2.9%, fruits - 6.5% and 1.5 %, eggs - 13.9% and 2.2% (Fig. 1).

**Figure 1.** *Market capacity of main agricultural products in the Stavropol Territory, %* (**Source:** *According to statistics of the MAST RF and FSSS RF.*)



The basis of the balance sheet of data resources and their use in the context of product groups allowed us to calculate the number of indicators:

- *the level of self-sufficiency as the ratio of production in the territory to its domestic consumption (production consumption + private consumption + loss of production+recycling products for non-food purposes);*
- *the import dependence as the ratio of import to the territory, including imports to "total resources";*
- *the import consumption as the ratio of import to the territory, including imports to domestic consumption;*
- *the exported level as the ratio of export, including the export to production;*
- *the balance of trade as the difference between exports and imports to the territory;*
- *the coefficient of openness of the agricultural market as the ratio of foreign trade turnover of the main food groups goods to their production: Co = (I+E) / STMC (share of total market capacity); If Co = (I+E) / STMC >1 – the branch is importing; If Co = (I+E) / STMC < 1 – the branch is exporting.*

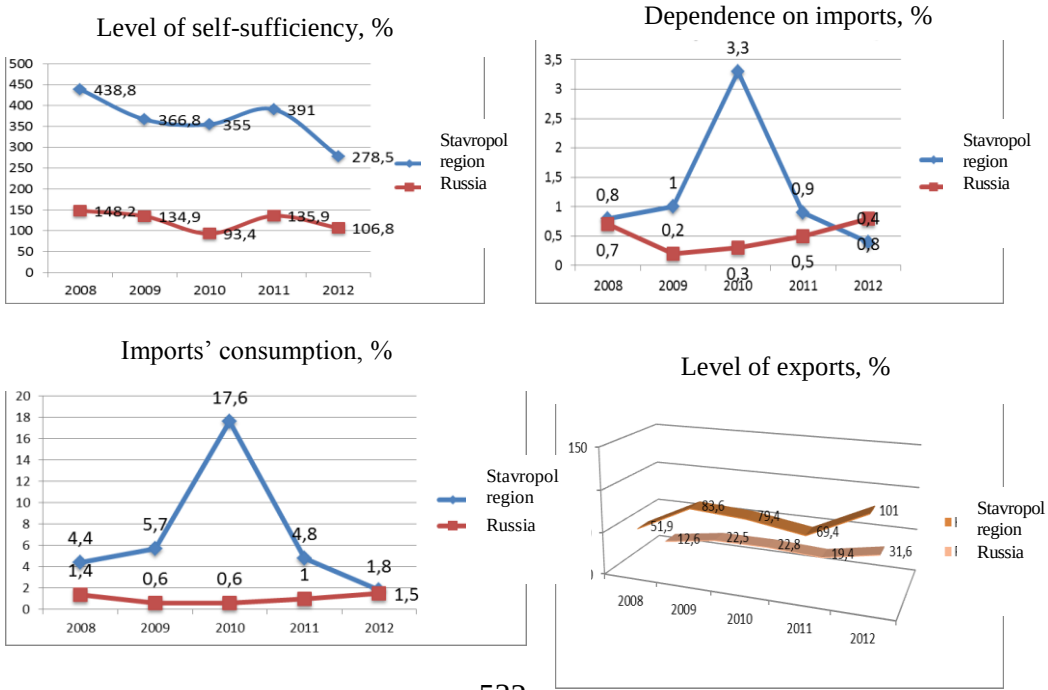
When icreasing the degree of market openness the level of market concentration is reduced,which to a certain degree leads to the increased competition from foreign suppliers. It is possible to estimate the share of imported goods and imported products in the total sales for a particular product market: *LIIM = I / (P + I - E) x 100, where LIIM (Level of imports at the internal market), I (Imports), P (Production), I (Import), E (Export).* This figure is also the starting point in addressing issues related to protective measures for domestic producers. The border to assess the number of the threatening share of imports is considered to be 10-35% on various commodities.

## Result

From the data it is evident that the region is self-sufficient in grain provision (Fig. 2), meat and milk. The lack of resources in the territory's own products is covered by the import from other regions and other imports. So the market is the most import dependant on fruits, the share of imports ranges from 44.7 to 46.9% and on fish by more than 65%. In the Stavropol region it is observed the decline of import dependence on potatoes and vegetables (almost 2-fold decrease), significant increase of dependance on imports (almost 2-fold increase), milk – ( 35.5%), eggs (1.8 – fold). The comparison of import and export of products allows to determine the trade vector. So the regional market

has an active trade balance of grain, meat and milk [1]. The borderline number to assess the number of the threatening share of imports is considered to be 10-35% on various commodities. So, in the Stavropol region, such situation is typical for fish (over 70%), fruits (more than 50%), vegetables and meat ( more than 20%). The inventory analysis indicates the exixstance of food security in all product groups and types of markets. However, the regional market is experiencing decline in stocks of grain - 58%, meat - 3.2%, eggs - 13.3%. The done research of the market capacity must be complmented by the study of the level of saturation of the population needs needs in food, including through the self-provision. This raises the need to determine the total demand for agricultural products as food. The data show a steady trend of growth of the aggregate demand for agricultural products up to 2.1 times against the backdrop of the population growth of the Stavropol Territory. In general, during the study period the income of the population has increased 1.7 times. The household spending on food increased up to 1.9 times. While the share of food expenditure in the total consumer spending has increased. As a result, the ratio of household demand for agricultural products to the volume of agricultural production increased up to 1.6 times [2]. To determine the saturation level of the population's needs for food products the value of scientific norms of consumption will be used.

**Figure 2.** *Fragment of an Analysis of the grain market in the Stavropol Territory* (**Source:** *According to statistics of the MAST RF and FSSS RF*.)



As a result of the comparison of consumption of basic foodstuffs with the standard value, we concluded that there is a persistent increase in the saturation level of the physiological needs of the population.

Physiological needs of the population in the region are met by grain products up to more than 140%, meat up to 91.8%, milk up to 62.4%, 122.4% for potatoes, vegetables up to 112.3%, 42.1% fruits, 111.5% eggs, 40% fish. After comparing the data values with indicators of self-provision and import dependency it is evident that the product substitution is present in the process of food consumption, due to the ratio of real incomes and the prevailing prices in the food market, ie purchasing power [3].

Comparative characteristics of prices show the exceeding of regional prices over the average ones for the region and Russia as a whole. A lower price for imported products would explain the growth import use for meat and milk, fish and fruits due to the low competitiveness of the regional producer due to the high cost of production.

As a result of the detailed study of the market price, we came to the conclusion that pricing in agriculture has certain unique to this industry features, which are due to the specific demand and supply of agricultural products. Thus the expansion of demand for agricultural products, unlike for the most non-agricultural goods, has more clearly defined limits of saturation of the human consumption, associated with physiological boundaries. This ensures that the share of food expenditure in the total consumer spending on food products in the process of the progressive development of the society and the growth of real incomes of consumers are decreasing. Wherein in the region the reverse tendency is observed. As we approach the needs of the population for food to the level of absolute requirements, the decrease in the demand eleasticity on incomes of fimal consumers occurs. With the accelerated growth in the level of supply, the level of demand growth slows. At the same time , in contrast to the demand, the agricultural proposal has no clearly defined growth limits. That becomes relevant as a result of the Russia's becoming a memeber of the WTO [4].

So at the regional market according to the the results of 2012 the traditional export sector increased the grain production level of export compared to the year 2011 by 30 percentage points.

As a result, the market capacity, the grain boundary structure of resources and their use have changed. If in 2008 the share of the production in the resource potential constituted up to 82% had, in 2012 it accounted for 58%. The inventories significantly reduced at the end of the year from 38.7 to 20.1%. Wherein the export European average price is inferior than the one worldwide.

Russia's entering the WTO requires constant monitoring of international prices. So in September 2013 the average value of the FAO Food Price Index constituted 199.1 points that is 2.3 points (1%) lower than in August and 11 points (5.4%) lower than at the beginning of the year.

This marked decrease in September, is a continuation of the fifth month in a continuing downward trend in the index value, the cause of which was the sharp drop in world cereal prices, wherein the prices of all other components of the index: dairy products, oils, meat and sugar, rose slightly.

The basis for sustainable development of entrepreneurship in agribusiness is the resource potential, the effective use of which contributes to the performance of industries and agriculture in the region sub complexes. The resource potential in the context of this study includes logistical base and staffing.

Material resources in agribusiness are represented by the basic production assets, including land and inventories. The agro-industrial complex manpower is characterized by the number and quality of the workforce.

The resource potential of the regional economy is estimated by a system of indicators, which generally characterize the agricultural output in the agriculture of the region. Wherein, the agricultural production peculiarities determine the necessity of complementing the market mechanism with the control actions of the state.

Investments in agriculture have a decisive effect on the parameters of agricultural output, a token of which is the participation of agriculture in the creation of the GDP of the country. Agriculture is the leading sector of the Stavropol Territory, as evidenced by the data in Table 1.

**Table 1.** *Indicators of the agricultural nature of the economic development of Russia and the Stavropol Territory, billion rubles*

| Indicators | 2008 | 2009 | 2010 | 2011 | 2012 | During the five year average | 2012, % by | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2008 | 2011 |
| Russia's gross domestic product | 33247,5 | 41276,8 | 38807,2 | 45172,7 | 54585,6 | 42618,0 | 164,2 | 120,8 |
| including the production of agriculture | 1931,6 | 2461,4 | 2515,9 | 2618,5 | 3451,3 | 2595,7 | 178,7 | 131,8 |
| the proportion of agricultural production, % | 5,8 | 6,0 | 6,5 | 5,8 | 6,3 | 6,1 | 108,6 | 108,6 |
| Gross regional product of the Stavropol Territory | 222,2 | 275,0 | 277,3 | 316,9 | 382,5 | 294,8 | 172,1 | 120,7 |
| including the production of agriculture | 69,1 | 76,4 | 67,7 | 82,8 | 100,2 | 79,2 | 145,0 | 121,0 |
| the proportion of agricultural production, % | 31,1 | 27,8 | 24,4 | 26,1 | 26,2 | 27,1 | 84,2 | 100,4 |

**Source:** *According to statistics of the MAST RF and FSSS RF*.

During the studied period, the Russian GDP grew by 64.2%, while the Stavropol Territory GRP - by 72.1%. The volume of agricultural production in the whole country increased by 78.7%, in the territory - 45%. The share of agricultural production in Russia increased from 5.8 to 6.3%, the margin decreased from 31.1 to 26.2%. The share of agricultural production on average during the studied period in the territory is about 27.1% (compared to 6.1% in Russia). To determine trends in the agrarian economy as the most important component of the population livelihood we should investigate the agricultural output of the Stavropol Territory, which is a set of indicators that characterize the agricultural character and as a result, food security of the domestic economy. To assess the agricultural output of the economy of the Stavropol Territory in comparison with the Russian one, in Table 2 we systematized

structural parameters, the main ones being the proportion of the volume of agricultural production in GDP; the share of the population employed in the agricultural sector to the total working people in industries; the share of investments to support agricultural producers, to the total investment into the economy.

**Table 2.** *Dynamics of parameters of the agricultural output of the economy of the Stavropol Territory, %*

| Indicators | 2008 | 2009 | 2010 | 2011 | 2012 | Growth rate (decrease) | | Average for 5 years |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 2012 by 2008 | 2012 by 2011 | |
| Share of agricultural output in GDP | 31,1 | 27,8 | 24,4 | 26,1 | 26,2 | 84,2 | 100,4 | 27,1 |
| Share of turnover of food products in the total volume of retail trade turnover | 45,9 | 42,8 | 47,1 | 47,3 | 48,2 | 105,0 | 101,9 | 46,3 |
| Ratio of agricultural products to the volume of household incomes | 25,7 | 23,4 | 18,2 | 19,2 | 20,9 | 81,3 | 108,9 | 21,5 |
| Share of the population employed in the agricultural sector in total employment in the economy | 18,0 | 17,6 | 16,9 | 16,6 | 16,7 | 92,8 | 100,6 | 17,2 |
| Share of the population employed in the agricultural sector in the total population living in rural areas | 18,5 | 18,4 | 17,6 | 17,7 | 18,1 | 97,8 | 102,3 | 18,1 |
| Share of rural population in the total population | 43,5 | 43,3 | 43,1 | 42,9 | 42,6 | 97,9 | 99,3 | 43,1 |
| Level of wages in agriculture compared to the average wage in the country | 65,9 | 74,9 | 74,9 | 78,0 | 81,7 | 124,0 | 104,7 | 75,1 |
| Share of investments to support agricultural producers, in the total investment in the economy | 16,0 | 15,4 | 13,3 | 11,6 | 12,4 | 77,5 | 106,9 | 13,7 |
| Area density of rural land in the total land area | 87,5 | 87,5 | 87,5 | 87,5 | 87,5 | 100,0 | 100,0 | 87,5 |
| Share of arable land in the area of agricultural land | 69,4 | 69,4 | 69,4 | 69,4 | 69,4 | 100,0 | 100,0 | 69,4 |
| Share of acreage in arable land | 71,5 | 73,3 | 74,0 | 71,9 | 71,1 | 99,4 | 98,9 | 72,4 |
| Level of lending rates in agriculture compared to the average lending rate in the economy | 156,7 | 148,2 | 147,7 | 145,2 | 142,7 | 91,1 | 98,3 | 148,1 |

**Source:** *According to statistics of the MAST RF and FSSS RF*.

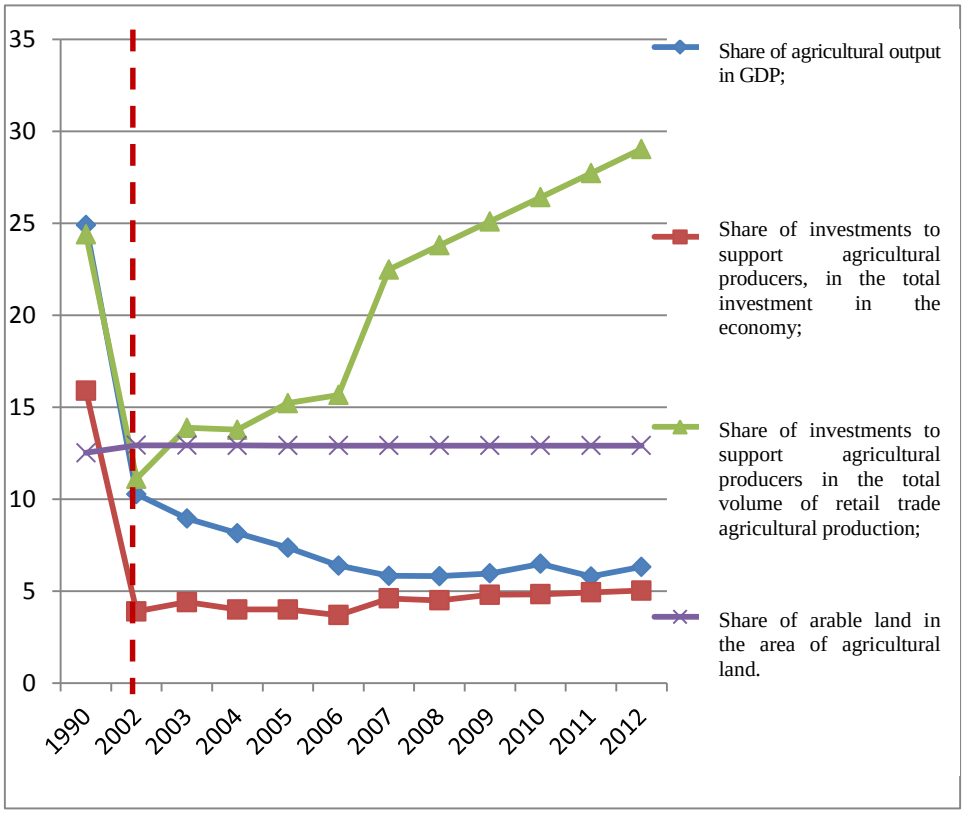
Analysis of data on Russia as a whole showed that over the past five years the growth in the share of raw materials in the Russian economy from 5 to 5.9% has been seen.

The share of the population employed in the agricultural sector in total employment in the economy has increased from 8.7 to 10.4%. The share of the rural population in the total population has declined from 26 to 22%. While the share of the population employed in the agricultural sector in the total population living in rural areas has increased from 16.5 to 16.9%. The conditions of doing agribusiness generally remain at the same level, which is confirmed by statistical data and calculations. The share of agricultural land in the total land area, as well as the proportion of arable land in the farmland, has remained virtually unchanged (respectively 12.9 and 60.7%). However, the proportion of acreage in arable land has increased from 74.2 to 76.1%. Wages in agriculture in comparison to the average wage in the country have increased from 49 to 62%.

Comparisons of the level of agribusiness lending rates with the average rates on loans provided suggests unavailability of credit due to its high cost . With regard to the level of the state support, there has been a favorable increasing trend. The share of investments to support agricultural producers, in the total investment in the economy has increased from 4.5 to 5%, and the share of investment allocated to support agricultural producers in the gross agricultural output has increased from 23.8 to 29%.

Identified trends of the outreached values over the all-Russian boundary indicators suggest that the economy of the Stavropol Territory in comparison with the Russian Federation as a whole has a more pronounced agrarian character, despite the fact that a number of indicators in recent years have shown a decline. The statistical research allows denoting that dynamics of indicators are characterised by a low variability, and hence we can talk about sustainable character of trends.Sustainable character of the trend in isolation from quantitative parameters is not a positive characteristic as on the chart the failure can be clearly seen, separating the pre-reform period from the modern agricultural development. The analyzed indicators in the reported 2012 are not significantly higher than in 2002, but significantly lower than in 1990 (Fig. 3).

**Figure 3.** *Dynamics of indicators of agricultural output and investment support of the industry*




**Source:** *According to statistics of the MAST RF and FSSS RF.*

To maximize the value of the resource potential in agriculture it is necessary to ensure the balance of all types of resources and their rational use in the production process. We will consider the totality of the resource potential of the region successively by types:

- *ground;*
- *human resources;*
- *production assets;*
- *material circulating assets.*

Arable lands, which are based on agricultural land, cover an area intended for the systematic use in agribusiness. As of 01.01.2013, the total area of the regional land fund has not changed and accounts for 6616 hectares. (Table 3) The regional land fund is divided into 26 administrative regions and 10 cities of the regional subordination.

**Table 3.** *Dynamics of changes of land resources, thousand hectares*

| Indicators | 2008 | 2009 | 2010 | 2011 | 2012 | Structure of 2012, % |
|---|---|---|---|---|---|---|
| Total land area, including: | 6616 | 6616 | 6616 | 6616 | 6616 | - |
| farmland, total | 5787,6 | 5787,6 | 5787,3 | 5786,9 | 5786,9 | 100,0 |
| from it: - arable land | 3994,6 | 3994,6 | 3995,7 | 3996,4 | 3997,7 | 69,08 |
| - hayfields | 105,2 | 105,2 | 105,2 | 105 | 105,1 | 1,82 |
| - pastures | 1628,8 | 1628,8 | 1628,1 | 1627,8 | 1626,3 | 28,10 |
| - forest | 113,2 | 113,2 | 113,2 | 113,3 | 113,2 | 1,96 |
| - ponds and reservoirs | 127 | 127 | 127 | 127 | 127 | 2,19 |
| - plots of land | 79,2 | 79,2 | 80,7 | 82 | 82,9 | 1,43 |
| - other land | 125,8 | 125,8 | 125,5 | 125,4 | 125,4 | 2,17 |

**Source:** *According to statistics of the MAST RF and FSSS RF.*

Agricultural land in the region is dominating and occupies about 88% of the territory, which indicates a high agricultural land development fund. The main type of agricultural land is arable. Its share in the structure of land is 60.42% (for the reporting period the proportion of arable land in the composition of agricultural land increased up to 0.04), indicating a rather high degree of plowing (Table 4).

**Table 4.** *Level of use of the land fund, %*

| Indicators | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|
| Farmland in the total land area | 87,48 | 87,48 | 87,47 | 87,47 | 87,47 |
| Arable land in the composition of agricultural land | 60,38 | 60,38 | 60,39 | 60,41 | 60,42 |
| Crops in arable land | 69,02 | 69,02 | 69,04 | 69,06 | 69,07 |

**Source:** *According to statistics of the MAST RF and FSSS RF.*

The employment potential of the region is one of the most important indicators of the economic development, the calculation of its main characteristics in practice is a challenge. There are two characteristics of the labor potential - quantitative and qualitative. The quantitative one is determined by the demographic factors and the intensity of the labor process, the qualitative one by the ability to produce labor-added tax and socio-economic relations. The strenth of the employment potential of the region is the dominance of the economically active population (63.4%, fourth place in the macro regions of the Southern Federal District and 19$^{th}$ in Russia); low overall unemployment rate, which

according to the calculation methodology of the International Labour Organization in 2012 amounted to 7.8 % (in Russia - 6.5% ;on average in the regions of South and North - Caucasus Federal District - 10.2% of which the Krasnodar Territory - 4.8%; the Chechen Republic - 35.5 per cent ). In contrast to the majority of Russian regions , the population is not a limiting factor in the development of the Stavropol Territory (Table 5).

**Table 5.** *Assessment of the labor market and employment in the region*

| Indicator | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|---|
| Number of the economically active population, thousand people | 1289,7 | 1300,2 | 1363,6 | 1374,4 | 1346,5 | 1363,6 | 1373,2 | 1383,4 |
| Economic activity rate,% | 61,4 | 61,8 | 64,6 | 64,9 | 63,5 | 64,6 | 65,1 | 65,1 |
| Number of employed, thousand people | 1199,7 | 1184,0 | 1275,6 | 1266,7 | 1229,1 | 1270,0 | 1290,8 | 1309,2 |
| Employment rate, % | 57,2 | 59,2 | 60,4 | 59,8 | 57,9 | 59,4 | 61,2 | 61,6 |
| Number of unemployed, thousand people, including | 90,0 | 116,2 | 87,9 | 107,7 | 117,4 | 93,6 | 82,5 | - |
| males | 76,1 | 58,1 | 40,5 | 63,8 | 63,9 | 51,1 | 51,6 | - |
| females | 57,8 | 63,0 | 49,5 | 52,4 | 53,5 | 42,5 | 48,4 | - |
| Level of unemployed, % | 7,0 | 8,9 | 6,4 | 7,8 | 8,7 | 6,7 | 6,0 | 5,4 |
| Level of official unemployment, % | 2,3 | 2,5 | 1,8 | 2,3 | 2,5 | 2,0 | 1,8 | 1,3 |

**Source:** *According to statistics of the MAST RF and FSSS RF*.

Weaknesses include: low GRP, investments in fixed assets and fiscal capacity per capita of the Territory; disparities between the established production levels and population density (5 times greater than the average density in the Russian Federation); high degree of uneven economic and social development of the region by areas, depression areas in eastern areas; growing stratification of the population by income level; increase in need of social support; outflow and aging among professionals, high mortality rate of working age population, the growing shortage of skilled workforce. There is a tendency for the population growth of the Stavropol Territory. While in the 2000s, the growth was negligible, in 2012

the population of the region has increased by nearly 84 thousand people, compared with 2008. The economic activity rate for the year 2012 amounted to 65.1%, the increase constituted 0.2% in comparison to the year 2008. The highest economic activity of the population growth was observed in urban areas - by 7.8 thousand people. In the total number of economically active population,the urban population accounted for 57.5%. The employment rate for 2012 increased by 1.8 % and amounted to 61.6 %, which is higher than that prevailing one in the North Caucasus Federal District ( 54.7%) , at the same time this figure is lower than in the Russian Federation (64.3 %). Among the subjects of the North Caucasus Federal District, the level of employment in the Stavropol region is on the 1st place. The auxiliary and household farming as a small-scale production makes a positive influence on the population employment, as well as individual work activity, the production of goods and services for sale. In the next three years, the organizations of the Stavropol Territory will experience strong demand for skilled workers and professionals. This is due to the implementation of the investment projects, sectoral development strategies in the Stavropol Territory. Considering the performance dynamics of fixed assets in the Stavropol Teritory one can see that in general, the cost of agricultural machinery in the territory increased from 2008 to 2012 by 34.8%. But at the same time there was a decline of almost all indicators of the presence of technology in the agricultural organizations of the territory (Table 6).

**Table 6.** *Material-technical base of the Stavropol Territory*

| Indicators | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|
| Number of combines for 1,000 hectares of crops (planting) of the respective crops | 3 | 3 | 3 | 3 | 3 |
| Number of combines for 1,000 hectares of arable land | 4,6 | 4,4 | 4,2 | 4,1 | 4,0 |
| Coefficient of the machinery updating | 4 | 1,8 | 2,2 | 4,3 | 2,6 |
| Load of arable land per tractor | 216 | 229 | 238 | 245 | 252 |
| Park of the main machinery | 13048 | 12527 | unavailable | unavailable | unavailable |
| New machinery bought | 464 | 231 | 266 | 495 | 293 |
| Seeding (planting) of certain crops per one combine | 364 | 360 | 344 | 379 | 375 |
| Energy capacity, hp | 4939 | 5551 | 5382 | 5271 | 5291 |
| Energy capacity per one employee, hp | 57 | 69 | 67 | 66 | unavailable |
| Energy capacity per 100ha of arable land, hp | 232 | 268 | 271 | 242 | 244 |

**Source:** *According to statistics of the MAST RF and FSSS RF*.

The growth has been observed in all areas of agricultural production in the Stavropol Territory over the last five years, according to the results of 2012 the traditional main export oriented industry of grain production increased its export compared to 2008 by 6.1% (Table 7). As a result the market capacity, the grain boundary structure of resources and their use have changed. While in 2008 the share of production in the resource potential was up to 82%, in 2012 it accounted for 59%. The inventories significantly reduced at the end of the year from 38.7 to 12.5%. In this situation the export average Russian price is smaller than worldwide.

**Table 7.** *The territory grain structure of resources and their use, %*

| Name of an indicator | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|
| Inventories at the beginning of a year | 38,7 | 17,7 | 16,4 | 14,5 | 12,5 |
| Production | 82,6 | 73,7 | 69,6 | 63,4 | 59,7 |
| Coming in, including import | 0,8 | 1,1 | 3,3 | 0,9 | 0,4 |
| Coming out, including export | 82,1 | 79,2 | 80,1 | 83,5 | 88,2 |
| Inventories for the end of the year | 17,7 | 16,4 | 14,5 | 12,5 | 7,4 |

**Source:** *According to statistics of the MAST RF and FSSS RF*.

In the Stavropol region as a whole for 2012 the agricultural production in all categories of farms amounted to 103.6 billion rubles, of which the share of agricultural enterprises accounts for 62 billion rubles. The share of profitable agricultural enterprises constituted 92 percent, which received 8.6 billion rubles of profit. The profitability of all economic activity in the industry remained at the level of 2011 and amounted to over 19 percent, while there was a rise in this indicator in the livestock production up to 12 percent, in 2011 - 3.2 percent.

Based on the data we ranked commodity groups, the analysis of which shows that the share of the total capacity in the market grain is leading, the outsider is fish and fish products. However, according to the combination of other indicators in the end, grain is assigned only the 7th place in the ranking and fish – the 1st place. The second place is occupied by the group of "Fruits and Berries", the 3rd - "Vegetables and melons food", the the 4th - "Meat", the 5th - "Potato", the 6th - "Eggs and egg products", the 8th - "Milk and dairy products" (Table 8).

**Table 8.** *Ranking of commodity group of agricultural produce according to the system of market indicators*

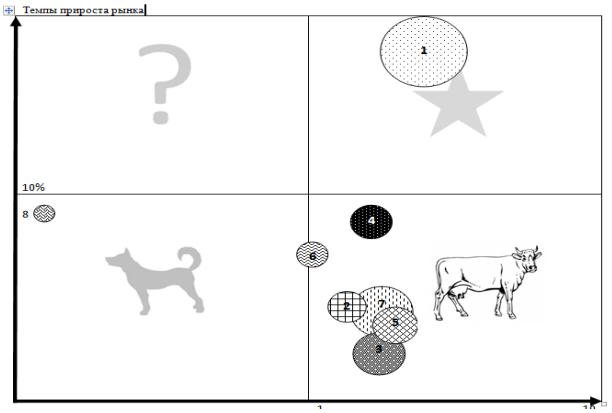
| | Share of total market capacity,% | Ranking indicator | Self-sufficiency of the Stavropol Territory,% | Ranking indicator | Import dependency of the Stavropol Territory ,% | Ranking indicator | Level of import of the Stavropol Territory, % | Ranking indicator | Level of export of the Stavropol Territory, % | Ranking indicator | Coefficient of openness of agricultural market | Ranking indicator | Share of imports in volume of sales,%,% | Ranking indicator | Level of satisfaction of physiological needs of the population,% | Ranking indicator | Sum of ranking | Place in the rating |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grain | 42,2 | 1 | 366,02 | 8 | 1,28 | 8 | 6,86 | 7 | 77,06 | 1 | 0,79 | 2 | -1,68 | 8 | 143 | 8 | 43 | **7** |
| Meat and meat products | 3,9 | 6 | 106,78 | 6 | 18,74 | 5 | 28,32 | 5 | 32,5 | 2 | 0,59 | 4 | 28,28 | 5 | 84,92 | 4 | 37 | **4** |
| Milk and milk products | 12,5 | 3 | 107,08 | 7 | 4,52 | 7 | 5,2 | 8 | 11,5 | 5 | 0,164 | 7 | 5,22 | 7 | 60,72 | 3 | 47 | **8** |
| Potato | 9,1 | 5 | 72,28 | 3 | 23,94 | 4 | 29,08 | 4 | 0,6 | 8 | 0,426 | 5 | 28,88 | 4 | 118,56 | 7 | 40 | **5** |
| Vegetables and melons | 10,2 | 4 | 73,98 | 4 | 31,34 | 3 | 37,4 | 3 | 12,5 | 3 | 0,666 | 3 | 36,98 | 3 | 100,76 | 5 | 28 | **3** |
| Fruit and berries | 3 | 7 | 48,2 | 2 | 45,94 | 2 | 53,98 | 2 | 4,04 | 7 | 1,16 | 1 | 53,86 | 2 | 39,14 | 2 | 25 | **2** |
| Eggs and egg products | 18,6 | 2 | 95,44 | 5 | 14,06 | 6 | 15,7 | 6 | 11,66 | 4 | 0,286 | 6 | 15,72 | 6 | 106,94 | 6 | 41 | **6** |
| Fish and fish products | 0,5 | 8 | 26,42 | 1 | 64,54 | 1 | 76,18 | 1 | 7,18 | 6 | 0,79 | 2 | 75,62 | 1 | 36,8 | 1 | 21 | **1** |

**Source:** *According to statistics of the MAST RF and FSSS RF.*

For the final decision about the prospects of a particular industry it is necessary to analyze the strategic positions of the commodity investment group of agricultural products by creating a BCG matrix. In the Stavropol region grain refers to the group "Star", which is characterized by a high rate of growth and the ability to bring a lot of profit. These are market leaders, but to maintain their positions at the market they require a significant investment. However, since the leadership of the "stars", brings significant profits, those can be invested in maintaining their market position. At the maturity stage, these groups of goods become "cash cows". The group "Dogs" or "lame ducks" includes fish and fish products having a small market share and low growth. Typically, the cost of production is relatively high, compared to the

competition. If these are not related products that are needed to maintain the range, the best solution would be to remove them from the range, or at least, the complete cessation of investments into these products.

**Figure 4.** *Adapted BCG matrix of investment strategic positions of commodity groups of agricultural products of the Stavropol Territory*




**«Dogs»** have a small share of the market and low growth rates. Their production net cost is relatively high in comparison with competitors.

"Stars" are characterized by the high growth rates and ability to bring a lot of profits. These are market leaders, but to keep their positions at the market significant investments are required.

The cash flow in the position "cash cows" is well-balanced; an investment minimum is required into this business area.

For «stars» - try to keep or increase the business share at the market.
For «cash cows » - try to keep or increase the share of their business at the market.
For «dogs» - be satisfied with their position, either to reduce it, or close out this type of business

Denotation:

1. Grain
2. Meat and meat products
3. Milk and milk products
4. Potato
5. Vegetables and melons
6. Fruit and berries
7. Eggs and egg products

The group of "cash cows" is represented by meat and meat products, milk and dairy products, potatoes, vegetables and food melons, fruits and berries, eggs and egg products. This is the business area, which in the past received a relatively large share of the market. But over time, the relevant industry growth slowed markedly. As usual, the "cash cow" were "stars" in the past, which now provide a sufficient profit in order to keep their competitive market position. The cash flow in these positions is well balanced, as the investments into such business area require the absolute minimum.

## Conclusion

Positions held by the individual business areas in the strategic space, defined by the BCG model, dictate the choice of well-defined areas of action. For the "stars" it is to try to maintain or increase their share of the business market.

For the "cash cows" it is to try to maintain or increase the proportion of their business in the market. For "dogs" it is to be satisfied with their position, or reduce it, or eliminate this type of business. Comparing the results of the evaluation of investment strategic positioning and market demand the following priority sub-sectors for the business development are identified: fruit growing, vegetable growing on the open ground and in a greenhouse, poultry meat production, sheep and cattle breeding and the traditional branch of the Stavropol Territory - grain production. The most promising sector in the province is the poultry meat production (especially turkey-breeding). Further priorities are as follows: sunflower cultivation and processing, vegetable growing in the closed and open soil, horticulture, cultivation and processing of soybeans, dairy and beef cattle, meat sheep production. The study of the agricultural sector of the Stavropol Territory indicates a high potential for the development of entrepreneurship in agriculture. In general, the economic potential of the Stavropol Territory agro-industrial complex is determined by the following factors:

1. Positive ones:
   - *good production and financial performance indicators in comparison with other regions of the Russian Federation;*
   - *high (although, given the low starting level) economic growth - they exceed the national average and, apparently, will be kept;*
   - *improving the quality of financial management and information transparency of the agricultural organizations.*

2. Negative ones:
   - *socio-economic instability in the region. This is a limiting factor in the growth of investment in agriculture;*
   - *high depreciation of the material-technical base of the agro-industrial complex;*
   - *low-level processing of agricultural products;*
   - *volatility of financial results and fluctuation of functioning efficiency of agricultural organizations;*
   - *restrictions on the export of agricultural products outside of the Territory;*
   - *shortage of investment resources;*
   - *dumping prices for agricultural products imported to the Territory [5].*

But despite the economic problems of the agricultural sector in the Stavropol Territory positive trends such as increasing agricultural production with the

introduction of intensive technologies, increasing of investment activity, development of business, resulting in a steady trend increase the efficiency of the agro-industrial complex. There are reserves of the business activity there, it is necessary, with the support of government agencies, to create conditions for the introduction of expanded reproduction by agricultural organizations, the introduction of intensive energy saving technologies to reduce the deficit production facilities for the storage and processing of agricultural products; ensure a flow of skilled personnel in the organizations of agriculture, make more accessible financial resources to implement grant financial support system of large, medium and small agricultural organizations, to create a long-term program to implement the policy of intervention in the agricultural market.

## References


1. Sklyarov I.Y., Sklyarova Y.M. (2013): *Development of Small Forms of Entrepreneurship and Agricultural Production in Russian Village*/ Middle-East Journal of Scientific Research, № 17(4), p. 424-428.

2. Sklyarov I.Y., Sklyarova Y.M. (2013): *Entrepreneurship development and production of small farms in rural areas*, Russian Entrepreneurship, № 19 (241), p. 13-23.

3. Sklyarov I.Y., Sklyarova Y.M., Lapina E.N. (2013): *Resourcing of the agricultural sector of the Stavropol Territory*, Economics of agricultural and processing enterprises, № 12, p. 17-21.

4. Sklyarov I.Y., Sklyarova Y.M., Lapina E.N. (2013): *Resourcing of the agricultural sector of the Stavropol Territory*, Economics of agricultural and processing enterprises, № 12, p. 27.

5. Mazloev V.Z., Adzhiyeva A.Y. (2010): *Formation of competitive institutional environment in the regional market of the agro-industrial complex*, Economical sciences, № 63, p. 173-177.

# ECONOMIC JUSTIFICATION OF INVESTING IN PERENNIAL SWEET CHERRY PLANTATIONS*

*Todor Marković, Nemanja Pajić*[1]

## Abstract

*In the last few years a large number of individual agricultural producers have become interested in investing in perennial sweet cherry plantations due to their highly cost-effective cultivation. In order to prove the economic justification of the mentioned investment, this paper will focus on the most important factors that affect the results of the analyzed problem. The paper analyzes the overall trends on the global and domestic sweet cherry markets in the last ten years, and projects all the necessary costs for sweet cherry production, as well as the expected income for the entire period of exploitation of1 haperennial sweet cherry plantations. With the analyzed investment, given that the interest rate is 9.5%, the achieved capital value is €233,447. In other words, the annuity of the profit is €24,745. The planned investments can be returned in the second year of a regularexploitation of plantations.*

**Key words:** *investment, sweet cherry, economic justification*

## Introduction

Having in mind the natural, economic, political, geostrategic, social,and other factors, it is easy to acknowledge the immense importance of agricultural production for every country, as well as for Serbia. Agriculture represents a specific sector of economy that can ensure significant financial results for our country. Furthermore, it is necessary to emphasize the extraordinary strategic importance of agriculture,

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especially now when there is a clear growing trend of food prices around the world.

The most intense branch of agriculture is fruit growing, which means that it provides the biggest revenues, that is, the biggest profit. Serbia exports many agricultural products and an important part of revenues is made by exporting the products of fruit growing which are renowned on some foreign markets. These facts are related to several fruit species, one of them being sweet cherry, which has attracted the attention of many agricultural producers in Serbia in the last few years. For that reason, during a very short time period, a great number of agricultural producers have decided to invest in perennial sweet cherry plantations. The goal of the research in this paper is to analyze the economic cost-effectiveness and justification of such an investment, which will be thoroughly discussed in the next segment.

## Data sources and work methods

In order to realize the given goal of the research, the data used were collected from the FAO data base and the National Institute of Statistics (for the period between 2003 and 2012), as well as from an agricultural holding that is planning to commence the analyzed production. On the other hand, various scientific publications were used in the making of the theoretical part of the paper.

The paper is conceived on the basic principles and procedures of contemporary scientific papers. Different scientific methods of gathering information and research were used for acquiring the results and coming to certain conclusions. Moreover, statistical methods were used in the research (average, variation interval,change rate, variation quotient), as well as dynamic methods of evaluating economic effectiveness of investments (capital value of an investment, annuity method, pay-off method).

## Basic characteristics of investing in perennial plantations

In economic literature the term ‘investment’ can be explained in various ways, and one of the widely accepted definitions is that investments represent investing resources, first and foremost financial resources, inacquiring the assets needed for multi-year production (Andrić et al, 2005). Investment projects in agriculture are mostly aimed towards the creation of basic assets (Subić et al, 2011).

Perennial plantations represent biological assets for production which, in the long turn, ensure certain economic benefits (Gogić, 2010). Perennial plantations include fruit plantations, vineyards and hop plantations (Sredojević, 1999). Investing in perennial plantations includes investing in the preparation of land for sowing, obtaining seedlings and sowing, care and protection of young plants, erecting a fence, etc (Apáti, 2008). Apart from this, investments include investing in the necessary machines and equipment, as well as possible investments in facilities and other basic assets.

Perennial plantations are characterized by certain specificities in comparison with the other investments in agriculture and other sectors of economy. Firstly, these differences are reflected in the biological nature of production, in the length of time needed for establishing and utilizing the plantation, as well as in the way of achieving benefits (Gogić, 2005). Besides the mentioned specificities, the initial phase of an investment in perennial plantations includes the analysis of land, meteorological, hydrographic and market conditions. These factors are of great importance for economic effectiveness of investing in perennial plantations.

## General characteristics of sweet cherry

Sweet cherry is characterized by numerous advantages in cultivation in comparison with other fruit. It requires a simpler technology for cultivation, possesses a significant resilience to disease and pests, and its fruits become market ready quite early (Blagojević and Božić, 2012). Hilly areas provide convenient agro-ecological conditions for successful cultivation of sweet cherry; however, high quality production can take place in lowlands alike. Its yield is affected by: the choice of land, climatic conditions, the choice of assortment and seeding materials, application of agro-technology, and the protection from disease and pests (Blagojević and Božić, 2012).

For a number of years, sweet cherry has not been considered desirable for serious production with a high level of cost-effectiveness. However, in the last few years, this fruit species has received a growing economic importance, so that now more attention is paid to the selection of its cultivars. When choosingcultivars it is very difficult to find an optimal solution because of the many differences among the cultivars. The mentioned differences are comprised in the use value of fruit, as well as in the cultivars' adjustability to different climatic conditions of cultivation

(Milatović and Đurović, 2010). Apart from this, producers must pay attention to the differences related to blooming time, resilience to low temperatures, sensitivity to spring frost and the cultivars' yield potential. All listed characteristics affect the economic productivity of some cultivars. Furthermore, when choosing a cultivar it is important to analyze the distance of certain markets. If markets are remote, the advantage should be given to the cultivars with compact fruits, suitable for transportation.

There are many ways of dividing sweet cherry assortment and one of the basic and most important divisions is by fruit ripening time. Based on this criterion, the following groups can be identified: early, medium-early and late.

**Table 1.** *Sweet cherry assortment*

| **Early** | **Medium-early** | **Late** |
|---|---|---|
| Cavalier | Benton | Selah |
| Chalen | White Gold | Skeena |
| Tieton | Glacier | Regina |
| Early Burlat | Rainier | Stardust |
| Early Robin | Emperor Frances | Hedelfingen |
| Index | Blushing Gold | Sweetheart |
| Black Republican | Sandra Rose | Hudson |
| Sam | Black Gold | |
| Kristin | Summit | |
| Black York | Schmidt | |
| Brooks | Ulster | |
| Bing | Olympus | |
| Cristalina | Attica | |
| Vega | Lapins | |

**Source:** *Blagojević and Božić, 2012*

In producing sweet cherry, besides the choice of cultivar, the type of soil on which the cultivar is spooled is of crucial importance. First and foremost, the type of soil affects the lushness of the tree itself, which is crucial for the costs of harvest. A great number of existing sweet cherry plantations arepositioned on lush soil (wild cherry and mahaleb)(Ljubojević et al, 2010). The advantage of this type of soil is good adjustment to different types of terrains.

However, recent research emphasizes the importance of a less lush soil which increases work productivity during fruit picking (Whiting et al, 2005). This candrastically decrease the costs of harvesting. Nowadays, there is a great amount of research which compares the mentioned soil and emphasizes positive trends of positioning sweet cherry plantations on

a less lush soil. Therefore, in modern plantations, for obvious reasons, less lush soils are more attractive and the yield is compensated with a shorter distance between the trees in one row. The yield of these perennial plantations can be several times higher in comparison with that of traditional plantations (Hrotkóet al, 2011). Approximately 80% of modern plantations are placed on the soil of controlled size (Hinman and Hoheisel, 2007). This fact shows that, besides the choice of sweet cherry cultivar, it is important to carefully choose the type of soil.

## Sweet cherry market

When making a decision to commence a certain production it is important to analyze the existent tendencies on the world market of the analyzed production. The most important parameters which should be taken into account are: soil, the yield achieved, total production, international turnover. In this paper, the listed parameters are analyzed according to the findings from 2003 to 2012.

An extremely important indicator of the future trends on the market of agricultural products is the size of the area on which the analyzed species is produced (Vlahović, 2010). Having in mind the global level in the last 10 years, the average sweet cherry area was 367,892 ha. More important data refer to the increase of sweet cherry area in the analyzed period with the growth rate of 1.86% per year(see Table 2). The findings indicate the fact that the interest of fruit producers for this fruit species has increased in the last decade. As a result, there is an increase in the area of perennial sweet cherry plantations.

Despite not being a typical indicator of the current market conditions, the yield of one species can still indicate certain tendencies of production. The changes in yield clearly indicate the trends in the intensity of the analyzed production. As far as sweet cherry is concerned, it can be noticed that, in the last 10 years, there has been an increase in the average yield achieved with the rate of 0.76% per year (see Table 2). Undeniably, this increase of yield is a consequence of greater investment in the analyzed production. The chances of achieving even greater yields certainly exist. This can be justified by the technologies applied in Slovenia and Switzerland, world leaders in the levels of the given parameter.

**Table 2 .** *Area, yield and sweet cherry production worldwide (2003 - 2012)*

| | Average | Variation quotient (%) | Variation interval | | Change rate (%) |
|---|---|---|---|---|---|
| | | | Minimum | Maximum | |
| Area (ha) | 367,892 | 5.78 | 342,212 | 401,656 | 1.86 |
| Yield (t/ha) | 5.33 | 4.95 | 4.95 | 5.82 | 0.76 |
| Production(t) | 1,963,057 | 10.06 | 1,703,125 | 2,256,519 | 3.13 |

**Source:** *Authors on the base www.fao.org*

The consequence of the increase in sweet cherry area and intensity of cultivation is a greater production of the analyzed fruit species. The cause of this tendency is the increase of sweet cherry consumption around the world. According to the used statistical data, the production of sweet cherry in the last decade has been increasing globally at a rate of 3.13% a year (see Table 2). In the analyzed period, Turkey, the USA, Iran, Italy and Spain were the biggest sweet cherry producers worldwide.

Considering the data of the last ten years, the international turnover of sweet cherry also shows a growing trend both in quantity (change rate 9.31%) and in value (change rate 15.27%). A big increase in the value of global sweet cherry turnover in the last few years is not only the consequence of the natural volume of business but also the consequence of higher prices on the global market. The expansion of international sweet cherry trade is especially visible in the most developed countries in the world.

**Table 3.** *International sweet cherry turnover (2002 - 2011)*

| | Average | Variation quotient (%) | Variation interval | | Change rate (%) |
|---|---|---|---|---|---|
| | | | Minimum | Maximum | |
| Quantity (t) | 251,126 | 27.46 | 153,783 | 376,306 | 9.31 |
| Value (000 $) | 850,061 | 42.63 | 382,306 | 1,537,619 | 15.27 |

**Source:** *Authors on the base www.fao.org*

The biggest sweet cherry exporters in the given period were the USA, Turkey, Chile and Austria. Contrastingly, the biggest global importers of this fruit species are Russia, Germany, Canada and China.

Despite the crucial importance of tendencies on the world market, during an analysis it is also important to take into account certain tendencies on the domestic market. A more detailed preview of parameters of sweet cherry market in Serbia is shown in the following part of the paper.

According to the analyzed data in the given period, sweet cherry area in Serbia was 8,631 ha with a slight decrease (change rate -0.31%).

**Table 4.** *Area, yield and sweet cherry production in Serbia (2003-2012)*

| | Average | Variation quotient (%) | Variation interval | | Change rate (%) |
|---|---|---|---|---|---|
| | | | Minimum | Maximum | |
| Area (ha) | 8,631 | 11.57 | 6,800 | 10,000 | -0.31 |
| Yield (t/ha) | 14 | 14.29 | 11 | 16 | -6.92 |
| Production(t) | 25,984 | 14.87 | 19,767 | 30,823 | -0.32 |

**Source:** *Authors on the base www.fao.org and www.stat.gov.rs*

By comparing the yields of sweet cherry production achieved by our producers with the average yields in the world, it can be concluded that our production technology belongs to the world average. The average yield of sweet cherry on the territory of Serbia in this period was 14 kg per tree which is in the same range as the world yield. Having in mind the favorable weather conditions in Serbia, sweet cherry production technology is still insufficiently developed. Establishing new plantations with more productive cultivars for more intensive production and clearing not cost-effective plantations can be expected in the near future.

Concerning the data from the analyzed period, the average sweet cherry production in Serbia was 25,984 t. According to the most recent data, Serbia is in the 19$^{th}$ place in the world by the amount of the sweet cherry produced. In terms of European production only, Serbia is in the 11$^{th}$ place.

What is evident is the constant increase of sweet cherry export from our country in the last decade. The increase of export is undoubtedly the result of the growing demand for sweet cherry produce on the global market. In the analyzed period, the natural volume of sweet cherry export from Serbia increased annually by 39.03% (see Table 5). On the other hand, the export volume value is on an even greater increase (change rate 55.76%) which is the consequence of the constant increase of sweet cherry purchase price (see Table 5).

**Table 5.** *Sweet cherry export from Serbia (2002-2011)*

| | Average | Variation quotient (%) | Variation interval | | Change rate (%) |
|---|---|---|---|---|---|
| | | | Minimum | Minimum | |
| Quantity (t) | 3,998 | 97.30 | 165 | 10,771 | 39.03 |
| Value (000 $) | 3,927 | 110.41 | 106 | 12,973 | 55.76 |
| Price (€/kg) | 0.74 | 54.05 | 0.24 | 1.60 | 26.62 |

**Source:** *Authors on the base www.fao.org and www.stat.gov.rs*

According to the latest available data, sweet cherry export from Serbia is directed to several countries, and the greatest exports are those to Russia and Germany. The given results clearly show that Serbia has become a competitive country on foreign sweet cherry markets. This increased market development is also indicated by a significant increase in the purchase prices in the analyzed period (growth rate 26.62%), which is the result of a greater demand for this product.

It is very important to mention that the price of sweet cherry changes depending on the cultivar, especially when it comes to an organized purchase by certain subjects, that is, the exporter. In addition, the quality of product is very important, which, besides the cultivar, has a great influence on the levels of the purchase price.

## The analysis of the investment in perennial sweet cherry plantations

Making investment decisions in agricultural practice must be based on a strict quality and quantity analysis which will ensure precise directing of costs that is, investing in the most effective project variations (Subić et al, 2011). To avoid, or to mitigate potential financial risks, it is necessary (before establishing a plantation) to estimate the financial investment needed for certain years of cultivation, as well as the expected yield during the planned period of the plantation exploitation (Milić et al, 2008). During the exploitation of a plantation, an important instrument for risk management is fruit insurance (Marković, 2013).

Establishing perennial plantations is a time-consuming, precise and very complex task, which lasts for several years (usually between 2 and 5 years) (Milić et al, 2010). Investment in establishing perennial plantations represents the total sum of all the investments made during the period in

which the plantation is established, up until the moment when the plantation starts bearing fruit annually, and the value of that fruit becomes greater than the value of annual expenditures (Sredojević et al, 2011). The amount of the total investment depends on a number of factors: conditions of the terrain on which the plantation is established, the area of the plantation, the type of plantation, the system of cultivation, the soil and cultivars present in the plantation, the time needed to establish the plantation, the dynamics of plantation establishment, the schedule of investing for the years spent on the plantation establishment, the time of the so called 'low-yield', the ways and conditions of financing, etc (Gogić, 2010).

The preview of the necessary investments in establishing a 1 ha perennial sweet cherry plantation is given in the next part of the paper. The data is based on the basic information received from an agricultural holding in Krčedin.

**Table 6.** *Investments needed for establishing a 1 ha perennial sweet cherry plantation (€)*

| Purpose | Year | | | | | Total |
|---|---|---|---|---|---|---|
| | 1. | 2. | 3. | 4. | 5. | |
| Land preparation | 240 | 90 | 115 | 220 | 380 | 1,045 |
| Erectinga fence | 1,500 | / | / | / | / | 1,500 |
| Fertilization | 400 | 100 | 130 | 190 | 360 | 1,180 |
| Seedlings | 1,700 | 85 | / | / | / | 1,785 |
| Care(pruning) | 50 | 120 | 280 | 390 | 490 | 1,330 |
| Chemicalprotection | 620 | 620 | 620 | 620 | 620 | 3,100 |
| Workers'wages | 200 | / | 123 | 308 | 492 | 1,123 |
| Costs of packaging | / | / | 16 | 40 | 64 | 120 |
| Otherexpenses | 200 | 200 | 300 | 300 | 500 | 1,500 |
| **Total investments** | 4,910 | 1,215 | 1,584 | 2,068 | 2,906 | **12,683** |
| Yield(kg/tree) | / | / | 1 | 2,5 | 4 | / |
| Value of low yield | / | / | 640 | 1,600 | 2,560 | 4,800 |
| Incentives[2] | 680 | / | / | / | / | 680 |
| **Totalincome** | 680 | / | 640 | 1,600 | 2,560 | **5,480** |
| **Investments** | 4,230 | 1,215 | 944 | 468 | 346 | ***7,203*** |

**Source:** *Agricultural holding, Krčedin*

Based on all the listed elements and data, the amount of the investment budget is € 7,203, which is the cost of total investments ($A_0$), in the period

[2]Based on the Subsidiary law in agriculture and rural development, Article 31, an agricultural producer has the right to be given a refund of 40% of the invested assets in a certified planting material by the state (Gazette of the Republic of Serbia, No. 10/13).

of the plantation establishment.During the analysis of investments, all up-to-date and relevant data related to specific costs were used.

Apart from designing the investment budget, it is also necessary to take into account the expected financial results in certain years of sweet cherry plantation exploitation, so that certain conclusions can be made about the economic justification of such an investment. Sweet cherry trees start giving economically significant yield in the $4^{th}$ or $5^{th}$ year and full maturity is achieved in the $9^{th}$ year(Grantetal, 2011). Full maturity, and with it the biggest annual profit, is expected between the $9^{th}$ and $28^{th}$ year, after which there is a projected decline in the yield per sweet cherry tree, followed by plantation clearing during the $30^{th}$ year. In the $6^{th}$ year of the projected perennial plantation exploitation, the return of the investments can be expected. Actually, this is the first year of plantation exploitation in which the level of the annual income will be higher than the level of annual expenditure. The difference between the mentioned parameters will be becoming bigger with the increase of the yield per sweet cherry tree, and the maximal financial result can be expected for the first time in the $9^{th}$ year of the exploitation of the analyzed perennial plantation.

**Table 7.** *Thecalculation of sweet cherry production in the period of full maturity (1 ha)*

| **Elements of calculation** | **Amount** (€) |
|---|---|
| -land preparation | 630.00 |
| -fertilization | 580.00 |
| -care (pruning) | 670.00 |
| -chemical protection | 620.00 |
| -workers' wages | 8,615.00 |
| -costs of packaging | 1,120.00 |
| -other costs | 1,000.00 |
| **TOTAL COSTS (A)** | **13,235.00** |
| **PRODUCTION VALUE (B)**<br>28,000 kg · 1.6 €/kg | **44,800.00** |
| **FINANCIAL RESULT (B-A)** | **31,565.00** |

**Source:** *Authors*

The biggest parts of costs are definitely workers' wages in the process of picking (Gogić, 2005). This expenditure is directly conditioned by the worker's performance norm. According to the opinions in contemporary literature, depending on the cultivar, yield, work organization and equipment used in picking, an average worker picks between 5 and 7 kg of fruit in one hour (Sredojević, 2011). Some other authors give examples

of even bigger norms, mentioning quotas as high as 9kg per hour(Apáti, 2008). Generally speaking, performance norm is only important if it does not affect the quality of fruit. Having in mind the insufficient intensity of sweet cherry production in Serbia, the norm of 6.5 kg per hour was taken in the mentioned calculation. The costs of packaging were calculated based on the current market data, so the price of €0.2 per crate was used in the making of the calculation (it is necessary to mention that the volume of crates is 5kg). All other data related to costs were made based on specific empirical information. Apart from costs, another important element of the analyzed investment is the expected value of the realized production in eachyear of exploitation. This value is directly dependent on the price of the product realization. In this paper, the price of 1.6 €/kg was used for the purpose of analysis. This price is actually equivalent to the average sweet cherry purchase prices in the last analyzed year, according to the data from the National Institute of Statistics.

From the previously stated data, it can be assumed that the given investment is economically justified. In order to prove these assumptions, it is necessary to analyze the indicators of economic effectiveness of the analyzed investment. In this way, some reliable conclusions can be made.

The answer to whether a certain investment is economically justified is usually reached by comparing financial income and expenditures. The best indicator for the mentioned comparison is definitely capital value of an investment. Capital value of an investment denotes the difference between the expected financial income and the expected expenditures made to acquire and use the object of the investment, discounted by a certain calculative interest rate at a certain moment of the investment period(Andrić et al, 2005). The given indicator can be calculated at different moments of aninvestment period. What is the most common case in practice is that the capital value is determined at the moment immediately before ($C_{0^-,0^-}$), and immediately after ($C_{0^-,0^+}$) the first investments are made. Starting with these facts, in the next part of the paper, the capital value of an investment related to these two moments will be calculated for the analyzed investment in perennial sweet cherry plantation.

Capital value, calculated at the moment immediately before the initial investments is:

$$C_{0^-,0^-} = 233{,}447\ €$$

Based on the acquired result, it can be confirmed that the economic justification of the analyzed investment is quite obvious, having in mind that the capital value of the investment is positive, that is$C_0^-{}_{,0}^- > 0$.

On the other hand, capital value calculated immediately after the investments are made is:

$$C_0^-{}_{,0}^+ = 240{,}650\ €$$

The determined capital value does not include the investments made for acquiring the investment object ($A_0$) and showsthe biggest amount of the capital that can be invested so that the investment is still economically justified. It is also called the profit value of an investment ($P_0$).

Therefore, given the analyzed investment, €240,650 is the biggest amount that can be invested in establishing a perennial sweet cherry plantation. As the given amount is higher than the actual amount needed (€7,203), that is $P_0 > A_0$, the investment is economically justified.

Another method for determining the economic effectiveness of investments is the annuity method. Unlike the capital value, this method provides the expected average financial result in certain years of the investment period (Andrić et al, 2005).

In the case of the investment analyzed in this paper, the average annual annuity is:

$$an = 24{,}745\ €$$

Concerning the fact that the calculated value of annuity is €24,745> 0, it can be said that the analyzed investment in a perennial sweet cherry plantation is economically justified.

During the investment analysis, it is necessary to determine the shortest time period in which the invested assets can be returned. The procedure for determining the shortest time period for the return of the invested assets is based on the calculation of time in which the amount of the annual income from the investment will be the same as the amount of the annual expenditures for the investment, discounted in the same billing period (Andrić et al, 2005).

In the case of the analyzed investment in 1ha of perennial sweet cherry plantation, the total invested assets can be returned in the second year of regular exploitation, that is, in the 7th year of the perennial sweet cherry plantation.

This is the preview of the most important indicators of the mentioned investment:

**Table 8.** *Analysis of the investment in a 1 ha perennial sweet cherry plantation*

| | **Basic parameters** | |
|---|---|---|
| **$A_0$** | - total investments (€) | **7,203.00** |
| **N** | - exploitation period (year) | **25** |
| ***i*** | - calculative interest rate (%) | **9.5** |
| | **Indicators of economic effectiveness** | |
| **$C_{0,0}$** | - capital value of the investment (€) | **233,447.00 > 0** |
| **$P_0$** | - profit value of the investment (€) | **240,650.00 >$A_0$** |
| **an** | - profit annuity (€) | **24,745.00> 0** |

**Source:** *Authors*

With the analyzed investment, given that the interest rate is 9.5%, the achieved capital value is € 233,447. In other words, the annuity of the profit is € 24,745. Calculated indicators of economical efficiency have shown that investing in sweet cherry orchards, under estimated organizational and economical conditions, would be economically justified.

## Conclusion

Agriculture in Serbia is facing serious challenges and changes, which are imposed by the transitional period our country is in (Todorović et al, 2011). Numerous smaller agricultural holdings are deciding to intensify their production. One way of intensifying production is definitely the transition from crop farming to fruit growing, which is, undoubtedly, the most intense branch of agriculture. A very interesting fruit species, that has caught the attention of the mentioned agricultural holdings, is sweet cherry. It represents an important and promising fruit in Serbia, mostly because of the possibility of exporting it to foreign markets, as well as because of the excellent agro-ecological conditions for its production. The results of the market analysis point to the growing tendencies in the production and consumption of sweet cherry on the global market. As a result, an evident increase in the turnover and prices of the analyzed fruit

has been noted. These tendencies on the mentioned markets prove the positive aspect of investing in perennial sweet cherry plantations as there are good prospects of marketing this fruit and achieving a good price for it. This paper has dealt with the cost-effectiveness of sweet cherry production. Based on the calculated indicators of the economic effectiveness, it can be concluded that the investment in perennial sweet cherry plantation is undoubtedly economically justified.

## References


1. Andrić Jovan, Vasiljević Zorica, Sredojević Zorica (2005): *Investicije - osnoveplaniranja i analize*, Poljoprivredni fakultet, Zemun.

2. Apáti Ferenc (2008): *Economic analysis of up-to-date sour cherry orchards in Hungary,* International Journal of Horticultural Science, Budapest, 14 (1-2), 89-94.

3. Blagojević Radisav, Božić Vladimir (2012): *Tehnologija proizvodnje trešnje*, priručnik, Kancelarija za program podrške u privatnom sektoru za podršku sektoru voćarstva i bobičastog voća u Južnoj Srbiji, Niš.

4. Faostat, Area harvested, Yield and Production Quantity (Cherries), World, http://faostat.fao.org/site/567/DesktopDefault.aspx?PageID=567#ancor (14.02.2014.)

5. Faostat, Export Quantity and Export Value (Cherries), World, http://faostat.fao.org/site/535/DesktopDefault.aspx?PageID=535#ancor, (17.02.2014.)

6. Gogić Petar (2010): *Ekonomska efektivnos tpodizanja višegodišnjih zasada*, monografija, Poljoprivredni fakultet, Zemun.

7. Gogić Petar (2005): *Optimalna struktura dugogodišnjih zasada porodičnih gazdinstava i zaštita životne sredine,* Zbornik radova XI Međunarodnog naučnog skupa - Vlasinski susreti 2005, Zavod za sociologiju sela, Vlasotince, 140-152.

8. Gogić Petar (2005): *Teorija troškova sa kalkulacijama*, Poljoprivredni fakultet, Zemun.

9. Grant Joe, Caprile Janet, Coates William, Anderson Kathy Kelly, Klonsky Karen, De Moura Richard (2011): *Sample Costs to Establish an Orchard and Produce Sweet Cherries*, Cherries Costs and Returns Study, UC Cooperative Extension, San Joaquin Valley - North.

10. Hinman Herbert, Hoheisel Gwen-Alyn (2007): *Cost of Establishing and Producing Sweet Cherries in Central Washington in 2007*, Farm business management reports, Washington State University, Washington.

11. Hrotkó Károly, Magyar Lajos, Gyeviki Marta, Steiner Mark (2011): *Progress in high density sweet cherry orchard system in Hungary*, Proceedings of the 3rd Conference „Innovations in Fruit Growing", Belgrade, 93-103.

12. Ljubojević Mirjana, Ognjanov Vladislav, Kurjakov Aleksandar, Mladenović Emina, Čukanović Jelena (2010): *Sortiment i tehnologija gajenja trešnje*, Zbornik naučnih radova Instituta PKB Agroekonomik, Institut PKB Agroekonomik, Beograd, 16 (5), 21-29.

13. Marković Todor (2013): *Vremenski derivati i upravljanje rizikom u poljoprivredi*, monografija, Poljoprivredni fakultet, Novi Sad.

14. Milatović Dragan, Đurović Dejan (2010): *Pomološke osobine sorti trešnje u beogradskomPodunavlju*, Voćarstvo, 44 (171-172), 87-93.

15. Milić Dušan, Sredojević Zorica, Jeločnik Marko (2008): *Utvrđivanje gornje granice investiranja u podizanj ezasada višnje*, Ekonomika poljoprivrede, Beograd, 55 (4), 379-387.

16. Milić Dušan, VukojeVeljko, Sredojević Zorica (2010): *Proizvodne karakteristike i ekonomski aspekti proizvodnje dunje*, Journal on Processing and Energy in Agriculture, Nacionalno društvo za procesnu tehniku i energetiku u poljoprivredi, Novi Sad, 14 (1), 36-39.

17. Republički zavod za statistiku, Prinosi i ukupna proizvodnja trešnje u RepubliciSrbiji, http://webrzs.stat.gov.rs/WebSite/Public/ReportResultView.aspx?rptKey=indId%3d1301IND01%2635%3d6%262%3d200300%2c200400%2c200500%2c200600%2c200700%2c200800%2c200900%2c201000%2c201100%2c201200%2639%3d36000%266%3d1%2c2%2c3%26sAreaId%3d1301%26dType%3dName%26lType%3dSerbianCyrillic (21.02.2014.)

18. Sredojević Zorica (2011): *Ekonomska analiza proizvodnje, prerade i plasmana trešnje i višnje u Srbiji*, Agrobiznis projekat USAID Serbia, Beograd.

19. Sredojević Zorica (1999): *Primena prinosne metode pri proceni vrednosti višegodišnjih zasada*, Ekonomika preduzeća, Savez ekonomista Srbije, Beograd, 47 (3-4), 83-96.

20. Sredojević Zorica, Milić Dušan, Jeločnik Marko (2011): *Investment in Sweet and Sour Cherry Production and New Processing Programs in terms of Serbian Agriculture Competitiveness*, Bulletin, Petroleum-Gas University of Ploiesti, Ploiesti, 63 (3), 37-49.

21. Subić Jonel, Nastić Lana, Jeločnik Marko (2011): *Dinamička ocena efekata investiranja u podizanje zasada jabuke*, Zbornik naučnih radova Instituta PKB Agroekonomik, Institut PKB Agroekonomik, Beograd, 17 (5), 59-68.

22. Todorović Saša, Ivanović Sanjin, Marković Todor (2011): *Investicije u kupovinu poljoprivrednog zemljišta u cilju smanjenja ruralnog siromaštva*, Ekonomika poljoprivrede, International scientific meeting: Sustainable Agriculture and Rural Development in Terms of the Republic of Serbia Strategic Goals Implementation within Danube Region, Vrdnik, 58 (1), 344-351.

23. Vlahović Branislav (2010): *Tržište agroindustrijskih proizvoda*, Poljoprivredni fakultet, Novi Sad.

24. Whiting Matthew, Lang Gregory, Ophardt David (2005): *Rootstock and Training System Affect Sweet Cherry Growth, Yield, and Fruit Quality*, HortScience, Pleasanton, 40 (3), 582-586.

# THE SYSTEM OF INTEGRATED FARMING AS THE BASIS FOR SUSTAINABLE AGRICULTURE[1]

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## Abstract

*Agriculture has passed through significant changes in recent decades. The modern technologies and introduction of new high yielding varieties have significantly increased productivity and agricultural production volume. Despite such trends, the prices of agricultural and foodstuff products have not been reduced. This has resulted in poverty and hunger. The efforts to be reduced the above problem are aimed at further increasing of the agricultural production volume. To what extent it is possible to increase agricultural production, i.e. what the negative consequences and in which proportions occur if the trend follows the exhaustion of natural resources? As a response to previous issues of economic, environmental and social character caused by conventional production methods, it has appeared the idea of sustainable agriculture. The aim of the paper is to investigate the importance of sustainable agriculture and to point out possible models for its implementation, primarily through a system of integrated farming.*

**Key words:** *sustainable agriculture, integrated farming system, rural development, value added products, rural tourism.*

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## Introduction

Agriculture has undergone significant changes in recent decades. By application of the modern technology and an introduction of new high yielding varieties, it has been significantly increased productivity, and thus the volume of agricultural production as well. Although the volume of agricultural production has been increased in recent years, the prices of agricultural and foodstuff products have not been decreased, but they had significant growth in recent years. Such trends are possible to explain, inter alia, by the progressive growth of the human population. As a result of uneven growth of population and the volume of produced food, a part of the human population is still faced with hunger and poverty. The efforts to reduce the above-mentioned problems, since it is almost impossible to eradicate them, are aimed at further increasing the volume of agricultural production. The question is to what extent it is possible to increase agricultural production, i.e. what the negative consequences and in which proportions occur if the trend follows the exhaustion of natural resources?

The merits of the previous dilemma lies in the fact that extensive farming also means the disappearance of natural vegetation due to deforestation and consequent soil erosion, increased use of pesticides, pollution of groundwater and reducing air quality. In addition to the environmental aspects, the price fluctuations of agricultural products introduce additional uncertainty and risk for farmers. Obvious decline in the quality of life in rural areas inevitably leads to abandoning of rural areas and unfavorable population migrations.

As a response to previous problems of economic, environmental and social character caused by conventional production methods, it has appeared the idea of sustainable agriculture, whose importance is recognized just in finding innovative and, what is especially important, the economically acceptable opportunities for farmers, but also for the consumers. With regard to its wider reaches onto overall economic development, the idea of sustainable agriculture has been accepted not only by the national policy makers and agricultural development strategy bearers, but also by the regional and global institutions in the field of agriculture.

The transition from conventional to sustainable agriculture is a long-term process that takes place through small steps. Speed of this process and its

achievements depend on the extent to which participants (farmers) are ready for it and how much they can go far in this process.

In this paper the focus is placed on the importance of sustainable agriculture and possible modalities for the implementation of an integrated farming system, which represents an effective way of achieving the sustainable agriculture goals.

## Sustainable Agriculture as the Basis for the Society Welfare

We are today the witnesses of the fact that small farmers in developing countries (including the Republic of Serbia) are significantly poorer than the rest of the population that is employed in the other economy or non-economy activities, and that they often do not have sufficient funds to maintain the normal, healthy and active life. Fighting against poverty therefore means dealing with the problems faced by the farmers themselves and their families.

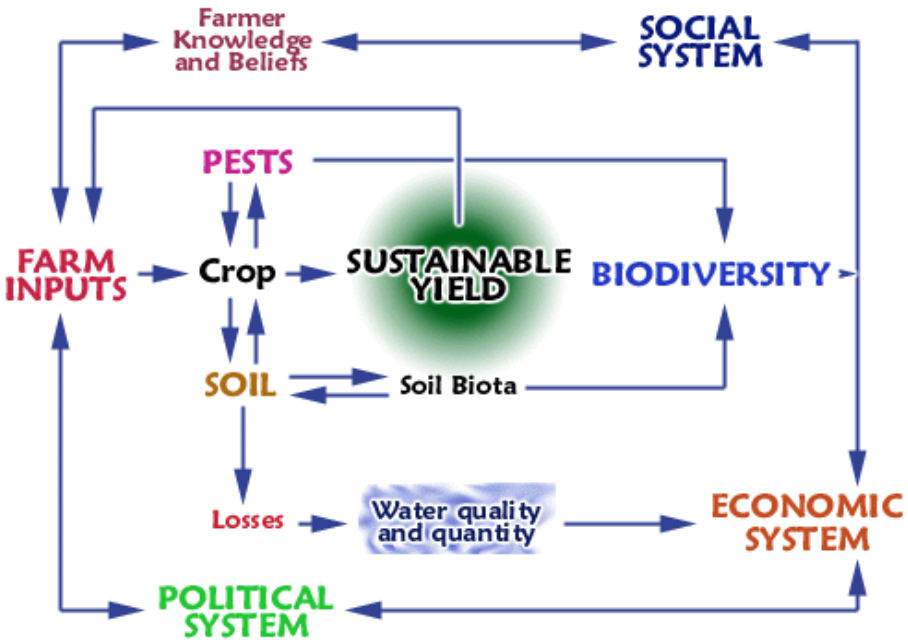
Numerous studies conclusively prove that there is a strong correlation between overall economic growth and agricultural development (Jugale, 1991). The importance of agriculture for the wider society is reflected in the following: agriculture enables the supply of agricultural and foodstuff products, then the creating a number of resources that are processed in the secondary sector, and finally creation of the value added as well as the strengthening of the purchasing power. As such, it has significant potential for an increase of production and creation of infrastructure in other parts of the economy. This sector is horizontally and vertically connected with entire economy. Agriculture creates demand for industrial outputs, it represents a solid source of public tax revenues, through the exports it significantly contributes to improving the state of the balance of payments, while the foreign currency inflows from agriculture provides the acquisition of capital equipment and raw materials necessary for the other sectors.

Previously stated facts inevitably impose the following questions: How the direct bearers of agricultural production, which are facing the low standard of living, could improve their position, and what are the modalities through which the developing countries, which are basing their economies just on agricultural production, can improve the overall economic and social development? The following chapters of this paper

will just focus on the idea of sustainable agriculture as the potential answers to those questions.

The phenomenon of sustainability can be viewed from different aspects – the global, national, regional, local one as well as from the household or farm level. Although the sustainability defined from the ecological perspective is very different from the observation of this phenomenon from an economic perspective, the fact remains that these dimensions are part of a broader concept – the sustainable development of society. However, a comprehensive and generally accepted definition as the one proposed by the Brundtland Report (World Commission on Environment and Development, 1987) includes the social, economic and environmental interests. The concept of sustainable development can be defined as the ability to be met different needs of a current generation, but without calling into question the meeting of the future generations' needs (Little, Edwards, 2003).

**Chart 1.** *Sustainable agriculture*




**Source:** *UNESCO 2010, http://www.unesco.org/education/tlsf/*

The concept of sustainable agriculture by definition is a system of farming that is profitable in the long term, and as such contributes

significantly to the improving of the quality of life for farmers and their families, thereby reviving the rural areas and smaller cities together with contributes to the protection and preservation of the environment. This also means that the concept of sustainable agriculture can be realized as a system within which the farmers could produce the high-quality crops (and other outputs) at affordable purchasing prices in the long term, without adverse effects on soil quality and the environment (Viaux, 1995).

As it is shown in the Chart 1, sustainability of agriculture is just reflected in its economic, ecologic and social acceptability, not only for current but also for the future generations. This will be possible only if all dimensions of the environment in which the process of agricultural production takes place should be respected. In ecological terms, this implies the conservation of biodiversity and improvement of the environment. In other words, sustainable agriculture achieves its goals through the reduced use of pesticides, taking into account the quality of land, water and air for the future generations. In economic and political senses, sustainable agriculture means the achievement of optimal yields and stability of supply. The social dimension refers to the development of society and its superstructure.

A study conducted by the Division for Sustainable Development of the United Nations that analyzed the state of agriculture on a global scale, gave its views on how agriculture will look like in the coming period. In this regard, the study authors express an expectation that the key bearers of agricultural activities will be just small and medium-sized farms, with a primary focus on private entrepreneurship and investments, including investments in water supply, together with a secondary focus on achieving high yields and protection of environment, innovations and availability of different technologies, as well as the reducing of waste throughout the food chain (United Nations Department of Economic and Social Affairs, Division for Sustainable Development, 2012). The core idea of described vision is the sustainable agriculture, which confirms the fact that agriculture of the future is in fact the sustainable agriculture and that the chance for numerous developing countries which base their economies on agriculture are in the adoption and implementation of the sustainable agriculture concept.

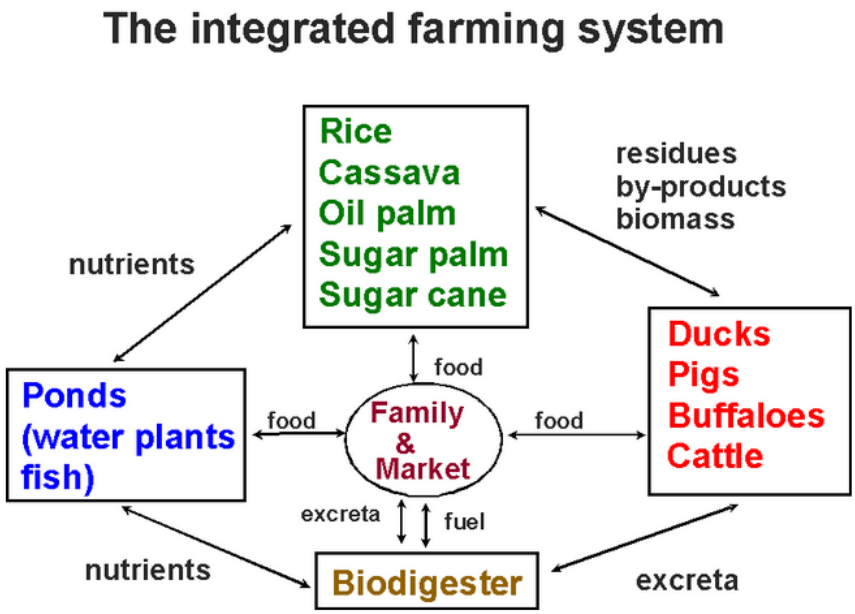
The operationalization of idea on sustainable development at farms' level as carriers of agricultural activity differs from area to area, i.e. must be

adapted to the specifics of certain areas. One of the modalities that have been successfully applied for many years is an integrated farming system which will be discussed in further analysis.

**The Integrated Farming System**

A key prerequisite for increasing productivity on farms and increase their revenues and profits is the transformation of the "agriculture for survival" in commercial agriculture. The fact is that the transformation is based on a number of factors such as institutional reforms, technological changes, the development of financial markets, the efficiency of extensive businesses etc.

**Chart 2.** *The integrated farming system*




**Source:** *Preston, http://www.mekarn.org/sarpro/preston.htm*

Experiences show that the crop, livestock, vegetable, fruit, fish and other farming sub-systems can function independently in certain farming systems, but their products will be a mere adjunct of total production. On the other hand, in the integrated farming system, output of one subsystem that in conventional system can be treated as trash, becomes the input for another subsystem, thereby contributing to the greater efficiency of target production. Here exists a synergy, since through interaction and by

working together the subsystems generate greater total effect than the simple sum of their individual effects.

Integrated farming or agro-ecosystem is a carefully designed structure of ecosystems in space and time in order to ensure sustainable development through clear regulation of relations between its components. Integrated farming system can be defined as an agricultural engineering aiming at construction of the sustainable, high productive agricultural system together with respecting of the economical and ecological principles in order to be achieved optimal environmental, economic and social effects (FAO, 2001). Observation of agriculture in a holistic way, emphasizing of interaction between particular components, represents a central part of creating a complex biological and socio-economic system. The ultimate goal is to achieve synergy effects of the whole system, but not of individual effects.

The key biological feature of an agricultural integrated system is reflected in the recycling of by-products and prolongation of the food chain, while improved utilization of space in which production of two or more subsystems takes place, could be the most important aspect of increased productivity. In terms of socio-economic benefits of integrated agriculture, they are primarily manifested in the area of inputs used by different subsystems that make up an integrated system of agriculture. Namely, the inputs within this concept tend to be generated on-farm, thus significantly reducing the dependence on other farms and agro-industries. The integrated farming also reduces the risks associated with the production since it increases the diversity of the products (Jugale, 1991).

In order to have the effects the efforts of building an integrated system of farming production, it is necessary to respect the following principles (Li, 2001):

*1. Diversity*
Whenever possible, it is necessary to combine agriculture, forestry, horticulture, aquaculture and other forms of biological production into the interconnected system;

*2. High efficiency*
Increase of the primary and associated secondary productivity is a key indicator in assessing the success of an integrated system. The objective can be achieved by recycling of nutrients within the system, rather than relying on the larger volume of external inputs;

*3. Multi-production program and risk minimization risk*
The system should meet the economic needs of the farm by providing different products. This will mitigate the risk of monoculture especially due to inadequate rainfalls, market fluctuations, the invasion of pests, weeds, and other factors. What is especially important is that the integrated system should provide flexibility in allocating jobs over the year, allowing farmers to earn sufficient income. Integrated farming system also needs to define the objectives in the short, medium and long term, in order to allow the introduction of high-quality varieties and crops with higher economic value;

*4. Recycling*
High ecological value of integrated farming system is reflected in the fact that it allows a multiple utilization of inputs, which can be achieved through the recycling of organic substance. Namely, the basic idea is that the by-products made by using of one resource are used, whenever possible, as input for another production. In this regard, the efforts of integrated farming are focused on the use of renewable energy sources, implementing the technologies that will enable energy savings, the use of biological fertilizers and pesticides. The principle states that if the use of chemical inputs cannot be avoided, then they should be used to a limited extent;

*5. Orientation towards independence*
Integrated farming is focused on developing a mechanism that helps farmers to develop their economy and increase the level of autonomy;

*6. Multidisciplinary*
The integrated farming should combine multiple disciplines with the participation of interdisciplinary experts;

*7. Participatory approach*
Implementation of integrated farming requires cooperation not only of the scientists and technologists, but also farmers and other decision makers.

These principles are the basis for the design of a comprehensive farm policy as well as a systematic approach to the management of the farm. The farmers strive to ensure efficient and profitable production which is economically viable and environmentally responsible, together with simultaneous delivery of the secure, high-quality products through an

efficient management system for livestock, feed, fresh products, and crops' cultivation, while maintaining and improving the environment.

A key part of an integrated farming system is the need for production to be profitable. Namely, in order to be sustainable, a system must be profitable. This is achieved through optimal and sustainable use of farm resources (labor, land, water, energy, equipment). Achievement of such goals presupposes an integration of natural regular processes, possible alternative methods of production, managerial skills, together with maintaining the specificities of bio-diversity, minimum pollution, ensuring supply of safe and healthy food and maintenance of the revenue. Integrated approach assumes compliance of every decision that is made on the farm (European Integrated Farming Network, 2012).

In managerial sense the effective functioning of the integrated farming system assumes the following elements:

*1. Organization and planning*
Planning and evaluation of farming practices to ensure environmentally friendly production and improvements on a continuous basis;

*2. Human capital*
Respecting of health standards and safety working standards together with adequate training of employees. Inputs should come from local suppliers with preference, wherever possible, local sales of products. This allows the development of local enterprises and generating of revenue, as well as improvement of efficiency;

*3. Energy efficiency*
Awareness of sustainable development and responsible management of natural resources is the core of an integrated system of farming. Careful selection and use of inputs, methods of land cultivation, reducing the use of fossil fuels wherever possible, and striving not for maximal but optimal yields;

*4. Use and protection of water*
The use of water resources should be coordinated and programmed in order to be identified the real needs of particular crops. Protection of aquatic and terrestrial surface is an important basis for maintaining and improving the environment and biodiversity;

*5. Climate changes and air quality*
Work outdoors and use of the fossil fuels, livestock production, storage and distribution of fertilizers and other agricultural practices emit greenhouse gases as well as other contaminants. Decisions of farmers in this regard may affect the level of carbon dioxide emissions over decisions about how to use certain land;

*6. Land management*
Land is a key resource in agriculture and rich soil ecosystem contributes to the improvement of crops and productive livestock production. Quality of life beneath the soil determines the productivity of the land above;

*7. The crop health and protection*
The basic strategy is control of the pesticides, diseases and weeds. The protection practices should be reasonable through integrated control, utilization of the biological methods whenever possible together with combining selections of the tolerant varieties, then harmonization of the crop rotation and other agro-technical methods;

8. *Health and safety of animals*
Health and livestock welfare is associated with the final performances. Care for the health, comfort, low stress and allowing the natural behavior of animals, together with the prevention of diseases are the basic assumption of satisfying this component of integrated farming;

*9. Preserving of environment*
The protection and conservation of wild game and biodiversity are of great importance for the concept of integrated farming;

*10. Waste management and pollution control*
Waste must be seen as a valuable resource in terms of saving money and reducing pollution. It is important to allow the recycling and reuse in order to be minimized the effects on the environment. Correct disposal of hazardous substances and materials, as well as the handling with them is an important part of integrated farming. The farm products should be stored separately to avoid contamination and to preserve the quality of the products;

In light of cited principles and elements for designing of an integrated farming system, in the practice there have been developed and successfully implemented numerous varieties of the basic model. Those

are examples of integration between the crop farming and livestock husbandry, then between the livestock husbandry and fishery, but also the complete system that includes the tourism services by farmers in addition to agricultural production. The further analysis in the paper will indicate on the specifics of the above-mentioned modalities.

## Integration of Crop Farming and Livestock Husbandry

Combining crops with livestock production is the basis of integrated farming in the sense that it allows the most efficient and effective use of natural resources and biological processes. The terms integrated production system and the combined system of farming should be understood in their broader sense in which farmers seek to integrate the annual crops based on the crop, fruit and vegetable production, then the pastures, fodder crops and forests into the productive, stable and sustainable system of production (Viaux, 1995).

Implementation of the integrated (combined) farming concept assumed that farmers grow different types of crops within the same agricultural area, in order to use space more efficiently and evenly distribute the risks on different lines of production. This includes the cultivation of a number of crops in the same field in different time cycles (Burrows, 2012).

The individual components are certainly not combined randomly, but on a systematic basis and in a manner to be achieved mutual compatibility and complementarity. Combined farming enables reduction of the inevitable risks associated with low yields, fluctuations in market prices and agricultural policy that is implemented in a particular country.

Combined and integrated farming also means the combination of plant and animal residues aiming at the soil quality improvement. An additional advantage of the integrated farming system is reflected in the following: selection of crops in terms of the need for their rotation in order to be minimized the problems with insects and diseases; reduction of the energy utilization and as much as possible reduction in utilization of fertilizers and pesticides; successful control of soil erosion and protection of environment; mitigation of climatic problems.

Hence, it is important that the rotation is performed every three to five years. If the system includes even the vital animal components, then there are possible and recommended more often rotations. Thus, for example,

the inclusion of leguminous crops contributes to a significant improvement of biological nitrogen and simultaneous reduction in use of pesticides and fertilizers. An important factor in maintaining the advantages of crop rotation is the parcellation of land and its cultivation. In addition, the precondition is that the plots should be of appropriate size in order to be achieved a satisfactory level of efficiency.

## Integration of livestock husbandry and fisheries

Integrated aqua-farming system combines aquaculture with conventional farming systems. These systems were originally developed in China as an instrument for increasing of food production on small farms with very limited resources, and were approved and successfully implemented even in other parts of the world such as Australia, Israel and other areas. Development of these systems is caused by the different needs in different parts of the world, including efforts to improve food safety on small family farms, to minimize pollution, and to use scarce resources such as water in more efficient way. The advantages of integrated aqua-agro systems are related to the greater profitability and productivity without increasing the total amount of water used, then to the diversification of production and introduction of profitable crops together with recycling of the used resources and reducing the unfavorable impacts on the environment (Gooley, Gavine, 2003). This certainly contributes to the sustainability of production system on certain farms.

In what way it is possible to combine agriculture and aquaculture? It is well known that livestock production generates by-products that can be an important input for aquaculture. The main link between livestock husbandry and fishery is the direct use of livestock waste and recycling manure as fertilizers. An integrated system of fishery assumes the use of pastures and water plants to feed the fish. Namely, the grass can be used as a cost-effective supplement to the diet of fish. Some species of fish can be fed by grass directly or indirectly, such as carp. For some species it is possible to use rye. Such a diet, however, can be expensive and that is why it is recommended the choice of fish species that are more cost-effective.

Perhaps surprisingly seems the possibility of combining fish farming and pig farming. Namely, the integration of pig farming, pastures and fishes is often present in the world. The large pig farms produce significant amounts of biological waste (excreta) that can be used as fertilizer for the

production of high yielding fodder, which is then used as the main feed for herbivorous fishes.

Aquaculture is one of the fastest growing sectors of production in the world with annual growth of over 10% in the past two decades. In Asia, for example, many farmers have ponds where breeding fish, shrimp, and they often grow them in combination with rice culture, which is another example of integrated farming. Concerning Serbia, the abilities for creation the aqua-agro systems can be identified in utilization of the thermal springs for so-called production in warm beds, then in construction of accumulation lakes and irrigation systems.

## Integration of agriculture and tourism

Significant natural potentials as a basis for tourism development provide an opportunity for the concept of integrated agriculture in the Republic to be wider applied on the relation agriculture-tourism. The city population not only expects that the agricultural sector produces enough healthy food at affordable prices, but also expects an attractive appearance of the rural areas, authentic rural households, the hospitality of the hosts, in order to creatively uses leisure time and the benefits of nature.

The most obvious linking areas in the supply chain for the tourist use are products such as food and beverages, cosmetics, handicraft products (handicrafts), which can significantly reduce dependence on imported goods. The local producers should find out an effective and profitable way to meet the demand in terms of volume, quality and safety of products.

As examples of these new services can be specified the providing the ability for the users to enjoy the scenery and preserved nature, recreation programs, education, health services, processing and sales of organic agricultural products on the farm. The high quality of foodstuff products is often of crucial importance for attracting and maintaining the loyalty of the tourists to the specific area.

The connection between agriculture and tourism could be not only an additional source of revenue and profit for local farmers, but also may give impetus to the local economic development. In order to be ensured the sustainable and effective integration of tourism and agriculture, it is necessary to consider a number of factors which can be classified into

three groups (Business Implementation of Pro Poor Tourism: Case Study Briefs, 2014):

- factors associated with the demand,
- factors related to supply and
- factors in the domain of marketing.

Concerning the factors on the demand side, the researches show that foodstuff products account for about 30% of total tourism expenditures, indicating onto the significant potential for local farmers if the food is provided from the local areas (International Trade Centre, 2010). Without a doubt, the demand for agricultural products is critical for the survival of local farmers. In agriculture, this is even more important due to the perishability of the products and the lack of adequate storage facilities. The link between the producer and the customer must be established before the harvest in order to be minimized the risk of loss. It is important to realize what products customers want, how often the product has to be delivered, as well as the prices at which products can be sold. The demand for local products can be increased through a variety of events, such as sporting events, festivals, conferences, organized farm tours, accommodation capacities etc.

When it comes to the factors that determine the supply of agricultural producers, it is necessary to point out the following:

- physical limitations,
- established production patterns,
- price level of locally produced food,
- quality and quantity of local products,
- technological constraints and limitations of processing capacities.

Emphasis should definitely be put on the quality of the products that farmers produce, since it determines an increase in demand for local products by tourists. However, there can be appear the problems because of the constraints faced by producers (e.g. insufficient capital level for the improvement and expansion of production, inadequate climatic conditions, lack of transportation for some farmers, inadequate communication between farmers and hotels etc.).

In the domain of marketing it is necessary to consider the willingness of demand to adapt to the requirements of supply, the modalities of supply, as well as available infrastructure and range of marketing. They are very important also the efforts towards the promotion of local agricultural production in order to be met the requirements of the tourism industry. In establishing the above-mentioned relations the state institutions have an important role as well.

All efforts to integrate agriculture and tourism must be carefully designed and implemented on the synchronized and continuous basis. For success it is also necessary a comprehensive approach, that is to develop several aspects of tourism and agriculture, not just one element, product or dimension of marketing.

## Conclusion

Requirements for sustainable agriculture and related sustainable economic development impose certain changes in agricultural production system. Acceptance of the sustainable agriculture concept has as a result the need of finding modalities for its successful implementation. One such approach is the integrated farming system. Numerous advantages that have been proven so far in the practice all around the world, such as more efficient space utilization, minimizing and managing the risk, as the risk has been evenly distributed in different lines of production, recycling and minimizing of negative impacts onto the environment, as well as improving the profitability of farmers, suggest that in the future this concept could occupy an important place in the agriculture of the Republic of Serbia.

In practice there are numerous modalities of integrated agricultural systems. The paper analyzes the advantages of integration between the livestock and crop production, then the integration of crops and aquaculture (in terms of utilization the aquatic organisms for improvement the farm profitability, but also the management of water as a limited resource, and finally, the integration of agriculture and tourism, as the Republic of Serbia has significant potential for development of rural tourism).
Previously presented suggests that integration, not specialization and separation of the livestock, the crop and other lines of agricultural production on the one hand, and the integration of agriculture and tourism

on the other hand, can contribute to the sustainable development of agriculture and the overall development of society.

All efforts to be integrated individual lines of agricultural production, as well as agriculture and tourism, have to be carefully designed and implemented on the synchronized and continuous basis. For success it is of crucial importance an application of a comprehensive approach that is to be developed several aspects of tourism and agriculture, not just one element, product or dimension of marketing.

## References


1. Burrows, R. (2012): *Sub-optimal office for the Pacific Islands, Report on a scoping mission in Samoa and Tonga*, Food and Agriculture organization of the United Nations.

2. *Business Implementation of Pro Poor Tourism: Case Study Briefs* http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications opinion-files/3790.pdf (19.02.2014).

3. European Integrated Farming Network (2012): *European Initiative for Sustainable Development in Agriculture.*

4. FAO (2001): Integrated Agriculture-acquaculture A primer, Technical Paper 407.

5. Gooley, G.,J., Gavine, F., M., (2003): *Integrated Agri-Aquaculture Systems: A Resource Handbook for Australian Industry Development*.

6. International Trade Centre, (2010): *Inclusive tourism, Linking agriculture to tourism markets.*

7. Jugale, V.B., (1991): *Theories of agriculture finance*, The Publishers.

8. Li, W. (2001): *Agro-Ecological Farming Systems in China*, UNESCO

9. Little D.C., Edwards P. (2003): *Integrated livestock-fish farming systems, Food and agriculture organization of the United Nations*, Rome.

10. Preston T., (2000): *Livestock Production from Local Resources in an Integrated Farming System: a Sustainable Alternative for the Benefit of Small Scale Farmers and the Environment*, Workshop seminar " Making better use of local feed resources" SAREC-UAF.

11. United Nations Department of Economic and Social Affairs, Division for Sustainable Development, Food and Agriculture, (2012): *The future of sustainability.*

12. Viaux P., (1995): *Integrated Farming Systems and Sustainable Agriculture in France*, Technical Institute of Cereals and Forages (TICF), Boigneville, France.

13. World Commission on Environment and Development (1987): *Our Common Future,* United Nation.

## II SECTION

# *ALLOCATION AND VALORIZATION OF RESOURCE POTENTIALS OF RURAL AREAS*

# ECONOMIC ASPECTS SUSTAINABILITY OF THE NATURAL AND SOCIAL RESOURCES

*Anja Rosandic,[1] Desimir Knezevic[2]*

## Abstract

*Natural resources economics is in focus of multidisciplinary field of research (earth science, human economics and nature) to establish interaction and dependence between economies and natural ecosystems. Economic models must be adapted to accommodate the special features of natural resource inputs. From the long time in past human economics of natural resources related to fisheries, forestry, minerals, while recently air, water, the global climate, and "environmental resources" in general have become increasingly important to develop model of sustainable. Also, during the exploitation of resources man successively improved and optimizes resources management for different purposes. The natural resources may also contribute to overall social welfare levels and that is the significant reason that economics include pollution control, resource extraction, and non-market valuation, sustainability and environmental management. The very important is research of environmental effect to agriculture, urbanization, communication infrastructure, international trade and environment, climate change and use of land in undeveloped countries.*

**Key words:** *economics, natural resources, social resources, sustainability*

*"As a science economics is older than ecology. At the time of the earliest economists there were no scarcities of natural resources. This is still reflected in present day economic planning. By contrast, ecology cannot accept the idea of unlimited resources. In addition, from the economic point of view a time horizon of 10 years is long while in ecology it is extremely short."*

Valste et al. (1993)

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## Introduction

The dinamics of changable population and income over the past millennium have been sustained under interactive process to settlement of relatively empty areas and potential to accommodate transfers of population to manage with fertile land and biological resources as well as to growing crops and livestock. Also, increase of income achieved by improvement of technological and institutional innovation and international trade and capital movements. However, without improvements in agriculture, the increase in world population could not have been sustained. It's well known the simplistic Malthusian view to resolve problem of population pressure to natural resources. Classical economists (Adam Smith, Reverend Malthus, David Ricardo) were concerned with limits of human population growth but from different point o wiev (in dependence of production upon labour and scarcity of land) Spash (2011). For production of enough foods is neccessary to intesify of land use with improved tools from dry farming and folloving to irrigation and multicroping as well to procuction of transgenic organisms.

World population is predicted to increase up 9 billion by 2050. The growth of population will be in the developing countries of the world. This will put increased presure on resources and systems that are already insufficient in many cases (OECD, 2010). In the past millennium, world population rose 22 fold. Per capita income increased 13 fold world GDP nearly 300 fold. This contrasts sharply with the preceding millennium, when world population grew by only a sixth, and there was no advance in per capita income. Growth in the second half of the 20th century was greater than at any previous historical period. Average incomes have increased eight fold since 1820, while population is five times higher. To look at the statistics, the world today is, on average, a prosperous place (Smits et al., 2000). However, world economy in the last half century is the more powerful than at any time in the past. World GDP increased six-fold from 1950 to 1998 with an average growth of 3.9% a year compared with 1.6 from 1820 to 1950, and 0.3% from 1500 to 1820." (Maddison, 2006).

World GDP rose by nearly 5% a year and world trade by nearly 8% a year. This dynamism affected all regions and indicates that GDP rose with greatest acceleration in the region of Europe and Asia. There was also a degree of convergence between regions, which indicate decreasing the gap between the United States and the other advanced capitalist countries in Western Europe and Japan (Maddison, 2001).

The pooreness growth is a key of makinin program to achieving the Millennium Development Goals (MDGs). It's well known that three-quarters of all poor people still live in rural areas, while the proportion of the world's poor living in towns is gradually rising. The modest pace of urbanisation and prediction for urban population growth indicate that most of the world's poor will still live in rural areas for many decades in the future (Ravallion et al., 2007). Poor people's livelihoods will reliant on natural resources as well: soil, water, forests and fisheries that supported commercial and subsistence activities can often provide a safety net for the poor iven in times of crisis. Strategies for rural poverty reduction, including pro-poor natural resource management, should remain at the centre stage for poverty reduction.

The rise of Ecological Economics can significantly contribute to integrating social and natural science understanding by economics and politicis assotiation. However, this vision has not been accepted by all those who have associated themselves with Ecological Economics (Spash, 2011). Constant growth in the production of goods was valued and waste production was not even considered a problem. Production measured by the GNP or Gross National Product, or the total value of goods and services produced during a given time period is the indicator of progress, development. We live in a period of high technological progress, world controversial politics related to respect of human rights, religions, ideology, health, economics development, cultural specificity and production, education. World nations have aspiration to make progress in life through development of scientific, cultural ane economica cooperation. Enormous increasing informations which are available to people and depend to resources of news and our links to sources. Nowdays, everything from politics to sport are available to read, listen, watch as well as creating the possibilities for news introduction to a society on the efficient way than in any previous historical epoch. Thank to the internet peopele can gain access to different information, discuss and influence trends of films, plays, books, music, scientifific studies, analysis and opinion. The lines of communication have essentially opened up, giving to people the opportunity of understanding what is going on around us and possibility to use all information for their theory and practice. In these conditions we simultaneously achieve multiple advances in the educational, professional and personal domain. The aim of this paper is to evaluate economics and natural resources sustainability, potential of natural resources for economic development and role of management in pro-poor growth strategies, how economics and natural resources are evolved during the last century, what is their perspective in the future.

## Economy and ecology

The economics and ecology comparison suggests that economics have approach to resolve different problems in short-term time, while ecology contains the assumption of limitless natural resources. The economic factors may have a strong influence on environment and more generally on social development. This theme is oftenly subject of discussion among the economist and people concerned about sustainable development. A lot of argue that this influence can be very strong, it is important to indicate of how economists understand natural resource and sustainability of economic growth (Begon 1996).

Ecological Economics has developed as a modern movement since the late 1980s (Spash 1999) that has gathered together a cultivar of perspectives and interests concerned to resolve the modern environmental problem. Environmental economists interested in how ecology might contribute to economics. A lot of problem appeared within environmental degradation - long range transport of air pollutants, contamination of soil and water, introduction of synthetic chemicals, species loss, desertification and deforestation-has only been recognized as integrally linked to the way the economy is run. In economics, the appearance of environmental problems has for long resolved sub-disciplinary specialists as well agricultural, resource and environmental economists easily disregarded by both mainstream micro and macro economists. In micro economics, the base of theoretical ideas was development of price theory for over a century (Lee, 2009) and subjects that dominate were money supply, unemployment and inflation what can influence that economists working on the environment could be easily minimized marked as irelevant. The experience of the world economy with oil prices over the past few decades illustrates some of the interactions between resource dynamics and macro-economic dynamics.

Similarly, environmental economics has to deal with pollution dynamics when pollution has cumulative effects in soil and marine resources or in the atmosphere. Looking at the impact of resource scarcity and pollution for the economy we can find that macro-economic dynamics become highly relevant (Førsund, 2009). To make up the increasing scarcity of natural resources and to promote sustainable development, capital accumulation and technological change are very important. In particular, the development and adoption of new technologies allow improving resource and decreasing efficiency.

Finally, social dynamics are important: the behaviour of polluters or natural resource users, as well policy makers, changes over time because of learning behaviour, or because of changing perceptions, the development of new information, and than adequate reaction.

For the majority of low economics deveoped countries the the natural resources are important factor for industrial development and all investment and donors need to worry about natural resources. Moreover, in economic terms, natural capital represents a quarter of total wealth in low-income countries and natural resources are often the main source of income of the poorest people. In biosphere exists great potential of natural resources which provide soil to grow food, and water for drinking, washing and irrigation. Forests and rivers provide fish to eat or export or sports and raw materials for developing different industrial production. Also, in many countries the natural landscapes and wildlife reserves are potential base for tourism development. So managing natural resources properly gives advances in safeguarding food production, preserving livelihoods and increasing export of products.

Very often known economists are talking about the environment without serious direction of environmental protection as well without anything to do with the core of economics as a subject. This can be explained by considering two alternative ways in which economists inspect environmental. First is the treatment of environmental problems as special cases of more general theoretical constructs in mainstream economics and second is the recognition that serious attention to environmental reality leads to the need for a totally new way of thinking based in political economy and interdisciplinary learning. First mode, pay much attention to the specifics raised by environmental problems (e.g., transforming to a low carbon economy becomes green jobs, which are just an aspect of macroeconomic employment policy) while second mode more discuss that the social and political as much as the economic need to learn from interactions with ecosystems (Martinez-Alier, 2002). The big recession of the mid-1970s was not only due to oil shortages but was additionally caused by other facts like the breakdown of the Bretton-Woods currency system and a broad uncertainty about the growth perspectives in general. Also, in the nearer past, price increases of raw materials have been more gradual, giving to all subjects more time to adjust. The most important difference to thirty years ago, however, is that developed countries use half as much oil per real unit of GDP as in the mid-1970s, thanks to improved energy efficiency, a switch to alternative energy sources, and the shift from manufacturing to services.

## Natural resources - form and function

Today, historically high commodity prices and the growing importance of resource extraction in many developing countries underlie a renewed of interest about natural resource that led to economic development. Natural resources can be either **renewable** such as land, water resources and forest or **non-renewable**, including fossil fuel and mineral deposits. Natural resources is renewable if the resource can restock itself by natural processes which distributed by commercial harvesting activities. Resource economics needs to study the dynamics of depletion of natural resources and environmental services.

Natural resources provide a flow goods and services. Goods produced from renewable natural capital include timber and nontimber forest products, catches of wild fish, etc. Goods produced from non-renewable natural resources are mainly oil and minerals, which current use determines future resource availability. Services produced from natural resources include, for example, water filtration and purification services provided by wetlands, regulation of water cycles provided by watersheds, etc. These services are generally not marketed and are invisible in standard economic statistics.

Renewable natural capital can provide yields over an infinite period of time, by dynamic of rate exploatation respects the limitation of capacity of regeneration. **Renewable natural resources** regenerate in a dynamic ecological process, and can maintained if their rates of use do not exceed their rates of regeneration. However, a continued decreasing of the stock above a certain level may be unsustainable and lead to permanent reduction of the stock and to lower regenerative capacity.

Non-renewable capital cannot regenerate at a rate that is comparable to the rate of exploatation what mean that the extraction of non-renewable resources is necessarily finite. In the case of **non-renewable resources**, such as minerals or fossil fuels, stock depletion is inevitable in the long run. In the formal sector, the value of the remaining stock such a mineral or oil reserves is an important factor conditioning the market value of the firm relying on a particular resource stock. John Stuart Mill (1857) recognised the potential of non-renewable resources.

Standard economic statistics can even provide a misleading picture about a natural resource. In the case of fisheries, for example, a high level of "gross value added" is consistent with poor economic performance if there is excess

fishing capacity. In such a case, removing capacity from the sector will result in increased overall production. Similarly, ecosystems may be degraded to the level that is no longer able to provide a range of services. This could bereason that these services are not bought and sold in markets. This development is not directly visible through market mechanisms but may induce indirectly to increasing costs or decreasing outputs in related or dependent sectors. On the base of this is evident that specific mechanisms are needed to monitor both the level of stocks and their quality in terms of capacity to deliver both goods and services.

## Natural resources management

Natural resource management and poverty reduction are complex issues and there are much interdependence. Benefits of natural resources in terms of production, incomes, employment creation, export revenues resources. Also, is necessary to pay more attention in management of many non-market environmental benefits provided by natural ecosystems, their value and the threats to human development posed by pollution and other forms of degradation (Førsund, 2001).

Climate change is a serious and long-term challenge to social and economic development with the potential to affect every part of the world and particularly to developing countries (Agrawala et al., 2008). Studies on the economic damage from climate change show that developing countries are expected to experience larger percentage losses of GDP than developed countries (IPCC, 2007). It should be considered together as an environmental and development issue.

Developing countries are particularly vulnerable to climate change because their economies are generally more dependent on natural resources as well agriculture and fisheries (Kagan, 2013). They are also less able to adapt because of limited human, institutional and financial capacities (Agrawala et al., 2010). Crop yields are projected to decrease by up to 30% in Central and South Asia by the mid-21st century; while in some African countries, yields from rain-fed agriculture could be reduced by up to 50% by 2020. Overall agricultural losses arising from impacts of climate change in Western and Central Africa and parts of the Sahara are estimated to range from 2% to 7% of GDP by 2100 (IPCC, 2007).

The over the long term, economic growth is an essential requirement and, frequently, the main contributing factor in reducing income poverty. The long-term reduction in income poverty results first and foremost from growth. At the same time, developing countries with similar rates of economic growth have different levels of economic poverty reduction, due to levels of inequality in incomes and assets and whether growth occurs in areas where the poor live and are economically active. The pattern and pace of growth are thus conected and need to be resolved together in the aim to have a substantial and sustained impact on poverty reduction (OECD, 2007). To improve the impact of growth on poverty reduction, the flow of output (or income) from the assets of the poor has to increase and the poor have to increase their asset base. Growth that is accompanied by degradation or conversion of natural resources on which the poor depend for their livelihoods (the conversion of open access natural forests into privately-held plantations) may even aggravate poverty.

According to developed Conservation Movement doctrine within political ideology of President Theodore Roosevelt in the USA between 1890 and 1920, the economic growth has clear physical boundaries that cannot be avoided by technological development. To preserve environment for the future generation is necessary lower depletion of nonrenewable resources. Also, economic competition and monopolies were seen as major enemies to the wise use of natural resources. The depletion of natural resources could be with higher level of control by Government. In study "The Economics of Exhaustible Resources" of an economist, Harold Hotelling, in 1931, is developed new model, as a reaction to Conservation Movement, in which social well-being from nonrenewable resources was maximized over an infinitely long period. According to this model a market economy, profit maximizing mining firms would extract nonrenewable resources at the "socially optimal rate."

The research of scarcity of natural resources showed increasing natural resource scarcity for agriculture and minerals, while price and production costs had fallen or on the constant level within the period from 1870 to 1957 (Barnett and Morse 1963). Only the price level in forestry had shown an upward trend. According to the study, these findings can be explained by technological development, which produces substitutes for scare resources, decreases extraction costs of minerals, and thus expands the size of economic reserves.

## Sustainable agriculture

The level of development economy as well as agriculture depends from accomplishment of sciences, research methodologies, from knowledge and technology transfer (Knezevic and Micanovic, 2013). Science in agriculture directed to support activities and institutions to reduce hunger and poverty, improve rural livelihoods, protect biodiversity and environment and contribute to social and economic sustainable development. The general model has been to continuously innovate, reduce farm gate prices and externalize costs. The achievement of science and technologies in agriculture provide conduction more intensive and profitable worldwide production. On the base of knowledge, science and technology in frame of economy level of development, organized the local, regional and global agricultural strategies for actions enabling to the multiple functions of agriculture (Micanovic et al., 2012). The industrial revolution and after 1960. year, green revolution spread rapidly to solve optimal scientific farming agriculture and creation cultivars with increased yield, biomass production by the choice the most adaptive cultivars in different region (Knežević et al., 2006). At the global, regional, local levels human meet opportunities to develop model of sustainable agriculture.

Agricultural science continuously developed and rapidly developed in developing countries from the 1960s known under the name as the Green Revolution, was closely tied to progress made in selecting and improving crops and animals for high productivity, as well as to developing additional inputs such as artificial fertilizers and phytosanitary products. Scientists are creating new cultivars or hybrids that can resist pests, diseases, and environmental stresses and need to know molecular base of breeding (Karp et al., 1997). “Green revolution” varieties have increased yields 2 to 3 fold (Knežević et al. 2006). The industrial agriculture opened many questions among agronomists that concerning to development and emergence of new fields: integrated pest management, waste treatment technologies, genomics etc (Altieri, 2005).

Sustainable agriculture presents the way of ecology farming and study of relationships between organisms and their environment or "an integrated system of plant and animal production practices having a site-specific application that will last over the long term" (Miller andnWilliam, 2000). For Example: a) Satisfy human food and fiber needs, b) Enhance environmental quality and the natural resource base upon which the agricultural economy depends, c) Make the most efficient use of non-reneweble and on-farm

resources and integrate, where appropriate, natural biological cycles and controls, d) Sustain the economic viability of farm operations, e) Enhance the quality of life for farmers and society as a whole (Gold, 2009). In the breeding practice man used heterosis in plants, induced mutations, and nowadays new techniques in biotechnology (Knezevic et al., 2012). Farmers' behaviour maybe due to prices, weather, government policy and programmes, exports, international events, and other factors, which althogether proportionaly a source of risk that exists in agricultural production. For continually rethink farmers decisions as environmental and economic condition change, it is necessary permanently provide source of information on new agricultural techniques, new seeds variety, new biological or chemicals agents for weed control, etc.

Sustainable agriculture can be understood as an ecosystem approach to agriculture (Altieri, 1995). In the aim of soil erosion preservation, soil fertility and soil moisture regime, the very important is carry out conservation agriculture as an alternative to traditional land use and management. This is possible achieve through next activities:

*a) Maintaining a permanent organic soil layer under the effect of sun, rain and wind.*

*b) Minimizing negative effect of cultivation on soil micro-organisms and soil fauna activities as well physical soil properties.*

*c) Protection of crop protecting crops from diseases and pests by implementation of crop rotation.*

However, the very complex is cary out conservation agriculture, because of occurence a lot of problem that is oposite each to other. For exsample: the biomass as a green manure on the soil surface, serves as physical protection of the soil surface and as substrate for the soil fauna, while mineralization is reduced and suitable soil levels of organic matter are built up and maintained. When adopting conservation agriculture, characterize economic reason to stop loose income on farm and such efficient farm management will contribute to advance to stop erosion, lost of soil fertility and productivity, extensive use of chemicals, etc. Economic advantages of conservation agriculture can be seen only in the medium- long-term run, when its principles (permanent cover crop and crop rotation) are well established within the farming system (Orr, 2006). Long-term experiments have provided some of the best data on how various practices affect soil properties essential to sustainability.

So, in comparing conventional and conservation agriculture system, according to cultivation crops in the same agro-ecological condition the differences will evident after several years of cultivating. Which system of agriculture will use, farmers will decide on the base achieved technical and agronomic improvement as well monetary and economic terms.

The economic aspects would determine whether or not a farmer would adopt the new technology (Zecevic et al., 2014). Some farmers may be easier computing expenses and income and analyse relationships between economic situation would change when technological changes are introduced and adopted by farmers as well as effect of adopted system of agriculture (Knežević et al., 2014). The economic aspects of conversaton system agriculture by analysing the farm activities and the impacts of new technologies in the production process can estimate on the base of: a) improvement of tillage techniques, reduction of production cost in comparison to conventional agriculture, b) improvement soil fertility, increase yield and farm income, c) diversification of crop, d) stability in production and productivity.

Sustainable agriculture depends on regeneration the soil while minimizing the use or need of non-renewable resources, such as natural gas (used in converting atmospheric nitrogen into synthetic fertilizer), or mineral one (e.g., phosphate). Possible sources of nitrogen that would, in principle, be available indefinitely, include: a) recycling crop waste, b) growing crops with capacity of symbiosis with nitrogenn fixing bacteria (rhizobia) and sustain nitrogen in soil, c) industrial production of nitrogen, d) genetically engineering (non-legume) crops to form nitrogen-fixing symbioses or fix nitrogen without microbial symbionts. Also, the phosphate is a primary component in the chemical fertilizer which application is important for yield increasing in modern agricultural production (Knezevic et al., 2011).

If the prediction of scientis is precise that rock phosphate reserves will be depleted in 50-100 years what could be reson for increasing food prices as a consequence of increasing cost of fertilizer In the aim to maintain food production the phosphate will therefore have to be recovered and recycled from human and animal waste. There are also many ways to practice sustainable animal husbandry by development of grazing management include fencing off the grazing area into smaller areas. Several attempts have been made to produce an artificial meat, using isolated tissues to produce it *in vitro* (Matheny, 2007)

The science in agriculture summarized related knowledge in climate changes, biotechnology, energy, to develop human health, natural resources, innovation in agriculture etc. The challenges is to identify the current condition propose measures based on knowledge a science technologies. There is no single approach to sustainable agriculture, as the precise goals and methods must be adapted to specificity of case. There may be some techniques of farming that are inherently in conflict with the concept of sustainability.

## Conclusion

Sustainability include a set of economic, environmental and social conditions in which all of society has the capacity to maintain and improve its quality of life, without degrading the quantity, quality of natural resources and ecosystems. Moreover, sustainable development is the process of converting natural resources into products and services in the aim of increasing profitability. All humanmankind activities are directed to improve availability of and productivity of natural resources and ecological systems in which they exists.

The time of hazardous exploitation of natural resources characterize pressure to accomplish profit and in the same time economists of majority schools ignore the evidence of environmental problems and that having anything to do with their work. In recent time this seems to have been changing if we can estimate throug the event of award the Nobel economic prize winners: Arrow, Ostrom, Sen, because of imparting their wisdom on environmental matter and that associated with ecological economists. This appears to indicate new activities by economists with environmental issues and develop new respect and new approach of management of natural resources.

The increasing of awareness of environment and developing mode how to nondeveloped countries can improve their poorness on the base of use natural resources and ther sustainability. The importance of environmental protection required intensive activities through introduction peoples and institutions with ideas and recommendations which can facilitate the path to better laws, regulations, knowledge and information, institutions, investments and transparent decision-making for natural resources and propoor growth. We permanently need analyse the condition in environment as well current situation and lists ways of transforming negative environmental trends and carry out measures to improve opportunities for income generation, economic growth, stability and resilience to natural hazards.

Majority of studies on global level established a continuous decline of natural resources, increasing the vulnerability of the poor as a result of ecosystem degradation, high expression of competition for space, food and energy, climate changes as well oftenly unexpected changes of prices on world trade market. For improvement economics of poor countries is necessary to improve management and cooperation with developed countries for exchange of knowledge and experiences in different field of theory and practices.

However, better management of natural resources will not automatically lead to poverty reduction, but what is needed are conducive political, institutional and governance frameworks, empowerment of the poor, women and marginalised groups is very essential. In the research need combine resource dynamics with macroeconomic dynamics and/or social dynamics provide new insights into the issues of sustainability, and in the is necessary to deal with a more detailed analysis of different types of technological progress in production and abatement technology, the role of uncertainty and radical technological change, and the micro-economic foundations.

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## References

1. Adams, W. M. (2001): *Green Development: environment and sustainability in the Third World* London: Routledge.

2. Agrawala, S., Crick, F., Fankhauser, S., Hanrahan, D., Jetté-Nantel, S., Pope, G., Skees, J., Stephens, C., Alina Tepes, A., Yasmin, S. (2008): Agrawala, S., Fankhauser, S. eds. (2008): *Economic Aspects of Adaptation to Climate Change: Costs, Benefits and Policy Instruments*. Paris: Organization for Economic Cooperation and Development, pp.135.

3. Altieri, M.A. (1995): *Agroecology: the science of sustainable agriculture*. Boulder: Westview Process.

4. Altieri, M. A. (2003): *Biodiversity and pest management in agroecosystems*. 2nd ed.NY: Haworth Press.

5. Barnett, H., Morse, C. (1963): *Scarcity and Growth*. Washington, D.C.: Resources for the Future.

6. Begon, M,. Harper, C., Townsend, C. (1996): *Ecology: Individuals, Populations and Communities.* Oxford: Blackwell Science.

7. Gold, M. (2009): *What is Sustainable Agriculture*? US Dept Agric., Altern Farming Syst Inf. Center.

8. Førsund, F. R. (2001): *Ecological sustainability*. In Andersson, D. E. and Poon, J P. H. (eds.): Asia-Pacific transitions, 115-123, Houndsmill and New York: Palgrave.

9. Førsund, F. R. (2009). *Good modelling of bad outputs: pollution and multiple-output production.* International Review of Environmental and Resource Economics, forthcoming

10. Agrawala, S., Kramer, M. A., Prudent-Richard, G., Sainsbury, M. (2010): *Incorporating climate change impacts and adaptation in Environmental Impact Assessments: Opportunities and Challenges, 19.* OECD Publishing, OECD Environmental Working Paper, no. 24, 1-37.

11. Bruinsma, J. (2006): *World Agriculture: Towards 2030/50, an FAO Perspective,* London: Earthscan and Rome: FAO 1-74.

12. Kagan, A. (2013): *The influence of agricultural holdings on the natural environment*. Economics of Agriculture 1,123-140.

13. Karp, A., Edwards, K. J., Bruford, M., Funk, S., Vosman, B., Morgante M., Seberg, O., Kremer, A., Boursot, P., Arctander, P., Tautz, D., Hewitt, G.M. (1997): *Molecular technologies for biodiversity evaluation: opportunities and challenges*. Nature Biotechnology, 15, 625-628.

14. Knežević, D., Mićanović, D., Zečević, V., Madić, M., Paunović, A., Djukić, N., Šurlan-Momirović, G., Dodig, D., Urošević, D. (2006): *Oplemenjivanje u funkciji obezbedjenja semena biološki vredne hrane*. U Monografiji "Unapredjenje poljoprivredne proizvodnje na Kosovu i Metohiji" (ured.:D.Knežević). str.71-87.

15. Knezevic, D., Milosevic, M., Torbica, A., Brocic, Z., Ciric, D. (2011): *Variability of grain yield and quality of winter barley genotypes (Hordeum vulgare L), under the influence of nitrogen nutrition*. Növénytermelés, suppl. 60, 25-28.

16. Knezevic, D., Kondic, D., Markovic, S. (2012): *Importance of geneticaly modified organisms.* Proceedings.Third International Scientific Symposium "Agrosym Jahorina 2012", Editoral in Chief: Dušan Kovačević, 15-17. novembar 2012. Jahorina, pp. 117-121.

17. Knezevic, D., Micanovic, D. (2013): *The role of science to development of economy and agriculture*. Proceeding of Sustainable agriculture and rural development in terms of the republic of Serbia strategic goal realization within the Danube region, 1:158-174. Inst. of Agric.Economics, Belgrade

18. Knežević D., Marić, S., Kovačević, V., Đukić, N., Atanasijević, S. (2014): Variability of genotype and inheritance of grain nitrogen content in winter wheat **(***Triticum aestivum* L.). Genetika, 46, 1, 27-32.

19. Miller, P., William, R. (2000): *Ecological Integrity: Integrating Environment, Conservation, and Healt*h. (Edited by D. Pimentel, L. Westra, and R.F. Noss). Island Press, p. 3.

20. IPCC (International Panel on Climate Change) (2007): "Summary for Policy Makers", in M. L. Parry *et al*., (eds.), *Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, U K, pp.7-22.

21. Jelinski, L. W., Graedler, T. A., Laudise, R. A., McCall, D. W., Patel, C. K. N. (1992). Industrial ecology: concepts and approaches, Proc. National Academy of Sciences 89, 793-797.

22. Lee, F. (2009): *A Histroy of Heterodox Economics: Challenging the Mainstream in the Twentieth Century*. London: Routledge.

23. Maddison, A. (2006): *The World Economy:1. A Millennial Perspective*, 2. *Historical Statistics.* pp.657. Development Centre Studies, OECD, Paris.

24. Martinez-Alier, J. (2002): The Environmentalism of the poor: a study of ecological conflicts and valuation. Edward Elgar, Cheltenham, UK, Northampton MA USA.

25. Matheny, J. G. (2007): Reducing the Risk of Human Extinction. Risk Analysis 27 (5): 1335-1344. http://jgmatheny.org/matheny extinction_risk.htm

26. Micanovic, D., Knezevic, D., Zecevic, V. (2012): *A model for the transfer of knowledge and technology in the economy*. In: Legal and infrastructural base for the development of knowledge-based economy, 83-91, Kragujevac.

27. OECD (2007): *Promoting Pro-poor Growth: Policy Guidance for Donors*, DAC Guidelines and Reference Series, OECD, Paris.

28. OECD (2010): *Economic, Environmental and Social Statistics*, OECD Factbook 2010, OECD Publishing http://www.oecd ilibrary.org/economics/oecd-factbook-2010/population-growth-rates-table_factbook-2010-table4-en;jsessionid=54cobv95blugq.delta

29. Orr, D. (2006) '*Framing sustainability'*. Conservation Biology 20: 265-6, p. 266.

30. Ravallion, M., Chen, S., Sangraula, P. (2007): *New Evidence on the Urbanization of Global Poverty*, Policy Research Working Paper 4199, World Bank,Washington, D.C.

31. Smits, J.P., Horlings, E., Van Zanden, J.L. (2000): *Dutch GNP and Its Components, 1800–1913*, Groningen Growth and Development Centre, Monograph Series, 5:19.

32. Spash, C. L. (1999): *The development of environmental thinking in economics*.Env.Value 8(4):413-435.

33. Spash, C.L. (2011): Social Ecological Economics: Understanding the Past to See the Future American Journal of Economics and Sociology, Vol. 70, No. 2: 340-375.

34. Valste, J., Airamo, S., Holopainen, M., Koivisto, I., Suominen, T., Viitanen, P. (1993): *Biologia: Toimiva eliömaailma, Perinnöllisyys ja Evoluutio* (in Finnish). Porvoo: WSOY.

35. WRI/UNDP/UNEP/World Bank (2005), *World Resources 2005: The Wealth of the Poor – Managing Ecosystems to Fight Poverty*, WRI, Washington, D.C.

36. WWF (2012): *Living Planet Report 2012: Biodiversity, Biocapacity and Better Choices*. Gland, Switzerland: WWF International.

37. Zecevic, V., Boskovic, J., Knezevic, D., Micanovic D. (2014): Effect of seeding rate on grain quality of winter wheat. Chilean Journal of Agriculture Research (CJAR), 74(1):23-28.

# POTENTIALS OF ECOTOURISM AS A RURAL DEVELOPMENT TOOL ON THE BASE OF MOTIVATION FACTORS IN SERBIA

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## Abstract

*Rural development plays very important role for overall national and country development in Serbia. Rural areas of Serbia possess major natural resources, with available waters, good soil, with rich ecosystems and biodiversity and authentic cultural and local heritage, which make this region attractive as a travel destination. According to the diverse natural conditions of territory there are much potential for ecotourism development in Serbia. The aim of this study is to research which factors affecting eco- tourists' motivations. The main objective of this research is to identify which motivation factors pursue people to become eco-tourists and to visit rural area. The study has been carried out by using a questionnaire created for the collection of the interested data. All surveyed people lives in Republic of Serbia.*

**Key words:** *ecotourism, motivation factors, rural development, Serbia*

## Introduction

Rural development plays very important role for overall national and country development in Serbia, as about 70% of area in Serbia can be considered as rural areas, with around 43% of the total population. By definition of the Organization for Economic Cooperation and Development (OECD) (population density below 150 inhabitants per km$^2$), rural areas cover 85% of the total territory of Serbia and are occupied by more than half of the population (55%) of Serbia. Rural areas face even basic problems and trends like: poor diversification of economic activities, extensive agriculture as dominant economic activity, lack of employment opportunities, depopulation as a result of emigration, poor and underdeveloped infrastructure (Action plan 2011-2015).

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Regarding to these facts it can be seen that it is very important to find the way to develop rural areas and find employment opportunities for people who live there. One of the strengths and very important characteristics of rural areas in Serbia are natural wealth and unpolluted environment. Rural areas of Serbia possess major natural resources, with available waters, good soil, with rich ecosystems and biodiversity and authentic cultural and local tradition and heritage, which make this region attractive as a travel destination. There are three broad agricultural regions that can be distinguished in Serbia on the basis of geography and climate, land quality, farm production systems, socio-economic development and political and administrative boundaries, namely: Vojvodina, Central Serbia and Southern Serbia. Serbian terrain ranges from the flat and rich lowlands of Vojvodina in the north for crop farming and vegetable production, to hilly terrain in central Serbia and high mountains on the eastern, western and southern borders of the country, with fruit and wine production. Furthermore, beside natural characteristics, areas are very differently developed, due to the turbulent history. The most developed one is lowland area of Vojvodina which provides building easy competitive agriculture, but the tradition of its organisation and property development created also differences within this one. Mountain environment is pretty depressed due to extensive and less developed agriculture. According to the diverse natural conditions of territory, biodiversity is much diversified, there are much potential for ecotourism development in Serbia. The development of the nature based tourism in such areas is important not only for preservation of environmental assets in which it relies, but also for providing economic benefits that will help to sustain those area and the communities involved.

## Ecotourism and its role in rural development

Rural areas usually have few sources of comparative advantage for attracting economic activities other than agriculture or industries based on harvesting natural resources (Wiggins et al. 2001). The development of tourism can help through economic growth and employment which generate income for rural community (Gannon 1994; Kieselbach & Long 1990). Various literatures consider tourism as an alternative channel for improving the living standards of local communities residing in rural areas (Viljoen & Tlabela, 2007; Cabrini, 2002; Hall & Brown, 2000; OECD, 1994). Kim et al. (2006) view tourism as a viable tool that can be utilized in achieving sustainable rural development where both the tourists and the rural population are considered. Tourism is thought to be one of the sustainable development channel through which rural areas can achieve economic, environmental and socio-cultural growth

(Haghsetan et al., 2011; Reeder & Brown, 2005). Ecotourism is assessed as one of representative alternative tourism aiming at sustainable tourism. The current ecotourism can be consider as an integrated form of all the interests arising from environmental, economic and social worries beyond the concept of experiencing intact nature and culture. With the advent of ecotourism, more individuals became interested in ecological damages on the nature by tourism, the value of wilderness and the life of local residents (Western, 1993; Kang, 2000). The Ecotourism Society (TES) in 1991 defined ecotourism as a travel to natural areas to understand the cultural and natural history of the environment, taking care not to alter the integrity of the ecosystem, while producing opportunities that make the conservation of the natural resources beneficial to local citizens (Wood, 1993). While in 1996 the World Conservation Union defined ecotourism as an environmentally responsible travel and visitation of quiet natural areas in order to enjoy and appreciate nature that promotes conservation, low negative visitor impact and socio – economic involvement of local population (Wood, 2002). It reflects that ecotourism is not a simple tour to natural areas, but a tour bearing social responsibilities (Dimanche and Smith, 1996).

The International Ecotourism Society (TES) has developed a set of ecotourism principles, which are being embraced by a growing constituency of NGO-s, private sector businesses, governments, academia and local communities. Some of the principles are: Minimize the negative impacts on nature and culture that can damage a destination; Educate the traveler on the importance of conservation; Direct revenues to the conservation and management of natural and protected areas; Rely on infrastructure that has been developed in harmony with the environment, minimizing use of fossil fuels, conserving local plants and wildlife, and blending with the natural and cultural environment. According to Chesworth (1995), ecotourism has six characteristics: a) involvement of travel to relatively undisturbed natural areas and/or archeological sites, b) focus on learning and quality of experience, c) create economic benefits to local communities, d) ecotourists seek to view rare species, spectacular landscapes and/or the unusual and exotic, e) ecotourists sustain the environment or help undo damage to the environment, and f) ecotourists appreciate and respect local culture, traditions, etc.

Ecotourism is a sustainable form of natural resource-based tourism. It focuses primarily on experiencing and learning about nature, its landscape, flora, fauna and their habitats, as well as cultural artifacts from the locality (Dowling, 1997; Fennell, 1999). Its aim is to conserve resources, especially biological diversity, and maintain sustainable use of resources. (Bansal & Kumar, 2011;

Godratollah et al., 2011; Tewodros, 2010). The most proclaimed positive issue of ecotourism's contribution to sustainable resource management on a direct or indirect basis (Cater, 1993, 1994; Dearden, 1995). Goodwin (1995) specified that ecotourism has a positive impact since it adds to the preservation of species and habitats through enhancing proper site management, providing revenue to the local community sufficient enough to make them value their land, and motivate them to protect their wildlife heritage area. To Ziffer (1989) ecotourism contributes to the area visited through labour or financial means. It aims at directly benefiting the conservation and the maintenance of the site and the economic well-being and needs of local residents. Summarizing the above, can be concluded that ecotourism support to minimizes negative impacts upon the natural and socio-cultural environment and protect the maintenance of natural areas that are used as ecotourism attractions, by creating opportunities for providing alternative employment and generation of income for local rural communities, which can affect the reduction of the depopulation and of the poverty.

## Motivation factors of ecotourists

Starting with the main idea that ecotourism can foster rural development, it is very important to attract persons to travel and spend time in natural areas, which are usually in rural areas. In order to make a good quality offer it is important to understand consumers and their needs and expectations, and to understand why ecotourists travel to natural areas. The push motivations are useful in explaining the desire for travel, as they are recognized as the starting point of understanding tourists' behavior (Crompton, 1979). In the generic forms of tourism, the motivations involved are very broad. On the other side, specific forms of tourism exist where a particular resource has the ability to attract the interest of a significant group of people. In ecotourism, as in all other types of tourism, the tourist profiles differ according to the motivations and values of the tourists. According to the literature, the way of identifying ecotourists can be based on the basis of the three core criteria of ecotourism: nature-based, education or learning, and sustainability (Beaumont, 1998; Blamey, 1995; Weaver, 2008). When observing and comparing the definitions of different literature two main groups may be distinguished: the first one including 'hard' or 'committed' ecotourists who are generally perceived to be well aware of their travel and consumption preferences as well as global and local issues regarding sustainability, responsibility and ecological lifestyle. To them is often related concept of biocentrism. This group of ecotourist is comprehensively committed to carry out their leisure time respecting the components involved in ecotourism: with minimal impact on nature and host

culture, preservation, learning and direct or indirect contribution to destination's well-being. Another group comprises the "soft", ecotourists who might be aware of environmental issues to some extent but still regard their own comfort as priority (Weaver and Lawton 2001, 5-8; Valtonen, 2013). Very often "soft" ecotourists are satisfied with superficial scratch of the eco-setting without going any deeper into the issues concerning the nature or community in the destination (Fuad-Luke 2008; Valtonen, 2013).

Criteria used to identify the ecotourist market have focused on motivations related to the nature and learning components and activity in the natural environment (e.g. Ballantine and Eagles, 1994; Juric et al., 2002; Kwanet al., 2008; Saleh and Karwacki, 1996; Wight, 1996a). Some studies have considered ecological values of potential ecotourists or environmental attitudes or behavioural intentions of ecotourists that have been identified according to motivational elements (e.g. Blamey and Braithwaite, 1997; Kerstetter et al., 2004; Luo and Deng, 2008; Weaver, 2002; Zografos and Allcroft, 2007). Natural places are sought for the benefits of enjoyment and learning, but there is scant evidence whether concern for the environment or sustainability also has a role in ecotourist decision-making and hence in identifying the ecotourist market. Indeed, some writers suggest that ecotourists are no more concerned about sustainability or the environmental credentials of their ecotourism product than mainstream tourists (Sharpley, 2006; Wheeller, 2005; Beaumont, 2010). According to McIntosh, and Goeldner (1990) and Tsephe and Eyono Obono (2013) tourism motivation has four dimensions: physical, cultural, interpersonal, and status and prestige. Physical motivation is directly connected to a person's bodily health: physical rest, participation in sports, and the need for recreation at the beach. Status and prestige motivation refers to tourists' self- esteem and personal development. Cultural motivation refers to the fact that travelers desire to gain knowledge about the cultural activities of other countries. Interpersonal motivation refers to the fact tourists want to meet new people, visit friends or relatives, get away from the routine conventions of life, or make new friends (Beaumont, 2010).

## The aim of the research

The aim of this study is to research which factors affecting ecotourists' motivations. The main objective of this research is to identify which motivation factors pursue people to become ecotourists and to visit rural area. We supposed that demand side of ecotourism depends on degree of interest in natural resources and activities that can be taken there, and we wanted to explore which would be more important motivation factors on the demand

side, based on these interests in Serbia. Until now there has been little research on motivation factors and market demand for ecotourism in Serbia. According to these preliminary results, some actions in order to attract people to spend the time in nature and in rural areas, with ecotourism offer can be developed, as development of ecotourism is concerned as possibility for rural development in Serbia.

## Methodology

In order to collect data we were interested in, questionnaire was created and data were collected on-line. All surveyed people lives in Republic of Serbia. Questionnaire has two parts, one with personal information about respondents such are: gender, income, education level, place of living – whether respondent lives in rural or urban area, information with whom respondent usually travels with, and whether respondent has ever visited rural tourism. In order to get information about motivation factors that influence on willingness to visit nature or rural area and to be involved in nature activities, we used questions with Likert scale. Likert scale provided has five categories, with end points from "strongly disagree" to "strongly agree". These questions were constructed on the idea based on literature review, such as that motivations for visiting nature or rural area, as already mentioned, could be divided in two groups: motivations with nature and learning components and motivations based on activities in natural environment, as well as opinion that tourism motivation has physical, cultural, interpersonal, and status and prestige dimension.

Questionnaire was provided in Serbian language. Data obtained were analyzed statistically with calculating average means and frequencies. The limitation of the study is number of respondents, which is 70, but we consider it as a base for the future research and for developing research in other Balkan countries, as Albania, and Bosnia and Herzegovina.

## Results and discussion

The results of the empirical study will be presented in the following part. Firstly, some demographical information on the study sample. The gender distribution is fairly balanced, since 48.6% of respondents are male and 51.4% female. In terms of age, the largest group is between 18 and 34 years old (58.6%), followed by the group between 35 and 44 (27.1%). Therefore, it can be said that this is a relatively young group of people.42.9% of surveyed people has high education or are still students, and even and 37.1% are with

master or PhD degree. According to these results, connecting with literature review, it can be supposed that people with higher level of education will have higher interest for ecotourism. Regarding to age, according literature results are different. Different age groups were interested in different offers.

**Table 1.** *Personal information*

| | |
|---|---|
| **Gender** | |
| Male | 48.6% |
| Female | 51.4% |
| **Age** | |
| 18-34 | 58.6% |
| 35-44 | 27.1% |
| 45-54 | 5.7% |
| 55-64 | 7.2% |
| >65 | 1.4% |
| **Education level** | |
| Primary school | - |
| High school | 12.9% |
| Higher education | 7.1% |
| Faculty (still student) | 42.9% |
| Master/PhD | 37.1% |
| **Monthly income (RSD)** | |
| <20.000 | 10.1% |
| 21.000-40.000 | 40.6% |
| 41.000-60.000 | 29.0% |
| 61.000-80.000 | 14.5% |
| >81.000 | 5.8% |

**Source:** *Authors' research*

40.6% of the sample has monthly income between 21.000 and 40.000 RSD, and 29.0% in range from 41.000 to 60.000 RSD, which is around average income in Serbia. Only 20.3% of the sample has income higher than 61.000 RSD, and that should be considered as limitation factor for decision making whether to travel and visit some destination. According to the literature, tourists choose rural destinations because of their affordability (Tsephe & Eyono Obono, 2013, Haldar, 2007). 92.4% of the sample lives in the town, and only 7.6% in the village. According this result, it is possible to aspect that people who lives in town would like to travel to some rural destination, in order to escape from urban area, and to enjoy nature. 32.9% of the sample usually travels with family, 31.4% with friends, 27.1% with partner, and only 8.6% usually travels alone. 70.6% of the people that were surveyed have

already visited rural tourism. We supposed that degree of experience would affect interest in ecotourism, and according to high percentage of people that has already taken part in rural tourism, it can be said that people has interest to participate in nature oriented tourism.

Analyzing results gained for motivation factors importance, presented in calculated average values of responses, as it has been explained in methodology explanation (Likert scale from 1 to 5), it can be said that for our surveyed group almost all motivations factors that were offered, were important. It can be said because average values of almost all responses are above 3 (where 1 is strongly disagree, or not important at all, and 5 is strongly agree, or extremely important). Only going to nature for fishing (2.87) and willingness to participate in farm activities (2.84) were less important for making decisions to visit nature or rural areas. According to the results the main motivation factor to go to the nature is relaxation and pleasure (4.50). 61.43% of the sample responded with 5, and 27.14% with 4, on the scale from 1 to 5. It is also in accordance to results of Haldar (2007) that most rural tourists are in search of "pleasure and relaxation of body and mind", and they want to relax away from their usual environment (Tsephe & Eyono Obono, 2013).

Second important motivation factor for making decision whether to go to the nature is desire to walk through the wood (4.31). 58.57% of the sample finds it extremely important for making decision to spend their time in nature. People from the sample find very important positive impact of natural environment on health (4.30). People are attracted by nature and rural areas because they are pollution-free and other micro-climate factors that influence positively on health, and also because they want to watching and enjoy the natural environment (4.29), because of beautiful green landscapes, and because the rural area is peaceful environment (4.10). These results are in accordance to Wight (1996a) who indicates that casual walking a viewing wildlife are the most preferred activities by ecotourists. Even 78.57% of the sample find very important to go out of the town in order to spend more time with their friends (4.29). According to the literature majority of the people expect to have memorable lifetime experience in nature when they go there with friends and families (Tsephe & Eyono Obono, 2013). Also this research showed that memorable lifetime experience has high value as motivation to spend the time in nature (3.93). More than 95% of the sample finds need to escape from everyday busy life very important reason to go to the nature (4.20), which is similar to the explanation of Holden and Sparrow hawk (2002) who found that one of the prime motivations for ecotourists is a change from the daily routine.

Participation in sports and recreational activities is connected with nature and rural areas for many persons, especially walking trekking, hiking (4.19).

For 44.29% of the sample visiting Natural Park is extremely important pursuing factor to spend the time in the nature, and for 27.14% it is very important. Average mean for influence of willingness to visit national park in order to spend the time in the nature is very high 4.03, on the scale from 1 to 5**.** According to the National Tourism Organisation of Serbia, a national park is "an area comprising multiple diverse natural ecosystems of national significance, areas of outstanding beauty and cultural heritage in which humans live in harmony with nature. National parks exist in order to preserve existing valuable natural resources and overall scenic, geological and biological diversity, as well as serving scientific, educational, spiritual, aesthetic, cultural, tourist, health, recreational and other purposes, in accordance with the principles of environmental protection and sustainable development."

There are five national parks in Serbia**:** Đerdap, Fruška Gora, Kopaonik, Šar-planina and Tara. According to the definitions stated in literature that underlines that national park visit is the activity usually undertaken by people while ecotourism travel, and to our research, which shows high interest to visit natural parks, it can be said that natural parks promotion should be one of the strength points for ecotourism and rural development strategy. Within national parks are only permit activities that do not harm the environment, and which serve educational purposes, promote health, recreation and tourism, the continuation of the traditional way of life in local communities and do not threaten the survival of any species, natural ecosystem or environment.

Furthermore, very important factors which affect motivations to visit rural area is possibility to taste food products that are produced with organic practice and locally produced products. These data are closely related to research conducted by Driouech et al. (2013), where it was highlighted that most of the interviewed Serbian consumers connect ethical values to the respect of environment (73.5%) and organic production (49.0%), and that interest for organic production in Serbia is increasing. In the same research authors explained that motivations for buying organic food is respecting the environment (e.g. minimising pollution, protecting biodiversity and natural ecosystems). These results are also in accordance to the results research conducted in Serbia by Panin (2013), which showed that Serbian population have interest in typical food products, mostly because they preserve tradition and support local economies.

Opinion of the sample that if they go to the nature in some rural area they will contribute to the nature preservation (3.89) and to local community development (3.40) is also very important, especially as it shows sustainable development awareness of the sample.

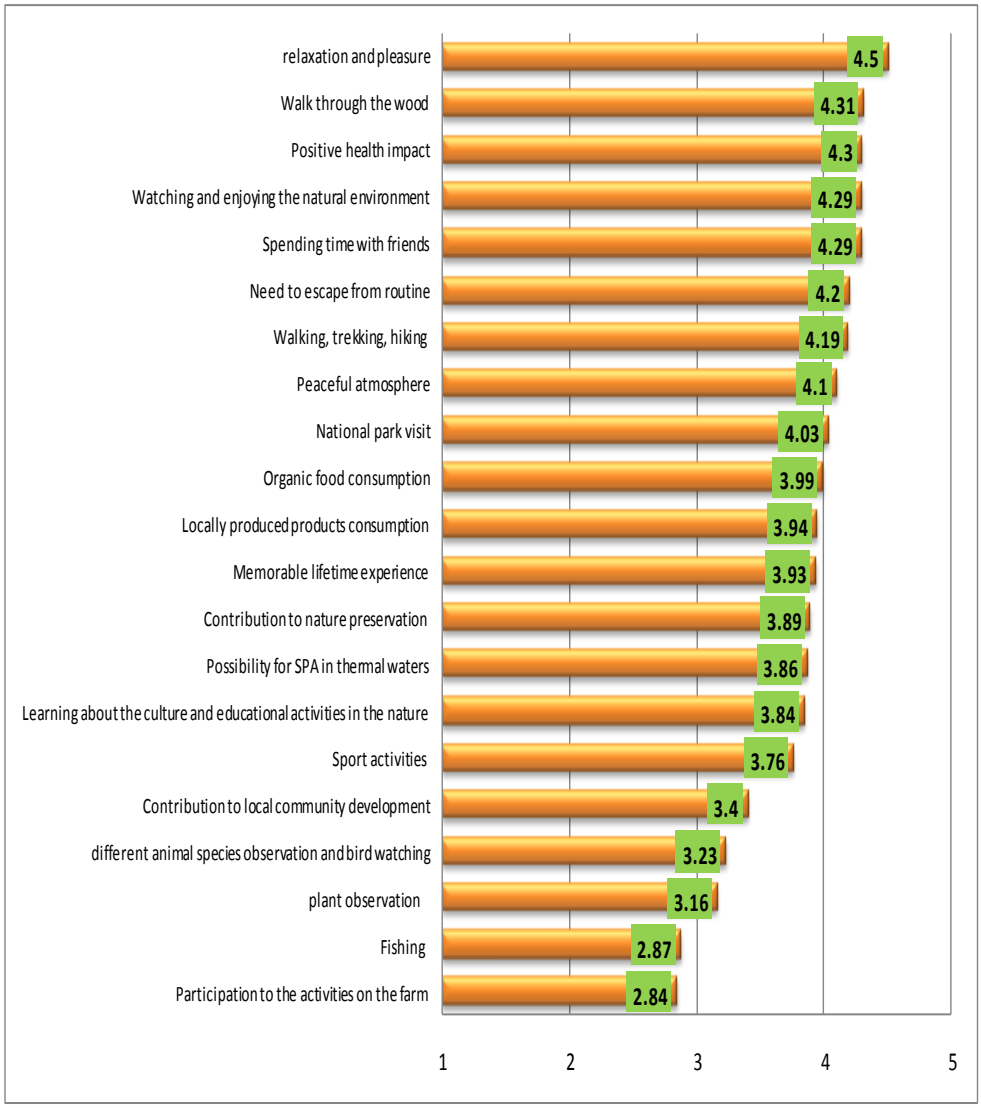
There are over 1000 cold and warm mineral water springs**,** with more than 300 thermal springs In Serbia (National Tourism Organisation of Serbia). The spa tradition dates back to the Roman age, when hot and mineral springs were used and Roman baths ("terme"). Most areas have two or more springs or wells often different in mineral composition and/or temperature. This is excellent natural-given base for SPA development, and using hot water springs to promote tourism and to achieve development. On the demand side, according to our research, there is significant willingness to go to and to enjoy and relax into hot water springs (3.86). This is definitely natural resource that should be used and promoted in order to achieve rural development.

Cultural motivation refers to the fact that travelers desire to gain knowledge about the cultural activities of other countries (Tsephe & Eyono Obono, 2013). Willingness to enrich themselves intellectually and to discover new things by taking advantage of the learning about a destination, its culture, its history, and its people is important to our sample (3.84). As in definitions of ecotourism are highlighted importance of learning activities and cultural interest, according to this research it could be said that people from our sample are ecotourists, as for almost 85% of the sample learning about the culture and educational activities in the nature plays very important role for making decision about spending time in the nature.

It is possible to attract people in nature by organizing tours for observation of different plant and animal species and bird-watching. According to global trends, bird-watching is a growing niche gaining more and more fans, conservationists and photographers alike - around the world, and is a great way for conservation-minded responsible travelers to experience natural destinations in a way that reflects their respect for wildlife and natural habitats (International Ecotourism Society).

Analyzing results from this research, it could be said that there is potential to promote these activities more, as people showed interest to go to the nature because of plant observation tours (3.16) and different animal species observation and bird-watching (3.23).

**Picture 1.** *Motivation factors – average means of the responses*




**Source:** *Our research*

## Conclusion

Development of ecotourism could have important impact on rural areas in Serbia, in terms of the development. Economic development could be achieved by creation of income of rural inhabitants, with further improvement the quality of life and living standard. Environmental benefits of rural areas achieved through ecotourism activities are also very important, and for Serbia

potential for rural development lays in environmental goods and preserved nature. Therefore, it is necessary to attract people to spend the time and nature by providing attractive offer, which would satisfy needs and expectations of travelers. Because of that exploring motivation factors that would attract Serbian people to spend the time in the nature and rural areas, it is of high importance. According to our research, there is interest of Serbian people to visit the nature as ecotourists, and the future promotional ecotourism activities could be based on the interest and motivation factors explored. Motivation factors explored in this research can be divided into four groups of motivation factors: 1. Social activities; 2. Sport activities and health; 3. Natural based motivation; 4. Cultural and educational activities. According to the research, motivation factors connected with sport activities and health, such as recreation and pleasure and positive health impact, and natural based motivation factors, such are walking through wood and watching and enjoying the natural environment, are the principal pursuing motivation factors that attract people in Serbia to visit and spend time in the nature.

## References


1. Ballantine, J.L., and Eagles, P.F.J. (1994): *Defining Canadian ecotourists*. Journal of Sustainable Tourism, 2(1), p. 1-6.

2. Bansal, S.P. and Kumar, J. (2011): *Ecotourism for Community Development: A Stakeholder's Perspective in Great Himalayan National Park.* International Journal of Social Ecology and Sustainable Development, 2(2), p. 31-40.

3. Beaumont, N. (1998): *The meaning of ecotourism according to... Is there now consensus for defining this 'natural' phenomenon? An Australian perspective*. Pacific Tourism Review, 2, p. 239-250.

4. Beaumont, N. (2010): *Identifying the ecotourist market using the core criteria of ecotourism: is there a true ecotourist that seeks nature, learning and sustainability?* In: CAUTHE 2010: Challenge the Limits, 8-11 Feb 2010, Hobart, Tasmania.

5. Blamey, R.K. (1995): *The nature of ecotourism.* Occasional Paper No. 21. Canberra: Bureau of Tourism Research.

6. Blamey, R.K., and Braithwaite, V.A. (1997): *A social values segmentation of the potential ecotourism market.* Journal of Sustainable Tourism, 5(1), p. 29-45.

7. Cabrini, L. (2002): *Rural tourism in Europe: Experiences and perspectives*. Proceedings of the 2002 Seminar held at Belgrade, World Tourism Organization.http://www.worldtourism.org/regional/europe/PDF/rural_en.pdf (viewed on 12 March 2014).

8. Cater, E. (1993): *Ecotourism in the third world: Problems for sustainable tourism development*. Tourism Management 14(2), p. 85–90.

9. Cater, E. (1994): *Ecotourism in the third world: Problems and prospects for sustainability*. In: E. Cater and G. Lowman (eds) Ecotourism: A Sustainable Option? Chichester: John Wiley & Sons, p.69-86.

10. Chesworth, N. (1995): *Ecotourism.* Seminar paper delivered in the Institute of Environmental Studies and Management. UPLB. College, Laguna.

11. Crompton, J.L. (1979): *Motivations for pleasure vacation.* Annals of Tourism Research, 6(4).

12. Dearden, P. (1995): *Ecotourism, parks and biocultural diversity: The context in Northern Thailand.* In S. Hiranburana, V. Stithyudhakarn and P. Dhaabutra (eds) Proceedings of Ecotourism: Concepts, Design and Strategy. Bangkok: Institute of Eco-tourism, Srinakharinwirot University Press, p. 15 – 42.

13. Dimanche, F. and Smith, G. (1996): *Is ecotourism an appropriate answer to tourism's environmental concerns?* Journal of Hospitality & Leisure Marketing 3(4), p. 67–76.

14. Dowlıng, R.K. (1997): *Plans for the Development of Regional Ecotourism: Theory and Practice.* In: Tourism Planning and Policy in Australia and New Zealand: Cases, issues and practice, C.M. Hall, J. Jenkins and G. Kearsley (Eds). Sydney: Irwin Publishers, p. 110–126.

15. Driouech, N., Capone, R., Dernini, S., Berjan, S., Bilali El, H., Radovic, M., Despotovic, A., and Panin, B. (2013): *Consumer Perceptions of Agro-Food Products with Ethical Values in Serbia*: *An Exploratory Study*. International Journal of Nutrition and Food Sciences, 2(3), p. 153-159. DOI: 10.11648/j.ijnfs.20130203.20.

16. Fennell, D.A. (1999): *Ecotourism: An introduction*. London: Routledge.

17. Fuad-Luke, A. (2008): *The eco-travel handbook: the complete sourcebook for business and pleasure.* London, UK: Thames & Hudson Ltd.

18. Gannon, A. (1994): *Rural Tourism as a Factor in Rural Community Economic Development for Economies in Transition.* Journal of Sustainable Tourism 2(1+2), p 51-60.

19. Godratollah, B., Azlizam, A., Manohar, M., Mohd, H.I. and Syed, M.H. (2011): *Delphi Technique For Generating Criteria And İndicators In Monitoring Ecotourism Sustainability In Northern Forests Of Iran;* Case Study On Dohezar And Sehezar Watersheds. Folia Forestalia Polonica Series A, 53(2), p. 130–141.

20. Goodwin, H. (1995): *Tourism and the environment.* Biologist 42(3), p. 129-133.

21. Haghsetan, A., Mahmoudi, B., and Maleki, R. (2011): *Investigation of obstacles and strategies of rural tourism development using SWOT Matrix.* Journal of Sustainable Development, 4(2), p. 136.

22. Haldar, P. (2007): *Rural tourism – Challenges and opportunities*. International marketing conference on marketing and society, IIMK 8-10 April, Kozhikode: Indian institute of management Kozhikode, p. 11-129. http://www.serbia.travel (viewed on 09 March 2014).

23. Hall, D., and Brown, F. (2000): *Tourism in peripheral areas.* Clevedon: Channel View.

24. Holden, A. and Sparrowhawk, J. (2002): *Understanding the motivations of ecotourists: the case of trekkers in Annapurna, Nepal*. International Journal of Tourism Research, 4(6), p. 435-446.

25. https://www.ecotourism.org (viewed on 12 March 2014).

26. Juric, B., Cornwell, T.B., and Mather, D. (2002): *Exploring the usefulness of an Ecotourism Interest scale*. *Journal of Travel Research, 40*, p. 259-269.

27. Kang M., (2000): *Tourism Impacts and Potential for Ecotourism Development in and around Mt. Sorak Biosphere Reserve.* Republic of Korea: Seoul National University, pg. 6-8. http://portal.unesco.org/science/en/ev.php URL_ID=7092&URL_DO= DO_ TOPIC&URL_ SECTION=201. htmluem/eco-tour/quebec-declaration.pdf (viewed on 09 March 2014).

28. Kerstetter, D.L., Hou, J.-S., and Lin, C.-H. (2004): *Profiling Taiwanese ecotourists using a behavioral approach.* Tourism Management, 25, p. 491-498.

29. Kieselbach, S. and Long, P. (1990): *Tourism and the rural revitalization movement.* Parks and Recreation, 25(3), p. 62-66.

30. Kim, H.I., Chen, M.H. and Lang, S.C. (2006): *Tourism expansion and economic development: The case of Taiwan.* Journal of Tourism Management, 27, p. 925 - 933.

31. Kwan, P., Eagles, P.F.J. and Gebhardt, A. (2008): *A comparison of ecolodge patrons' characteristics and motivations based on price levels: A case study of Belize.* Journal of Sustainable Tourism, 16(6), p. 698-718.

32. Luo, Y. and Deng, J. (2008): *The New Environmental Paradigm and nature-based tourism motivation*. Journal of Travel Research, 46, p.392-402.

33. McIntosh, R.W. and Goeldner, C.R. (1990): *Tourism: Principles, Practices, Philosophie. New York: Wiley.*

34. Organisation for Economic Co-operation and Development, OECD (1994): *Tourism strategies and rural development.* http://www.oecd.org/industry/tourism/2755218.pdf (viewed 10 March 2014).

35. Panin, B. (2013): *Petrovac Sausage and Futog Cabbage: Market Perspectives for two Serbian PDO's – a Field Analysis on Italian and Serbian Consumers*. Mimeo-Doctoral thesis, Italy: Tuscia University of Viterbo.

36. Reeder, R.J. and Brown, D.M. (2005): *Recreation, tourism, and rural well-being.* Economic Research Report No.7. Washington, DC: USDA, Economic Research Service.

37. Rural Development Network of Serbia (2010): *Action plan 2011 – 2015*. http://www.ruralinfoserbia.rs/dokumenta/action%20plan%202011%20%20 2015%20%20rural%20development%20network%20of% 20serbia.pdf (viewed 10 March 2014)

38. Saleh, F. and Karwacki, J. (1996): *Revisiting the ecotourist: The case of Grasslands National Park.* Journal of Sustainable Tourism, 4(2), p. 61-80.

39. Sharpley, R. (2006): *Ecotourism: A consumption perspective*. Journal of Ecotourism, 5(1&2), p. 7-22.

40. Tewodros, K.T. (2010): *Geospatial Approach for Ecotourism Development: A Case of Bale Mountains National Park, Ethiopia*. Master's thesis, Faculty of Natural Science, Department of Earth Sciences, Ethiopia: Addis Ababa University.

41. Tsephe, N. P. and Eyono Obono, S. D. (2013): *A Theoretical Framework for Rural Tourism Motivation Factors.* International Journal of Social, Human Science and Engineering, 7(1), World Academy of Science, Engineering and Technology.

42. Valtonen, M. (2013): *Ecotourism and Sustainability: Social Impacts on Rural Communities.* Bechelor's thesis, Laurea University of Applied Sciences

43. Viljoen, J., and Tlabela, K. (2007): *Rural tourism development in South Africa*: *Trends and challenges.* Cape Town, South Africa: Human Science Research Council Press (HSRCP). http://www.hsrcpress.ac.za (viewed on 10 March 2014).

44. Weaver, D. (2008): *Ecotourism* (2nd ed.). Milton, Qld: John Wiley & Sons Australia, Ltd.

45. Weaver, D. and Lawton, L.( 2001). *Resident perceptions in the urban – rural fringe*. Annals of Tourism Research, p. 5-8.

46. Weaver, D.B. (2002): *Hard-core ecotourists in Lamington National Park, Australia*. Journal of Ecotourism, 1(1), p. 19-35.

47. Western, D. (1993): *Introduction: Definition of Ecotourism*. In: K. Lindberg and D. E. Hawkins (eds.). Ecotourism: A Guide for Planners and Managers, 1, North Bennington, Vermont: The Ecotourism Society.

48. Wheeller, B. (2005): *Ecotourism/egotourism and development*. In: Hall, C.M. and Boyd, S. (Eds), Nature-based tourism in peripheral areas: Development or disaster? Clevedon: Channel View Publications, p. 263-272.

49. Wiggins S. and Proctor S. (2001): *How Special Are Rural Areas? The Economic Implications of Location for Rural Development.* Development Policy Review, 19(4). London: Blackwell.

50. Wight, P.A. (1996a): *North American ecotourists: Market profile and trip characteristics*. Journal of Travel Research, 34(4), p. 2–10.

51. Wood, M. E. (1993): *Ecotourism guidelines for nature tour operators*. North Bennington, Vermont: The Ecotourism Society, 16 p.

52. Wood, M.E. (2002). *Ecotourism: Principles, practices and policies for sustainability.*United Nations Publication, First Edition. http://www.pnuma.org /industria/documentos/ Ecotourism 1.pdf (viewed on 12 March 2014).

53. Ziffer, K. (1989): Ecotourism: The Uneasy Alliance, Working Paper NO. 1. Washington DC: Conservation International.

54. Zografos, C. and Allcroft, D. (2007): *The environmental values of potential ecotourists: A segmentation study*. Journal of Sustainable Tourism, 15(1), p. 44-66.

# PROFITABILITY OF QUEEN BEE REARING AT APIARIES OF DIFFERENT CAPACITY[1]

*Bojana Bekić[2], Mića Mladenović[3]*

## Abstract

*In this paper authors presented the structure and amount of costs related to queen bee rearing, at apiaries with capacity of 50, 100 and 150 hives, where amortization period of equipment and material is 20 years. Authors presented realized production volume at apiaries of different quantity, production value of queen bees and economic estimation of investing into apiaries with main strategy in queen bee rearing. Besides economic indicators, authors also gave insight into process of commercial queen bee rearing at apiaries of different capacity, which was applied for all calculations in this paper. Main goal of this paper is to present possibility for obtaining a profit at family farm which poses 50, 100 and 150 hives and which is oriented toward comercial queen bee rearing.*

**Key words:** *queen bee rearing, apiary, rearing expenses, profit*

## Introduction

Honey bee is an insect which lives in perennial colonies whose founder is a mother - the queen bee. Queen bee is the only reproductive female in the colony and her biological quality largely determines the strength of the colony, work productivity and resistance to diseases. All members of the bee society inherit physical characteristics and performance traits from the queen bee.

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Thanks to queen bee pheromone, which is produced only by a queen bee, thousands of worker bees live together and are stimulated to work, which considers large number of various activities in and out of the hive. In conditions of moderate continental climate, queen bee starts to lay eggs in January, maxiumum is reached in June when a good quality queen bee can lay up to 2,000 eggs per day, and she stops to lay eggs in October. Although queen bee can live few years in one society, in modern commercial beekeeping, queen bees are "used" at most two years, because in time their capacity to lay eggs decrease. Mostly, after two years old queen bee is being replaced with young mated queen bee, to keep high productivity of the bee colony.

Beekeepers which want to enlarge their own apiary or want to rear queen bees for comercial sale must learn basic principles of queen bee rearing methods and to have certain conditions at their own apiary, which considers having enough number of strong colonies and equipment necessary for queen bee rearing. At apiaries oriented towards queen bee rearing, besides standard apiary equipment, additional equipment designed only for queen bee rearing must be present.

Benefits of mastering the skills of rearing queen bees are multiple and are reflected in:

- *Benefits for beekeeper* - reduction of expenses at ones apiary regarding queen bee purchase, controlled quality of queen bees, disappearance of stress regarding forehand queen bee purchase, providing of self-sufficiency (rearing of queen bees for the needs of own apiary) and increase of income at family farm from sales of queen bees (commercial queen bee rearing);
- *Benefits for the state* - stimulation of beekeeping development in Serbia, export of queen bees in surrounding countries, indirect impact of queen bee rearing on development of other agricultural branches though development of beekeeping and reduction of poverty (especialy in non-developed rural areas).

For successful queen bee rearing it is necessary to have knowledge and experience, which demands some time. When rearing queen bees it should not be forgotten that it is a living being and that by selecting colonies for grafting larvae beekeeper manipulate the genetic material.

## Research method

In accordance with research topic in this paper the following methods are selected:

- Method of investment planning (Andrić et al., 2005)
- Method for estimation of investment projects (Subić, 2010)

For data analysis and presentation of queen bee rearing method, authors used data from agricultural production, findings of other authors published in books and thematic proceeding from scientific meetings as well as available electronic data bases.

## Location of the apiary

Rearing of queen bees may be of interest to beekeepers who decide not to move their hives to a specific location with a rich pasture that is for beekeepers with stationary beekeeping. In stationary beekeeping total costs are lower because there there are no migration costs, depreciation costs of hives are lower and if the apiary is near beekeepers' home, there are no travel costs to the apiary (Relić, 2007). Beekeeper who does not move hives can have profitable apiary if his focus is on queen bee rearing. On mobile apiary, economically is justified only rearing queens for own needs (Relić, 2007). If in the vicinity of the apiary is rich pasture then the beekeeper can achieve benefit from the honey yield. When it comes to stationary beekeeping beekeeper can use any type of hive, although the most common type of hive in the world, and in our country, is Langstroth hive.

Suitable place for stationary apiary must meet several key requirements which are: to be protected from the wind, surrounding terrain must not be saturated with bees, the terrain must not be exposed to floods, apiary must not be near large water bodies and in the area of bees' flight must be enough pollen and melifferous plants (Relić, 2007).

In locations where there are a lot of other people's bees is greater potential for disease and robbery and large number of bees fight for the same pasture. Hives should be protected from strong winds, such as košava in Banat, because a strong wind interferes with the bee exit from hives and their flight.

Next to large water bodies there is usually rich melliferous vegetation so it is preferable to place stationary apiary at the optimum distance from such water bodies. Stationary beekeeping is not profitable if the apiary is in the area poor with melliferous and polen rich plants. The apiary will only make losses, because the bees have to be fed, because they can not get enough food (Relić, 2007).

## Queen bee rearing process

There are many methods for queen bee rearing, and the choice of a method depends on the personal affinity of a beekeeper, level of his knowledge and equipment that he has or he can obtain. However, regardless on the chosen method, basic principles of queen bee rearing which consider respect of queen bee life cycle are the same. One of the most important principles of succssesful queen bee rearing is grafting of very young larvae after hatching i.e. larvae must not be older than 12 hours. So, for production of quality queen bees it is crucial to use the youngest possible larvae[4].

In this paper authors presented method which ensures continuous production in a longer period of time[5]. According to this method for queen bee rearing, it is necessary to prepare three groups of bee colonies:

1. *group of mothers* whose colonies are being monitored for few years and which are "donors" of young larvae for grafting,
2. *builder colonies* i.e. group of colonies necessary for raising of grafted queen bee larvae;
3. *mating colonies i.e.* group of colonies necessary for fertilization of queen bees.

*Group of mothers that is colonies of which larvae are taken* should be strong and healthy for a longer period of time; they must be able to give a lot of honey considering that the primary goal at the apiary is improvement of colonies performance. There are differences in characteristics between different races of bees so there are differences in characteristics between different colonies at one apiary, even though the starting material was of excellent quality. All colonies at one apiary do not have the same strenght. When choosing quality colonies as mother

[4]One of the main reasons for failure in queen bee rearing, often done by beginners, is grafting of older larvaes.
[5] http://www.glenn-apiaries.com/queenrear.html

colonies beekeeper must pay attention to: colonies strenght, bees diligence, resistance to diseases, expression of swarm instinct, bees aggressiveness, consumption of winter food stores, spring development, collection of pollen, honeycomb construction, arrangement of honey, hygiene and collecting of propolis. One of the certain indicators of good colony is large coverage of frames with capped brood.

*Builder colonies* are colonies for development of grafted larvae (queen bee cells)[6]. These colonies must be strong with large number of bees capable to nurture queen ceels well. Before they are put into builder colonies, beekeeper must limits activity of present queen bee by using queen excluder or he must remove the queen bee.

Builder colonies must fulfill the following conditions:
- to have 6 - 8 frames of brood;
- to be healthy;
- to have queen bee which is old 6 - 12 months (if one works with builder colonies with queen bee);
- to have lots of pollen and nectar;
- bees must cover all frames in the builder colony.

In builder colonies bees accept grafted larvae and their number can be seen by the number of constructed queen cells (cells with conical shape). When grafting, beekeeper must pay close attention to the number of grafted larvae which must not be to large. If the number of grafted larvae is to large produced queen bees will be of weaker quality or started queen cells will not developed completely. According to so far practical experience, one should not start more than 60 - 70 queen cells per colony (Mladenović and Stevanović, 2003).

Main steps in queen bee rearing, by order of activities, are the following:

1. *carefull selection of colonies* of which queen bee larvae are taken,
2. *grafting of queen bee larvae* from selected colonies into wax bases at frames using Chinese niddle,
3. *putting of frames* with grafted larvae into builder colonies,
4. *transfer of finished queen cells* from builder colonies to mating nucleuses.

[6]Grafted queen bee larvae can be placed into so called starters, for a first few days, and then they are tranffered into builder colonies. Starter colonies as well as builder colonies must be strong with enough quality food. Starter colony must be productive, without disease for a long period of time, diligent and calm.

Prior to queen bee hatching it is necessary to prepare so called mating nucleuses, that is small hives with small bee colony. Namely, if many younger virgin queens hatch at the same time they will attack one another and destroy non-hatched queen cells. To prevent this, it is necessary to transfer queen cells 1 - 2 day before hatching to colonies without queen bees i.e. mating nucleuses. Fortheen day old queen cells are placed in such mini-hives and, after two days, virgin queens will emerge. The simpliest mating nucleuses consist of 4 frames placed into mini-hive of which one frame is with honey, one frame is with pollen, two frames have open brood and there are additional bees from two more frames[7]. Considering that such mini - hives do not have queen bee, mini colony will starts to nurture placed queen ceels. After hatching, in the next two weeks, queen bees will fly to mating sites where they will be fertilized and after that they will start to lay eggs. After queen bee starts to lay eggs she will never fly to mate again.

If a builder colony is fomed quickly queen bee can die in the queen cells. Also, queen bee can die during careless grafting and manipulation with larvae material, if there is not enough food in builder colony and if grafting is done during unfavorable weather conditions.

When rearing queen bees, it is necessary to understand that the queen bee is a living being, with her own needs and instincts. Rearing of queens must be cooperation between beekeeper and bees where only large knowledge will ensure successful rearing and getting of high quality queen bees that will satisfy byers.

## Equipment needed for queen bee rearing

Besides strong and healthy builder colonies and mating nucleuses it is also necessary to have certain specialized equipment necessary for rearing and later transport of queen bees:

- bottom of the queen cell cups;
- Chinese needle;
- frames with slats;
- pedestal for frames;

[7]Mating nucleuses can be individual or divided to several chambers. In this paper calculation is being done considering mating nucleuses with three chambers (3+3+3 LR frames).

- neon lamp;
- magnifier;
- cages for queen bee transport.

For grafting of larvae it is necessary to make artificial bottoms of the queen cell cups (of wax) or to purchase plastic artificial bottoms of the queen cell cups[8]. This procedure of grafting larvae into wax cups considers using of so called Chinese needle which serves for transfer of young larvae into cups.

At the bottom of each cell cup is a small quantity of Royal jelly, which is a food for larvae. Chinese niddle should be used carefully because larvae will not be accepted if it is hurt in any way, if it is dirty or wrongly turned. Frame with queen larvae must not be outside of builder hive more than 30 - 40 minutes.

Place where grafting is being done should be warm closed room with relative air moisture 60 - 70%, light source (neon lamp) and magnifier to see the smallest larvae. For adding royal jelly into queen cell cups one can use medicine pipette. Magnifier and neon lamp serve to see one day old larvae and pedestal for frames serves to hold the frames with queen larvae, because grafting is easier when frame is placed aslope instead of horizontal.

Frames with slats are serving for fixing of bottom of the queen cell cups. Transport cages are needed to transfer queen bees to a new place and can also be used for accepting of hatched virgin queen or for safe keeping of fertilized queen bees. Popular cage for transport of queen bees is so called Benton cage which can be used not only for transport but also for adding of queen bees to the colony.

## Commercial queen bee rearing

Comercial rearing of queen bees considers rearing of large number of queen bees where main goal is successful emerging of large number of queen bees of good quality to satisfy the needs and wishes of byers. When rearing queen bees one must carefully plan and take care of time span because of timely delivery to a byer.

[8]For the calculation presented in this paper authors considered bottom of the queen cell cups made of wax.

Comerical rearing of queen bees considers grafting of large number of larvae, more times during one season, into bottoms of the queen cell cups made of wax. Chinese niddle is used for grafting of larvae.

Beekeeper must choose the right moment for grafting larvae because every attempt to graft larvae in the wrong time of the year will result in poor quality of queen bees. Ideal period for grafting is when there is good uptake of nectar and pollen. Queen bees can be reared only during period of drone's activity and in moderate - continental climate that is from May to August (Umeljić, 2010)[9].

The beginning of activity related to queen bee rearing starts with preparing of mating nucleuses which is being done in time of rich bee pasture. In one season there can be totally six rotations i.e. larvae are being grafted six times. Activity calendar regarding queen bee rearing, is given in the following table (Table 1.).

**Table 1.** *Activities calendar*

| Days | Activity |
|---|---|
| **1** | Queen bee lays eggs |
| **2** | |
| **3** | Larvae hatching from eggs |
| **4** | Grafting of one day old larvae (afternoon) |
| | Placement of grafted larvae in builder colonies |
| **5** | |
| **6** | |
| **7** | |
| **8** | Queen cells are sealed |
| **9** | |
| **10** | |
| **11** | |
| **12** | |
| **13** | |
| **14** | Removal of queen ceels from builder colonies and, |
| | their placement into mating nucleuses |

[9] In mountain climatic conditions the period of queen bee rearing is shorter and instead of three months lasts two months (June - July).

| | |
|---|---|
| **15** | |
| **16** | Emerging of queen bees |
| **17** | |
| **18** | |
| **19** | |
| **20** | |
| **21** | |
| **22** | Mating of virgin queen bees |
| **23** | |
| **24** | |
| **25** | |
| **26** | |
| **27** | Fertilized queen bees begins to lay eggs |
| **28** | |
| **29** | |
| **30** | |

**Source:** *http://www.glenn-apiaries.com/queenrear.html*

The most optimal time cycle for starting of rotation is 14 days. In this case queen bees are sold on 28$^{th}$ day, starting from the beginning of the cycle (Umeljić, 2010).

So, on 28$^{th}$ day young mated queen are removed from mating nucleuses and the same day in the after noon new 14 day old queen ceels are placed into mating nucleuses. To ensure successfulnes of rearing, queen bees must be fed with optimal amount of syrup, and pollen storage in hives must also be optimal.

After emerging of queen bees from queen cells, excellent queen bee will start to lay eggs in 8 days, very good queen bee will start to lay egss in 9 days, good queen bee in 10 days and poor quality queen bee will start to lay eggs after 10 days (Boža Petrović, Slavomir Popović, 1995).

All important activities at apiary must be recorded so that beekeeper does not lose sight of the timeline of events. All those activities can consider the following: date of larvae grafting, number of accepted cells, colony which was donor of the larvae material, date of queen bee emerging, date of distribution etc.

## Economics of queen bees rearing

In Serbia, beekeeping can activate and normalize the life of an impoverished population, especially in marginalized rural areas. In many rural areas in Serbia, due to long trend of population emigration to urban centers, the number of inhabitants in rural areas decreased but the quality of the environment is preserved. Development of beekeeping in these areas would stimulate development of the manufacturing industry, trade and other economic sectors.

Investments are the main material factor of economic and social development. Investments play a decisive role in the realization of goals and priorities of the agricultural and rural development, especially as a driving instrument of quantitative and qualitative growth of total agricultural and production factors and production, and they also create better living conditions in the countryside (Subić, 2010).

According to the definition, investments are sacrifice, abandonement of the current secure satisfaction, by a physical or legal person, in order to achieve the products and/or services in the future on account of certain invested financial assets (Subić, 2010). For the smooth functioning of the production process, it is necessary to invest in fixed as well as working assets, where the proportion of these investments depends on the specificity of the production.

Investment decisions in agriculture should be based on rigorous quantitative and qualitative provisions that will ensure accurate direction of money assets, and invest in the best (most effective) project variants. Investments should be carried out in a form that will ensure maximum effectiveness of exploitation that is greater level of achieved effects per unit of investment (Subić, 2010).

Key assumptions for calculating the profitability of queen bee rearing consider initial investment in the establishment of the apiary with the basic strategy directed towards queen bee rearing. Financing of investment is done with own funds and the investment does not include investments in land and auxiliary facilities.

Self - financing is the safest, most stable and readily available source of financing for investment, considering that it is ensured from the positive business results and the collected funds from amortization of fixed assets

(Andrić et al., 2005). Needed funds for establishing apiaries of different capacities are shown in the following table (Table 2.):

**Table 2.** *Investments into apiaries with 50, 100 and 150 hives, in €*

| INVESTMENTS, € | Apiary capacity - 50 hives | Apiary capacity - 100 hives | Apiary capacity - 150 hives |
|---|---|---|---|
| Hive LR, standard | 2,093.00 | 4,186.00 | 6,279.00 |
| Swarm at 5 LR frames | 1,500.00 | 3,000.00 | 4,500.00 |
| Selected queen bee | 375.00 | 750.00 | 1,125.00 |
| Main equipment and production material | 2,190.00 | 4,215.00 | 6,167.00 |
| Equipment for queen bee rearing | 2,361.00 | 4,721.00 | 7,036.00 |
| TOTAL | 8,519.00 | 16,872.00 | 25,107.00 |

**Source:** *Authors' calculation*

In the investment structure the largest percent of finantial assests, in compare to total investment assets, is related to purchase of hives and swarms, while in the case of the equipment for queen bee rearing, the largest part of expenses is related to purchase of mating nucleuses[10].

Equipment for queen bee rearing included purchase of: mating nucleuses, Chinese niddles, cages for queen bee transport, LR frames with slats for production of queen cells and additional small equipment. Incomes and expenses of queen bee rearing at apiaries of different capacity, during one year, are presented in the following table (Table 3.):

[10] For apiary with capacity of 50 hives is calculated purchase of 10 mating nucleuses, for apiary with 100 hives is calculated purchase of 20 mating nucleuses and for apiary with 150 hives is calculated purchase of 30 mating nucleuses (purchase price of mating nucleuses = 29.00 €)

**Table 3.** *Income and expenses at the apiary during one year*

| **Income, €** | **Apiary capacity - 50 hives** | **Apiary capacity - 100 hives** | **Apiary capacity - 150 hives** |
|---|---|---|---|
| Queen bee[11] | 10,350.00 | 20,700.00 | 31,050.00 |
| **Expenses, €** | | | |
| *Sugar*[12] | 173.00 | 300.00 | 450.00 |
| *Medicine (complet)* | 110.00 | 200.00 | 300.00 |
| *Workers*[13] | 1,200.00 | 2,400.00 | 2,400.00 |
| Total | 1,483.00 | 2,900.00 | 3,150.00 |
| PROFIT | 8,867.00 | 17,800.00 | 27,900.00 |
| Net profit (-15%) | 7,537.00 | 15,130.00 | 23,715.00 |

**Source:** *Authors' calculation*

In the structure of expenses the largest part of expenses is related to labour force, which has seasonal character, in accordance with demands of queen bee rearing. With the increase of apiary capacity, increases the income derived from the sale of queen bees. The following table shows the profit from the sale of queen bees for the period of 20 years, as well as associated costs related to the queen bee rearing (Table 4.):

**Table 4.** *Income and expenses at apiary during 20 years*

| **Income/expenses, €** | **Apiary capacity - 50 hives** | **Apiary capacity - 100 hives** | **Apiary capacity - 150 hives** |
|---|---|---|---|
| Total income | 207,000.00 | 414,000.00 | 621,000.00 |
| Total expenses without amortization | 29,650.00 | 58,000.00 | 63,000.00 |
| amortization (5% annualy) | 8,144.00 | 16,123.00 | 23,982.00 |
| Profit | 169,206.00 | 339,877.00 | 534,019.00 |
| Net profit (-15%) | 143,825.00 | 288,896.00 | 453,915.00 |

**Source:** *Authors' calculation*

[11] Calculated selling price of queen bee is 7.5 €.

[12] Calculated amount of sugar per colony is 5 kg by price 0.69 €. In apiaries with 100 and 150 hives calculated sugar price is 0.60 €/kg.

[13] For apiary with 50 hives number of workers is 1; for apiary with 100 and 15 hives number of workers is 2. All workers work in period of three months for monthly payment of 300.00 €.

For the period of 20 years, all equipment used in the production is completely amortized. The largest economic effect in queen bee rearing is achieved in beekeepers with the largest number of hives, 150 hives.

For the assessment of the investment project in this paper is used static evaluation of the economic efficiency of investments: cost of production, accumulation of production and period of investment return. Static evaluation of economic efficiency of investments is based on simple statistic methods which are being calculated using parameters from only one average year of project exploitation (Subić, 2010).

Economics of production is presented by *efficiency coefficient*, which represents ratio between total income and total expenses and it is being calculated using the following formula:

$$K_E=Up/Ur$$

Where: $K_E$ - efficiency coefficient, Up - total income, Ur - total expenses.

Investment project is economically efficient i.e. investment is profitable when total income is larger than total expenditure that is when $\kappa_E>1$.

Accumulativity (rentability) of production represents the ratio between profit (net effect) and total income. It is expressed trough the *rate of accumulation* and calculated using the following formula:

$$S_A=D/Up \times 100$$

Where: $S_A$ - rate of accumulation, D - profit (net), Up - total income

Investment is accumulative when $C_A>p_k$.

Period of investment return is calculated using the following formula:

$$T=I_{pv}/D$$

Where: T - period of investment return, Ipv - estimated value of investment, D - profit (net)

In the following table is presented economic evaluation of investing into queen bee rearing at apiaries of different capacity (Table 5.).

**Table 5.** *Economic estimation of investing in queen bee rearing*

| Economic estimation of investing | Apiary capacity - 50 hives | Apiary capacity - 100 hives | Apiary capacity - 150 hives |
|---|---|---|---|
| Efficiency coefficient | 6.98 | 7.14 | 9.86 |
| Rate of accumulation, % | 88.48 | 89.67 | 94.46 |
| Period of investment return, in years | 1.13 | 1.12 | 1.06 |

**Source:** *Authors' calculation*

From the table it can be seen that production in all three cases is economical, because the efficiency coefficinet is > 1, i.e. the investment is economical because the total income excess total expenses. The investment project is profitable and the most profitable is at the apiary with 150 hives. Period of investment return is the fastest in the case of the apiary with the highest capacity and it is one year and 0.72 months.

## Conclusion

From the presented economic analysis can be seen that in the production of queen bees positive financial effects can be achieved. Commercial queen bee rearing is a very profitable activity where the major effect is achieved at the apiaries of the highest capacity. Period of investment return is the fastest in the case of the apiary with the highest capacity even though the time difference in terms of return of investment between apiaries of different capacity is very low.

This analysis showed that although the initial investment is high, the invested funds are returned very quickly so that beekeeper is placed, upon return of investments, in a very favorable position for the next production cycle (Mladenović et al., 2011).

The overall conclusions of the analysis presented in this paper are as follows:

- In the commercial production of queen bees, with the aforementioned material costs, prices and yields, positive financial effects are generated,
- Production is economical and the most economical it is at the apiary with the highest capacity,
- Production is accumulative and the most acumulative is the one with the highest capacity,
- Time of investment return ranges from one year and 1.56 months, in the case of 50 beehives, up to one year and 0.72 months in the case of 150 hives.

Rearing of quality queen bees considers cooperation of beekepers with appropriate scientific and professional institutions with experience in this business. Scientific and technical institutions should, together with the beekepeer, monitore the health of bees at the apiary where production takes place. Queen bee rearing would improve the development of beekeeping in Serbia and would improve the financial situation of not only beekeepers but also producers of agricultural products, processing industry and trade. In Serbia, beekeeping can activate and normalize the life of an impoverished population, especially families who have been left without a safe source of existence (Mladenović et al., 2011).

Also, given that the comercial queen bee rearing is technically a bit more demanding work, in relation to the production of honey, beekeepers should receive trainings in this kind of production which would contribute to the development of family farms focused on beekeeping in Serbia.

To achieve better results in the production, it is necessary to expand the production capacity of the farm. In Serbia, there is a tradition of beekeeping so we can say with certainty that any improvement of this production will have a positive impact on the overall development of family farms in our country and therefore on the foreign trade balance of the Republic (Mladenović et al., 2011).

## References


1. Andrić Jovan, Vasiljević Zorica, Sredojević J. Zorica (2005): *Investicije - osnove planiranja i analize*, Univerzitet u Beogradu, Poljoprivredni fakultet, Beograd;

2. Dr Mladenović Mića, Mr Orović G. Dragan, dipl.ing. Milosavljević M. Saša (2011): *Uticaj povećanja proizvodnih kapaciteta na profitabilnost u pčelarskoj proizvodnji*, Ekonomika poljoprivrede, Specijalni broj, knjiga I, Vol. LVIII, Beograd, str. 349 - 356;

3. Mladenović Mića, Stevanović Gvozden (2003): *Uzgajanje visokokvalitetnih matica*, Poljoprivredni fakultet Zemun, Izdavačko preduzeće „Zavet“, Beograd;

4. Petrović Boža, Popović Slavomir (1995): *Pčelarski priručnik - uzgoj matica*, Beograd;

5. Relić Branko (2007): *Stacionarno pčelarenje*, PARTENON, Beograd;

6. Doc. dr Subić Jonel (2010): *Specifičnosti procesa investiranja u poljoprivredi*, Monografija, Institut za ekonomiku poljoprivrede, Beograd;

7. Umeljić Veroljub (2010): *Pčelarstvo - od početnika do profesionalca*, drugo izdanje, Kragujevac;

8. Queen Rearing for Commercial and Hobby Beekeepers, http://www.glenn-apiaries.com/queenrear.html (posećeno dana 06.02.2014).

# SHEEP FARMING GENETIC IMPROVEMENT AS SPECIFIC CONCEPT OF PIROT MUNICIPALITY RURAL AREA[1]

*Cvijan Mekić [2], Predrag Perišić[3]*

## Abstract

*This paper lays out the condition of the animal husbandry production in Republic of Serbia and Pirot municipality; therefore it shows the potential of the municipality for further development. Municipality of Pirot covers the area of 1.235 km$^2$ out of which meadows takes up 13.980 ha, and pastures 32.754 ha, which makes totally 62% of the agricultural land and predisposes this area for animal husbandry production. By improvement of genetic base of Pirot pramenka by crossbreeding new more productive genotype was created, pirot enhanced sheep which produces lambs of high quality for meat production. Therefore the need to have geographic origin seal has surfaced as this type of production can be significant exporting brand because demand for pirot lambs is very high, not only on domestic market but on foreign markets too, especially Arabic countries. Unfortunately not enough of lambs are being produced so increase in sheep farming and sheep production is needed. Rural areas such as Pirot municipality terrain represent unused resource not just for conventional food production but for development of sustainable agricultural production especially organic animal husbandry.*

**Key words:** *Pirot municipality, agricultural resources, sheep farming development, pirot enhanced sheep, organic animal husbandry production, sustainable development*

## Introduction

Large number of factors influences the agricultural development; they are usually systematized in three basic groups: natural, demographic and

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economical. It is very hard to measure exact influence of single factor as their roles and significance change in different stages of social-economic development of one country (*Tomić i Ševarlić, 2010*).

Basic characteristic of multi-decennial state of Serbian agriculture is economic devastation and constant decrease of farmer's income. This manifests through extraction of surplus value from agriculture in favor of three sectors: industry, trade and banking *(Mekić i Novaković, 2013).* Therefore agriculture in Serbia is in very bad state. Livestock fund has been depleted, since the beginning of the nineties livestock fund was being gradually decreased two to three percent and now it is at historic minimum. According to Republic institute for statistics of Republic of Serbia compared with the ten year average (2003-2012) total number of cattle is lower by 11,7%; swine by 10,7%; horses by 16,9%; while the number of sheep has been increased by 4,1%, goats by 42,8% and poultry by 25,4%. However, on 01.12.2013 compared to previous condition total number of cattle has been decreased by 0,8%, sheep by 1,2%; goat by 2,9%; horses by 7,7%; poultry by 3,0%, and number of swine was increased by 0,2%.

## Livestock products production

Meat production has fallen from 600.000 tons (in 90-ies) to 465.000 tons (2012). In the year 2012 82.000 tons of beef was produced, 22.000 tons of mutton, 252.000 tons of pork and 94.000 tons of poultry. Compared to 2010 production of beef has been decreased by 14.000 tons, mutton by 2.000 tons and compared to 2011 pork production has been decreased by 9.000 tons in same period. Serbia has preferential quote for exporting baby beef to EU which is 8.870 tons, and only 10% is being exported. (Table1).

**Table 1.** *Animal husbandry production*

| Year | Milk | | | Meat | | | | Eggs, million pcs | Wool, t |
|---|---|---|---|---|---|---|---|---|---|
| | Cattle mil., l | Sheep, mil., l | Goat, mil., l | Beef, thou.., t | Mutton, thou., t | Pork, thou., t | Poultry, thou., t | | |
| Republic of Serbia | | | | | | | | | |
| 2010 | 1462 | 10 | 15 | 96 | 23 | 269 | 84 | 1219 | 2461 |
| 2011 | 1434 | 11 | 15 | 81 | 24 | 271 | 103 | 1219 | 2385 |
| 2012 | 1442 | 11 | 24 | 82 | 22 | 252 | 94 | 1388 | 2662 |

**Source:** *Republic institute for statistic without data for APE Kosovo and Metohia*

According to the first results of agriculture census 2012 in Republic of Serbia there are 631.122 agricultural farms out of which: 628.555 family farms and 2.567 (0,41%) of industrial private ownership farms. Agricultural farms use/work upon 3.355.859 ha of agricultural lands. Average agricultural farm in Serbia uses 4,5 ha of arable land, owns one tractor, keeps one cattle, four swine, three sheep, 26 chicken and one beehive. Due to this facts exchange of goods with the world during the period January-December 2012 was 4.187 million USD, out of which export was 2.176,8 and import 1.470,2 million USD.

In this period agricultural sector has achieved surplus in world trade of 1.246,6 million USD, which is by 3.5 % less than in the last year. If we compare this period with same period in 2011 agricultural sector had 0,7% higher export while at the same time import was increased by 4,7%. In Serbian agricultural sector import was covered with export with 184,8%, while in the same period of the last year coverage was 191,9%.

Most important products of agricultural sector in export during January-December 2012 were: yellow corn in the value of 541 million USD; white sugar 164 million USD, frozen Roland raspberry 136 million USD; sunflower oil 96 million USD; soft drinks 64 million USD and soya oil 55 million USD. According to the agricultural sector export structure most commonly present were grains 30,86%, fruits and vegetable 19,85%, drink 7,84% and oils7,21%.

Therefore, in the agricultural products export animal husbandry products are completely marginalized, and that implies that Serbia has to increase its export of animal husbandry products if there is a desire to increase the production. When we look at demographic and natural resources Serbian agriculture has potential to export goods and that should be the part of strategic plan of Serbian agricultural development (*Ševarlić i sar. 2008*).

Even though that there is unsatisfying number of livestock compared to available resources, Serbian livestock fund represents significant development resource. The condition for the resource to be fully utilized is that genetic potential of cattle should be intensively improved as well as technology and production organization.

Aim of this paper is to lay out the condition and problems of animal husbandry in Republic of Serbia as well as development perspectives, improvement of sheep farming at the Pirot municipality territory, improvement of the genetic potential of autochthonous pirotpramenka sheep breed with goal to create more productive genotype which produces more mutton and milk which can be branded exporting goods. Natural resources such as healthy environment, rich waters, forests, traditionally good attitude towards nature and animal husbandry, possibility of organic food production, creation of brands, products with geographic seal, and possibility of development of rural tourism are the chances for development of the analyzed municipality.

## General information about PirotCounty

Pirot County is located at Southeastern part of Serbia. 105.654 people live at the area of 2.764 $km^2$, (43 people/$km^2$), 2002 census. Within county of Pirot are four municipalities: Babušnica (15.734 people); Bela Palanka (14.381); Dimitrovgrad (11.748) and Pirot (63.791 people). Next to four municipalities, within the county there are 216 villages.

## Pirot municipality

Pirot municipality covers the area of 1.235 $km^2$, on which there are more than seventy settlements and town Pirot. According to 2002 census within Pirot municipality 63.791 people live there (table2). Pirot municipality is located at southeastern Serbia between Nish and Sofia, at corridor 10 which connects Europe with Asia.

**Table 2.** *Population of Pirot municipality*

| | **Gender** | | | | **Total** | |
|---|---|---|---|---|---|---|
| | ♂ | | ♀ | | | |
| | **Census 1991** | **Census 2002** | **Census 1991** | **Census 2002** | **Census 1991** | **Census 2002** |
| Urban | 20.175 | 20.243 | 20.092 | 20.435 | 40.267 | 40.678 |
| Village | 13.982 | 11.758 | 13.409 | 11.355 | 27.391 | 23.113 |

**Source:** *Republic institute for statistic – 2002 census.*

From the table2 it is visible that number of people in the period from 1991 to 2002 has decreased in rural area by 2.224 males (15,91%), while number of females was decreased by 2.054 (15,32%), while the number

of people in urban areas is more or less constant. We can make conclusion that population of Pirot municipality was decreased in the period of 1991-2002 by the 3.867 people or 5,71%. In table 3 age structure of Pirot municipality population is shown.

**Table 3.** *Age structure of the Pirot municipality population*

| Age | Population | | Percent | |
|---|---|---|---|---|
| | Census 1991. | Census 2002. | Census 1991. | Census 2002. |
| 0-4 years | 3.866 | 2.620 | 5,71 | 4,11 |
| 5-19 years | 12.263 | 10.630 | 18,12 | 16,66 |
| 20-59 years | 51.304 | 34.142 | 75,83 | 53,52 |
| Over 60 years | 14.346 | 15.984 | 21,20 | 25,06 |

**Source:** *Republic institute for statistic - 2002 census.*

Unlike most of Eastern Serbian municipalities which are in state of very high demographic age, Pirot municipality is in slightly better position, but is also characterized with high demographic age.

The absolute and relative increase of population in old category is present while number of school children is being decreased (table3). Working population is also very important part of socio-economic development and it represents approximately 65% population.

## Natural resources of Pirot municipality

Pirot municipality territory is 1235 $km^2$, average maximal temperature is 18,42$^oC$, and average minimal temperature is 5,95$^oC$. Terrain is divided in to mountain area 40%, hilly area and planes each 30%. Forests take up 34% of total territory, meadows, pastures, lakes, clear spring water, endemic plants and Nature Park on "Stara Planina" are all significant natural resources.

Agricultural land at Pirot municipality takes up to 69.854 ha. Arable land and gardens 19.691 ha, from this surface for wheat 9.455 ha is used, for vegetables 2.084 ha, fodder crops 4.442 ha. Orchards take up to 1.752 ha; vineyards 1.658 ha, meadows take up to 13.980 ha and pastures 32.754 ha. Meadows and pastures make 62% of agricultural land and predispose this area for animal husbandry production. Arable land is in the valleys near the Nisava and Jarma rivers.

Agricultural production in Pirot municipality area has decreasing tendency and it falls back in terms of the real potential which is predisposed by available agro ecological and other conditions. To the volume and structure of agricultural production very high influence were following factors:

- Most of the farms are mixed and old age households who are mainly oriented to natural production.
- Average area surface per household is relatively small, with great number of small parcels, which significantly increases the use of mechanization and makes the efficient organization of work processes hard.
- Men working labor was mainly employed in the industry and outside of municipality area so on farms mainly old men and women were working.
- Small number of specialized farms.
- Agricultural production structure is mainly of natural character, and that is why available capacities are not fully utilized.

To these quoted factors, factors which are mutual for entire republic should be added. Investments in agriculture are significantly lower than what they should be considering its part in national production.

## Animal husbandry

From the economic point of view animal husbandry is the most significant and wide spread branch of agriculture at the Pirot municipality territory. For the well-known reasons, identical with other farming regions in Serbia number of basic domestic animal breeds is decreasing, this is especially true for "StaraPlanina" region. It is evidentthat number of domestic animals is decreasing much faster in this region than in entire Republic of Serbia. Special problem is enormous decrease in number of most significant and commonly distributed animal breeds in this area – sheep number was decreased 5.9 times and cattle number decreased three times.

Animal husbandry volume (milk, meat) does not decrease at the same rate as number of animals due to improvement of racial composition and increasing of the production per animal. However this fact does not ease the negative tendencies which are at work in this branch of agriculture. In

the cattle racial composition most present breed is domestic spotted cattle within the Simmental type, for sheep domestic pramenka strain that was improved with svrljig and pirot improved sheep and for swine it is the meat production oriented breed in the Landrace type, Pietren and Duroc.

Main reasons of long term tendency of decrease in livestock fund at Pirot municipality area are:

a) Neglecting of agriculture during the long period;
b) Economic deterioration of the village;
c) Decrease in internal market demand, which reflects through decrease in consumption of basic animal husbandry products (meat and milk) per head and total; and
d) Difficulty of placing the products on world market during the long period of time due to many reasons who with their negative consequences are very significant: (1) long term sanctions, (2) failing to fulfill European (and world) quality standards.

During the 2007 Veterinary service has conducted series of activities among which included detailed count of all the breeds of animals and poultry from the Pirot municipality county entire area. According to their data territory of Pirot municipality in the year 2007 had: 18.056 sheep, 6.831 cattle, 6.912 pigs, 80.438 poultry and 4.537 goats.

Relatively small numbers of animals are being reared in the farm system.Up until the end of eighties in Pirot County which next to the Pirot municipality has BelaPalanka area, Babusnica and Dimitrovgrad there were over 20.000 small farm animals, mostly sheep.

Today only experimental sheep farm under the ownership of Agriculture Institution is being operational, 400-500 sheep (Pirot improved) are being reared there.

On the Pirot municipality territory approximately 500 private small farms have approximately more than 100 sheep per farm. Unfortunately it is very hard to come to reliable information regarding the production volume because of two groups of reasons:

a) Dominant share of natural production in total production;
b) Incomplete follow-up and inconsistency in collecting and processing statistical data.

By comparing the available data regarding the land it can be concluded that there are great reserves for significant increase of animal husbandry production.

## Modern sheep farming concept

Main goal in intensive sheep farming today is the production of large quantities of high quality mutton per sheep during one year and increasing of the usage period, maintaining large quality of milk yield and as last goal to increase wool quality and yield.

## Genetic improvement of our sheep

Improvement of the genetic capacities and change of racial structure of the sheep in Republic of Serbia should be realized by following these steps: a) rearing domestic strains of Pramenka sheep in pure breed in order to preserve genetic resources; b) by changing the genetic base of specific number of Pramenka sheep and creation of new consistent populations and strains; c) directing the selection and building on existing good traits of mix breeds within the defined breeding programs. Having this in mind concept of genetic improvement of the sheep in the mountain-hilly area of Republic of Serbia would be following:

In mountain-hilly areas new populations should be made which would be more productive lighter type, dual production direction (meat-wool), with maintaining the milk yield on high level.

In the scope of genetic concept combination crossing should be used. For maternal base specially selected pramenka strains (pirot, sjenica, svrljig) and others should be used, as well as genetically identified groups of mix breeds. As paternal base lighter merino type rams such as Württemberg breed should be used.

Main point of this paper is to create programmed population with specific gene combination and production traits where body weight of fully grown ewes would be 50-55 kg, rams 70-77 kg; unwashed wool yield per ewe 3-3,5 kg per ram 4-5 kg; diameter of the wool fiber 25-28 micrometers; string length 10-12 cm; fertility 120%; milk yield during the lactation 80-90 kg; solid constitution and good health.

Breeding conditions should be improved in any case compared to traditional Pramenka breeding (bad accommodation, bad and inadequate diet etc.). We can take creation of Pirot improved sheep as an example of improvement of the Pirot pramenka sheep.

## Creation of pirot improved sheep

As everything was changing in Pirot area the need to increase sheep productivity was being felt. Meat yield had to be increased (heavier types, early maturing and higher fertility rate), as well as other products, especially quality and quantity of the wool. The textile industry was blooming during the 50ies of the last century and wool had to be imported as our own pramenka wool could have been used only for making carpets. Domestic breed wool did not satisfy the ever growing demands of textile industry with its quality.

Pirot area was well known for its sheep production and it was one of the best sheep farming areas not just in Republic of Serbia but in the area of the former Yugoslavia. After the world war two there was a plan to improve the sheep farming in this area. By changing the primitive way of sheep rearing with more intensive one, which meant that this area should have more productive type of sheep that is more productive than autochthonous type that was present in this area, sheep that would have high wool yield, better fiber quality, more meat and good milk yiled in improved breeding conditions.

This work started by forming the experimental sheep farming station in Pirot1954 when in this area 280.000 were reared (*Belićisar., 1986*). Experimental station formed its own farm by buying 190 sheep of domestic pirotpramenka breed. With that material they started improvement of the sheep farming of Pirot area by implementing new zootecnical measures in sheep farming (using the crossbreeding methods, artificial insemination, maintaining proper diet). 1955 experimental station had imported 34 ewes and 7 rams Arles Merino breed from France, 1956 fifty more ewes and ten more rams of same breed were imported. With this material well planned improvement of pirotpramenka was started. Purpose of import of this breed rams was to create the good rams for usage in insemination stations for artificial insemination with aim to get good mix breeds.

In order to improve pirotpramenka French Arles Merino breed was firstly used, because that breed is of the size of pirotpramenka and is very adaptable and it does not have high housing and dieting demands, yet it's very resistant to different ecological conditions and diseases. It was created in similar breeding conditions as pramenka breed but it produces fine wool and what is very important it easily passes on that trait on its offspring by making crossbreeds with rough wool breeds. Moreover it had excellent milk yield characteristics which were all very important for choosing that exact type for improvement of pirotpramenka.

After producing the mix breeds of second returning generation between Arles Merino and pirotpramenka with traits which were wanted (medium quality wool and increase of the fleece weight), good milk yield and increased body weight, second improvement phase was applied. Plan was to maintain the achieved wool quality (A-quality) but to increase the fleece weight, maintain the milk yield at its present level, speed up the time needed to reach puberty (growth and growth rate). Goal was to create sheep that had three production types. To achieve that German Württemberg sheep was used as third breed, its rams were combined with mix breeds Arles Merino and pirotpramenka that were reared in inbreeding (second return generation).

First generation of those triple mix breeds showed in its first generation the justification for such type of gene combining, the wanted goal was achieved. Higher weights with faster growth, good milk yield and needed Aquality of the wool was achieved. Second return generation was slightly unified regarding the genotype and phenotype; it was multiplied furthermore within its type constantly selected for triple production traits meat-milk-wool.

Creation scheme of the Pirot improved sheep

1) ♂W* x ♀$F_1$ (♂A* x ♀P*)
2) ♂W x ♀$P_1$ [(♂A x ♀$F_1$ (♂A x ♀P)]
3) ♂W x ♀($P_1$ x $P_1$)

W* - Württemberg
A* -Arles Merino
P* -PirotPramenka.

Furthermore with goal to consolidate the breed through systematic mix breed selection, inbreeding was performed according to the specific rule:

A) ♀(♂W x ♀$F_1$) x ♂(♂W x ♀$F_1$)
B) ♀(♂W x $P_1$) x ♂(♂W x ♀$P_1$)
C) ♀[(♂W x ♀($P_1$ x $P_1$)] x ♂[♂W x ♀($P_1$ x $P_1$)]

These schematics clearly show two very important phases in creation of pirot improved sheep.

First phase crossbreeding of Arles Merino rams with PirotPramenka with return (repeated) crossbreeding with Arles Merino in order to get $F_2$generation, whose consistent forms were used for mutual breeding.

Second phase in creation of genetic base for new breed third breed was introduced (Württemberg) only rams for mix breeding with ewes of ($F_2$) mix breeds between Arles Merino and PirotPramenka.

By systematic selection of mix breeds and their inbreeding new population of sheep was created which was good for mountain-hilly area, though it gives excellent results if reared in the planes too. Pirot improved breed is considered to be sheep of medium big size, as its average ridge height is approximately 67 cm. Body weight of breeding sheep is averagely between 60 and 65 kg for ewes and 100-120 kg for rams. Both gender sheep have well-formed white color wool cover. Fleece is enclosed and made from cylindrical strains. From the eyes up to the nose tip, ears, lower leg parts from knee and false knee joints up to the hoop are covered with white hair. Animals are of solid constitution, of very lively temperament. Averate yearly **unwashed wool yield** is approximately 4 kg for ewes and 8 kg for rams. Fleece thickness is approximately 7 cm. Wool fiber diameter is 23-26 micrometers. **Milk production** is from 60-90 kg with 7,5 – 8% milk fat content, which depends on breeding conditions. **Lamb body weight at birth** is 4,15-4,75 kg. Body weight at the age of 12 months is 60 kg for males and 45 kg for females. **Sheep fertility** is good, so depending on the diet from 100 ewes approximately 115-140 lambs can be obtained.

Based on this traits the general conclusion can be made that with combination breeding of three breeds Improved Pirot breed was created which is significantly bigger and has significantly higher production than its maternal base breed Pirot Pramenka, it is well adapted for mountain-hilly areas of southeastern and eastern Serbian regions. Therefore, having in mind that from total sheep fund in Serbia 80% is belongs to Pirot Pramenka of low production traits (meat, wool and milk) in future period

in order to increase production in sheep farming it is needed to change the racial composition of our sheep populations.

## Geographic origin seal for Pirot mutton

Majority of well-known products, such is Pirot mutton in Republic of Serbia was not registered, has no geographic seal.
Our agricultural products should be protected by geographic seal because:

- Possibility for product to achieve higher price on domestic and foreign market;
- Obtaining recognizable protected product at the market;
- Direct connection of the product with the area from where it came which gives it additional value;
- Protection of product from illegal copying and misuse.

With that goal the need to build base of all agricultural products that fulfill demands for geographic seal protection should be created. Database will enable full view of real potentials and will be of great significance in building the future long-term strategy with goal to help the farmers.

## Why geographic origin seal

It enables the farmers to:

- Separate their product from similar ones at the market;
- Exclusive right to use specific name;
- Higher value and higher demand for the product;
- Additional value in all production chain segments;
- Copyright protection;
- Preserving of tradition which is high potential for torurism development;
- Development of the village and usage of local resources.

It enables the buyers to know:

- Origin– from which region product originates;
- Tradition–product has characteristics which are specific for the region and its heritage, based on natural and human factors

- Special quality – quality control is done by independent organizations according to the control measures which are defined for entire production process.

Geographic seal identifies specific product that it comes from specific territory, specific country, regionetc, where specific quality, reputation can be given and that separates that specific product from the rest of the similar products.

Products with geographic seal guarantee that its specificity and quality are created in a natural way and are specific for the climate, land, breed, strain and tradition, knowledge and skills that are transferred from generation to generation.

## Perspectives for development of organic food production

Based on above mentioned facts about Pirot municipality region it can be said that on that area there is possibility for increasing the animal husbandry production and for organic farming, therefore for making organic products, meat, milk, milk products which are in high demand in our country and in European Union countries.

Our country has great potentials for organic farming development, especially for organic ruminant rearing. Most of the natural meadows and pastures are in hilly-mountain areas where because of depopulation agriculture has completely died. Those are ideal conditions for organic animal husbandry, as there are no highly developed industries and there is no economic base for sudden big development projects. Approximately 85% Republic of Serbia territory is rural area. Up until now those areas were neglected and devastated mainly in economic and demographic sense, but they are untouched in ecological sense. It is up to us to make this disadvantage in to our advantage, therefore we need to turn towards the villages, by developing them and financially support them which also is European trend.

## Main characteristics of organic animal husbandry production

– One of the significant goals of organic animal husbandry is securing all animals optimal living conditions, natural behavior and satisfying of their most significant needs.

– Increased number of consumers that demand that their food is biologically valuable and natural influence that organic products are more and more in demand.

– Organic agriculture complies with ecological agriculture and it does not represent new branch of agriculture, however in order for one farm to be called "organic" specific numerous conditions have to be met, considering that this type of production differs greatly from conventional, and especially from industrialized animal husbandry.

– Majority of differences is in demands that at organic farms great attention is given to protection and preservation of environment.

– One of the solutions which can stop degradation of environment is transition from conventional to organic agriculture.

– Mountain-hilly area agriculture is very close to organic agriculture. Great area of agricultural lands can be certified even without conversion.

– For organic production it is important that domestic breeds and strains of cattle and sheep are used who are adapted for specific breeding conditions. Animal reproduction should be natural, artificial insemination is allowed. Hormonally induced estrus is not allowed, embryo-transfer, genetic manipulation and usage of breeds that are product of genetic engineering is not allowed either.

– Pirot municipality territory has all needed conditions for high production of ecologic products of high value and making of special marketing brand. Through development of that production it is possible to use all unused natural resources which can have direct influence on further economic development of the municipality.

– With goal to realize planned programs agricultural economic measure policy will have big role, especially prices policies, marketing policies. Special role will be allowing credits for the start of the production and creation of social funds, investment funds, trading policies and different forms of subventions for farmers.

– Compared to other productions, labor in animal husbandry is hardest and most complex but it has least value at the market. In this type of production real criteria cannot be expressed because of two main reasons:

**First** – animal husbandry products, milk and meat cannot be kept for long at the producers, which is the case for other branches of agriculture (heat, corn), but they have to be placed on the market as soon as possible or given for further processing.

**Second**– animal husbandry products have to be when the time is right placed at the market (when animal achieves specific weight or just after the milking, milk has to be taken to the market). All this is accepted for granted by the market, but it should not be so with government policies.

## Conclusion

Even though its high importance animal husbandry in Serbia is in very big crysis. Number of animals in Serbia in the last decade (2003-2012) is decreased: cattle by 11,7%, swine – 10,7%, horses – 16,9%, while the number of sheep was increased by 4,1%, goats by 42,8% and poultry by 25,4%.

However, on 01.12.2013 compared to previous condition total number of cattle has been decreased by 0,8%, sheep by 1,2%; goat by 2,9%; horses by 7,7%; poultry by 3,0%, and number of swine was increased by 0,2%. Meat production has fallen from 600.000 tons (in 90-ies) to 465.000 tons (2012). In the year 2012 82.000 tons of beef was produced, 22.000 tons of mutton, 252.000 tons of pork and 94.000 tons of poultry.

Cause for this condition should be also looked for in the bad price parities, loss of market, lowered buying power of people, bad financing systems, and low agricultural budget. In order to overcome existing problems there is a need to define the unified development program.

- Pirot municipality has the area of 1.235 $km^2$, where according to 2002 census 63.791 people live. Out of that area meadows are at the 13.980 ha and pastures at 32.754 ha which makes 62% agricultural land which predispositions this area for animal husbandry production.

- Number of cattle and sheep at Pirot municipality territory is significantly below the expected, considering the available resources.

- Concept of modern sheep farming should be based on principle of expanding the number of new sheep population – pirot improved sheep not just on Pirot municipality territory but in all regions.

- Pirot mutton should be registered and geographic origin seal should be obtained – which is not done till now.

- Pirot municipality territory is area of unpolluted nature, and its ideal area for sustainable agricultural production – production of organic healthy food through development of organic cattle and sheep farming. This program must be directed towards: production organization based on world standards in this area, improvement of racial structure, increasing of the number of animals at family farms. Program must contain measures of agricultural policies that will come from state.

- Base for developing agriculture and food industry in the Republic of Serbia and Pirot region is that we should have export concentrated production. Only long-term well planned production can contribute to faster development of animal husbandry and enable Republic of Serbia to enter the international market of animal products.

## References


1. Anon (1991): *EEC. The Council of the European Community.* Regulation on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs to include livestock production.Regulation (EEC) No. 2092/91.

2. Belić J., Vidanović M., PetrovićM. (1986): *Stvaranje rase ovaca za brdsko-planinske predele Srbije (Pirotska oplemenjena ovca).* Srpska akademija nauka i umetnosti, Beograd, (posebna izdanja) knjiga DLXXI.

3. Birkas Marta, Szalai T., Nyarai F., Holló S. (1995): *Soil cultivation and production systems of sustainable farming*. Bult. Of the Univ. Of Agric. Sci. Gödöllö.

4. Bradford G-E. (1999): *Contributions of animal agniculture to meeting global human food demand.* Livestock Production Science, 59:95-112.

5. Council Regulation – EC (1999): *No 1804/99 of July 1999 supplementing Regulation (EEC) No. 2092/91 on organic procudtion of agricultural products.*Officiol Journal, L 222/24/08/1999/, 1-28.

6. De Weit T.C., Huisman H., Rabinge R. (1987): *Agriculture and its environment: Are there other ways.* Agricultural Systems, 23 (211-236).

7. Mekić C. (1990): *Uticaj tipa rođenja i različitog sistema gajenja na porast jagnjadi i proizvodne osobine pirotske oplemenjene populacije.* Zbornik radova Poljoprivrednog fakulteta, Beograd, God. 35, Sv. 594, Str. 119-140.

8. Mekić C., Trifunović G., Hristov S., Zorica Novaković (2011): *Stanje i mogućnosti razvoja stočarstva i turizma na prostoru pešterske visoravni.* VI međunarodni naučni skup, Mediteranski dani – Turizam i ruralni razvoj. Tematski zbornik, ISBN 978-99955-6642051, str. 331-339. Izdavač Sajamski grad DOO Trebinje.

9. Mekić C., Krajinović M., Petrović P.M. (2012): *Position, possibilities and directions of development of sheep production in Republic of Serbia.* The First International Symposium On Animal Science, (invited paper) Book I (15-24). Faculty of agriculture, University of Belgrade, Serbia.

10. Mekić C., Novaković Zorica (2012): *Possibilities for development of sustainable livestock production at the territory of the CrnaTrava municipality* (OriginalScientific Paper). Institut of Agricultural Economics, Belgrade. International Scientific Meeting , Sustainable Agriculture and Rural Development in Terms of The Republic of Serbia Strategic Goals Realization Within the Danube Region, preservation of rural values. Book of Abstracts, 6-8$^{th}$ (10), ISBN 978-86-6269-018-0,Tara.

11. Mekić C., Novaković Zorica (2012): *Mogućnosti razvoja stočarstva u funkciji preduzetništva i turizma u Opštini Crna Trava*. Mediteranski dani, Trebinje. VII naučni skup sa međunarodnim učešćem „Turizam: Izazovi i mogućnosti“, Trebinje, 20-22 septembra 2012. Tematski zbornik radova, Ekonomski institut, Beograd (135-143) ISBN:978-86-7329-096-6.

12. Mekić C., Zorica Novaković(2013): *Development of the animal husbandry as concept of preservation of the Sjenica municipality rural area*. International Scientific Conference"Sustainalbe Agriculture and Rural Development in Terms of the Republics of Serbia Starategic Goals Realization Within the Danube Region" (Thematic Proceedings), December, 5-7th2013, Hotel "Oplenac", Topola-Serbia, str. 903-920, ISBN 978-86-6269-026-5.

13. Ministarstvo životne sredine, rudarstva i prostornog planiranja: *"Regionalni i prostorni plan za područja nišavskog, topličkog i pirotskog upravnog okruga".* Niš-Beograd, 2011.

14. Miroslava Milojić (1991): *Biološko (prirodno, ekološko, organsko) stočarstvo.* Ekonomika poljoprivrede, (38) 6-7-8, 303-310.

15. Nenadić M., Žujović M., Petrović P.M. (1991): *Mogućnost ovčarstva i kozarstva za proizvodnju biološke hrane u brdsko-planinskom području*. Ekonomika poljoprivrede, vol. 38 (9) 483-486.

16. Republički zavod za statistiku Srbije: *"Opštine u Srbiji",* 2008.

17. Republički zavod za statistiku: *Saopštenje broj 035*, god. LXIV – Statistika poljoprivrede, 20.02.2014.

18. Ševarlić M., Tomić D., Bugarin Đ. (2008): *Kritički osvrt na prilagođavanje agrarne politike ZAP-u.* Tematski zbornik Agrarna i ruralna politika u Srbiji, (2) DEAS, Beograd, str. 9-18.

19. Skupština Opština Pirot: *"Strategija razvoja poljoprivrede na području Opštine Pirot do 2015. godine".*Pirot, 2008.

20. *Statitički godišnjak Republike Srbije za 2012*.

21. Tomić D., Popović Vesna, Šumljanac – Šećerov Mirjana (2007): *Održiva poljoprivreda – osnova ruralnog razvoja – Evropska iskustva*. Ekonomika poljoprivrede, vol. 54 (1) 85-90.

22. Tomić D., Ševarlić M. (2010): *Stanje i perspektive poljoprivrede Srbije u uslovima krize.*Škola Biznisa, broj 2/2010, UDC 631.1:338, 124, 4 (497.11).

# TOURIST SATISFACTION WITH PERCEIVED VALUES ON TRADITIONAL FARMS IN AP VOJVODINA[1]

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## Abstract

*The paper analyzes how perceived values influence different aspects of visitors' satisfaction, and whether there are significant differences between tourists depending on which age group they belong to or with whom they are traveling. Research was conducted on seven traditional farms (salasz) after tourists finished their trip. According to that, this paper is structured into the following parts: first, a review of relevant literature in order to pose the main theoretical arguments, then the research conducted on farms, and finally the discussion of results and their implications. The results of the research may be useful for farm owners and managers and others directly involved in agritourism for improving management and efficient targeting of its guests. This paper may be a stimulus for further research, in view of the importance of the theme and due to the very modest number of previously conducted research in Serbia.*

**Key words:** *tourist satisfaction, perceived values, traditional farms, AP Vojvodina, Serbia*

## Introduction

Rural tourism and its forms, such as village and agritourism, are a significant part of the tourist industry with great potential for continuous growth. These forms of tourism have numerous dimensions such as economic, sociological,

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cultural and educational and represent a complex phenomenon that has turned into a major source of revenue, employment and well-being of the environment in which they are developing. As a result, the tourist satisfaction has become the key factor for survival and development of a tourist destination.

Bowen and Clarke (2002) believe that tourist satisfaction is key judgment for measuring a tourism service. One of the most relevant areas of research in tourism is to understand what drives satisfaction for a tourist (Prebensen, 2006) since satisfied tourists will recommend destinations to others and repeat their visit.

The rural tourist offer of AP Vojvodina includes several significant tourist products such as traditional farms, tourist villages, ethnic houses, village architecture and village manifestations. In spite of the existence of good potentials, the offer is uncoordinated, still insufficiently attractive and often intended for the imprecisely defined tourist segment. The traditional farms characterized by the traditional way of life, earning and housing with the preservation of elements of customs are a specific part of the rural tourism of AP Vojvodina (Ćurčić, Bjeljac, 2008). The majority of the traditional farms are located in northern Bačka (around Subotica and Palić), in southern Bačka (near Novi Sad) and along the road Novi Sad – Zrenjanin and the greatest part is located along the main road corridors.

There is no accurate data about the number of traditional farms that are active in tourism, which makes the research much more difficult, however, according to some assumptions; more than 30 traditional farms offer tourist amenities. Due to their close ties to the local population, the traditional farms may be a powerful asset for local development, hence, it is investigated hereinafter how perceived values influence different aspects of visitors' satisfaction, and whether there are significant differences between tourists depending on which age group they belong to or with whom they are traveling.

## Tourist satisfaction: conceptual background

Tourist satisfaction has been defined in various ways in the existing literature. Hansemark and Albinson (2004) believe that satisfaction is an emotional reaction to the difference between what customers anticipate and what they receive. Neal and Gursoy (2008) stated that tourist satisfaction is the result from the expectations about the destination based on previous images and from tourist assessment of the outcome of their experience at the destination area.

Researchers have identified that the major driving factors of tourist satisfaction are destination image (Lee, Lee, Lee, 2005), tourist expectations (Bosque, Martin, Collado, 2006), perceived quality (González, Comesaña, Brea, 2007) and perceived value (Lee, Yoon, Lee, 2007).

As one of the key factors, perceived value is defined as the comparison between benefits and price of product or service (Zeithaml, 1988). Perceived value is related to customer satisfaction. Satisfaction will be created if tourists perceive that the quality of service or product that they used is greater than the money paid for them (Sadeh et al., 2012).

Satisfied visitor is one of the most important components of tourism business since it has influence on the selection of the destination, the consumption of products and services, publicity and the decision to return (Kozak, Rimmington, 2000; Bhat, Qadir, 2013).

Although the research about tourist satisfaction is quite extensive, a limited number of researches are dealing with visitor satisfaction in agritourism. For example, Malkanthi and Routray (2012) evaluated satisfaction of domestic and foreign visitors in Sri Lanka using 21 attributes divided into five different aspects and discovered that local visitors express higher level of satisfaction. Also, they concluded that the possibility of revisiting the destinations is low for both groups and there is the necessity for improving some aspect of demand (entertainment activities, educational programs, improving the road conditions etc.).

Hilchey and Kuchn (2006) analyzed an agritourism market in New York showing that visitors were highly satisfied with the agritourism operations. Coomber and Lim (2004) analyses whether there are significant differences between the expectations and perceptions of participants of a guided tour in an organic farm in Australia. This research has shown that the participants have found the farm experience to be enjoyable and have felt comfortable with the farm environment.

## Farm (salasz) tourism in AP Vojvodina

Farm tourist (salasz) is a term designating the tourism offer on the Vojvodina farms, as a specific form of traditional agricultural farmsteads and makes a specific segment of rural tourism (Ćurčić, Bjeljac, 2008) because they provide an authentic experience due to their appearance, furnishings and traditional way of life. The salasz implies an individual agricultural estate separated from the context of grouped settlements, villages and towns, which

besides the residential buildings also have service buildings that are used for accommodation of agricultural produce, cattle and agricultural machines (Ćupurdija, 1993). It is assumed that they began to be built in the middle of the 18th century, whereas the majority of these farms were built in the second half of the 19th and first decades of the 20th century. In the last couple of years these farms were activated for tourism in order to revive them (Košić, 2012).

Until recently the farms in Vojvodina represented one of the important forms of life and work of their population, and the food production that was going on at the farms was the basis of development of the Vojvodina cuisine. The authentic gastronomic specialties prepared even today and offered to the tourists (poultry soup with home-made noodles, cooked meat with sauce, bacon, cracklings, suet rolls, poppy seed and current strudel, home-made brandy and wine) are indicators of the attempt of the local population to preserve the local culture and present it to the tourists that are visiting them.

The farms in Vojvodina are grouped on the basis of closeness to the major places (city or village):

- Somborski salaszi – the tourists are offered, beside the comfortable houses, farms without water, electricity and with old traditional furnishing. Among the best known farms from this group is Dida Hornjakov salasz;

- Čenejski salaszi – the rich and developed agriculture of this area was very significant throughout history, both for the Čenejski salaszi, as well as for the population of Novi Sad, close to which they are located. The most attractive for the tourists are the Salasz 137, Volić salasz, Mitin salasz and Naš salasz;

- Bečejski salaszi – there had been no significant attempts of activation of the farms in the Bečej municipality to date, nor had there been any significant attempts of activation of the farms for tourism. Devising an adequate program would make these farms an interesting offer;

- Subotica salaszi – the farms of northern Bačka were formed on the sites of medieval villages, and some of the best known Subotica salaszi with developed offer for tourism are Rokin salaš, Majkin and Cvetni salasz.

From the existing salaszi that were activated for tourism, seven were selected randomly (Table 1.). The selected salaszi are the ones that offer accommodation, located close to villages or cities and their values can be an attractive tourist product. They were used to analyze the tourist satisfaction with all the aspects of the offer.

**Table 1.** *Examination of tourist satisfaction at chosen salasz*

| Name of salasz | Location | Accommodation capacities | Activities |
|---|---|---|---|
| Katai salasz | Mali Iđoš | 1/2 - 4<br>apartment - 4 | Domestic animals, riding of horses and donkeys, tractor ride, handcrafts, visiting of bakery and ethno-museums, lake, walking tours, collecting of medical herbs |
| Mitin salasz | Čenej | 1/2 - 3 | Riding , horseback riding lessons, birthday parties |
| Babin salasz | Žabalj | apartment - 5 | Domestic animals, ethno-houses, production of fruits and fruit liqueurs |
| Đeram | Mokrin | apartment - 2 | Domestic animals, workshop of souvenirs, strawhouse with ethno display |
| Cvetni salasz | Palić | 1/2 – 15 | Riding, swimming in the pool, riding in hackney-coach, fishing, sports terrains |
| Debeli lad | Žabalj | 1/2 - 2<br>apartment - 1 | - |
| salasz 137 | Čenej | 1/2 - 10<br>1/3 - 3 | School of riding and recreational riding, riding in hackney-coach/sleigh, sports terrains, vine tasting, golf school, archery |

**Source:** *www.salasi.info; information provided by owners and managers of chosen* salasz

## Methodology

Questionnaire design

The questionnaire was structured with satisfaction items based on a review of the related literature in agritourism and tourism (Malkanthi, Routra, 2012; Park, Nunkoo, 2013; Kozak, 2001). Respondents were asked to rate the importance of 16 agritourism attributes divided into four groups at the end of their trip (Table 2). The questionnaire consisted of three parts. Part 1 included seven demographic and trip related questions.

Part 2 consisted of statements related to the data collected on the perceived values for the 16 attributes. All attributes were measured on a five-point Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied). Part 3 included two additional questions related to tourist destination loyalty (revisit intention and recommendation intention) measured also with five point Likert scale ranging from 1 (completely disagree) to 5 (completely agree).

**Table 2.** *Description of selected agritourism attributes*

| Attributes | Description |
|---|---|
| **Service and facilities** | |
| Cleanliness of accommodation | Cleaning of accommodation unit |
| Quality of food at farm | Range of dishes, portion, local authentic dishes |
| Water and electricity supply at salasz | Salasz has electric power and water supply (particularly hot water) |
| Other accommodation facilities | Chairs, beds, bed sheets, towel, bathrooms, telephones, television, Internet, reading materials… |
| Variety in farm activities | Activities during the stay are well developed and organized |
| **Staff members** | |
| Helpfulness | The level of helping visitors when required |
| Friendliness | How friendly they were with the visitors |
| Courtesy | How faithful and polite they were to the visitors |
| **Surrounding environment** | |
| Natural beauty | The level of the natural beauty and greenery of the environment |
| Friendliness of local residents | How friendly and hospitable the local residents were |
| Road condition to the destination | Quality of the roads to the salasz |
| Safety and protection of the area | Available strategies for safety and protection such as police, hospitals, fire brigades… |
| **Price level** | |
| For food and drinks | Price food and drinks available on salasz |
| For accommodation | Price of accommodations (room, apartment) |
| Off the farm products and other items | Price of items such as fresh fruits, vegetables, jam, milk products, souvenirs |
| Overall value for money | Reasonable prices of products and services |

**Source:** *Malkanthi and Routray (2012); authors descriptions*

Data collection analysis

Data were collected during four months (July, August, September and October) 2013 in the seven Vojvodina salaszi that have developed tourism. The respondents for this research were composed of tourists who spent at least one night on farmstead. The researchers asked the owners and managers to deliver a questionnaire to their guests after they check out. They showed their support and helped out during the research as the findings would be useful for them as well. A cover letter was attached to the questionnaires in order to explain the purpose of the study and respondents were assured that the survey was anonymous, confidential and voluntary.

A total of 250 questionnaires were distributed and after examining the questionnaires, those questionnaires that were fully completed by the

respondents were kept. Of the 210 returned questionnaires, 12 were incomplete which makes that the usable questionnaires for this study were 198.

Data analysis

To examine the characteristics of agritourists in Vojvodina and their satisfaction with their travel experience, two types of statistical analysis were conducted. First, a descriptive analysis was conducted to study the visitors' demographic features in order to identify their profiles and trip characteristics.

Second, statistical comparisons were made using One-way Analysis of Variance (ANOVA) to determine whether statistical differences existed among tourist belonging to one age group, or depending with whom they are traveling, in their satisfaction with services and facilities, staff members, surrounding environment, price level and their intention to return and to recommend farmstead to others. The Statistical Package for the Social Sciences (SPSS Version 17) was used to perform all of these statistical analyses.

## Findings and recommendation

Demographic profiles of the visitors

In Table 3, are presented the results of the descriptive analysis of the important demographic characteristics of the visitors. The gender of respondents was fairly distributed, with 46.5% males and 53.5% females. With respect to the respondents' age a considerable number of respondents are between 21 to 30 years old (31.8%). Education level of respondents was fairly distributed among secondary (48.5%) and degree educational level (51%).

Furthermore, a very high level of visitors was employed (67.7%). With regard to the respondents' income, 41.4% respondents were receiving a monthly income between 301 and 500 euro. Mostly, respondents are traveling with spouse (37.9%). According to this information, it is clear that the visitors of salaszs are in the young and middle age, educated, employed but with lower income level. This information can be helpful to understand the needs of this category of visitors.

**Table 3.** *Demographic Profile of the Respondents*

| Descriptions | Frequency | Percentage | Cumulative (%) |
|---|---|---|---|
| **Gender:** | | | |
| Male | 92 | 46.5 | 46.5 |
| Female | 106 | 53.5 | 100 |
| **Age:** | | | |
| 21-30 | 63 | 31.8 | 31.8 |
| 31-40 | 44 | 22.2 | 54.0 |
| 41-50 | 50 | 25.3 | 79.3 |
| 51-60 | 31 | 15.7 | 94.9 |
| Above 61 | 10 | 5.1 | 100.0 |
| **Employment status:** | | | |
| Student | 24 | 12.1 | 12.1 |
| Employed | 134 | 67.7 | 79.8 |
| Unemployed | 27 | 13.6 | 93.4 |
| Retired | 13 | 6.6 | 100.0 |
| **Education level:** | | | |
| Primary | 1 | 0.5 | 0.5 |
| Secondary | 96 | 48.5 | 49.0 |
| Degree | 101 | 51.0 | 100.0 |
| **Household income per month in euro:** | | | |
| Less than 300 | 73 | 36.9 | 36.0 |
| 301-500 | 82 | 41.4 | 78.3 |
| 501-700 | 8 | 4.0 | 82.3 |
| Without income | 35 | 17.7 | 100.0 |
| **Traveling with:** | | | |
| Husband /wife | 75 | 37.9 | 37.9 |
| Family (with children) | 62 | 31.3 | 69.2 |
| Friend | 61 | 30.8 | 100.0 |

**Source:** *Data obtained applying statistical method*

Satisfactory and dissatisfactory attributes on traditional farms

In order to determine the satisfaction of tourists an arithmetic mean and minimum and maximum values were determined for each of the 16 attributes. In the segment "services and facilities" the tourists were most satisfied with the quality and diversity of food as well as water and electric power supply in the accommodation units. The employees at the salasz were estimated as extremely hospitable, whereas within the segment "surrounding environment", the tourists were most satisfied with the *natural beauty* and *friendliness and courtesy of local residents.* In the last segment („price level"), none of the

attributes received a high score. The obtained results indicate that the attributes the tourists were most satisfied with could be used to attract the tourists to the salasz, making an emphasis on the food quality, kindness of the hosts and the local community and wonderful natural environment in combination with marketing slogans that suit the specific segment of guests.

Tourists are most dissatisfied with *road condition to the destination, price level of food and drinks* and with *variety in farm activities*. The salaszi are located near villages and the road quality is often of very poor quality, particularly the roads leading to the very salasz which are drawn in from the main road. There is no paved or gravel road to certain salaszi, and in bad weather conditions reaching the facility is difficult. The owners of the salaszi should solve these problems. It is also necessary to take care that the salasz has an adequate parking area considering that the majority of tourists come with their own vehicles. Although the tourists were extremely satisfied with the quality and diversity of food, they consider the prices to be rather high and consider that the prices need to be adjusted to their means, or that an offer should be provided that will tend to certain categories of tourists (students, pensioners, families). The tourists consider that the activities during the stay are not adequately organized and conceived. Certain salasz have numerous activities that a tourist may engage in during the stay, but these are often intended solely for organized groups. However, the tourists most often come independently and have a very limited or no choice regarding the activities that would make their stay complete. It is necessary to enrich the tourist product of the salasz activities that will acquaint the guests with the life at these places, so that the stay would not boil down only to overnight stay or a visit lasting couple of hours with consumption of food. This leaves a dissatisfied tourist.

Satisfaction level of tourists depending on the age group they belong to:

In the "Services and facilities" the tourists from different age categories are most satisfied with the cleanliness of accommodation units they stayed in, quality and diversity of offered food as well as electric power and water supply in the accommodation units. The next variable (*level of other accommodation facilities*) shows differences in the satisfaction among tourists. Least satisfied tourists with this segment are those aged from 21 to 30 and tourists from 31 to 40 years, whereas the most satisfied are tourists aged from 41 to 50 years. Very often the tourists aged from 21 to 40 years expect certain standards and greater comfort during the tourist stay; however, they can in no way be identical to the hotel facilities in the cities. Providing small things like a radio set with CD where relaxing music can be played, interesting book a tourist can find on his table, house slippers and sufficient number of towels does not

require great investment and can certainly affect the satisfaction and pleasant stay of the tourists. If the owners of the salaszi are unable to invest additional assets to provide services such as separate bathroom for each room, available Internet connection and telephone in each accommodation unit and similar, thus raising the quality of services to a higher level, it is necessary to provide the tourists with adequate (true and objective) information before the beginning of travel so as not to result in great differences between the anticipations and perception, which can reflect significantly on the total satisfaction. Furthermore, there are differences in satisfaction with respect to variable *variety in farm activities*. Almost all the tourists gave a low score for this variable, and the tourists aged from 51 to 60 and tourists from 21 to 30 are least satisfied with the additional activities, whereas somewhat higher satisfaction was declared by tourists aged over 61 years. It is necessary to come up with activities that will be age appropriate to the segments of tourists and their needs (e.g. cooking classes and preparation of winter food provisions for women below the age of 45, possibility of feeding animal for children aged up to 10, animation programs where children aged up to 15 will learn about medicinal herbs from that area, history and life on the salasz, walks and fishing in the nearby lake or river for those aged above 55, etc.).

In the category "Staff members", almost all tourist age groups expressed great satisfaction with the variable *friendliness* perceiving their hosts as extremely pleasant. A difference can be observed in the variable *helpfulness*. Tourists aged from 21 to 30 and 31 to 40 were less satisfied with the helpfulness of the hosts when addressed, whereas the other age categories expressed satisfaction with this variable. The obtained results could be interpreted by the fact that the majority of people working on the salasz are aged over 40 and that there is a certain generation gap and lack of understanding for the needs of the younger generations. In order to realize a successful two-way communication and raise the guest satisfaction, it is necessary to learn more about the habits and lifestyles of these two groups of tourists. Furthermore, a certain number of tourists were neutral with respect to the variables, which can be interpreted by the fact that they did not need additional help and information from the hosts during the stay. Almost all tourist groups did not clearly define their position regarding the variable *courtesy;* hence, it may be considered that this variable was not crucial for forming the feeling of satisfaction with the provided services and stay.

In the category "Surrounding environment", all tourist groups expressed their satisfaction with the variable *natural beauty* and *friendliness and courtesy of local residents.* Isolation from the urban noise, slower pace of living, peace and quiet, preserved natural environment are the main characteristics of the

salasz that attract the tourists. A friendly and positive attitude of the local population towards the tourists shows the existence of support by the local community to the tourist development and perceiving of tourism as one of the revitalization factors of the area. The tourists of all age categories are least satisfied with the variable *road condition to the destination*. Tourists spend a couple of hours on the salasz or stay over the weekend, and the quick and easy access is an essential factor in the choice of the destination.

Out of all the categories the tourists were least satisfied with the "price level" and consider that the prices of products and services are out of the price range suited to their incomes. The tourists aged over 61 and from 21 to 30 are least satisfied with the variables *price for food and drinks* and *price for accommodation*. Such a result was expected considering that these are tourists disposing with more modest incomes. These categories are made up of persons that have just started working, and their beginners' salaries are lower than the average, whereas the groups of tourists over 61 years are pensioners with modest incomes. Furthermore, these groups of tourists consider that the prices of products and services are not affordable (*overall value for money*) which can also be interpreted as a result of their modest incomes. The most satisfied with this variable are tourists in the category from 51 to 60 and from 31 to 40. The tourists from the first category (51-60 years) are most often married couples that have achieved their goals (raised and educated their children, "released" them into the world, have financial security) and reached a certain level of maturity, with the quality being the most important criteria in the choice of any activity or purchase. They are ready to set aside a significant amount of money for such quality.

Furthermore, a unilateral variance analysis was performed (ANOVA) in order to determine whether there is a difference between the tourists of different age groups with respect to each variable. A statistically significant difference appeared in two variables (*friendliness* and *price of the farm products and other items*).

The ANOVA test was followed by an analysis using the Post hoc tests in order to determine the existence of difference between groups. With respect to the variable *friendliness*, none of the groups was particularly singled out. It is not disputable that there is a difference, but such result may indicate the need of a greater sample of respondents. As for the variable *price of farm products and other items,* the lowest score was realized by tourists belonging to the category above 61 years, whereas the tourists aged from 41 to 50 had the highest score.

**Table 4.** *Comparison of tourist satisfaction (age differences) using ANOVA test*

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| | | **Sum of Squares** | **Df** | **Mean Square** | **F** | **Sig.** |
| **Friendliness** | **Between Groups** | 5,226 | 4 | 1,307 | 5,318 | ,000 |
| | **Within Groups** | 47,420 | 193 | ,246 | | |
| | **Total** | 52,646 | 197 | | | |
| **Price for Farm Products** | **Between Groups** | 6,229 | 4 | 1,557 | 2,520 | ,043 |
| | **Within Groups** | 119,251 | 193 | ,618 | | |
| | **Total** | 125,480 | 197 | | | |

**Source:** *Statistically processed data*

Tourist satisfaction level depending on the travel partner

Regardless of who they arrived with at the salasz, all the tourist groups were satisfied with the variable *quality of food at accommodation, adequacy of water and electricity supply at accommodation, friendliness of staff members, natural beauty of surrounding environment* and *friendliness and courtesy of local residents.* The tourists were least satisfied with the *variety in farm activities* and with *road condition to the destination*. It proved again that the additional activities represent the weakest point of the tourist offer. Those tourists that stayed with friends were least satisfied with the existing activities, however, in the obtained results there are also two other categories. Due to the specific life and work on the salasz, the organization of activities is often one of the main motives for the visits by tourists. However, inadequate and activities characterized by the absence of creativity will lower the guests' satisfaction.

A unilateral analysis of variance (ANOVA) was performed and showed a statistically significant difference in two variances (*helpfulness* and *price for the food and drinks*). Those that arrived with the family were less satisfied with the variable *helpfulness* from those that came with the family, whereas the most satisfied were those that spent the vacation with the spouse. The relation of employees in a tourist facility or destination towards the guests' children was one of the important factors affecting satisfaction, hence, it is necessary to devote additional attention to this group of tourists, particularly their children. The guests that came with friends were least satisfied, whereas those that came with their spouses were most satisfied with the price of good and drinks. Such a result could be expected considering that those that travel with friends are younger persons, mostly students or persons that have just started working and have limited financial means.

**Table 5.** *Comparison of tourist satisfaction (depends with whom they are traveling) using ANOVA test*

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| | | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| **Helpfulness** | **Between Groups** | 3,453 | 2 | 1,726 | 3,077 | ,048 |
| | **Within Groups** | 109,421 | 195 | ,561 | | |
| | **Total** | 112,874 | 197 | | | |
| **Price for Food and Drinks** | **Between Groups** | 6,794 | 2 | 3,397 | 3,515 | ,032 |
| | **Within Groups** | 188,478 | 195 | ,967 | | |
| | **Total** | 195,273 | 197 | | | |

**Source:** *Statistically processed data*

Overall satisfaction and future behavior

Regarding the intention of the respondents to revisit the same salasz in the forthcoming period, most of the respondents (34.8%) declared that they have a neutral position i.e. that there is no clear position on this matter. This group of respondents represented an important segment to which the owners and managers of the salasz need to devote additional attention in order to generate a positive attitude regarding a return visit. Almost one half of the respondents (25.8% of those that completely agree and 22.2% those that agree) is ready to visit the same salasz again. However, when comparing the age groups, a difference is observed. The respondents that belong to the age group from 21 to 30 are least ready to revisit the same salasz, which was to be expected to a certain extent, considering that this category of tourists if rarely loyal to a single destination because they are searching for tourist experiences always on new locations. The maximum readiness to spend their next tourist travel on the salasz was exhibited by the age category above 61 years, followed by the respondents aged from 51 to 60 years. These two groups of tourists belong to the most loyal tourists, considering that when they find a destination that suits their needs, they rarely change it. Depending on who they are traveling with, the greatest readiness to return again to the same destination was shown by those traveling with the spouses, whereas the least readiness was shown by those traveling with the family (children). This result can be interpreted by the fact that the married couples with children are the most demanding tourists considering that the safety and quality of service for the children is most important. Therefore, it is necessary to improve the segments they were dissatisfied with during their stay. Answering the question "Would you recommend the salasz to your friends and family?", 44.9% respondents replied that they "completely agree" and 32.8% that they agree, whereas 19.7% was indecisive, which was a rather positive attitude. If the respondents are considered according to age categories, the recommendation will be given

mostly by respondents aged from 51 to 60, and least by those that belong to the category from 31 to 40. These results coincide with those related to whom the respondents would travel with because they show that the salasz will be recommended by those traveling with the spouse (majority of respondents in the category 51-60 and 41-50), whereas those that came with the family (most of the respondents in the category 31-40 years) have a negative or neutral attitude regarding the recommendation.

With respect to the complete satisfaction of the respondents, the greatest satisfaction was shown by the respondents from the age category over 61 years and those traveling with spouse, whereas least satisfaction was shown by the respondents in the category from 21 to 30 years and those traveling with the family. In order to achieve a great number of repeated visits, the salasz owners and managers need to undertake additional marketing activities, particularly those tourists that have taken a neutral position on this issue. The hosts could make a modest gift (souvenir) to these guests at the end of the stay, which can be a postcard with the salasz motif in which they will personally thank the guest for the visit (putting the guest's name and surname), and then give them the possibility to state their opinion of the stay and services they have consumed, so that the guest could see that the host cares about their opinion. It is necessary for the host to stay in contact with the guests, which is possible by e-mail or sms messages, informing them about the news on the salasz or by sending messages on the important dates (birthdays, New Year and similar). Furthermore, it is necessary to occasionally organize sweepstakes (sweepstakes may be a weekend for two, weekend for the family, formal lunch at the salasz). Although the tourists that belong to the age group from 21 to 30 are least loyal to a single destination and facility, the analysis showed that this very group is least satisfied with the existing tourist product and services offered at the salasz. Therefore, one of the primary tasks of the hosts in the forthcoming period needs to be adapting the product to this age group. The families with children are one of the most important and most demanding segments of salasz tourism, therefore, it will depend on the diversity of the offered activities (domestic animals, open area for play, different entertainment programs) and quality of services (high level of cleanliness of the facilities, quality food, pleasant staff) whether they will return to the same facility and recommend it to other (very often other families with children). This group of tourists is ready to spend a significant sum of money if the facility provides amenities for their children. Although the current tourist product of the salasz is adapted mainly to the needs of tourists that belong to the age category from 51 to 60 years and over 61 years, and although they belong to the most loyal tourists, it is necessary to focus the marketing activities in the forthcoming period also to these groups of tourist in order not to lose their trust.

## Conclusion

This paper analyzes the tourist satisfaction with perceived values on the traditional farms (salasz) in Vojvodina. The tourists evaluated 16 attributes divided into four categories (*Services and facilities*, *Staff members*, *Surrounding environment* and *Price level*), expressing their readiness to return again to the same facility and recommend it to others, evaluating this way the degree of their loyalty. Determination of the degree of tourist satisfaction was made in relation to age group the tourists belong to and with who they travelled, namely, stayed with at the salasz.

The analyzed data showed that there is general satisfaction of tourists with several variables - *quality of food at accommodation*, *friendliness of staff members*, *natural beauty of surrounding environment* and *friendliness and courtesy of local residents*. The positively evaluated variables need to be emphasized, particularly in the marketing activities, maintaining at the same time the current or improving their quality. The obtained results indicate that the salasz owners must pay attention to several variables the tourists were dissatisfied with, these being the *variety in farm activities*, *road condition to the destination* and *price for food and drinks* (which reflects negatively on the variable *overall value for money*). The tourists aged from 21 to 30 years and from 51 to 60 are least satisfied with the existing additional activities on the salasz, namely, tourists that stayed with friends and family, which shows that the current tourist product is not adapted to these segments. In order to achieve better business results the salasz owners need to create a tourist product that will provide the tourists with special experience, and a need is imposed to reinvestigate the price structure of offered services. Before that, it is necessary to learn the needs, habits, lifestyles of potential guests because the tourist satisfaction will depend on their fulfillment. The salasz owners may create the offer taking into account the age group the tourist belongs to or depending on whom they are travelling with, but also combining these two factors. This paper may be significant to all those engaged in salasz tourism, but also to other forms of rural tourism because the understanding of variables that affect the guest (tourist) satisfaction will determine the degree of success of business operation and is a key element to achieve greater competitiveness in the tourist market.

## References

1. Bhat, M. A., Qadir, N. (2013): *Tourist Satisfaction in Kashmir: An Empirical Assessment.* Journal of Business Theory and Practice, Scholink Co., LTD, London, vol. 1(1), pp.152-166.

2. Bosque, A.R., Martín, H.S., Collado J. (2006): *The role of expectations in the consumer satisfaction formation process: Empirical evidence in the travel agency sector*. Tourism Management, Pergamon, Oxford, vol. 27(4), pp. 410-419.

3. Bowen, D., Clarke, J. (2002): *Reflection on tourism satisfaction research: Past, present and future.* Journal of Vacation Marketing, Sage Publications Ltd., London, vol. 8(4), pp. 297–308.

4. Coomber, L., Lim, C. (2004). *Farm Tourism: A Preliminary Study of Participants' Expectations and Perceptions of Farm Tours*. In: Complexity and Integrated Resources Management (ed. C. Pahl-Wostl, S. Schmidt, A.E. Rizzoli, A.J. Jakeman), pp. 1363-1367, International Environmental and Modelling Software Society, Manno Switzerland.

5. Ćupurdija, B. (1993): *Stambena arhitketura subotičkih salaša*. Prometej, Novi Sad.

6. Ćurčić, N., Bjeljac, Ž. (2008): *Vojvodina Traditional Farms as Characteristic Tourist Destinations.* 6th International Scietific Conference „Management in the Function of Increasing the Tourism Consumption", Opatija, Faculty of Tourism and Hospitality management, pp. 91-100.

7. González, M.E.A., Comesaña, L.R., Brea, J.A.F. (2007): *Assessing tourist behavioral intentions through perceived service quality and customer satisfaction*. Journal of Business Research, Elsevier Inc., New York, vol. 60(2), pp. 153-160.

8. Hilchey, D., Kuehn, D. (2006): *Agritourism in New York: A Market Analysis*, available on http://www.uvm.edu/tourismresearch/ agritourism/ research/nyagtourmarkets.pdf (accessed on 15th January 2014).

9. Košić, K. (2012): *Ruralni turizam Vojvodine*, monografija. Prirodno-matematički fakultet, Departman za geografiju, turizam i hotelijerstvo, Novi Sad.

10. Kozak, M. (2001): *Comparative assessment of tourist satisfaction with destinations across two nationalities*. Tourism Management, Pergamon, Oxford, vol. 22(4), pp. 391- 401.

11. Lee, C.K., Lee, Y.K., Lee, B.K. (2005): *Korea's destination image formed by the 2002 World Cup*. Annals of Tourism Research, Pergamon, Oxford, vol. **32**(4), pp. 839-858.

12. Lee, C.K., Yoon, Y.S., Lee, S.K. (2007): *Investigating the relationships among perceived value, satisfaction, and recommendations: The case of the Korean DMZ*. Tourism Management, Pergamon, Oxford, vol. 28(2), pp. 204-214.

13. Malkanthi, S.H., Routra, J. (2012): *Visitor satisfaction in agritourism and its implications for agritourism farmers in Sri Lanka*. International Journal of Agricultural Management, Iranian Association of Agricultural Economic, vol. 2(1), pp. 17-30.

14. Neal, J.D., Gursoy, D. (2008): *A Multifaceted Analysis of Tourism Satisfaction*. Journal of Travel Research, Sage Publications, Inc, London, vol. 47(1), pp.53-62.

15. Park, D-B., Nunkoo, R. (2013): *Structural Relationships among Service Quality, Satisfaction, and Loyalty: The Moderating Effects of Tourists' Motivation*. Available on: http://sites.uom.ac.mu/wtochair/attachments/article/83/Nunkoo%20-%20The%20Moderating%20Effects%20of%20Tourists% 20%20Motivation.pdf (accessed on 15th January 2014).

16. Prebensen, N.K. (2006): *A grammar of motives for understanding individual tourist behaviour*, master thesis. Norvegian School of Economics and Business Administration, Department of Strategy and Management.

17. Sadeh, E., Asgari, F., Mousavi, L., Sadeh, S. (2012): *Factors Affecting Tourist Satisfaction and Its Consequences.* Journal of Basic and Applied Scientific Research, vol. 2(2), pp. 1557-1560.

18. Strategija razvoja turizma Republike Srbije (2006), Ekonomski fakultet Beograd, Horwath Consulting Zagreb.

19. Zeithaml, V.A. (1988): *Consumer perceptions of price, quality and value: a means-end model and synthesis of evidence*. Journal of Marketing, American Marketing Association, Chicago, vol. 52, pp. 2-22.

# SWOT ANALYSIS IN THE FUNCTION OF SUSTAINABLE AGRICULTURE DEVELOPMENT IN THE MUNICIPALITY OF KANJIZA[1]

*Gordana Dozet, Gorica Cvijanović*[2]

*„The one who wants to make a difference – is seeking for means, and the one who doesn't – is looking for excuse."*
Arabic proverb

**Abstract**

*Agriculture is one of the most important branches of the economy in the municipality of Kanjiza. The aim of this study was to analyze the current situation and possibilities for improvement of agriculture in the Kanjiza municipality using the SWOT analysis in terms of sustainable development. This would give the recommendations about the most important potentials for agricultural development of Kanjiza municipality. Organic farming is a complex process that requires a lot of time in the implementation, the inclusion of new and modification of conventional production methods. It requires full engagement of the community through adoption of the legal framework and subventions for production certification. To speed up the process of agricultural development in the municipality of Kanjiza, intensification of primary agricultural production is inevitable. It is necessary to protect the trademark - the protection of geographical origin of spice pepper.*

**Key words:** *sustainable development, Municipality of Kanjiza, agriculture, SWOT analysis*

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## Introduction

Agriculture is one of the most important branches of the economy. This doesn't relate only to Serbia, which has excellent conditions for development of agriculture, but also the entire planet. Thanks to agricutural production we are able to provide the necessary food for our survival. Bearing in mind that food is necessary for our survival; this implies that food production is necessary and something that will always have to exist.

Municipality of Kanjiza is located in the north of Vojvodina and belongs to the North Banat District. It occupies part of the Pannonian Basin, which extends throughout Vojvodina, partly Croatia and Romania and throughout Hungary. Municipality of Kanjiza is located in the Autonomous Province of Vojvodina and its neighboring municipalities are Novi Knezevac, Senta, Subotica, and its borders are the Tisa River and Serbian-Hungarian administrative border line. Its distance from major centers is as follows: from Subotica 40 km, from Novi Sad 120 km and from Belgrade 200 km.

Kanjiza municipality occupies an area of 400 $km^2$ and within the municipality there are 12 settlements: Adorjan, Doline, Horgoš, Male Pijace, Mali Pesak, Martonoš, Vojvoda Zimonić, Velebit, Trešnjevac, Novov Selo, Orom and Tototvo selo, and the administrative seat of the municipality Kanjiza.[3] The municipality is one with the most crowded traffic in Serbia. On the territory of Kanjiza municipality are two border crossings between Serbia and Hungary (Horgos, which presents the road-rail crossing and river border crossing on the Tisa). Kanjiza is in Pannonian Plain and because of that its altitude is very low, 87 meters in average. In geomorphological terms there are the following areas: Alluvial plain of Tisa, Loess terrace, Subotica Sands and Backa loess plateau.[4] Bearing in mind that it is in the Pannonian Plain it is clear that the climate is continental with hot summers and cold winters. In the last few years summers are getting longer and winters are getting shorter and colder. Since there are no mountains, territory of the municipality is under effects of various types of winds which bring various and specific weather characteristics. Climate of Kaniza is under effect of the Tisa river, as well as several lakes that are located in this territory or in neighboring municipalities. The great wealth of Kanjiza is represented by wells of thermal water that accumulated on the bed of an ancient sea. Water from these wells is used in medical treatments, and Kanjiza became known by its spa which is also used in recreational purposes.

[3] www.visitkanjiza.rs
[4] www.visitkanjiza.rs

Kanjiza is a municipality with a real opportunity for rapid economic development in the new conditions created by transition and with opportunities for economic integration. This development is based, among the other, on the assumption of geographic location and proximity to EU markets, entrepreneurial spirit of the local population, the existence of professional organizations that can influence the development and production of brand with a strong market position. In order to achieve the economic development of the municipality, it is necessary to develop a long-term and sustainable development strategy of the municipality of Kanjiza, with special emphasis on the analysis of the situation and the possibilities for the development of agriculture and its operationalization. Agricultural production is very diverse, and therefore provides great opportunities for various activities in which their actions could achieve small and medium businesses (Dozet et al., 2011). On food market, both domestic and international there is great competition for the high quality of sources or a specific geographical origin and there are the chances for greater success. Because of this marketing is very important, and Cvijanović D. (2000) points out that the marketing concept is the new orientation in the business of agro-industrial companies and is based on the needs of customers (consumers).

The aim of this study was to analyze the current situation and possibilities for improvement of agriculture in the municipality of Kanjiza using the SWOT analysis in terms of sustainable development. This would give the recommendations for the most important potentials for agricultural development of Kanjiza municipality.

## Sustainable Development

The term "sustainable development" is associated with the condition, and vulnerability of the environment. Since there must be considered the factor of time, this means that sustainability should be viewed as a process. In recent decades, the prevailing opinion is that sustainable applies to non-renewable and renewable resources (Cvijanović D. et al., 2011). The concept of sustainable development now lies in a central consideration in the long-term perspective of the progress of human society burdened with the consequences of the dramatic environmental degradation over the past century, a strong demographic pressure and the real limitations of natural resources (Đukanović, 1991). The concept of sustainable development of land has aro-ecological and socio-economic character, thanks to the awareness development of preservation of basic agricultural resources (Cvijanović G. and Dozet, 2012). The basis of sustainable development is the production of food and agriculture.

For sustainable development it is necessary to carry out strategies, not use renewable resources faster than they can be renewed. It has to rely more on alternative energy sources, encouraging biological cycles, recycle, composti organic waste, reduce waste production, etc. (Cvijanović G. et al., 2013).

## Agriculture of Municipality of Kanjiza

Current state and perspectives of agriculture development reflects the image obtained by analysis of existing conditions and opportunities, and thus the proposal of implementation of real solutions that municipality Kanjiza could enhance and sustain agricultural development. Agriculture has a long tradition in municipality and its development was very important for the residents who lived there in the past. In Horgos famous spice pepper was cultivated for more than a century. Natural features of any region, including the municipality of Kanjiza have a specific relevance. Several requirements should be fulfilled if a certain area could be recommend for agriculture. The first requirement to be met is certainly the existence of climatic conditions.

The first requirement is certainly the existence of climatic conditions. If there are no adequate climatic conditions, agricultural production is very difficult. In the analyzed municipality there are adequate conditions for the development of agriculture. Another factor that is important, and in some way connected with the climate issue is the issue of water and water management. In order to develop any form of agricultural production it requires water for irrigation or for livestock.

Soil conditions of a particular area are very important. The possibility of developing high-quality agriculture depends on the quality and type of soil, or to remain at a greater or lesser extent on extensive agriculture. Considering the above mentioned factors it can be the better way to present what conditions provides municipality of Kanjiza. In the sustainable development population is unavoidable (non) resource. In this respect important are age and educational structure of the population. The educational structure of the population defines the level of intensity, and extensiveness of agriculture.

In a further analysis of the situation and perspective of agricultural development of Kanizsa, as elementary aspect was used the overview of the current state of agriculture and the development strategy of the municipality of Kanjiza, in part related to agriculture.

Fertile chernozem has always allowed cultivation of industrial crops and vegetable farming, while the sandy areas allowed raising orchards and vineyards. The municipality of Kanjiza, precisely Horgos became famous for the industrial cultivation of peppers, sandy areas which extend to the Subotica became known for its high quality wines. Great advantage and wealth of Kanjiza is the River Tisa. Large amount of water that the river brings from its source allowed the farmers in the surrounding area of Kanjiza to irrigate their fields and thus achieve quality production. Good and intensive farming has given the basis for the development of industry. The raw material base created by agriculture influenced the development of the industry, especially the food, and we are now witnessing companies like Vitaminka and Iglo.

Large share in the economic development of the municipality of Kanjiza offers tourism, which in recent decades has further developed and raised to a higher level. This is made possible thanks to the good traffic connections, which is a positive feature of Kanjiza municipality. Economic and agricultural potential of the Kanjiza municipality is huge and there are basis in the coming years and decades, that the municipality will become one of the most developed municipalities in Serbia. Due to the huge economic potentials, which are reflected in the high quality agricultural land, oil and gas sources, as well as the thermal mineral springs, municipality Kanjiza offers great economic perspective This is improved by the proximity of Corridor 10, which passes through the municipality and begins or ends in Horgos which is one of the most important border crossings in Serbia. Kanjiza is rich in quality agricultural land, although the biggest companies are not in the agricultural sector or the food production. However, the total income, the food sectors has the highest share of over 30%, not including primary agricultural production.

## Soil as a Basic Resource of Kanjiza Municipality

The land is a prerequisite for agricultural production. Since the municipality of Kanjiza is located in the area of the Pannonian Basin, known for its high-quality land, which provides intensive agricultural production, it involves the development of vegetable growing, fruit growing, viticulture, but also lovestock production. The total area of Kanjiza municipality is 39.941 ha, of which the agricultural land is about 88 % or about 35.000 ha.[5] The largest agricultural areas are on the territory of Horgos, where is 7.679 ha or almost 22 % The total area.

[5] Služba za katastar nepokretnosti Kanjiže

**Table 1.** *Agricultural land by class of 2012th year*[6]

| Class of land | | | | | | | | In total |
|---|---|---|---|---|---|---|---|---|
| **I** | **II** | **III** | **IV** | **V** | **VI** | **VII** | **VIII** | |
| 3.439 | 6.869 | 12.324 | 8.315 | 3.166 | 1.231 | 4.598 | 0 | 39.942 |

**Source:** http://www.kanjiza.rs/dokumenti/2013/pdf/strategija_prelom_final.pdf

There is a division of the land in relation to the quality, so that agricultural land is classified (Tab. 1). The largest area is the land of class III or quality (12.324 ha). It is a good land that provides good agricultural production. Land of class IV occupies 8.315 ha or almost 21% of total arable land. Similar to class III, class IV meets the requirements of quality land. The best quality land (first class) takes 3.439 ha, and the second class land 6.869 ha. It should be noted that of the total agricultural, I, II, III and IV classes together occupy about 31.000 ha or almost 77.50 %, which is very important and good for the municipality that wants to develop a high-quality agricultural production and sustainable development. Areas that are under land V, VI and VII classes are predominantly used for livestock and grazing. Kanjiza has no land to be classified under category VIII (worst land in terms of quality).

From the point of ownership there are private and state-owned agricultural land. Analyses of ownership of the land showed that a greater percentage of the land is privately owned, then state-owned. On average, 66% of the land is privately owned and is processed. State-owned land includes arable land, forest and water area. When it comes to land under arable land, it is mainly in the lease of large companies, but also farmers from surrounding villages. This gives small businesses the ability to further develop and increase their production, and thus provide themselves and their families livelihoods. About 5% of the land is under other forms of ownership.

The largest areas of public land in the territory of the village Subotica, as well as the settlement Horgos, while the minimum area of public land in the village of Male Pijace. In Kanjiza and Horgos is the most common state land. In these areas it is necessary to develop the industry, especially in (immediate vicinity) Kanjiza, so it is very important to state institutions, or their local government has land that can be rearranged in the land for industrial zone Similarly, when it comes to settlement Horgos. In this neighborhood the industry is present, but

[6] www.kanjiza.rs

also it is a place where Corridor 10 passes, which requires large areas of transport infrastructure. Most of the agricultural land in the municipality is leased to large and small agricultural producers. Thanks to this the municipality of Kanjiza is able to raise significant funds that will allow further development.

Of course, these are not sufficient funds for major infrastructure projects such as railways or roads, but could be used for some smaller projects. Proposals for the investment of money from the lease are as follows:

1. Construction and/or reconstruction of wastewater and channels maintenance,
2. Bringing/availability of water for irrigation,
3. Construction and/or reconstruction of unclassified field roads,
4. Raising forest plantations and creation of forests under the control of local governments on the state owned agricultural land,
5. Maintenance of pastures,
6. Equipping agricultural keeping service.

Mentioned proposals rely on the idea of improving agricultural production and utilization of agricultural land.

The process of degradation and unidirectional reduction of arable land, affected by natural and anthropogenic factors, it is much more intensive than the process of creating the soil, and we can no longer talk about its renewability, but the potential renewability (Milanović et al. 2008). Land as a resource is not indestructible, and if it is not maintenanced it could be lost.

Therefore, the municipality undertook a series of measures to maximize the protection of agricultural land, which is reflected in raising windbreaks which should prevent erosion and the prevention of excessive use of chemical treatments. In addition, it is necessary to pay attention to land reclamation, in order to land that is fertile, and which in recent years was not used or is too neglected, to be transformed to its purpose.

According to the plan of the municipality of Kanjiza, for the period 2011-2030 it is foreseen reduction of the area under classical cultures and increases the area for buildings and ponds as a form of agricultural production (Tab. 2).

**Table 2**. *Showing existing and planned land structure in the municipality Kanjiza for the period 2011-2030.*[7]

| Ordinal | Use of space | Existing | | Planned | |
|---|---|---|---|---|---|
| | | Hectares | % | Hectares | % |
| 1. | Agricultural land | 35126 | 88.20 | 34689 | 87.00 |
| | Arable | 34705 | | 34030 | |
| | Fishpond | 421 | | 692 | |
| 2. | Forest land | 918 | 2.20 | 823 | 2.00 |
| 3. | Building land | 3468 | 8.60 | 4301 | 10.00 |
| 4. | Watershed land | 430 | 1.00 | 430 | 1.00 |
| | In total | 39942 | 100 | 39942 | 100 |

**Source:** http://www.kanjiza.rs/dokumenti/2013/pdf/strategija_prelom_final.pdf

Negative side is reflected in the fact that the area with agricultural land will be reduced, but the positive side can be seen in the fact that ther is a plan to increase the area under ponds. This reduction of arable land does not mean that there will be a reduction in agricultural production. Bearing in mind the increasing use of modern agro-technical measures, it is expected that despite the reduction in area of agricultural activity, total agricultural production can be increased. It will also lead to reduction in forest area, which is one of the biggest complaints, especially if we take into account the fact that the forest area is already small. Category of barren land includes building and water land. Building land includes land where are residential buildings and houses, as well as industrial plants and facilities for livestock, as well as road infrastructure.

Adequat assess the situation in agriculture of municipality of Kanjiza, required the analysis of the structure from the perspective of households and their. Farms, especially small family farms, represent a great potential for the development of not only the municipality but also the entire state, as well as provide secure livelihoods owners of farms, which reduce social pressure on state and society. Experience has shown that in countries where are mostly small family farms, there is a greater degree of social equality, bacause a large number of people is involved in the production, and the unemployment rate is lower than in countries where large agricultural companies dominate.

[7] www.kanjiza.rs

**Table 3.** *Structure of registered agricultural holdings to the surface to handle*[8]

| Households (ha) | Number of farms | Participation in the total number of farms (%) | Hectares | Participation in the total area (%) | Average (ha/ household) |
|---|---|---|---|---|---|
| **0-2** | 1577 | 50.35 | 1038.49 | 5.00 | 0.66 |
| **2-5** | 701 | 22.38 | 2283.43 | 11.00 | 3.26 |
| **5-10** | 409 | 13.06 | 2915.95 | 14.04 | 7.13 |
| **10-15** | 147 | 4.69 | 1795.44 | 8.65 | 12.21 |
| **15-30** | 172 | 5.49 | 3687.80 | 17.76 | 21.44 |
| **30-50** | 60 | 1.92 | 2270.77 | 10.94 | 37.85 |
| **50-100** | 52 | 1.66 | 3629.62 | 17.48 | 69.80 |
| **Upward of 100** | 14 | 0.45 | 3141.02 | 15.13 | 224.36 |
| **In total** | 3132 | 100.00 | 20762.52 | 10.000 | 6.63 |

**Source:** http://www.kanjiza.rs/dokumenti/2013/pdf/strategija_prelom_final.pdf

Table 3 shows the structure of the size of agricultural holdings. It is very important how big tare he households. In fact, these are registered households, meaning that the state in their plans, as it works in Kajniza municipality, and takes into account only the registered households and on this basis predicts production, as well as subventions necessary for the stimulation of agricultural production.

The highest number of households in the farm category is up to 2 ha. These farms make half of the total number of farms. Participation percentage (17.76%) of the total area are farms with an area of 15-30 ha. Observing such a state it can be said that the very small farms can not achieve high economic scale, and costs will in relation to income will be much higher, which would produce losses.

In addition to the arable land important is share of forest and water land. Forest land in the municipality of Kanjiza is located on 918 ha, or only 2.20%, which is, compared to the forest area in Vojvodina, in relation to the size of Vojvodina, below average because forests in Vojvodina occupy 6.64%. It is necessary to carry out afforestation on state land, as well as on private land. The issue of forests and forest lands is of the multiple and importance, because

[8] www.kanjiza.rs

this is an area where are many animals and insects that have a positive effect on the natural balance and have a beneficial impact on agriculture. Also, wind-protective belts act positively when it comes to soil erosion and thus enhance the quality of arable land.

Land under water in the municipality occupies 429.59 ha or 1% of the municipality. Adequate regulation of municipality, it is necessary to enable the exploitation of groundwater and comprehensive water resources for irrigation, water supply, utilization for the purpose of tourism and recreational potentials.

## Forms of Agricultural Production in the Municipality of Kanjiza

In the municipality of Kanjiza are the following forms of agriculture: crop farming, animal husbandry, beekeeping, fisheries, fruit prodiction and viticulture, vegetable production, organic farming, as a special form of agricultural production.

Taking in consideration natural conditions prevailing in the municipality of Kanjiza, it is expected that the crop production is the most common form to agricultural production. According to the data of agricultural departments of the municipality Kanjiza, crop production is spread over nearly 27,000 ha, which represents more than 2/3 of the total agricultural area. According to the 2012 data, the most common crop is maize, which occupies 54% of the total arable land. The next after maize, there are areas under wheat (15%). It was recorded, compared to the past ten years, the trend of continuous decline of areas under wheat. The reason is unfavorable economic situation in the purchase price of wheat. Sunflower takes the total area of 1,900 ha, sugar beet the surface of 452 ha, soybean of 230 ha and winter barley on 395 ha. The order of distribution of cultivated crops, depending on the year of production does not vary, but the area under these crops is subject to minor changes.

Besides crop production, animal husbandry is developed, too. According to the type of cattle that are grown in the municipality, dominant is cattle breeding, mainly for the milk production, and partly for the production of meat. In addition to cattle breeding, pig production is also present and sheep and goats are grown in smaller quantities.

Bearing in mind that in the municipality of Kanjiza, as well as in neighboring municipalities, fruit production and viticulture are developed, there are good conditions for development of beekeeping. The municipality has about 40

families involved in beekeeping and there are a total of 1.200 hives. The last few years a great extinction of bees is observed, which is similar in Republic of Serbia, too. However, the honey production at the state level has had an upward trend thanks to investments in technology, thereby contributing to a higher quality. Good quality has contributed to increased demand for honey from Serbia abroad and thus to increase the export of honey.

In the municipality of Kanjiza there are four freshwater ponds. The largest pond is the Kapetanski rit of total area of 613 ha, and the annual production in the pond is 400 t of fish, of which 80% belongs to the carp. Fish farms in the municipality of Kanjiza have the capacity to produce more fish. In addition to fish production, there are opportunities for fishing tourism in existing ponds.

Fruit production and viticulture have great potential for development in the municipality of Kanjiza. Fruit production is mostly present in the area of Horgos, because the sandy area around the settlement is suitable for the development of fruit production. According to official data, the area under fruit in Kanjiza municipality is about 700 ha. The most numerous plantations are around Horgos. The most common fruit culture is apple which covers 400 ha. Besides apples, production of peaches and plums is also present. Fruit production is mainly represented by individual farms and the most of fruit is sold at local markets.

Great fragmentation of holdings makes problem of lacking higher production and production of more quality products, which leads to big differences in product quality between different manufacturers, and the lack of irrigation and frost protection measures. When it comes to the cultivation of grapes, the situation is better. Vineyards are spread on 120 ha. More than 80% are represented by wine production varieties while 20% are table grapes, which are sold at the market. Vineyards of Kanjiza belong to one of the wine-growing region of Subotica, respectively Horgos sub-region. Besides excellent conditions, especially climate, nowadays small number of farmers produces grape, although state subventions contributed to increase the area and the number of vines. The main problem to grape producers is placing products on the market. Wine production is extremely expensive, and only a small number of farmers start private production and investment in the private wine cellars.

Vegetable production involves intensive use of land and irrigation systems. During the year, in the fields and protected spaces are grown two to three vegetable types. According to yield per area unit, the realized income, net income, and the share of human labor, vegetable production can provide five

to eight times the value of production in the open and in greenhouses 190-250 times compared to wheat (Vlahović, 2010). This type of production has significant perspective because of favorable natural conditions for all kinds of vegetable and expressed demand in the domestic and international market. The yield of vegetables in Serbia is significantly lower than the European yield. Yield of agricultural enterprises and cooperatives is significantly higher, but still below the global yield especially when we consider the real possibilities to achieve significantly higher yield because we have a very favorable agro-ecological conditions.

In Vojvodina it is irrigated between 1.2% and 4.4% of arable land, which is unacceptable low according to potentials. The systems that were built in the past are partly out of use due to disrepair and malfunctioning. A small number of the systems are in working order (Novković and Mutavdžić, 2010).

Kanjiza is well known for the production of vegetables, especially when it comes to pepper, Horgos pepper, which is known throughout the country and beyond. Vegetable production is the most represented in the small agricultural family farms that form the backbone of agriculture in this region. Except for industrial pepper, which Kanjiza is known of, in the municipality other vegetables are produced which ree partly sold in markets, while the majority is sold to processors in the municipality.

The good side of production and vegetable industry is that the processors are in need of much larger quantities of vegetables than is produced in the territory of municipality. From this point, the market placement is conditionally guaranteed. This opens up possibilities for increase of production. The area where vegetables are grown varies from year to year, but the average was represented by 1.580 ha. Development of vegetable production is possible by expanding cultivation in greenhouses.

Geographical position of Serbia, favorable climatic characteristics of each macro-region with sufficient environmental clean surface allows very different directions of organic production. Soil fertility maintenance is fundamental for the production of healthy products in organic farming (Dozet et.al., 2013). In addition to commercial production, organic production covers about 17 ha. In the municipality there are only two registered organic producers and the potential for this type of production exists. Organic production is present in two villages, Orom and Totovo Selo, where beans, barley, potatoes and medicinal, aromatic and spice plants are grown. Organic producers pack their products and sell them by themselves through a health food stores in Kanjiza

and other cities in Serbia. Demand for this type of products tends to increase and it is clear that stimulation of organic production and products processing is necessary. Agro-ecological characteristics of conditions in the macro-region of Serbia provide multifunctional organic production development through a number of non-agricultural products, various forms of tourism by promoting the tradition and cultural heritage (Cvijanović G. and Dozet, 2013). Certainly, the correct selection of varieties adapted to specific environmental conditions, methods and goals of production are very important (Dozet and Cvijanović G., 2012).

## SWOT Analysis of Agricultural Production in Municipality of Kanjiza

SWOT analysis is one of the most common methods of problem analysis, opportunities and possibilities for any project or activity. SWOT analysis consists of four components: Strength, Weakness, Opportunity (Chance) and Threats (Danger).

On the basis of a ratio between strength and weakness on one side, and the opportunities and threats on the other, vision can be defined, mission and goals of observed actions and formulation of strategic option for realization of the objectives of agriculture of Kanjiza municipality. Natural conditions for agricultural production are very favorable, due to specific local conditions such as soil fertility, micro-climate and access to water.

Cross-section of data collected and the SWOT analysis can lead to conclusion that the strength of agriculture of Kanjiza is primarily in the potential of geographic location and transportation infrastructure with the recognition of the municipality for the pepper production (Horgos) and managing water resources, including the Tisa River (Tab. 4). Availability of large areas of arable land followsl, as well as a huge range of individual producers whose strength lies in the flexibility and adaptability to market conditions.

When is talked about what will continue to be a **weak** side of agriculture in the municipality of Kajniza, then still stand out inadequately built irrigation system, low productivity as a result of inadequate professional workforce and outdated technology and machinery, and lack of funds. Not small importance belongs to those initiatives that should solve the problem of insufficient capacities for fruits and vegetables processing, as well as unemployment.
The biggest **opportunity** is the proximity to the border, which is the potential for of international transport development, then protection of geographical

origin of spice pepper. Chance lies in association of producers and partnership creation with the processing industry, in ecology, organic food production, new markets and agro-tourism development (Tab. 5).

In agricultural production, one of the measures, objectives and guidelines is integrated and organic farming, and that includes finding fertilization alternatives to avoid the consequences of land degradation (Cvijanović G. et al., 2010).

**Table 4.** *Internal strategic factors*

| Strengths | Weaknesses |
|---|---|
| Quality of land suitable for development of all cultures (gardening, horticulture) | Small farm |
| The geographical location and transport infrastructure | Small areas under irrigation system |
| Water resources and river Tisa | Too much moisture in certain areas of the municipality |
| he long tradition of growing vegetables and fruits | Reducing the workforce for the hardest physical labor |
| Developed manufacturing | Lack of latest technology |
| Catling | Lack of sufficient storage capacity, such as cold storage for vegetables and fruits |
| The existence of the support of the municipality Kanjiža | Insufficient capacity for processing fruits |
| Recognizability of the municipality for the production of pepper | Insufficient capacity to produce wine |
| | Small area under greenhouses |
| | he poor condition of pastures and their utilization |
| | Disorganized and unbalanced production |

**Source:** http://www.kanjiza.rs/invest/strateski-dokumenti.html

The greatest **threat** to the development of this area lies in the lack of habit of crop insurance from the bad weather conditions, undeveloped irrigation system, disorganization, inadequate agricultural policies implemented by the government, bad credit policies, legislation, obsolete knowledge, and frequent

price changes as a result of the monopoly position of product processors. And there is need for serious environmental protection.

**Table 5.** *External strategic factors*

| Opportunities | Threats |
|---|---|
| Association of producers and creating partnerships with the processing industry | Crops in more than 90% of cases are not insured, especially the weather |
| As a consequence of the association, has emerged to be a common occurrence in major markets, and to major customers | Prices of agricultural products are unstable |
| Protection of geographical origin pepper in the municipality Kanjiža | There is no uniform demand, and manufacturers of industrial plants are not sure how many areas need to sow for next year |
| The development of organic production, support small processors | An imbalanced total production by individual cultures which creates surpluses / deficits on the market |
| timulating the production of medicinal, aromatic and spice plants | The difference in the quality of fruits and vegetables |
| Development of small processing facilities for processing of fruits, vegetables and grapes | Fluctuation of prices of milk and weak support from the state |
| Better use of pastures | No good regulations when it comes to protecting the environment and non-compliance of these regulations with the regulations of the European Union, thus preventing higher exports to the EU |
| Better use of manure | Continuous agricultural policy |
| Stimulating the creation of small processing facilities for the processing of milk and meat | Poor relations between producers and processors |
| Support hale municipalities to develop agribusiness | The worsening economic situation in the country |
| xploiting the potential for the development of organic food | Weak support from the municipality of developing certain agricultural sectors |
| Exploiting the potential development of agritourism | |

**Source:** http://www.kanjiza.rs/invest/strateski-dokumenti.html

The **chance** of this field, agriculture lies in legal, educational and subventional support policy, which together with strategies for the use of funds enables improvement of organization of agricultural products purchase, as well as better utilization and expansion of processing capacities.

## Conclusions

Agriculture is one of the most important branches of the economy in the municipality of Kanjiza which is located in the north of Vojvodina and belongs to the North Banat District. The largest area is the III class of land quality (12.324 ha). It is a land of high quality that provides good agricultural production. The basis of sustainable development is food production, agriculture actually.

Modern agriculture is developed on ecological principles, which also means more economical production with conservation of agro-ecosystem and health of peopleand land. Organic farming is a complex process that requires a lot of time in the implementation, the inclusion of new and modification of conventional production methods. It requires full engagement of the community through the adoption of the legal framework for subvention of production.

To speed up the process of agricultural development in the municipality of Kanjiza, intensification of primary agricultural production is necessaryl: crop and vegetable production, fruit growing, industrial crops, livestock, irrigation, healthy food production and investment in the agricultural tourism. Also, to increase and improve the processing industrial facilities, and protect the trademark - protection of geographical origin of spice pepper. The position of the Corridor 10 contributes to optimistic approach in realization of improving the quality of agricultural production and sustainable development of agriculture of Kanjiza municipality.

## References

1. Cvijanović Drago (2000): *Marketinška orjentacija u funkciji razvoja savremenog agroindustrijskog preduzeća*. Agroekonomika, br. 29, str. 151-161.

2. Cvijanović Drago, Cvijanović Gorica, Anton Puškarić (2011): *Marketing i ekološka poljoprivreda* Institut za ekonomiku poljoprivrede, Monografija, Izdavač Institut za ekonomiku poljoprivrede, str. 1-395.

3. Cvijanović Gorica and Dozet Gordana (2012): *Conditions and possibilities recultivation of degraded soil in the area mining basin Kolubara*. International Scientific Meeting Sustainable Agriculture and rural development interms of the Republic of Serbia strategic goals realization within the Danube regiom –preservation of rural values, Thematic proceedings, December, 6-8th2012. Tara, pp. 293-310.

4. Cvijanović Gorica, Dozet Gordana (2013): *Ecological specificities and permaculture in function of organic agriculture*. Tematic proceedings of International scientific Conference „Sustainable agriculture and rural development in terms of the republic of Serbia strategic goals realization within the Danube region" – achieving regional competitiveness-., Institute of Agricultural Economics, Belgrade, Serbia. Ed.: Prof.dr Drago Cvijanović, Jonel Subić, Andrei Jean Vasile. December, 5-7th , Topola, Serbia, pp. 955-972.

5. Cvijanović Gorica, Dozet Gordana, Cvijanović Drago (2013): *Menadžment u organskoj biljnoj proizvodnji*, Monografija, Institut za ekonomiku poljoprivrede, Beograd, str. 1-366.

6. Cvijanović Gorica, Milošević Nada, Dozet Gordana, Đukić Vojin, Jeločnik Marko (2010): Producers education about microbiological inoculates application in function of soil fertility. „Agriculture and Countryside in the Squeeze of Climate Change and Recession " IX. Oszkár Wellmann International Scientific Conference Hódmezővásárhely, 22nd April 2010. Review on Agriculture and Rural Development. Scientific Journal of University of Szeged, Faculty of Agriculture. Volume 5. (1) supplement, pp. 572-577.

7. Dozet Gordana, Cvijanović Gorica (2012): *Varietal Adaptability of Organic Green Beans Cultivated Using Microbial Preparattions*. The Forth Joint UNS-PSU International Conference on BioScienece: Biotechnology and Biodiversity. Book of the Proceeding and Conference Proceedings, pp. 431-443.

8. Dozet Gordana, Cvijanovic Gorica, Djukic Vojin (2013): *Changes in the technology of soybean production*. CHAPTER 1 FROM THE BOOK - Sustainable Technologies, Policies and Constraints in the Green Economy, Advances in in Environmental Engineering and Green Technologies (AEEGT) Book Series, IGI GLOBAL BOOK USA, pp. 1-22.

9. Dozet Gordana, Cvijanović Gorica, Puzić Goran (2011): *Analiza stanja i mogućnosti razvoja poljoprivrede u opštini Bačka Topola.* Ekonomika poljoprivrede, specijalni broj-1, I Book God./Vol. LVIII, Institut za ekonomiku poljoprivrede-Beograd i dr., str. 88-95.

10. Đukanović Mara (1991): *Ekološki izazov*, Elit, Beograd, str. 1-492.

11. Milanović Milan, Cvijanović Drago, Cvijanović Gorica (2008)**:** Prirodni resursi, ekonomija-ekologija-upravljanje. Monografija. Beograd, ISBN 978-86-82121-54-1;CIP 502.131.1 (330.15:33)COBISS.SR-ID 147082508. Izdavač: Institut za ekonomiku pljoprivrede Beograd. str. 1-301.

12. Novković Nebojša, Mutavdžić Beba (2010): *Konkurentnost poljoprivrede Vojvodine*. Invited paper, DETUROPE, „Central European Journal of Regional Development and Tourism", Volume 2, Issue 1, pp. 5–30.

13. Služba za katastar nepokretnosti Kanjiža http://www.rgz.gov.rs (04.03.2014. god. u 16:00h)

14. *Strategija razvoja Opštine Kanjiža*, http://www.kanjiza.rs, (04.03.2014. god., u 14:30h)

15. *Strategija razvoja poljoprivrede i ruralnih krajeva Opštine Kanjiža*, https://www.agrif.bg.ac.rs , (04.03.2014. god. u 14:30h)

16. Vlahović Branislav, Puškarić Anton, Červenski Janko, 2010: *Obeležja proizvodnje povrća u Republici Srbij*i, Ratarstvo i povrtarstvo, Vol. 47, br. 2, str. 461-466.

17. www.visitkanjiza.rs (28.02.2014. god. 23:20h)

18. www.kanjiza.rs (28.02.2014. god. 23:30h)

19. www.wikimedia.org (28.02.2014. god. 24:30h)

# THE ROLE OF RURAL TOURISM IN THE PRESERVATION OF NATURAL RESOURCE POTENTIALS OF RURAL AREAS

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## Abstract

*The modern-day society has long been confronted with the fact that both satisfying their needs and overall development also entail taking into account the conservation of resources and the natural balance in order to preserve the conditions for the survival and development focused on the benefit of future generations. Rural tourism and hospitality have the potential to play a key role in supporting Serbia in achieving the Millennium Development Goals (MDGs) and joining the EU. Rural tourism, as one of the economy's fastest-growing segments, is an opportunity for revitalization of rural areas, and consequently, most countries are attempting to include it to a higher extent into their development policies, as a means of economic diversification, employment growth, urban and rural regeneration, and social well-being.*

**Key words:** *rural development, rural tourism, agriculture, countryside, natural resources*

## Introduction

The existing professional and academic literature contains numerous definitions of rural development, concentrated on various aspects and considerations. The concept of rural development represents a search for new future and the driving force of the rural population. "The rural development theory is not about the world as it is, but the way agriculture and rural areas can be restructured" (Nemes, 2005).

The farming sector has often played the role of the engine in developing rural economy, and represented a dominant source of rural revenue,

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employment and production. Consequently, rural and agricultural issues were practically equated, and it was assumed that agricultural and rural objectives can be achieved through joint policies created so as to help the transition of the farming sector. The situation has changed, primarily because agriculture is no longer the principal sector in terms of production or employment in rural areas. A conclusion imposes itself that rural development policies are required for at least three reasons (Đorđević Milošević, Milovanović, 2012):

1. Rural areas are faced with major challenges obstructing the territorial cohesion within countries.
2. Rural areas are possessed of economic potential which is unexploited or should be better exploited for the benefit of the rural population and the overall development of the nation.
3. Sectoral policies and market forces are unable to fully respond to the heterogeneity of the challenges and potential of rural areas, and cope with all the positive and negative external impacts.

The above mentioned facts point to the existence of the need for a new rural development paradigm. The main characteristics of the new paradigm must focus on territories rather than sectors, and emphasise the need for more investment in relation to subsidising.

The objectives of equalizing the living conditions in rural and urban areas, increasing the revenue, and competitiveness of individual farms need to be reinforced with the objectives of competitiveness of rural areas, valorisation of local resources, and exploitation of unused resources. In addition to the government and the farmers, application of the new paradigm also includes all the levels of governments, and various local players (OECD, 2012).

## The rural development concept

The rural development concepts is gaining increasing significance both in developed and in developing countries, including Serbia. Major changes are occurring in terms of the policies of the overall social and economic development. In addition to overcoming regional disparities between urban and rural development, the focus of attention also encompasses the development of agriculture and other activities and services in rural areas.

In order to provide a better quality of life and enhance the population's living standards, it is vital to exploit resources rationally and preserve them for future generations. Currently, the basis of all development policies of EU member countries is the integral approach, which Serbia is also aiming for.

Defining the development goals and economic sector where a competitive growth strategy could be developed both individually and with the support of the international community, the Republic of Serbia has the prospects for success. In this context, hospitality industry, with the emphasis on rural tourism, imposes itself as an indispensable complex with an unexploited growth potential. Rural tourism features as one of the fastest-growing segments of tourist industry, which is why most countries are focussed on including it as much as possible into their development policies, as a tool for economic diversification, growth in employment rate, urban and rural regeneration and increase in social well-being.

Decisions on the vision of tourist industry development and the choice of competitive strategies will determine the quality and dynamics of Serbia's entry into the global market. There are still numerous unused opportunities in rural tourism demanding creativity, determination and dedication to particular projects.

In order to fully initiate the investment and development processes and finally embark on competition, it is vital to turn to knowledge, ideas and innovation. It is necessary to decide whether and to what extent rural tourism should be involved as growth potential, source of welfare and increase in the quality life of the rural population.

It is unrealistic to expect that tourism will make an economic and social impact on the regeneration of Serbia quickly and simply, without appropriate strategy. Numerous natural and anthropogenic appeals, convenient geographic position and attractive natural, social and historical elements that Serbia undoubtedly possesses are not sufficient for the development of rural tourism and hospitality industry.

Apart from the motives listed above, what is also necessary is a large amount of investment in the offered facilities, basic infrastructure, marketing, traffic, complementary activities etc., requiring major investment, which Serbia cannot afford at the moment (Čerović, 2002).

The decline in economic activities, restructuring of the farming sector and migration of highly educated young people are the actual reason for adopting tourism as an alternative development strategy and a factor of economic and social renewal of rural areas **(**Briedenhann, Wickens, 2004).

The concept of sustainable development of tourism and hospitality features as a novel approach, reflected in the protection and preservation of natural and cultural resources, and highlighting the issue of the social costs of developing tourism. Limited by distance and underdevelopment, rural areas have limited possibilities for economic development. It has therefore become inevitable for rural areas to seek alternative avenues of using the local resources (Liu, 2006).

Together with the comparatively favourable effects of income generation and new job creation, tourism is an option for revitalising rural areas. Tourism helps strengthen rural economy and plays a significant role in creating the commercial sales channels for local products.

The benefits of rural tourism lie in providing the feeling of relaxation in peaceful surroundings, preserved nature, good communication with the hosts, consumption of healthy home-made food and learning about the traditional farming chores (Birovljev, Štavljanin, 2011).

The recent years have seen a trend of shifting from the massive tourism concept to selective. Selective forms of tourism encourage its sustainable development in all of its aspects, and are compatible with the regional strategic development concept (Luković, 2008). Despite recognising the importance of rural tourism as the most prominent example of selective forms of tourism, when it comes to developing rural areas, Serbia is still in the initial stage of its development.

There are certain positive examples and experiences in terms of entrepreneurship in the rural tourism of Serbia, but the projects conducted so far have mostly relied on private initiative of individuals and groups. Such a model of developing individual (selective) tourism with entrepreneurial attributes is not sufficiently recognisable in Serbia's tourist output, and there are no appropriate instruments of financing entrepreneurial idea in this area.

Development advancement in rural areas and prevention of uncontrolled urbanisation requires investment in infrastructure (such as transport and communication network), providing healthcare, and environmental protection and preservation. (Birovljev, Štavljanin, 2011).

In order to better understand the reason for the existence of extreme differences in the development levels of both the rural tourism sector and overall farming, the essential requirement is to consider the differences in the functioning of the farming sectors of Serbia and the European Union.

**Table 1.** *Differences between the European Union and Serbia in issues related to agriculture and rural development*

| AREA | EU COUNTRIES | SERBIA |
|---|---|---|
| **Socio-economic structure** | 18% of the population live in predominantly rural areas<br>8% of the population are employed in agriculture<br>20% of the economically active rural population are employed in agriculture | Agriculture is the basic and often sole economic activity in rural areas.<br>Agriculture does not yield revenue like in the EU countries.<br>Only a small value added is created through processing and diversification. |
| **Rural infrastructure** | • well-developed, due to long history of high-level investment in agriculture and rural areas. | • poorly developed and additionally neglected;<br>• numerous villages without basic infrastructure;<br>• low possibility of fast establishment due to prioritised intervention in urban areas. |
| **Economic structure** | • strong urban economy that can contribute to rural development;<br>• diversified economy with considerably developed rural business<br>• | • economy that can insufficiently contribute to employment |
| **Agricultural production** | • Agriculture is a sector spending funds (high support levels from taxpayers) to achieve social objectives and protect the environment.<br>• Average farm size is 19 ha. | • expectations that agriculture will earn income and thus contribute to economic development;<br>• unfavourable producer structure due to fragmented estates; |
| **Human capital** | • high education levels of rural and agricultural population | • low education levels in comparison with urban areas, and particularly in comparison with the EU |

| | | |
|---|---|---|
| **Regional policies** | • developed regionalisation and recognised regions;<br>• considerable funds within the EU budget | • initial settings of the regional development policy;<br>• still unestablished criteria and funds for supporting regional development |
| **State of environment** | • Much biodiversity has already been lost during the agricultural intensification period;<br>• numerous large farms acting as large sources of pollution.<br>• a well-developed control system<br>• high level of civic interest in environmental protection;<br>• a rich economy willing to invest in environmental protection | • small farms with low levels of intensive agricultural production, and thus acceptable pollution levels;<br>• relatively small number of large farms as large sources of pollution;<br>• inadequate regulatory system of environmental protection and farmers uninterested in the need for environmental protection;<br>• public care for environmental protection is still under development;<br>• transition economy pressing for rapid economic growth |
| **Funds and financial resources** | • defined, comprehensive and significant | • *ad hoc* and modest, in terms of both total amount and share |
| **Local government** | • developed organisations and local action groups;<br>• organised local administration;<br>• locally networked entrepreneurs | • weak role of local government in networking farmers and economic development |
| **Production networks** | • established majority of competition-based market chains | • low competition with high monopolisation of certain markets |
| **Social security** | • agriculture provides a low employment share, even in rural areas, so that social needs are fulfilled through the development of other sectors;<br>• a well-developed social support system | • undefined social security system for farmers;<br>• low levels of contribution to the healthcare and pension fund by the farmers. |

**Source:** *http://www.ruralinfoserbia.rs/dokumenta/uporedna%20analiza.pdf. p. 18.*

## The role of sustainable tourism in rural development

The imperative of modern-day civilisation is integrated economic, technological, social and cultural development (Biočanin et al., 2010), which is feasible only if it is adjusted to the requirements of environmental protection. An economic system that does not value natural resources adequately and propagates unlimited economic growth despite the limited resources is unsustainable in the long run (Riznić et al., 2012).

There are certain inconsistencies in the relationship between economy and ecology, but it is vital to establish their reciprocities and the dominant tendency of the economic over the environmental aspect of development. The simultaneous contradiction and interdependence of economy and ecology in contemporary conditions entails the requirement for maintaining the quality and level of natural assets, i.e. the balance of natural resources.

A unanimously accepted definition of sustainable tourism still does not exist. In its purest sense, sustainable tourism refers to a branch of economy making a minimum impact on the environment and the local culture, and, at the same time, contributes to earning income, creating new jobs and protecting local ecosystems (source: www.ekoplan.gov.rs).

Responsible and sustainable development of tourism refers to development of tourism that will meet the needs of current tourists, tourist destinations and all the participants in the hospitality industry, simultaneously preserving and enlarging the potential for using tourist resources in the future, without jeopardising the future generations' generations to fulfil their needs. In other words, it refers to improving the quality of people's lives within the potentials of the surrounding ecosystem (source: www.cenort.rs ).

Rural tourism and hospitality are often regarded as forms of tourism characterised by sustainability, as they attracts small numbers of visitors interested in local culture and tradition, and there is no need for developing large-scale infrastructure. One of the main appeals of rural tourism is interaction between local population and visitors, so that the guests and the host exchange ideas and knowledge. The key sustainability dimensions of rural tourism are (Popesku, 2002):

- **Environmental sustainability**, meaning that developing tourism does not cause irreversible changes in a given destination's ecosystem. This is the widest accepted dimension, in view of the clear worldwide need to protect natural resources from the negative impact of the tourism and hospitality industry.

- **Social sustainability** refers to the local community's capability to maintain or adapt their own characteristic cultural features despite the pressure of the visitors' "entertainment-based" culture.

- **Economic sustainability** refers to the level of economic benefit from tourism, which will suffice to provide a given amount of income for the local community and cover all the costs of special measures taken to meet the tourists' needs and requests. Although the prerequisite of economic sustainability actually means the appeal of a given area and awareness of the need for high-level service, no destination can be economically sustainable on the global market without taking up a competitive position.

It is essential to analyse the economic profitability of rural hospitality services, primarily due to the seasonal character of demand, and the ratio of capacity utilisation which is low, and the investment required for maintaining the level of service rendered to tourists, which is often very high. Mastering the unique sales points which include a combination of material and cultural heritage, rural activities and rural accommodation, and, at the same time, emphasising the genuine Serbian character of all of the above would provide Serbia with a chance for successful positioning among the Balkans tourist destination. Eradication of extreme poverty, securing the sustainability of environment and developing global development partnerships are only some of the Millennium Development Goals for the Republic of Serbia, whose accomplishment is to be contributed to by the development of rural tourism.

## Interdependence of agriculture and tourism

Agriculture takes up a significant place in the structural and spatial development of rural areas. The multiple role of farming, primarily as a supplier of food, raw materials and labour, contributes to the development of rural tourism and motivates the tourism-induced migration of people.

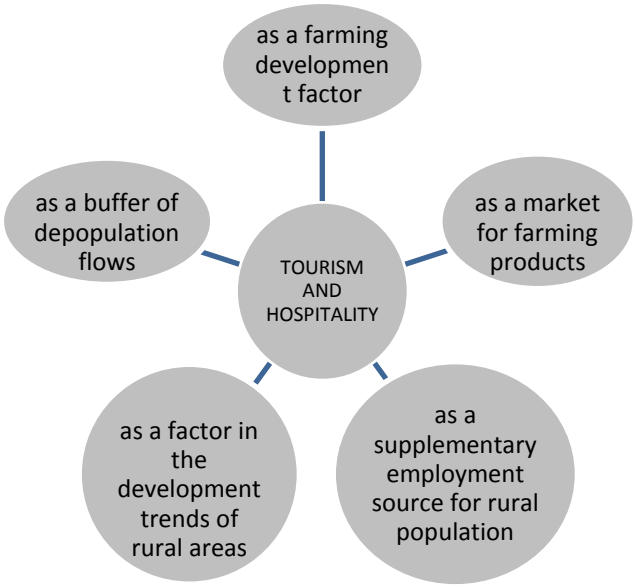
Increase in income and living standards are accompanied by changes in the demands of individual categories of consumers, both in search of higher-quality, more varied food safe in sanitary terms, and also more varied entertainment range. The growing needs feature as support to the preservation of the traditional way of life and scenic landscapes of the rural areas (Angelkova, 2012). Rural tourism requires specific forms of agricultural production, which can sustain the identity of the local area, and parallel with this, organic food production, which, as such, preserves biodiversity. Farming activities in the countryside should by no means be substituted by tourism and entertainment activities; they should integrate in such a fashion that agriculture is reshaped so as to provide conditions for the development of tourism, not only in terms of providing food for tourists, but also in terms of maintaining the ambience that make the surrounding countryside appealing (Angelkova, 2012).

A view of farming as a mere food production for meeting human needs may present an obstacle to the development of rural areas. Actually, agriculture is essential for maintaining resources, especially in depopulated areas such as the mountains, with their abundance of neglected land that depends directly on agriculture, i.e. the impact of humans and livestock. A mountain resource such as pasture cannot exist without livestock and humans to shape its appearance. On the other hand, this appearance is the very factor valorised in many areas as tourist potential. There is a danger of extinction of many species and disappearance of many natural assets due to lack of farming. The interaction between nature and farming is highly complex, and without sustainable development of rural areas is not possible without in-depth knowledge of these elements. Farming and hospitality industry are connected by a complex web of connections, relations and influences, and their touching points are numerous, with broad and permanent links. Tourism makes an impact on improving living conditions in rural areas, and their integrated development, which entails revitalising rural area through optimum development strategies of rural economy as a whole.

It includes agricultural production, environment-based food industry, all types of economic and service activities, economic renovation and innovation, communal, transport, social, medical, educational and cultural infrastructure. The direct influences of mutual connections of farming and tourism are reflected in opening a supplementary function of tourism in agriculture, which activates the existing capacities, facilities and space,

acting in two directions: selling food at the production site, and creating accommodation facilities in rural areas (Štetić, Šimičević, 2011).

**Figure 1.** *A model of correlation between tourism and agriculture*




**Source:** *Todorović, Štetić, 2009, p. 27*

Rural tourism is a significant factor in the development of underdeveloped areas, creating conditions for diversifying rural areas and earning additional income for the rural population. Furthermore, it promotes the development of agricultural production, growth in employment rates in rural areas, expanding the volume and structure of agricultural production, and appropriate use of unproductive plots in rural areas. The development of rural tourism and hospitality, therefore, enables cashing in on the natural advantages of rural areas.

**The influence of tourism on the transformation of rural areas.**

The impact of tourism on the transformation of rural areas can be clarified through three basic types:

The first type of impact is recognisable in high tourism concentration zones, because certain activities have to be performed within a limited, convenient and customised area, which is, in most cases, a consequence of not only natural conditions but also appropriate facilities.

The first type is characteristic of seaside and mountains, i.e. villages with a presence of high concentration of tourist equipment and tourists. In most cases, one encounters a complementary relation between tourism and agriculture, but, in extreme cases, tourism may cause a negative impact, in the form abandoning agriculture by the local population and reorientation to non-farming activities, i.e. providing tourist services. Despite the presence of imbalance in the relationship, it can be considered that total conversion is a better solution than total depopulation of certain rural regions, which would occur without tourism (source: http://www.psss.rs/e107_plugins/forum/forum_viewtopic.php?659). The next type of impact is manifested as a less significant influence of tourism and hospitality on the transformation of the environment, that is, the content, organisation and landscaping. There is no notable influence on agriculture, but tourism and hospitality provide complementary income for the rural area. Taking into consideration the dependence of rural economy on farming, it is a significant fact that developing rural tourism and hospitality particularly support the development of agricultural activities in rural areas.

## The economic impacts of rural tourism

The development of rural tourism may produce numerous positive economic and non-economic affects, both on the development of individual farms, and the development of the local community as a whole, such as: developing underdeveloped areas, employing a larger number of household members, sale of rural craftsmen's products and needlework (embroidery, knitwear, ethnic clothing etc.), and thus the preservation of customs and revival of old, forgotten crafts, creating a possibility for the return of population into rural areas, expanding the basis for developing tourism, and increasing income from this industry (Todorović, Štetić, 2009). Rural tourism and hospitality yield economic effects contributing to a faster development of rural areas. The most prominent ones are growth in employment and personal revenue. In Medlik's (1996) opinion, tourism produces direct effects to those participants in the supply chain who provide services to tourists directly. In this case, they are small rural households involved in tourism and hospitality, who succeed in employing their household with minimum investment. Rural households also have the opportunity to earn income from the sale of home-made products, such as food, handicraft etc. (Bošković, 2012). According to survey results (MPŠV, 2009), rural tourism and hospitality industry employs two household members on the average, and the average net income from rural tourism and hospitality amounts to 200 euros per household.

Many rural areas have recognised their potentials and exploited them, profiting from the existing potentials such as location, natural and cultural contents and social capital. The development of rural tourism makes a positive impact on almost all economic and non-economic activities, that is, benefit the development of overall economy. Assessments of the effects of rural tourism on the overall development of Serbian economy are presented in a recent strategic document – the *National Rural Tourism Master Plan* (2011) and *the Serbian National Sustainable Development Strategy*. According to the data from the Master Plan, the total number of beds available in rural areas generates an annual income of more than 5 billion dinars from accommodation, contributing to the increase in revenue in the tourism and hospitality sector. In addition, according to the forecasts of the Master Plan, the total direct economic contribution of rural tourism and hospitality will have reached 45 billion dinars by 2020. Of course, the prerequisites for these forecasts to come true include an increase in the number of visitors, total of overnights in rural areas, and the demand of rural accommodation capacities in the forthcoming period.

**Table 2.** *The National Rural Tourism Master Plan and the Serbian National Sustainable Development Strategy*

| **Source / Forecast period** | | | **Initial year** | **Year 3** | **2015** | **2020** | **CAGR** |
|---|---|---|---|---|---|---|---|
| **LTO/ UNWTO (2009)** | Beds | General | 4.439 | 4.577 | 4.643 | 4.746 | 0.7% |
| | | Rural | 1.157 | 1.239 | 1.366 | 1.78 | 4.4% |
| | | **Total** | **5.596** | **5.816** | **6.009** | **6.526** | **1.6%** |
| | Occupancy rate (%) | General | 16% | 21% | 23% | 30% | |
| | | Rural | 5% | 10% | 13% | 20% | |
| | Overnights | General | 266.501 | 342.732 | 393.567 | 519.729 | 6.9% |
| | | Rural | 21.118 | 42.965 | 62.326 | 129.932 | 19.9% |
| | | **Total** | **287.619** | **385.697** | **455.892** | **649.661** | **8.5%** |
| | Rural tourism multiplicative effect | | 1 | 1 | 1.1 | 1.6 | |
| | **Direct economic impact (billion RSD)** | | **0.6** | **0.9** | **1.2** | **2.3** | **14.1%** |

**Source:** *The National Rural Tourism Master Plan (p. 12)*

Rural tourism and hospitality primarily rely on domestic demand from urban areas. Intensifying the development would contribute to revenue transfer from economically developed urban regions to underdeveloped rural areas, and thus enable a faster economic development of rural areas, which would contribute to bridging the existing gap in the development of Serbian rural and urban areas.

## Conclusion

Rural tourism in Serbia plays a significant role in of preserving the rural environment and protecting nature and wildlife, but, at the same time, contributes to the survival of village communities. Investment in dilapidated country houses, renewing the tradition of rural households and raising rural tourism to the level of significant economic value are key issues supported by the *Ministry of Agriculture, Forestry* and *Water Management* of the Republic of Serbia. The objective of these measures is achieving a new image of rural Serbia. The popularity of rural tourism has been showing a growing trend in the past years. Ever since 2006, the Ministry of Agriculture, Forestry and Water Management has been employing measures to encourage and support the development of rural tourism in Serbia, and diversification of economic activities in rural areas. Subsidiary funds are used to support investments encouraging the development of rural tourism and hospitality, and extending economic activities in the countryside, such as :

1. construction and adaptation of accommodation facilities modelled after authentic rural architecture: farmhouses;

2. renewal of authentic economic facilities in the countryside – water mills, wine cellars, felt rolling facilities, etc.

3. procurement of equipment for enriching the content in the offer range of rural tourism, promotion of rural tourism and hospitality, events fostered by women's associations in rural areas, and the activities aimed at employing women in rural areas;

4. procurement of production materials, raw materials and equipment required for preserving old, traditional trades, skills, handicrafts and activities (source: http://www.ruralinfoserbia.rs/dokumenta/ruralni%20turizam-analiza%20budzetske%20podrske.pdf).

The Ministry of Agriculture, Forestry and Water Management is striving to provide direct budget support to rural development and enable the promotion of small family farms intending to become involved in rural tourism, and slow down the depopulation trend of rural areas by creating new employment opportunities and reducing regional differences in the development of rural areas. Diversifying rural economy enables improving the quality of rural live and significantly contributes to the economic development of the country. The concept of multifunctional agriculture and integral approach to improving the standards of living, social and economic status of villages and rural communities are the key factor of sustainable rural development. As the dominant user of rural resources, agriculture plays a key role in forming the appearance of rural areas. The concept of multifunctional agriculture is vital to sustainable rural development. The model of support to agriculture must inevitably be included in the framework of rural development, and strongly reflect the multifunctional role of farming in the wealth and diversity of scenery, production of food and preserving the cultural and national heritage. Such a support requires strengthened institutional mechanisms for improving the socio-economic status and quality of life in rural communities, as well as preservation of cultural and national heritage. Along with all these needs Serbia also needs a radical change of attitude to everything that is rural.

## References


1. Angelkova, T. (2012) Uloga specifičnih vidova turizma u revitalizaciji pograničnih područja između Srbije i Makedonije, Beograd.

2. Biočanin, R., Mijajlović, J., Badić, M. (2010) Energetska efikasnost i životna sredina, Međunarodna naučna konferencija Menadžment, Kruševac, str. 283-293.

3. Birovljev J., Štavljanin B. (2011) *Ruralni turizam u funkciji razvoja ruralnih ekonomija lokalnih zajednica u Srbiji*, Ekonomika poljoprivrede, specijalan br. 1, Institut za ekonomiku poljoprivrede, Beograd, str. 41-45.

4. Bošković T. (2012) *Ekonomski efekti razvoja turizma u ruralnim područjima Srbije*, objavljeno u Škola biznisa, br. 2, Visoka polovna škola strukovnih studija, Novi Sad, str. 29-34

5. Briedenhann, J., Wickens, E. (2004). Tourism routes as a tool for the economic development of rural areas—vibrant hope or impossible dream? Tourism Management,Vol. 25, Issue 1, pp. 71-79, Oxford: Elsevier.

6. Čerović, S. (2002) Strategijski menadžment turističke privrede Srbije, Želnid press, Beograd, str. 82

7. Đorđević Milošević, S., Milovanović, J. (2012) Održivi turizam u funkciji ruralnog razvoja, mala poljoprivredna gazdinstva i ruralni turizam u Srbiji, Fakultet za primenjenu ekologiju, Futura,Univerzitet Singidunum,Beograd, Agroznanje, Vršac, FAO Budimpešta.

8. Đorđević-Milošević S. (2008) Održivi ruralni razvoj u Srbiji,Odgovornost za selo – odgovornost za budućnost nacije, njene ljudske i prirodne resurse, Evropske sveske, EMNIS

9. Liu, A. (2006). Tourism in rural areas: Kedah, Malaysia. Tourism Management. Vol. 27, Issue 5, Pp. 878-889. Oxford: Elsevier.

10. Luković, T. (2008) Selektivni turizam, HIR, ili znanstveno istraživačka potreba, *Acta Turistica* Nova.Vol. 2 Num. 1. str. 51-74, Ekonomski fakultet - Zagreb,

11. Master plan održivog razvoja ruralnog turizma Srbije (2011) Centralna Srbija, UN Joint Programme 'Sustainable Tourism for Rural Development' funded by the Spanish MDG Achievement Fund Workshop: 8. april2011.

12. Medlik, S., (1966) Economic Importance of Tourism, "The Tourist Review", p. 39, navedeno prema: Unković, Zečević (2006).

13. Ministarstvo poljoprivrede, šumarstva i vodoprivrede Srbije (2009) Rezultati ankete o efektima mere za podsticaj seoskog turizma u Srbiji i diverzifikaciju ekonomskih aktivnosti na selu

14. Nemes, G. (2005) Integrated rural development, The concept and its operation, Institute of economics, Hungarian Academy of sciences, discussion papers, Budapest

15. OECD (2012) Food and the Tourism Experience, The OECD-Korea workshop, OECD Studies on Tourism, OECD Publishing

16. Popesku, J. (2002) Marketing u turizmu, Čigoja štampa, str. 193-196, Beograd.

17. Riznić, D, Manić, M., Krstić, A. (2012) New strategies of ecological-economic growth, ranking models and comparisons of suppliers, Ecologica vol. 19, iss. 66, pp. 237-242

18. Štetić S., Šimčević D. (2011) *Poljoprivreda kao preduslov održivog razvoja ruralnog turizma dunavskog regiona*, Ekonomika poljoprivrede, specijalan br.1, Institut za ekonomiku poljoprivrede, Beograd, str. 397-408

19. Todorović M., Štetić S., (2009) *Ruralni turizam*, Geografski fakultet, Beograd

20. Unković, S., Zečević, B., (2006) Ekonomika turizma, Beograd, Ekonomski fakultet

21. www.cenort.rs

22. www.ekoplan.gov.rs

23. http://www.ruralinfoserbia.rs/dokumenta/ruralni%20turizam-analiza%20budzetske%20podrske.pdf

24. http://www.psss.rs/e107_plugins/forum/forum_viewtopic.php?659

# COMPARATIVE ANALYSIS OF LAND CAPACITY OF THE REPUBLIC OF SERBIA AND THE COUNTRIES OF THE EU[1]

*Jelena Karapandžin, Danica Bošnjak*[2]

## Abstract

*It is known that land capacity is not a limiting factor for agricultural development in Serbia. However, irrational property is dominant in Serbia, both in terms of size and grouping of the area. The comparison of land capacity in Serbia and the EU member countries is possible due to the Census of Agriculture (Republic of Serbia, 2012), done by compatible methodology. The authors of this paper are trying to analyze the current condition of the capacity, the ownership structure and the ways of utilizing agricultural land in Serbia, and point to the differences with the EU member countries. The research has shown that the average size of a property in Serbia is 5.44 hectares per agricultural holding and that, on average; it consists of 6 separate parts. In order to make a property more productive and competitive in terms of its size and organization, upsizing is still the priority.*

**Key words:** *agricultural area, structure, way of utilization*

## Introduction

Agriculture is a significant sector of Serbian economy. Agricultural development largely depends on the available natural conditions. Earlier research (Subić et al., 2005; Rodić et al., 2008; Bošnjak and Rodić, 2010; 2011) indicates that the available natural conditions in Serbia enable the organization of a successful plant and livestock production. In terms of natural conditions, compared to the surrounding countries, Serbia has much larger production potentials, most of all the biggest capacity of cultivable land (Tomić and Tomić, 2011). The available land capacity is important, but not enough for the development of agriculture (Subić et al., 2005a), especially for

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its competitiveness. Therefore, a rational use of agricultural resources stands as a priority (Grahovac, 2006; Katić et al., 2007, Rodić et al., 2007). For the rational use of the available agricultural area the general state of agricultural property is very important (its size and area grouping). Earlier researches (Jeftić and Penčić, 1990; Tomić, 1993; Bošnjak, 1997; Bogdanov and Ševarlić, 2007; Nikolić et al., 2007; Bošnjak and Rodić, 2010) point out the important differences in the size of the property and indicate that the irrational property is dominant in Serbia, in terms of size as well as in terms of area grouping. Undoubtedly, the unfavorable ownership structure directly affects the work productivity in agriculture and, with that, its competitiveness, which has stood out as one of the priorities in agricultural development in the last years. Bogdanov et al. (2008), as well as Tomić and Tomić (2011) emphasize the need for both upsizing the property as well as for area grouping, so that it can be used more rationally. For this reason, the subject of the research in this paper is land capacity and the goal of the research is to analyze it, compare it with the EU members (Serbia being a candidate for EU membership), point to certain problems and solutions regarding ownership structure and the ways of utilizing agricultural area in Serbia.

## Work method and data sources

According to the set goal and the subject of the research, comparative-analytical method was applied in the paper. For the purpose of the research, secondary data about the capacities of agricultural area and the ways of its utilization were used. In other words, the data collected during the Census of Agriculture in 2012 were used for Serbia, and the data for the year 2010, available in the Eurostat electronic base were used for the EU member countries. Apart from this, other relevant documents, as well as domestic and foreign literature were used. During the making of the Census of Agriculture in the Republic of Serbia in 2012, a new methodology was applied and it was compatible with the methodology of the EU. Having this in mind, it can be concluded that the data are not completely comparable with the data of the earlier period, so in this paper the focus will not be on chronological comparison, but rather on spatial comparison, which is now, for the first time, possible with the EU member countries.

## Available land capacities

According to the Census of Agriculture from 2012, the Republic of Serbia has 3,861,477 hectares of agricultural area at its disposal. 11% of that area was not used in the Census year, which means that the total utilized agricultural area

(UAA) was 3,437,423 hectares. In the total utilized agricultural area in Serbia the most widespread ways of utilization are arable land (73.11%), pastures and meadows (20.75%), areas under permanent crops and plantations (5.45%), while kitchen gardens make up only 0.69%[3] of the area. Intensive ways of utilizing the land (areas of kitchen gardens, arable land, fruit plantations and vineyards) have an important share in the total utilized agricultural area on the territory of the Republic of Serbia (79.25%), especially on the territory of AP Vojvodina (92.85%). According to the new methodology, applied in the last Census of Agriculture in 2012, moors and reed beds are not considered as agricultural areas. The analysis of the regional distribution of the total capacity of the utilized agricultural area shows that about 47% of the land is concentrated on the territory of Vojvodina, which, by the structure of utilization and quality (Hadžić et al., 2005), most of all of its arable land, makes intensive agricultural production possible.

In Serbia, the available funds for agricultural area are used by 631,552 agricultural holdings (AH). Within the scope of agricultural holdings, there are two types of organization: family agricultural holdings on one hand, and legal entities and unincorporated enterprises on the other. Family agricultural holdings are dominant in terms of their presence (628,552) and the available capacity of the utilized agricultural area (2,887,435 hectares). Regional dispersion of family agricultural holdings is quite present. From the total number of these holdings, around 77% of them, that is 482,283 can be found on the territory of Central Serbia, while in Vojvodina there are 146,269 family agricultural holdings. Legal entities and unincorporated enterprises are outnumbered (3,000 in Serbia), but have 549,988 hectares of the utilized agricultural area at their disposal (The draft 2014-2024 strategy for agriculture and rural development of the Republic of Serbia). They also have certain benefits and advantages when it comes to using modern technologies.

[3]The mentioned ways of categorization of agricultural area are different from the division of land based on the ways of utilization, which was defined by the Law on agricultural area (Gazette 62/2006, 65/2008, 41/2009), which includes the division of agricultural land into cultivable and non-cultivable area. Considering the fact that cultivable area includes arable area, fruit plantations, vineyards and meadows, and that non-cultivable area includes pastures, moors, reed beds and ponds, it is clear that the Census of Agriculture does not differentiate between pastures and meadows, which makes the comaprison impossible. According to the data of the National Institute of Statistics (Statistical Yearbook of the Republic of Serbia 2013), 5,052,000 hectares of the total agricultural area in the Republic of Serbia were recorded. It is evident that the data of the Census of Agriculture do not match with the cadastre records. This fact can not be seen as favourable, as it indicates a lack of knowledge about the size of the basic production capacity, which, as such, represents the starting point for projecting and planning agricultural development both on the level of a holding and on the level of the entire country.

Taking into account the available capacities of land on one hand and the number of agriculture holdings on the other, it is not difficult to conclude that the average size of the utilized agricultural area in Serbia per holding is 5.44 ha[4]. It is a small property, which still does not open the possibility for rational and economically justified production (Table 1). In comparison with the EU members, Serbia is in the 25th place in property size. In EU-28 the average number of holdings and their average size fluctuate in a very large interval. The average size of an agricultural holding is 14.35 hectares. In terms of the total number of holdings, the most dominant is Romania, which comprises almost one third of the total number of agricultural holdings in the EU. Regarding the average size of agricultural holdings, Czech Republic has more than 150 hectares available per holding, and Great Britain has an average of 90 hectares per holding (Eurostat, 2013). By comparing it with the surrounding countries, Serbia has larger utilized agricultural area per holding than Romania (3.4 ha), Cyprus (3 ha), and Malta (0.90 ha), while it has significantly smaller area than Bulgaria (12.53 ha) and Hungary (8.78 ha). In terms of the holding size we are the closest to Croatia (6.56 ha).

**Table 1.** *Availability of land capacities of the Republic of Serbia and its surrounding countries*

| Country[5] | Arable land (ha) | UAA (ha) | AH | UAA/ AH (ha) | Popula-tion | UAA/ per capita (ha) |
|---|---|---|---|---|---|---|
| **Hungary** | 3796920 | 4686340 | 576810 | 8.12 | 10014324 | 0.47 |
| **Bulgaria** | 3124930 | 4475530 | 370220 | 12.09 | 7421766 | 0.60 |
| **Romania** | 8306420 | 13306130 | 3859040 | 3.45 | 20294683 | 0.66 |
| **Croatia** | 895220 | 1316010 | 233280 | 5.64 | 4302847 | 0.31 |
| **Montenegroo** | 4050 | 221298 | 48824 | 4.53 | 620029 | 0.36 |
| **Macedonia[6]** | 190726 | 264339 | 192378 | 13.64 | 2052722 | 0.13 |
| **Serbia** | 2513154 | 3437423 | 631552 | 5.44 | 7186862 | 0.48 |
| **EU-28** | 103922630 | 175815160 | 12247990 | 14.35 | 503402952 | 0.35 |

**Source:** *RZS, Eurostat, author calculation*

By taking into account that the size of the available agricultural area can be a limiting but also a stimulating factor for the development of agricultural

[4]When it comes to legal entities and unincorporated enterprises, the average size of the utilized agricultural area is 210 ha, and the average size of a family agricultural holding is 4.5 ha (The draft 2014-2024 strategy for agriculture and rural development of the Republic of Serbia).

[5]The data are from 2010 for all the countries except for Macedonia, which are from 2007 and Serbia, which are from 2012.

[6]The data related to Macedonia were taken from the webpage of the National Institute of Statistics of the Republic of Macedonia (www.stat.gov.mk).

production, Bošnjak and Rodić (2010) point to the importance of the capacity of the available agricultural area per citizen. This is a good indicator of land availability as a resource of agricultural production of one country. There is 0.48 ha of utilized agricultural area per citizen in the Republic of Serbia. In that sense, compared to the EU member countries where there is 0.13 ha of available land per citizen, Serbia is in the 8th place. If we combine this data with the fact that the countries with a much more developed agricultural production have less area available than Serbia (Holland 0.11ha, Germany 0.21ha, France 0.43ha, Hungary 0.47ha), it is clear that the available agricultural area is not a limiting factor of growth, and that it can even be the driving force of agricultural development. However, if the available capacity is seen in comparison with the number of active farmers, Zekić et al. (2011) indicate that the resource structure of agriculture is less favorable than in the EU, as there were 7.51 ha per active farmer recorded in Serbia in 2008, and 8.27 ha per farmer in the EU. Considering the fact that the size of agricultural holdings fluctuates in a very large interval, it is of great importance to have a detailed preview of the ownership structure (Table 2).

**Table 2.** *Ownership structure of holdings according to the size of agricultural area*

| | Utilized agricultural area | | | | | | Total |
|---|---|---|---|---|---|---|---|
| **Property size (ha)** | **<1** | **1.01-2** | **2.01-5** | **5.01-10** | **10.01-50** | **>50** | |
| Agricultural holdings | 184674 | 123719 | 182489 | 89083 | 45342 | 6245 | 631552 |
| Shares (%) | 29.24 | 19.59 | 28.90 | 14.11 | 7.18 | 0.99 | 100.00 |
| Family agricultural holdings | 99.3% | 99.8% | 99.8% | 99.8% | 99.2% | 89.1% | 628552 |
| HLE and unincorporated enterprises | 0.7% | 0.2% | 0.2% | 0.2% | 0.8% | 10.9% | 3000 |

**Source:** *RZS, author calculation*

In the structure of agricultural holdings on the territory of Serbia, as it was mentioned before, family agricultural holdings are dominant, while there is a small number of legal entities and unincorporated enterprises. This small number of legal entities and unincorporated enterprises in the utilized agricultural area indicates that the family agricultural holdings design the basic features of ownership structure and the total agricultural production in Serbia (Bošnjak i Rodić, 2011a). The data point to the alarming state of agricultural holdings in terms of their size. The biggest share is comprised of the holdings

which use less than 1 ha of agricultural area. Considering the fact that less than a half of the holdings have up to 2 ha of property and that only 1% of the holdings utilize more than 50 ha of agricultural area, the decadal problem of Serbian agriculture can be proven – the downsizing of property (Cvijanović et al., 2006). As is stated by Bošnjak (1997), holdings with the size of property over 10 ha belong to the group of those which have certain possibilities of market competitiveness, which points to the need for upsizing agricultural properties. The share of those holdings in the total number of holdings in Serbia is, however, only 8.17%, while the share of holdings that cultivate more than 10 ha in Belgium, Denmark, France, Germany, Italy, Great Britain and Ireland is around 50-80 % (Nikolić et al., 2005). On the regional level, there are significant differences in terms of the average size of the utilized agricultural area per holding (Table 3). The analysis shows that, in terms of size, agricultural holdings of the Administrative area on the territory of AP Vojvodina are dominant, although their property size (except for Mid-Banat area) is not bigger than the EU average. The fact is that some positive changes have been made in the ownership structure, but those changes are not sufficient and the ownership structure on the level of the republic and parts of the Administrative area is insufficient for achieving a competitive level of productivity.

**Table 3.** *Regional features of the average property size*

| Area | UAA/AH | Average number of lots by AH | Area | UAA/AH | Average number of lots by AH |
|---|---|---|---|---|---|
| Mid-Banat | 15.7 | 7 | Beograd | 4.1 | 4 |
| Southern Banat | 12.47 | 7 | Podunavlje | 3.84 | 5 |
| Northern Banat | 12.43 | 5 | Pomoravlje | 3.69 | 7 |
| Northern Backa | 12.35 | 4 | Raška | 3.65 | 5 |
| Western Backa | 10.44 | 4 | Mačva | 3.61 | 4 |
| Southern Backa | 9.00 | 4 | Morava | 3.54 | 4 |
| Srem | 7.82 | 4 | Toplica | 3.16 | 7 |
| Bor | 5.81 | 6 | Rasina | 2.73 | 8 |
| Braničevo | 5.08 | 7 | Nišava | 2.64 | 7 |
| Zaječar | 5.07 | 8 | Pčinj | 2.37 | 7 |
| Zlatibor | 4.76 | 4 | Jablanica | 2.35 | 8 |
| Kolubara | 4.54 | 4 | **Vojvodina** | **10.9** | **5** |
| Pirot | 4.32 | 9 | **Serbia** | **5.44** | **6** |
| Šumadija | 4.16 | 5 | | | |

**Source:** *RZS*

From the aspect of rational and economically oriented production, it is important of how many separate parts an agricultural property consists. The property of agricultural holding in Serbia consist of 6 separate parts on average (Table 3) with the average area of 98 acres, which is the area that does not provide a rational utilization of modern machinery. According to Brčić (1985), Lazić and Turan (1997) the conditions on small, scattered and shapeless parcels are unfavorable for a rational utilization of mechanical and tractor aggregates. This is the case mostly because of a low performance and a larger fuel consumption per production unit (quoted from Lazić et al., 2000). As is stated by Clamens (1993), according to Nikolić et al. (2005) variable costs are lowered by 15.6% and the demand for work force is lowered by 68.2%, if the size of the parcel is increased from 0.5 ha to 20 ha. With the purpose of preventing further downsizing of property, by adding amendments to the legal regulations on land inheritance, it should be regulated that the land can be inherited by those who cultivate it and make a living out of it. Apart from that, different measures to motivate the upsizing and grouping of land should be taken (Lazić et al., 2000; Kranjčević and Prosen, 2003).

Božić et al. (2011) point out that the state is the one that, by using concrete measures, taking into consideration the economic and ecologic principles, needs to introduce and implement a certain land policy to ensure a rational utilization of land as a necessary condition, asset and object of work. It should stop further downsizing of agricultural properties and control the use of chemicals that harm the quality of land and its fertility.

## Arable land and the ways of its utilization

The most common way of utilizing land in Serbia is definitely arable land. A citizen in Serbia has, on average, 0.35 ha of arable land, which is much more than an EU-28 citizen who, on average, possesses 0.21 ha. The arable capacity of land is mostly used for growing cereals (68.26%), industrial crops (15.27%) and fodder crops (10.19%). There is a similar structure of sowing in Vojvodina, but cultivation of industrial crops is more present there (23.66%), while the share of fodder crops is only 3.13% (Table 4). The structure of arable land utilization, that is, a high presence of area under cereals and low presence of intensive groups of crops point to the extensiveness of arable land utilization (Bošnjak i Rodić, 2002). In addition to this structure of arable land utilization, there is also the fact that only 3.38% of the total arable land is irrigated, which is another proof of the extensive use of arable land.

**Table 4.** *Arable land utilization*

| Structure of utilization | Serbia | | Vojvodina | | Central Serbia | |
|---|---|---|---|---|---|---|
| | ha | (%) | ha | (%) | ha | (%) |
| Arable land | 2513154 | 100.00 | 1466176 | 100.00 | 1046978 | 100.00 |
| Cereals | 1715562 | 68.26 | 976243 | 66.58 | 739319 | 70.62 |
| Pulses | 5708 | 0.23 | 1925 | 0.13 | 3783 | 0.36 |
| Potatoes | 25132 | 1.00 | 3775 | 0.26 | 21357 | 2.04 |
| Sugar beet | 69112 | 2.75 | 65660 | 4.48 | 3452 | 0.33 |
| Industrial crops | 383881 | 15.27 | 346943 | 23.66 | 36938 | 3.53 |
| Vegetables, melons and strawberries | 33232 | 1.32 | 15190 | 1.04 | 18042 | 1.72 |
| Flowers and ornamental plants | 382 | 0.02 | 148 | 0.01 | 234 | 0.02 |
| Fodder crops | 256008 | 10.19 | 45854 | 3.13 | 210154 | 20.07 |
| Other arable land crops | 2102 | 0.08 | 1741 | 0.12 | 361 | 0.03 |
| Fallow land | 22036 | 0.88 | 8696 | 0.59 | 13340 | 1.27 |

**Source:** *RZ, author calculation*

In the EU member countries, cereals are grown on 84,624,200 ha, that is, their presence in the total arable land is 54.95%. EU leaders in terms of the area under cereals are: France, Poland, Germany, Spain and Romania. In terms of the area under cereals, Serbia is in the 10$^{th}$ place with 1,715,562ha. When it comes to the presence of grain on arable land, Serbia is in the 2$^{nd}$ place (68.26%) compared to EU member countries. A bigger share of grain in arable land is only present in Poland (70.44%). Concerning the structure of the area under cereals, in Serbia the most dominant is corn (57%) and wheat (35%), while the share of the other crops is negligible. In the structure of cereals in the EU the biggest area is under wheat and spelt 42.03%, followed by barely 21.87%, and corn 14.48%. The biggest area under wheat is found in France, Germany, Romania, Poland and Italy, and what is common for all these countries is that all of them use more than half of the area under cereals for growing wheat and spelt.

The area under pulses is, compared to the EU member countries, small. While in the EU pulses take, on average, 1.60% of arable land, in Serbia that is only 0.23% of the total arable land. With 5,708 ha under pulses, Serbia is in the 20$^{th}$ place compared to the EU member countries. The countries that stand out in

terms of pulses area are France (415,210 ha), Spain (318,130 ha), Great Britain (210,330 ha), Poland (169,100 ha) and Italy (139,140 ha).

In the EU, potato is grown on the area of 1,688,230 ha, that is on 1.62% of the arable area. The share of potato in the total arable area goes from 0.39% (Italy) to 15.49% (Holland). EU members with the largest potato area are Poland (374,760 ha), Germany (254,370 ha), France (161,150 ha), Holland (158,270 ha) and Great Britain (138,020 ha). In Serbia, potato is grown on 25,132 ha, which means that this crop makes up one hundredth of the available arable land.

Sugar beet is considered an important agricultural crop in Serbia. Its presence in the total arable area is 2.75%. In the EU, the total area under sugar beet is 1,620,900 ha, which makes up 1.56% of the available arable land capacity. In terms of the size of the area under sugar beet, compared to the EU member countries, before Serbia (69,112 ha) there are: France (383,590 ha), Germany (364,120 ha), Poland (206,220 ha), Great Britain (118,600 ha) and Holland (70,580 ha).

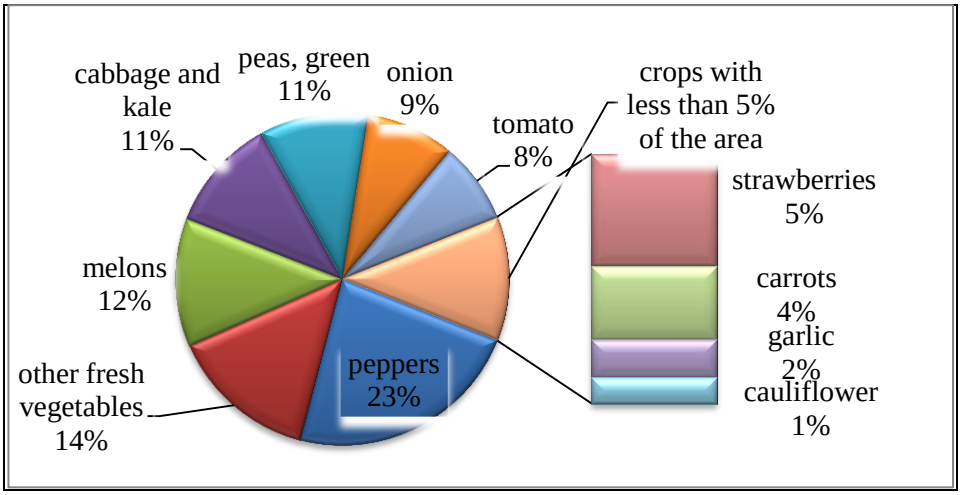
The production of industrial crops in Serbia is becoming more and more important (Bošnjak and Rodić, 2010), especially because of the relatively favorable agro-ecological conditions and the existing processing facilities. According to the last Census of Agriculture, in the Republic of Serbia, industrial crops are grown on 383,881 ha, that is, on 15.27% of the arable area. As much as 90.38% of the area under industrial crops is found in Vojvodina.

A high share and growth of the industrial crops area in Serbia, according to Bogdanov, is due to the market-production connection between the producer and the purchaser/processor. Industrial crops are grown on 12.14% of the total arable land in the EU. They are mostly grown in France, Germany, Romania and Bulgaria. In the structure of the area under industrial crops in Serbia, soy and sunflower make up around 96%. The Republic of Serbia has greater area under soy than all the EU members, and in terms of its sunflower area it is in the $6^{th}$ place.

Vegetables, as a group of crops, have specific productive, organizational and economic characteristics, and their production is one of the most intensive plant productions in terms of work and capital (Novković and Rodić, 1995; Oplanić et al., 2005). Vegetables, melons and strawberries are grown on 1.59% of the arable land in the EU (1,650,210 ha). The EU countries that stand out in terms of vegetable area are Italy, Spain, France, Poland and Great

Britain. In Serbia, vegetables are grown on 33,232 ha, which is 1.32% of the total arable area. The presence of certain vegetable crops in the vegetable area is different (Graph 1).

**Graph 1.** *The structure of area under vegetables, melons and strawberries in Serbia*




**Source:** *RZS, author calculation*

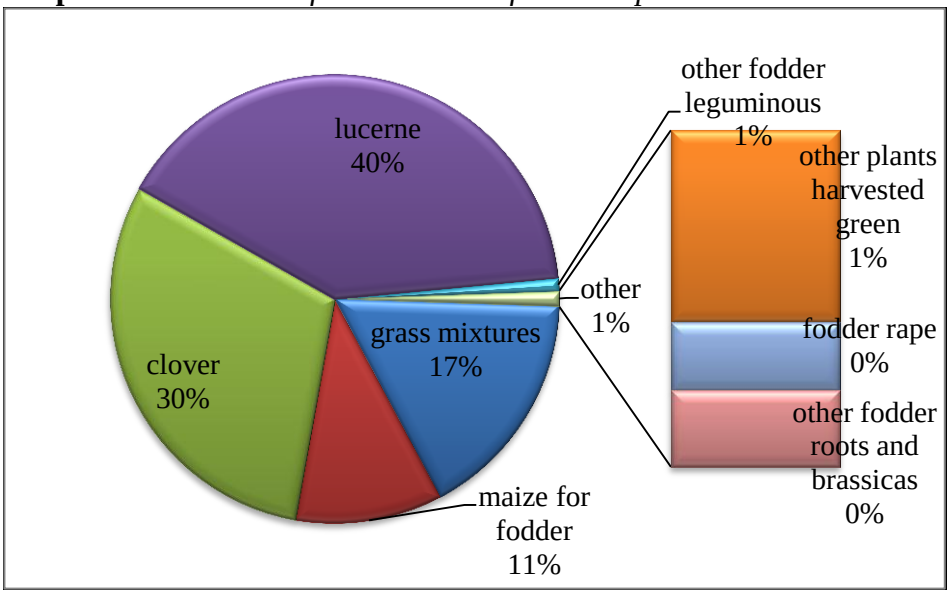
From the total area under vegetables in Serbia, only 6.27% is in protected area, and 63.8% is irrigated. Spain has the largest vegetable area grown in protected area (40,980ha, that is, 17.33% of the total vegetable production is in protected area) and it is followed by Italy with 32,940ha. All the other countries have less than 10% of the vegetable area in protected area. Considering the fact that in protected area the yield is much higher, safer, more competitive and of higher quality, such a low share is not acceptable in Serbia and requires solutions for increasing the intensity of the total plant production.

It is widely known that the arable area is mostly used for growing crops used in human and animal diet. However, on the level of the EU, flowers and ornamental plants take up significant area. In the EU, they are grown on 88,320 ha of the arable area, out of which 35.1% in Holland, which uses 3.03% of its arable area for this purpose. All the other EU member countries (even those that have the largest area under flowers: Italy, France, Germany, Spain) use less than 0.5% of their arable area for production of flowers and ornamental plants. In Serbia, flowers and ornamental plants are grown on only 382 ha, that is, on 0.02% of the arable land.

Fodder crops are grown for the purpose of fodder production and are the main connection between plant and animal husbandry (Bošnjak and Rodić, 2010). In Serbia, fodder crops are grown on 256,008 ha, that is, 10.19% of the total arable area, while in the EU fodder crops make up 19.22% of the total arable area (19,973,180 ha). Significant area under fodder crops can be found in: France, Germany, Italy, Great Britain and Sweden, especially Ireland (67.79%) and Malta (61.12%), which use most of their arable land for fodder crops production.

The most widespread fodder crop is lucerne, followed by clover, maize for fodder and grass mixtures. Other fodder crops make up less than 2% of fodder area (Graph 2).

**Graph 2.** *The structure of the area under fodder crops in Serbia*




**Source:** *RZS, author calculation*

Fallow land, or arable land that is left to rest, is the land that was not used in the year of the Census, but was rather left as black fallow (ploughed area) and green fallow (ploughed in and sown for the production of green manure). In 2010 on the territory of the EU 7,407,070 ha, that is, 7.13% of the arable area was under fallow land, while in 2011 in Serbia there was 22,036ha (0.88%) of fallow land. EU members with the biggest share of arable area under fallow land are: Portugal (29.11%) and Spain (23.60%) which also has the biggest fallow land area in the EU.

## Pastures and meadows

In the Census of Agriculture, the category of meadows includes the area overgrown with grass and are, for a number of years (more than 5), mowed for hay. In Serbia, 20.75% of the total used agricultural area (713,242 ha) are pastures and meadows. Of that area 83.93% is in Central Serbia. EU has 60,840,280 ha of pastures and meadows at its disposal, that is, 34.6% of the total used agricultural area is used for this purpose. The greatest area can be found in Great Britain, France, Spain, Germany and Romania. The biggest presence of pastures and meadows in the total available agricultural area is found in Ireland, with the share of 79.71%, Great Britain (64.57%), Slovenia (59.20%), Luxemburg (51.55%) and Austria (50.01%).

## Permanent plantations

Of the total used agricultural area in Serbia, permanent plantations make up only 5.45% of the area. In the EU the average share of the area under permanent plantations is similar (6.09%). In the structure of the area under permanent plantations in Serbia, fruit makes up 87%, grape vine 12%, and nurseries and other permanent plantations make up less than 1%.

When comparing EU and Serbia in terms of the area under permanent plantations, there is a bigger share of vineyards (28.65%) and a smaller share of fruit plantations (including olive and citrus growing - 68.84%).

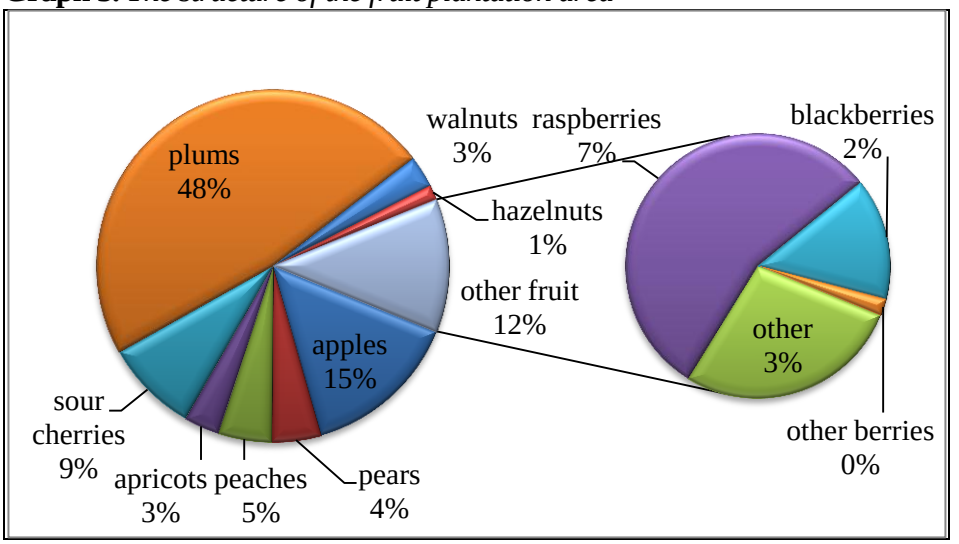
The biggest area under permanent plantations can be found in Spain, Italy, France, Greece, and Portugal, and Serbia is in the 9$^{th}$ place. The biggest area under fruit can be found in Spain, Italy, Greece, Portugal and Poland, and Serbia is in the 7$^{th}$ place. In the scope of permanent plantations in almost all EU countries, fruit plantations take up the biggest area. In Lithuania, as much as 97% of permanent plantations are fruit plantations.

Grape vine in the EU is grown on 3,066,060 ha. The biggest area of vineyards is in Spain, France, Italy, Portugal and Romania. In Serbia, nurseries take up 1,327 ha and in the EU 143,090 ha. The biggest nursery area is found in Italy, Poland, Germany, Holland and France. The share of nurseries in permanent plantations is different for each country and goes from 0.15% in Greece to 47.08% in Holland.

The most widespread fruit species in the total area of fruit plantations in Serbia on the whole is plum (48%, Graph 3), while in Central Serbia more than half

of the fruit plantations are plum plantations. Most fruit plantations in Serbia are continuous, but there is still significant fruit plantation area in the extensive system of cultivation (64,736 ha). Although one of the indicators of the intensity of fruit growing production is the presence of continuous plantation systems, even with the major presence of plantations, it cannot be claimed that fruit growing in Serbia is intense, as only 8.17% of fruit plantations are irrigated.

**Graph 3.** *The structure of the fruit plantation area*




**Source:** *RZS, author calculation*

Vineyard area in Serbia is 22,150 ha. In its structure wine varieties are dominant. Varieties for wine with protected origin designation take up 12% of the total vineyard area, while others take up 67%. Table wine varieties are grown on one fifth of the total vineyard area.

Of the total vineyard area in Serbia, 215ha is irrigated, in other words, less than 1%. In the EU, out of 3,066,060 ha of vineyards varieties for wine with protected origin designation are grown on 64.70% of the area, while table grapes (including fresh grapes and raisins) are present in the structure of vineyard area with 3.66%.

The only country that has a bigger share of table grapes in the total vineyard area than Serbia is Greece (40.38%). In Austria, Luxemburg, Germany, Slovakia and Slovenia more than 95% of the vineyard area is used for growing varieties for wine with protected origin designation.

In the end, it is also necessary to mention the part of agricultural area that is recorded as unutilized agricultural area. In the Republic of Serbia, 10.98% (424,054 ha) of agricultural area is unutilized, and in Vojvodina that area is 4.30% (72,313 ha). A worrying fact is that in Central Serbia as much as 16.13% (351,741 ha) of the total available agricultural area is not utilized.

Considering the fact that this area can be returned in the process of cultivation, it represents an important unutilized capacity. As is stated by Bošnjak and Rodić (2010), the main reasons for the existence of such huge uncultivated agricultural area are, on one hand, relatively high costs of production and unfavorable financial positions of producers, and, on the other hand, the restitution of land to its former owners who are not interested in cultivating it, or are not ready to sell it to those who are.

## Conclusion

According to the data of the Census of Agriculture from 2012, Serbia has 3,437,423 ha of utilized agricultural area at its disposal. The available fund of the agricultural area is used by 631,552 agricultural holdings, of the average size of 5.44 ha. Family agricultural holdings are dominant both in terms of their number (628,552), and in the available capacity of the utilized agricultural area (2,887,435 ha), and, as such, shape the basic features of the ownership structure and total agricultural production of Serbia.

Having in mind that around half of the holdings own up to 2 ha, and that only 1% of holdings use more than 50 ha of the agricultural area, it can be concluded that the decadal problem of Serbia is still present –downsizing of property. Such a structure represents a limiting factor for the development of agricultural production. In order to make a property more productive and competitive in terms of its size and organization, upsizing is still the priority.

In accordance with the stated problems, solutions can be found in the reforming of the land policy, which should be based on a better organized cadaster and further enforcement of regrouping of the agricultural area on the territory of the entire Serbia. While solving these problems, agricultural policy should also be directed to finding solutions that would enable the restructuring of production. The purpose of this policy should be a more intense use of land, where the adequate relation between plant and animal production should be emphasized.

## References


1. Bogdanov, N. (2007): *Izazovi poljoprivredno-prehrambenog sektora Srbije u procesu približavanja EU* http://www.daes.si/Konf07/Bogdanov%20DAES%20Srbija.pdf (05.03.2014.).

2. Bogdanov, N. i Ševarlić, M. (2007): *Posedovna struktura farmi zemalja članica EU*, monografija Međunarodna iskustva u tranziciji agrarnog sektora i rualnih područja, DAES, Beograd

3. Bogdanov, N., Božić, D. i Munćan P. (2008): *Ruralna poljoprivredna ekonomija Srbije i smanjenje ruralnog siromaštva, Agrarna i ruralna politika u Srbiji 2 - Početna iskustva pridruživanje EU i predlog mera za 2009. godinu*, tematski zbornik, DAES, Beograd, p. 19-32.

4. Bošnjak, D. (1997): *Posedovna struktura gazdinstava u poljoprivredi SR Jugoslavije*, stručni rad Uređenje, korišćenje i očuvanje zemljišta, Jugoslovensko društvo za proučavanje zemljišta, Novi Sad, p. 28-34.

5. Bošnjak, D. (2007): *Organizacija ratarske proizvodnje*, praktikum, Univerzitet u Novom Sadu, Poljoprivredni fakultet

6. Bošnjak, D. i Rodić, V. (2002): *Major Caracterteristics of Plowed Fields Exploitation in Vojvodina,* In e-Proceedings of the International Simposium of Interdisciplinary Regional Research, Secion – Use of Natrural Resources of the Region, Proceedings,Novi Sad

7. Bošnjak, D. i Rodić, V. (2010): *Oranice u Srbiji: kapaciteti, razmeštaj, način korišćenja*, monografija, Univerzitet u Novom Sadu, Poljoprivredni fakultet

8. Bošnjak, D. i Rodić, V. (2011): *Korišćenje oranica u fukciji razvoja ratarske proizvodnje u Vojvodini*, Agroznanje, Vol. 12, No. 3, p. 337-346.

9. Bošnjak, D. i Rodić, V. (2011a): *Zemljišni resursi kao faktor povećanja dohodka porodičnih gazdinstava u AP Vojvodini*, Ekonomika poljoprivrede, SB - 2, p. 63 -78.

10. Božić, D., Bogdanov, N. i Ševarlić, M. (2011): *Ekonomika poljoprivrede*, Univerzitet u Beogradu, Poljoprivredni fakultet Zemun.

11. Cvijanović, D., Katić, B., Vuković, P. (2006): *Privatizacija zemljišta u Republici Srbiji*, Zemljište i biljka, Vol. 55, No. 1, p. 107-118.

12. Eurostat (2013): *Agriculture, forestry and fishery statistics*, edition 2013, pocketbooks, http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-FK-13-001/EN/KS-FK-13-001-EN.PDF (05.03.2014.).

13. Eurostat, *Land use: number of farms and areas of different crops by type of farming*, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ef_oluft&lang=en (12.02.2014.).

14. Grahovac, P. (2006): *Regionalne značajke posjedovne strukture u Hrvatskoj poljoprivredi*, Zbornik Ekonomskog fakulteta u Zagrebu, 4, p. 23-44.

15. Hadžić, V., Sekulić P., Vasin, J. i Nešić, Lj. (2005): *Geološka osnova poljoprivrednog pokrivača Vojvodine*, Ekonomika poljoprivrede, No. 4, p. 429-438.

16. Jeftić, S. i Penčić, M. (1995): *Stanje prirodnih i drugih resursa za razvoj poljoprivrede u Jugoslaviji*, IV kongres o hrani, knjiga II, Beograd, p. 151-160.

17. Katić, B. i Simonović, Z. (2007): *Briga o poljoprivrednom zemljištu u Srbiji - osvrt na novi Zakon o poljoprivrednom zemljištu*, Ekonomika, Vol. 53, No. 1-2, p. 149-162.

18. Kranjčević, S. i Prosen, A., (2003): *Komasacija: doprinos održivom razvitku ruralnog prostora u srednjoj i istočnoj Europi u novom tisućljeću, Sociologija sela Vol. 41, p. 119-130.*

19. Lazić, V., Turan, J. i Meši, M. (2000): *Analiza veličine parcela na privatnom sektoru atara Beče,* Savremena poljoprivredna tehnika, Vol. 26, No. 1-2, p. 1-42.

20. Ministarstvo poljoprivrede, šumarstva i vodoprivrede Republike Srbije (2013): *Nacrt strategije poljoprivrede i ruralnog razvoja Republike Srbije 2014-2024*, http://www.mpsv.gov.rs/upload/Strategija_Poljoprivrede_i_ruralnog_razvoja_RS_2014_Nacrt.pdf (25.02.2014.).

21. Nikolić, R., Furman, T., Tomić, M. i Simikić, M. (2005): *Uticaj veličine poseda na troškove nabavke i korišćenja mehanizacije*, Traktori i pogonske mašine Vol. 10 (3), p. 54-58.

22. Nikolić, R., Simikić, M., Savin, L., Furman, T., Tomić, M. i Gligorić, R. (2007): *Mehanizacija i veličina poseda*, Traktori i pogonske mašine Vol. 12, No. 1, p. 5-10.

23. Novković, N. i Rodić, V. (1995): *Analiza korišćenja radne snage i sredstava mehanizacije u optimalnoj strukturi poljoprivredne proizvodnje*, Ekonomika poljoprivrede No.1, p. 33-44.

24. Oplanić, M. Radinović, S., Ban, D. (2005): *Povećanje dohotka u povrćarskoj proizvodnji na obiteljskim gospodarstvima Istre,* Agronomski glasnik, Vol. 1, p. 55-66.

25. Republički zavod za statistiku, *Poljoprivreda 2009*, bilten http://pod2.stat.gov.rs/ObjavljenePublikacije/G2010/pdf/G20105523.pdf (19.02.2014.).

26. Republički zavod za statistiku, *Popis pojoprivrede 2012. - Poljoprivreda u Republici Srbiji 1*, knjiga popisa http://pod2.stat.gov.rs/ObjavljenePublikacije/Popis2012/PP-knjiga1.pdf (02.02.2014.).

27. Rodić, V., Bošnjak, D. i Vukelić, N. (2008): *Održivost upravljanja poljoprivrednim zemljištem u AP Vojvodini*, Agroekonomika, No. 37-38, p. 15-22.

28. Rodić, V., Bošnjak, D.,Vukelić, N. (2007*): Sustainability Of Agricultural Land Management*, In thematic proceedings of the 100th Seminar of the Europiean Association of Agricultural Economists: Development of Agriculture and Rural Areas in Central and Eastren Europe, p.p.429-439.

29. Službeni Glasnik 62/2006, 65/2008, 41/2009, *Zakon o poljoprivrednom zemljištu*, http://www.parlament.gov.rs/народна-скупштина.115.html (04.03.2014.).

30. State Statistical Office of the Republic of Macedonia, *Census of Agriculture, 2007 Individual agricultural holdings grouped by total available land, by regions*, book 3 http://www.stat.gov.mk/Publikacii/PopisNaZemjodelstvo2007/KnigaIII.pdf (11.02.2014.).

31. Subić, J., Katić, B. i Vuković, P. (2005a): *Zemljište - najzančajniji prirodni resurs u poljoprivredi*, Ekonomika, Vol. 51, No. 5-6, p. 49-56.

32. Subić, J., Popović, V. i Vuković, P. (2005): *Održivo korišćenje zemljišta u poljoprivredi*, Ekonomika, Vol. 51, No. 5-6, p. 26-35.

33. Tomić, D. (1993): *Zemljišni potencijali i njihovo korišćenje u poljoprivredi Srbije*, Zbornik radova sa naučnog skupa Problemi sabijanja zemljišta, Novi Sad-Bečej, p. 6-13.

34. Tomić, R. i Tomić, D. (2011): *Proizvodni potencijali agroprivrede Srbije*, Škola biznisa, No. 3, p. 1-10.

35. Zekić ,S., Kresoja, M. i Tošin, M. (2011): *Razvojne karakteristike poljoprivrede Srbije i EU - komparativna analiza, Agrarna i ruralna politika u Srbiji i nužnost ubrzanja reformi*, Tematski zbornik, p. 39-48.

# QUALITY ASSESSING OF ACID SOILS IN TERMS OF ALUMINIUM MOBILITY AND TOXICITY IN PLANTS[1]

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## Abstract

*This paper presents a review of the quality of acid soils depending on the content of mobile aluminium and its toxic effect on small grains. Acid soils in Central Serbia (over 60% of total arable land) are marginal with respect to the cultivation of most small grains due to their unfavourable physical, chemical and microbiological properties. Al toxicity and low P levels are considered the main constraint to plant growth and development on acid soils. High levels of Al in the soil solution have an extremely toxic effect on cultivated plants. The plasma membrane of root-tip cells is the primary target of Al toxicity. Mechanisms of Al tolerance in plants involve the exclusion of Al from the root-tip rhizosphere zone and its neutralisation in the plant symplasm. This review also presents the latest interpretations of Al toxicity and resistance mechanisms in small grains considered important for stable food production in the future. However, regardless of intensive research, Al toxicity and resistance mechanisms have not been sufficiently elucidated.*

**Key words:** *aluminium, soil, plant, cereals, toxicity, tolerance*

## Introduction

Acid soils limit crop production on 30-40% of the world's arable land and up to 70% of the world's potentially arable land. It has been estimated that over 50% of the world´s potentially arable lands are acidic (von Uexkull and Mutert, 1995; Kochian et al., 2005). In the Republic of Serbia, acid soils are widespread, accounting for over 60% of the total arable land (Stevanović et al., 1995). These are mostly lowland or hillside types of Pseudogley or its leached

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variants, acid Vertisols, podzolic eutric Cambisols, diluvial, brown, or leached brown soils in mountainous regions (Djalović et al., 2010). These soils are rather poor in bases, medium to strongly acidic, poorly structured, poor in organic matter and insufficiently suitable or completely unsuitable for the cultivation of most cereal crops (Jelić et al., 2007).

The acidity of these soils, their high content of $H^+$ ions and low contents of essential plant nutrients, primarily P and Ca, are factors that limit yield and yield stability in cereal crops (Milivojevic et al., 2014). Apart from acidity, these soils are often characterised by high levels of toxic forms of Al, Fe and Mn, and nutrient deficiencies caused by leaching or decreased availability of P, Ca, Mg and some other micronutrients, especially Mo, Zn and B (Narro et al., 2001; Sumner, 2004; Welcker et al., 2005; Kovačević et al., 2006; Jovanović et al., 2006; Milivojevic et al., 2012).

Recent studies worldwide have shown that massive deterioration of small grains on acid soils is caused by elevated concentrations of mobile forms of some toxic elements (Al, Fe, Mn), especially when no phosphorus nutrition is practised or when the Ca component is missing from nitrogen fertilisers (Jelić, 1996). Soil acidification can develop naturally when basic cations are leached from soils, but it can be accelerated by some farming practices and by acid rain (Kennedy, 1986). As a result of increased solubility of certain mineral components and, partly, organic components in the soil substrate, acids soils have elevated levels of some heavy metals and aluminium which show low to high toxic effects on crops (Kastori, 1983; Jelić et al., 2004; 2012; Milivojevic, 2003).

The accumulation of aluminium in the acid soil may result from natural lithogenic and pedogenic processes or from anthropogenic factors (environmental pollution) (Kastori, 1995). The toxic effect of Al is a great problem in the cultivation of plants on acid soils (pH < 5) (Foy et al., 1978). Plant species differ in their tolerance to soil acidity and high levels of mobile Al in the medium. Some of them are intrinsically more tolerant than others, for example rye is one of the most stress-tolerant species in *Triticeae* family. Hitherto, research on the tolerance of cereal species has shown that rye is the most tolerant, followed by triticale, wheat and barley (Aniol and Madej, 1996).

Methods to reduce soil acidity and increase small grain yields include the use of a range of soil amending operations (liming, humification, use of phosphorus fertilisers). The use of lime and organic and phosphorus fertilisers as soil amendments is highly efficient in improving major physical, chemical

and biological properties of acid soils and particularly in terms of increasing their fertility (Dugalić, 1998; Caires et al., 2008); Haynes, 2010; Jelić et al., 2013).

This study presents the quality of acid soils depending on mobile aluminium content and provides a survey of developments in understanding the toxicity of Al to small grains and mechanisms of their tolerance to Al.

## Acid soils in Serbia and their mobile aluminium content

Serbia covers a total area of 8,840,000 hectares. The total agricultural area is 5,718,599 hectares (0.56 ha per capita), with arable land amounting to 4,867,000 hectares (0.46 ha per capita). Agricultural land and forests account for about 70 and 30 percent of the total land area in Serbia, respectively.

Serbia has been regarded as a true mosaic of soil types, subtypes, variants and forms, due to the high complexity of the geological and lithological substrates, diversity of its relief and specific climate characteristics of certain regions. The Vojvodina region is covered mostly by fertile black soil, areas next to the rivers and edges of Banat bordering Romania are covered by marshy black soil and alluvial sediments, and northwestern parts of Central Serbia have a soil cover of Pseudogleys, leached soils and eutric Cambisols (brown forest soils).

Apart from the alluvial soils predominating mostly around the Morava River (Pomoravlje Region), part of the soil was formed on calcareous dolomite rocks in the uplands of Central Serbia (south of the Sava and the Danube) where black and brown soils predominate.

Acid soils are widespread throughout Serbia, occurring on acid substrates or in regions where other agroenvironmental factors have led to the leaching of bases and soil degradation.

Long-term research has shown that acid soils cover over 60% of Serbia's land area and are becoming a constraint to plant production due to their low productivity (Stevanović et al., 1995). The constant increase in acreage under these soils is the result of intensive agricultural practices, uncontrolled use of mineral fertilisers, effect of acid rains and absence of organic fertilisers. In consequence, the chemical, biological and physiological properties of these soils have become disturbed (Jelić, 1996).

Acid soils in Serbia are largely low-land and sloping Pseudogleys or certain variants of leached pseudogley soils (Luvisol), followed by acid Vertisols, podzolised brown forest soils (eutric Cambisol), brown deluvial soils and brown leached soils (distric Cambisol) in the uplands, which are rather poor in bases, medium to strongly acidic, poorly structured, poor in organic matter and insufficiently suitable or completely unsuitable for the cultivation of most plants.

Most acid soils are found in Central Serbia and in Kosovo and Metohija. With the exception of the soils in the valleys of large rivers (formed on alluvial sediments), those formed on calcareous and lacustrine sediments and on calcareous rocks, almost all regions in Central Serbia have soils that show different degrees of acidity (Jelić et al., 2012).

Seventy one percent of extremely acid soils in the Republic of Serbia are under forest and grass vegetation. Forests in Serbia cover 2.7 million hectares i.e. just above 30 percent. Strongly acid soils account for 27% of the total land under acid agricultural soils, with about 23% of strongly acid soils being under fields, gardens and permanent orchards (Čakmak et al., 2009).

Western Serbia and some northern parts of the country have substantial areas of acid soils. Čakmak et al. (2009) reported considerable areas of acid soils in northwestern parts of Serbia. These soils are located mostly in the Kolubara Basin, Lajkovac, Pocerina and Jadar regions characterised by a humid climate and flat to gently undulating relief. The dominant acid soils in these regions include Luvisols and Pseudogleys that have developed mostly on Neogene and alluvial sediments.

Substantial areas of acid soils (distric Ranker and Cambisol) are spread over the region southwestern of the Kolubara Basin in the sloping terrain below Koceljeva and around Krupanj, along the mountainous range next to the Drina through to Užice. These soils are formed on schist and granite and partly on cherty diabase. Further on to the south towards Ivanjica and in its vicinity there are somewhat larger areas under acid soils including Rankers and distric Cambisols formed on carbon and sericite schists. These same types of acid soils spread towards Mt. Golija in the east; they are formed on phyllito mica schists and phyllites (Čakmak et al., 2009).

Northeastern Serbia has large areas of strongly acid soils. The acidification of these soils was accelerated by sulfurous gas emissions from the Mining and Metallurgical Company in Bor (Antonović et al., 1974). The same authors also

found that the soils surrounding the Bor mines are heavily damaged and acidified by sulfurous gases. The soils in this region include acid Vertisols and distric Cambisols formed on andesite and sand stone as well as on alluvial sediments covered with waste mining material.

In northeastern Serbia, the predominating acid soils are distric Rankers and Cambisols formed on different acid substrates (diorites, gneiss, schist etc.). Minor acid soils in this area include Luvisols and Pseudogleys. Very acid soils occur sporadically in Šumadija (Milivojevic et al., 2012; 2014). The area between Belgrade and Aranđelovac is covered by acid eutric and distric Cambisols and acid Luvisols formed mostly on schist, flysch and plutonite. Large areas of acid soils are found in southern Serbia, particularly to the south of Leskovac, and partly in the Leskovačko Polje and Vranjsko Polje plains, as well as in the surrounding slopes. The predominating acid soils include ilimerised soils and pseudogleys formed on fluvial terraces and Miocene sediments.

Most of the strongly acid soils occurring in southern Serbia are located in the highlands dominated by acid parent materials. Depending on the existing relief, vegetation and other pedogenetic factors, different types of acid soils have formed (i.e. Lithosols, Regosols, Rankers, distric Cambisols and leached soils). Their formation is related primarily to the properties of the geological substrate. Thus, metamorphic rocks of Paleozoic age are common in this region, which also has (Cretaceous and Palaeogene) granitoids underlying acid soils.

In addition to natural (primary) pedogenetic factors contributing to the formation of acid soils, some areas have experienced adverse anthropogenic impacts. This is strongly apparent in the Bor surroundings affected by soil acidification. Moreover, soil contamination by acid oxide emissions occurs in large towns, at power plant locations and in towns that have a well-developed chemical industry (Belgrade, Obrenovac, Lazarevac, Kostolac, Kolubara, Smederevo, Prahova, Šabac, Loznica, Pančevo, Užice).

Poor physical, chemical and biological properties of acid soils pose a complex problem for plant production on these soils. As regards chemical properties, a low pH of soil increases the levels of mobile aluminium and manganese while decreasing those of available phosphorus (Okiljević, 1982; Dugalić, 1998; Radanović and Predić, 1997, Jelić et al., 2003; Milivojević, 2003).

Milivojević et al. (2012) reported strongly unfavourable chemical properties for the Vertisol and Pseudogley in Kragujevac and the surrounding region i.e. increased soil acidity and a very low level of readily available phosphours. The exchangeable acidity of these soils (in N KCl) ranged between 4.20 and 4.40 pH units, and it had a highly negative effect on plant growth and development and yield of most agricultural crops. The low pH of these soils limits the production of some susceptible plants (legumes, barley).

Aluminum toxicity is considered to be the most important growth limiting factor in acid soils (Carver and Ownby, 1995; Jayasundara et al., 1998; Arsenijević-Maksimović et al., 2001; Jelić et al., 2004). Accordingly, aluminium toxicity in plants has been the subject of many studies both in Serbia and throughout the world. The level of Al toxicity to crops is dependent on the content and form of Al present in the soil, pH, organic and inorganic ligands in the soil solution, ionic strength and plant genotype (Ramaškevičiene et al. 2002; Shamshuddin et al. 2009). Therefore, at pH ≤ 4.0, the predominant form of mobile aluminium in the solution is $Al^{3+}$ ion, whereas increasing pH results in a decrease in its content due to the formation of OH-Al species, including monomers, polymers or their complexes. Monomers of aluminium ($Al^{3+}$, $Al(OH)^{2+}$ and $Al(OH)_2^{+}$) are generally considered toxic in aqueous systems (Parker et al. 1988, Cronan and Grigal 1995).

**Table 1.** *Effect of acidification on pH, Almono and Altot in soil solution,*

| Location | ml 0.1M HCl | pH | $Al_{mono}$ µM l-1 | $Al_{tot}$ µM l-1 | $Al_{mono}$ in $Al_{tot}$ (%) |
|---|---|---|---|---|---|
| Arilje | 0 | 4.90 | 33.19 | 38.40 | 86 |
| | 0.25 | 4.72 | 34.53 | 40.39 | 85 |
| | 0.5 | 4.60 | 34.81 | 41.48 | 84 |
| | 1 | 4.38 | 37.39 | 43.41 | 86 |
| | 1.5 | 4.15 | 40.13 | 40.86 | 98 |
| | 2 | 3.93 | 61.04 | 61.04 | 100 |
| | 2.5 | 3.80 | 74.77 | 74.77 | 100 |
| | 5 | 3.30 | 219.10 | 219.10 | 100 |

**Source:** *Mrvić et al., 2012*

Differences in the content of exchangeable aluminium in pseudogleys, depending on heterogeneous biological substrates, were first reported by Nikodijević (1964). According to the degree of acidity and content of exchangeable aluminium, he classified the Parapodzols occurring in western Serbia into three groups: 1. pH/KCl < 4.0, exchangeable Al 45.0-13.0 mg 100

$g^{-1}$, 2. pH/KCl 4.0-4.5, exchangeable Al 13.0-3.0 mg 100 $g^{-1}$, 3. pH/KCl > 4.5, exchangeable Al < 3.0 mg 100 $g^{-1}$ soil.

Okiljević (1982) found a high content of readily soluble aluminium in the soil, reaching values as high as 36 mg 100 $g^{-1}$ soil at some locations. At these locations, the plants showed signs of physiological disease, due to a 2- to 27-fold increase in aluminium levels compared to the locations where plant development was normal.

Avdonin (1976) observed that phosphorus nutrition is governed by aluminium levels, as aluminium combines with phosphorus, in strongly acid soils, to form compounds that make phosphorus less available to plants, eventually leading to plant decay due to starvation. Since plants differ in their susceptibility to mobile aluminium, they were classified by the author into four groups, with winter wheat and winter barley as highly susceptible and maize as having medium susceptibility. According to this classification scheme, mobile aluminum levels of 5-6 mg/100 g soil cause poor plant development, and those of 10-11 mg/100 g lead to plant decay. Apart from aluminium, manganese in acid soils can also have a toxic effect on crops (Foy et al., 1973).

The toxicity of aluminium as an important constraint to the growth of many plants grown on acid soil was analysed by Foy (1974) who determined that excess mobile aluminium is markedly deleterious in the topsoil, as it decreases the depth of root penetration, thus reducing the uptake of nutrients and water from deeper soil layers, consequently decreasing the growth of aerial parts of the plant. This leads to a substantial reduction in dry matter yield.

**Table 2.** *Effect of nitrogen rates on mobile aluminium levels at different sampling dates (mg 100 $g^{-1}$ soil),*

| Sampling date | Nitrogen rate (kg $ha^{-1}$) | | Average |
|---|---|---|---|
| | 60 | 250 | |
| 2 April | 5.8 | 13.3 | 9.5 |
| 9 April | 4.2 | 12.9 | 8.5 |
| 15 April | 11.7 | 22.5 | 17.1 |
| 21 April | 6.6 | 14.1 | 10.3 |
| Average | 7.1 | 15.7 | 11.4 |

**Source:** Jelić, 1996

Jelić (1996) observed considerable variations in mobile aluminium levels on a Vertisol depending on weather and type of nitrogen fertilisers. The effect of

acid soils and aluminium and manganese toxicity on the chemical composition of wheat and barley was evaluated by Radanović and Predić (1997). The soils used in the study were very acid (pH in KCl below 4), and mobile aluminium varied with soil pH: from 1-2 mg $kg^{-1}$ at $pH_{(KCl)}$ of about 4.5 to as high as 35-40 mg $kg^{-1}$ Al at $pH_{(KCl)}$ of 3.8, causing toxic effects on the wheat crop. Furthermore, the same authors found different Al toxicity levels for certain genotypes and agroenvironmental conditions, with levels above 10 mg 100 $g^{-1}$ Al being potentially dangerous to Serbian commercial wheat and barley cultivars grown on a distric Pseudogley and a degraded Cambisol.

## Toxic effect of mobile aluminium on small grains

Aluminium toxicity is the primary factor that limits crop production on strongly acid soils. In soils with a pH of 5.0 or below, toxic forms of aluminium are solubilised into the soil solution, inhibiting root growth and function, and thus reducing crop yields.

Acid soils in Serbia are poorly structured, low in organic matter and marginal with respect to the cultivation of most small grains. They exhibit reduced adsorption capacities, markedly increased exchangeable acidity, a low buffering capacity, decreased levels of major biogenic elements and elevated levels of toxic elements, specifically toxic forms of mobile aluminium (Jelić, 1996; Dugalić, 1998; Mrvić et al., 2012).

Most of the aluminium present in the soil is incorporated into aluminosilicate minerals, and only small (submicromolar) amounts occur in soluble forms capable of affecting biological systems (May and Nordstrom, 1991). Different forms of aluminium occur in the soil solution: $Al(OH_2)^{2+}$ and $Al(OH)_2^{+}$ at pH 4-5, $Al^{3+}$ at pH 5.5-7.0 and $Al(OH)_4^{+}$ at pH 7-8. Other complex ions $AlO_4Al_{12}(OH)_{24}(H_2O)_{12}^{7+}$($Al_{13}$) and $Al^{3+}$ are certainly toxic, but no toxicity has been detected for $AlSO_4^{+}$, $Al(SO_4)_2^{-}$ and Al-F. The status of $Al(OH)^{2+}$ and $Al(OH)_2$ is uncertain although experimental results have indicated their toxicity (Kinraide, 1997). The toxicity of certain Al species for wheat roots in the increasing order is as follows: $AlF_2^{+} < AlF^{2+} < Al^{3+} < Al_{13}$. Kochian (1995) reports that Al toxicity has been convincingly confirmed only for $Al_{13}$ and $Al^{3+}$. Al mobility in the soil increases with increasing soil acidification caused by the leaching of alkaline metal ions ($Na^{+}$, $K^{+}$, $Ca^{2+}$, $Mg^{2+}$) from the soil and a decrease in soil pH. Aluminium ions are uptaken by plants mostly through the root system, and only small amounts penetrate the leaves. Active forms of metals are uptaken by ion-specific carriers with energy expenditure involved but a specific Al carrier has not yet been found. Al has the ability to bind to the

carboxyl and phosphate groups of the cell wall and membrane, respectively, thus ensuring its primary effect on root membrane permeability. Although the primary response to Al takes place in the root apex, the mechanism of Al-induced growth inhibition remains poorly understood. Also, molecular forms of Al capable of passing through cell membranes and the rate of Al transport are unknown (Gunse et al., 1997). According to Chang et al. (1999), most of the total cellular aluminium accumulates in the cell wall, binding to the pectin produced during Al stress. Induction of callose formation is an indicator of genotypic Al toxicity. Callose is accumulated in the root cell wall in response to the damage caused by Al (Horst et al., 1997). Callose may cause the blockage of cell-to-cell transport by blocking plasmodesmata (Sivaguru et al., 1999). Low soil pH increases the content of mobile Al in the soil solutions of acid vertisols and pseudogleys (Jelić, 1996; Dugalić, 1998). The content of mobile Al in acid vertisols in Central Serbia changes depending on parent material, profile depth, site and agricultural practices, particulary fertilisation. Jelić (1996) and Đokić et al. (1997) found the high content of mobile Al in acid soils to be the main cause of decay of young winter wheat plants in spring. An increase in Al mobility in soil may be the result of continued application of only one fertiliser type, especially N fertiliser, and its unchanging application rate (Jelić, 1996). Treatment of acid vertisol with physiologically acid fertilisers without Ca components further increases soil acidity and the content of mobile Al in soil (Jelić, 1996).

Most plants contain up to 0.2 mg Al $g^{-1}$ dry matter. However, some plants, known as Al accumulators, may contain over 10 times more Al with no damage caused. Tea plants are typical Al accumulators; Al content in these plants can reach as high as 30 mg $g^{-1}$ dry matter in old leaves (Matsumoto, 2000). About 400 plant species belonging to 45 families have so far been identified as hyperaccumulators of various toxic elements (Baker et al., 2000). Recent investigations worldwide have shown that massive deterioration of small grains on acid soils is caused by elevated concentrations of mobile forms of some toxic elements (Al, Fe, Mn), which are especially evident when no phosphorus nutrition is practised or when the Ca component is missing from nitrogen fertilisers (Jelić, 1996).

The current state of knowledge regarding Al toxicity in plants is insufficient, and there has been constant scientific research indicating the importance of the problem (Matsumoto, 2000). Root and shoot growth inhibition is the earliest visible symptom of Al toxicity. The first symptoms are observed on roots, whereas shoots are considerably less affected (Chang et al., 1999). Root stunting is a consequence of Al-induced inhibition of root elongation. Roots

are stubby and brittle, and root tips and lateral roots become thick and may turn brown. Such roots have a limited efficiency in absorbing nutrients and water (Mossor-Pietraszewska et al., 1997).

Young plants are more susceptible to increased Al concentrations than older plants. Shoot biomass decreases due to decreased photosynthetic activity, cellular and ultrastructural changes in leaves, chlorosis and necrosis, and a decrease in shoot leaf number and size.

## Ways to solve the acid soil problem

Solving the acid soil problem relies on the use of adequate soil amendment practices and fertilisation systems-"soil adaptation to plants" and singling out and growing tolerant genotypes of small grains, "plant adaptation to the soil". Fertilisation for soil amending purposes (liming, use of phosphorus fertilisers and humification) has been used in Central Serbia to reduce soil acidity. The use of different soil amendments (lime materials, organic and phosphorus fertilisers) has had a positive effect on the fertility of these soils. Lime, manure and mineral NPK fertilisers used as soil amendments by Jelić et al. (2013) on a pseudogley led to a significant increase in soil pH (by over 1.0 pH units in KCl) and readily available phosphorus (6.9-10.4 mg 100 $g^{-1}$), a partial increase in readily available potassium and a significant decrease in mobile aluminium levels (from about 10.0 to 0.4 mg 100 $g^{-1}$ soil). In addition, the same authors observed positive changes regarding available calcium and magnesium levels and the degree of saturation of the soil adsorption complex.

**Table 3.** *Effect of NPK, manure and lime on yield of spring small grains (t $ha^{-1}$)*

| Small grains | Treatments | | | | |
|---|---|---|---|---|---|
| | control | NPK | N+$CaCO_3$ | NPK+$CaCO_3$ | NPK+manure+ $CaCO_3$ |
| Wheat | 1.488 | 2.937 | 2.476 | 2.648 | 2.726 |
| Barley | 0.963 | 2.878 | 2.483 | 2.487 | 2.201 |
| Oat | 1.498 | 3.331 | 2.569 | 3.088 | 2.820 |
| Triticale | 0.958 | 2.062 | 1.799 | 1.949 | 2.008 |

**Source:** *Živanovic et al., 2002*

The basis for the choice and creation of tolerant genotypes is provided through research into and development of Al tolerance mechanisms. These underlying mechanisms have been widely classified as mechanisms that prevent Al uptake by roots and mechanisms involved in detoxicating Al that has

accumulated in plant cells (Rengel, 1996). Cereals show different tolerance in the following decreasing order: rye > triticale > wheat > barley (Aniol and Gustafson, 1984). A number of mechanisms of Al tolerance have been defined (Ma et al., 2000; Matsumoto, 2000); however, evidence has shown that the secretion of organic acids from plant roots plays the most important role in both external and internal neutralisation of Al. Some organic acids form stable complexes with Al ions, thus preventing the binding of Al with intra- and intercellular compounds in the root (Ma, 2000). Al detoxification in plant cytoplasm cells involves the formation of complexes between Al and proteins, particularly the enzymatic protein calmodulin which binds Al to form a stable metal protein complex (Somers and Gustafson, 1995; Wu et al., 2000). The reduction in toxic Al level in tolerant cereal cultivars is associated with increased protein kinase activity (Moustakas et al., 1992).

Also, cereal plants have genetically controlled Al tolerance mechanisms. A substantial number of genes involved in the regulation of Al stress in small grains, particularly wheat and rye, have been isolated (Aniol and Gustafson, 1984; Aniol and Madej, 1996). Genetic Al tolerance mechanisms have been established not only in plant species, but also in many cultivars within species (Aniol and Gustafson, 1984). For example, Gallego and Benito (1997) found that Al tolerance in rye is controlled by at least two major dominant independent alleles: Alt1 and Alt3, located on the 4R and 6R chromosomes.

## Conclusion

Acid soils in Central Serbia (accounting for over 60% of the total arable land area) are extremely unfavourable in terms of chemical, microbiological and, in most cases, physical properties, which makes them insufficiently suitable or unsuitable for the cultivation of most small grains. Al toxicity and low P levels are considered the main growth limiting factors in acid soils. Elevated levels of Al in plant cells in small grains grown on acid soils are defined as being genotoxic. Given that the destructive effect of Al is evident at different plant organisation levels, the molecular mechanisms of its toxicity in plants have not been sufficiently elucidated. Understanding the mechanisms of Al toxicity and resistance in plants is of utmost importance in achieving grain yield stability in small grains on acid soils. Plant resistance to Al can be attained through the mechanisms that facilitate the exclusion of Al from root tips and/or through the mechanisms that enable the plants to tolerate its presence in the symplast.

Improving Al tolerance in cereal crops through genetic resources using the previously identified Al resistance genes provides great potential in terms of increasing Al tolerance levels in plants.

The low productivity of acid soils in Central Serbia, resulting from low fertility and, in particular, from the very low content of available phosphorus and high levels of mobile aluminium in the humus and, at times, in the subhumus horizon, requires the use of lime, phosphorus and organic fertilisers for soil amending purposes.

## References


1. Aniol, A., Gustafson, J. P. (1984): *Chromosome location of genes controlling aluminum tolerance in wheat, rye and triticale*. Can. J. Genet. Cytol., 26, 701-705.

2. Aniol, A., Madej, L. (1996): *Genetic variation for aluminum tolerance in ray*. Vortr. Pflanzenz, 35, 201-211.

3. Arsenijević-Maksimović, I., Jelić, M., Lomović, S., Kastori, R. (2001): *Genetic and physiological bases of plant tolerance to high concentrations of heavy metals and aluminium*. In: Quarrie, S. A. Et al., (eds.) genetics and Breeding of small Grains. ARI Serbia, Belgrade, 377-405.

4. Antonović, G., Nikodojević, V., Tanasijević, Đ., Vojinović, Lj., Pavićević, N., Aleksić, Ž., Filipović, Đ., Jeremić, M. (1974): *Zemljišta basena Timoka*. Centar za poljoprivredna istraživanja. Institut za proučavanje zemljišta, Beograd.

5. Avdonin, N. S. (1976): *Izvestkovanije kiselih pochv*. Izdateljstvo "Kolos", Moskva.

6. Baker, A.J.M., McGrath, S.P., Reeves, R.D. and Smith, J.A.C. (2000): *Metal hyperaccumulator plants: A review of the ecology and physiology of a biological resource for phytoremediation of metal-polluted soils*; in Phytoremediation of Contaminated Soil and Water (Terry, N. & Banuelos, G., eds.) pp. 85-107, Lewis Publisher, Boca Raton.

7. Caires, F. E., Garbuio, J. F., Churka, S., Barth, G., Correa, J. C. L. (2008): *Effect of soil acidity amelioration by surface liming on no-till corn, soybean, and wheat root growth and yield*. European Journal Agronomy, 28, 57-64.

8. Carver, B. F., Ownby, J. D. (1995): *Acid soil tolerance in wheat*. Adv. Agron. 54; 117-173.

9. Chang, Y.-C., Yamamoto, Y. and Matsumoto, H. (1999): *Accumulation of aluminium in the cell wall pectin in cultured tobacco* (*Nicotiana tabacum* L.) *cells treated with a combination of aluminium and iron*. Plant Cell Environ. 22, 1009-1017.

10. Cronan, C. S., Grigal, D. F. (1995): *Use of calcium/ aluminum ratios as indicator of stress in forest ecosystems*. J.Environ. Qual. *24*, 209-226.

11. Čakmak, D., Martinović, Lj., Stevanović, D., Mrvić, V., Saljnikov, E., Sikirić, B., Koković, N. (2009): *Plodnost zemljišta. In: Plodnost i sadržaj opasnih i štetnih materija u zemljištima Centralne Srbije*. Monografija, V. Mrvić i sar. (eds.), 39-69. Institut za zemljište, Beograd.

12. Dugalić, G. (1998): *Karakteristike kraljevačkog pseudogleja i iznalaženje mogućnosti za povećanje njegove produktivne sposobnosti*. Doktorska disertacija, Poljoprivredni fakultet, Zemun, 1-173.

13. Djalovic, I., Maksimovic, I., Kastori, R., Jelic, M. (2010): *Mechanisms of adaptation of small grains to soil acidity*. Proc. Nat. Sci. Matica Srpska, 118, 107-120.

14. Djokić, D., Stojanović Jovanka, Jelić, M., Lomović, S. (1997): *Toxic effects of aluminium on wheat decay in its early growth and development*. Acta Agriculturae serbica, vol II, 4, 39-44.

15. Foy, C. D., Fleming, A. L., Schwartz, J. W. (1973): *Opposite aluminium and manganese tolerances of two wheat varieties.* Agron. J., 65, 123-126.

16. Foy, C. D. (1974): *Aluminium tolerance of wheat cultivars related to region of Origin*. Agronomy Journal, 66, 751-758.

17. Foy, C. D., Claney, R. L., White, M. C. (1978): *The physiology of metal toksicity in plants.* Annu. Rev. Plant Physiol., 29, 511-566.

18. Gallego, F. J., Benito, C. (1997): Genetic control of aluminium tolerance in rye (*Secale cereale* L.). Theor. Appl. Genet. 95, 393-399.

19. Gunse, B., Poschenrieder, Ch., Barcelo, J. (1997): *Water transport properties of roots and root cortical cells in proton- and Al-stressed maize varieties*. Plant Physiol. 113,595-602.

20. Haynes, J. R. (2010): *Effect of liming on phosphate availability in acid soils. Plant and Soil*, 68, 289-308.

21. Horst, W. J., Pschel, A.-K., Schmohl, N. (1997): *Induction of callose formation is a sensitive marker for genotypic aluminium sensitivity in maize*. Plant Soil, 192, 23-30.

22. Jayasundara, H. P. S., Thomson, B. D., Tang, C. (1998): *Responses of cool season grain legumes to soil abiotic stresses*. Advances. Agr., 63, 77-151.

23. Jelić, M., (1996): *Proučavanje mineralne ishrane pšenice gajene na lesiviranoj smonici*. Doktorska disertacija. Poljoprivredni fakultet, Zemun, 1-121.

24. Jelić, M., Milivojević, J., Trifunović, S., Dugalić, G. (2003): *Zagađenje zemljišta u Kragujevcu i okolini.* U: Studija o prošlim, sadašnjim i budućim ekološkim planovima na nivou Kragujevca i okoline. EKO CENTAR Kragujevac, 53-66.

25. Jelic, M., Dugalić, G., Stojanović, J., Milivojević, J., Živanović, S. (2004): *Mobile aluminium in some Serbian acid soils and its toxic effect on wheat and maize plants*. Zemljište i biljka , vol. 53, 21-28.

26. Jelić, M., Živanović-Katic, S., Nikolić, O., Milivojević, J., Cvetković, D., Dugalić, G. (2004): *Perspektive korišćenja genetski tolerantnih biljaka prema aluminijumu za proizvodnju cerealija*. Ekološka istina "Ekoist '04", Borsko jezero. Zbornik radova., 245-248.

27. Jelic, M., Zivanovic-Katic, S., Milivojevic, J., Nikolic, O. (2007): *The effect of liming to change of pH values and content of mobile Al in vertisol type*. Proceedings, EkoIst '07/Ecological Truth, Sokobanja, 242-246.

28. Jelić, M., Dugalić, G., Knežević, D., Milivojević, J., Đekić, V., Nikolić , O., Savić, N. (2012): *Aluminium toxicity and tolerance in cereal plants*. Proceedings, XVI International Eco-Conference® 2012 "Safe food", 26-29. September 2012, Novi Sad, 209-217.

29. Jelić, M., Nikolić, O., Dugalić, G., Milivojević, J., Paunović, A., Knežević, D. (2013): *Ameliorative effect of lime and manure in presence mineral fertilizers on some soil chemical properties*. Proceedings of the international conference newenviro "New approaches for assessment and improvement of environmental status in Balkan region: interaction between organisms and environment", D. Panković et al. (eds.), Sremska Kamenica, Serbia, 68-72.

30. Jovanovic, Z., Djalovic, I., Komnjenovic, I., Kovacevic, V., Cvijovic, M. (2006): *Influences of liming on vertisol properties and yields of the field crops.* Cereal Res. Commun., 34, 517-520.

31. Kastori, R. (1983): The roleof elements in plant nutrition. Matica srpska, Novi Sad.

32. Kastori, R. (1995): *Agroecoszstems protection*. Feljton. Novi Sad.

33. Kinraide, T. B. (1997): *Recosindering the rhizotoxicity of hydroxyl, sulphate and fluoride complexes of aluminium.* Journal of Experimental Botany, 48, 1115-1124.

34. Kennedy, I. R. (1986): *Acid soil and acid rain: The impact on the environment of nitrogen and sulphur cycling*. Research Studies Press, Letchworth, UK.

35. Kochian, L.V. (1995): *Cellular mechanism of aluminum toxicity and resistance in plants*. Annu. Rev. Plant Physiol. Mol. Biol. 46, 237-260.

36. Kochian, L. V., Pineros, M. A., Hoekenga, O. A. (2005): *The physiology, genetics and molecular biology of plant aluminum resistance and toxicity*. Plant and Soil, 214, 175-195.

37. Kovacevic, V., Banaj, D., Kovacevic, J., Lalic, A., Jurkovic, Z., Krizmanic, M. (2006): *Influences of liming on maize, sunflower and barley*. Cer. Res. Commun., 34, 553-556.

38. Ma, J. F., Taketa, S., Yang, Z. M. (2000): *Aluminum tolerance genes on the short arm of chromosome 3R are linked to organic acid release in triticale.* Plant Physiol., 122, 678-694.

39. Ma, J. F. (2000): *Role of organic acids on detoxification of aluminum in higher plants*. Plant Cell Physiol. 41, 383-390.

40. May, H.M. & Nordstrom, D.K. (1991): *Assessing the solubilities and reaction kinetics of aluminous minerals in soil*; in Soil Acidity (Urlich, B. & Sumner, M.E., eds.) pp. 125-148, Springer-Verlag, Berlin.

41. Matsumoto, H. (2000): *Cell biology of aluminum toxicity and tolerance in higher plants*. Int. Rev. Cytol. 200, 1-46.

42. Milivojević, J. (2003): *Sadržaj i mobilnost mikroelemenata (Fe, Mn i Zn) u smonicama Srbije*. Doktorska disertacija. Poljoprivredni fakultet, Beograd-Zemun, 1-132.

43. Milivojević, J., Đekić, V., Jelić, M. (2012): *Plodnost oranica ratarskih proizvodnih lokaliteta grada Kragujevca u privatnom vlasništvu*. Ratarstvo i povrtarstvo, Novi Sad 49:2: 195-201.

44. Milivojevic, J., Jelic, M., Djekic, V., Djikic, A., Simic, Z., Lukovic, K. (2013): *The available contents of heavy metals (Fe, Mn, Zn, Cu, Ni and Pb) compared to a soil properties in the area of Kragujevac*. 1st International Congress SOIL-WATER-PLANT, 23-26 September, Belgrade, p. 466-476.

45. Milivojević, J., Jelić, M., Đekić, V. (2014)*: Sadržaj teških metala u zemljištima kisele reakcije.* Zbornik naučnih radova Instituta PKB Agroekonomik, Beograd, 19-20. Februar 2014, Vol. 20, br. 1-4, str. 147-156.

46. Moustakas, M., Yupsanis, T., Symeonidis, L., Karataglis, S. (1992): *Aluminum toxicity effects on durum wheat cultivars*. J. Plant Nutr. 15, 627-638.

47. Mossor-Pietraszewska, T., Kwit, M. and Legiewicz, M. (1997): *The influence of aluminium ions on activity changes of some dehydrogenases and aminotransferases in yellow lupine*. Biol. Bull. Poznan 34, 47-48.

48. Mrvić, V., Čakmak, D., Sikirić, B., Nikoloski, M., Delić, D., Belanović, S., Beloica, J. (2012): *Uticaj zakišeljavanja na sadržaj vodorastvornog aluminijuma u pseudoglejevima*. Ratar. Povrt., 49 (3), 257-262.

49. Narro, L. A., Perez, J. C., Pandey, S., Crossa, J., Salazar, F., Arias, M. P. (2001): *Implications of soil-acidity tolerant maize cultivars to increase production in developing countries.* In: N. Ae (eds.) Plant nutrient acquisition: New perspektives. NIAES series 4. Springer- Verlag. Japan. 447-463.

50. Nikodijević, V. (1964): *Sadržaj i dinamika aluminijuma u parapodzolu (pseudogleju) zapadne Srbije.* (Doktorska disertacija). Poljoprivredni fakultet, Beograd.

51. Okiljević, V. (1982): *Toksično dejstvo Al na neke sorte pšenice i ječma, na tipu zemljišta pseudoglej u Bosanskoj Krajini*. Zemljište i biljka, 31(1): 45-54.

52. Parker, D. R., Kinraide, T. B., & Zelanzy, L. W. (1988): *Aluminum speciation and phytotoxicity in dilute hydroxy-aluminum solutions*. Soil Sci. Soc. Am. J. *52*, 438-444.

53. Radanović, D., Predić, T. (1997): *Primeri toksičnosti Al i Mn na usevima pšenice i ječma na drističnom pseudogleju i degradiranom smeđem zemljištu.* IX Kongres JDPZ "Uređenje, korišćenje I očuvanje zemljišta", Zbornik radova, Novi Sad, 235-243.Đ

54. Ramaškevičiene, A., Kupčinskiene, E., & Sliesaravičius, A. (2002): *Evaluation of growth dynamics of Lithuanian cultivar of Hordeum sativum ssp. distichum* L. *after treatment with aluminium*. Ekologija, 2, 12-17.

55. Rengel, Z. (1996): *Uptake of aluminium by plant cells*. New Phytol., 134, 389-406.

56. Somers, D. J., Gustafson, J. P. (1995): *The expression of aluminum stress induced polypeptides in a population of wheat* (*Triticum aestivum* L.). Genome, 38, 1213-1220.

57. Stevanović, D., Jakovljević, M., Martinović, Lj. (1995): *Rešavanje problema kiselih zemljišta Srbije-preduslov povećanja proizvodnje hrane i zaštite zemljišta.* Savetovanje "Popravka kiselih zemljišta Srbije primenom krečnog đubriva "Njival Ca". Zbornik radova, Paraćin, 7-21.

58. Sumner, M. E. (2004): *Food production on acid soils in the developing word: problems and solutions*. Proceedings of the 6th International Symposium on Plant-Soil Interactions at Low pH. Matsumoto H. Sendai, Japan, 2-3.
59. Von Uexkull, H. R., Mutert, E. (1995): *Global extent, development and aconomic impact of acid soils*. Plant Soil, 171: 1-15.

60. Welcer, C., The, C., Andreau, B., De Leon, C., Parentoni, S. N., Bernal, J., Felicite, J., Zonkeng, C., Salazar, F., Narro, L., Charcosset, A., Horst, W. J. (2005): *Heterosis and combining ability for maize adaptation to tropical acid soils: implications for future breeding strategies*. Crop. Sci. 45, 2405-2413.

61. Wu, P., Liao, C. Y., Hu, B., Yi, K. K., Jin, W. Z., Ni, J. J., He, C. (2000): *QTLs and epistasis for aluminum tolerance in rice (OryzasativaL.) at different seedling stages.* Theor. Appl. Genet., 100, 1295-1303.

62. Živanović, S., Jelić, M., Stojanović, J., Nikolić, O. (2002): *The influence of mineral, organic and lime fertilizers to productive and morphological traits of spring small grains, cultivated on acid soil*. Proceedings International Conference TEMPO HP, Čačak, 13-20.

# DEVELOPMENT OF HUMAN RESOURCES IN MOUNTAIN RURAL AREAS OF SERBIA

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## Abstract

*Rural areas represent great potential for economic growth and prosperity in Serbia. In this paper, we focus on the mountain area region, which is by Rural Development Strategy declared to be resource oriented. Given that human resources generate greatest competitive advantage in modern developed economies, the emphasis is placed on indicators that describe current state of human capital. They include almost all demographic indicators as well as the educational structure of population. We have revealed certain trends in target population, and have given an overview of potential activities necessary to improve current situation. The main idea is that improvement of human capital in mountain areas can reduce migrations to urban areas and weaken their negative effects. That can be achieved through education of population which should result with improved living standards and better utilisation of natural resources.*

**Key words:** *rural areas, mountain areas, human capital development*

## Introduction

Literature review provides several definitions of rural development in respect to different viewpoints and perspectives of analysis. According to Van der Ploeg et al (2000) the concept of rural development is primarily a heuristic invention. It puts an emphasis on finding the new triggering power for rural development in the search for promising future. He overcomes modernization theory where the problems of rural areas and agriculture are considered resolved, and emphasizes that the theory of rural development is not a theory about the world as it is, but the way in which agriculture and rural areas can be reconfigured.

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Nemes (2005) describes analytical models of integrated and non-integrated rural development systems which is a step forward in resolution of the problems of rural development. Heyer, Roberts and Williams (2010) give a detailed overview of rural development described as ideology and give practical examples. More precisely Djordjevic Milosevic and Milovanovic (2012) stress that creation of adequate rural development policy should be necessary for the following reasons:

- Rural areas face significant challenges which undermine their economic and social cohesion;

- Rural areas often have economic potential that is largely untapped and can be better utilized for the benefit of the rural population and overall national development;

- No sectoral policies or market forces are able to fully respond to the heterogeneity of the challenges and potentials of rural areas and to cope with all the positive and negative external factors.

Focusing on mountain regions, Tzanopoulos et al (2011) introduce analysis of mountain regions as specific and differing from other rural areas. Moreover Iorio and Corsale (2010) go into specifics and target tourism as potential way out of growing disparities of mountain areas. In this paper we will try to expand the research topic on the creation of human capital of population living in mountain rural areas in Serbia.

The paper is structured in the following manner. In the first part we give some theoretical aspects of human capital and the importance of rural development for sustainable economic growth. Further there is the review of rural areas in Serbia, focusing on mountain region and its population characteristics. That is followed by the analysis of possible direction sand obstacles for development of human capital. Finally we complete the paper with conclusions and recommendations.

## Methodological aspects

Literature review is used to stress on the importance of human capital in general and particularly in rural areas. Afterwards we have made a selection of municipalities that belong to given selection of the third rural region in Serbia in accordance to National Rural Development

Programme 2011-2013 (Government of Serbia, 2011). By means of reviewing publicly available statistical databases published in "Municipalities and regions in the Republic of Serbia" (Statistical Office of Serbia, several years) we have statistically analysed relevant data and indicators are synthesised trends on selected target population focusing on economic activities (agriculture, forestry, fisheries, tourism and catering). Thereafter we have proposed required activities that may influence development of rural regions in targeted municipalities.

## The importance of human capital in rural areas

The concept of human capital is based on the fact that not every work is equal and that investment in human resources is one of the strategic directions of possible development of both individual organizations and the economy in general. Schultz (1961) argues that human capital is the same as any other form of capital.

He notes that investments in education, training, and expanded benefits can lead to improved quality and production levels of human capital. Since the research conducted by Becker (1964) and Drucker (1968), knowledge is recognized as a fourth economic pillar alongside those of land, labour, and capital. Knowledge is of course generated by human resources and creates human capital.

Defining the concept of human capital in literature differs to some extent. However, an overall idea could be summarized as to that human capital is a concept which views people as creators who are encompassed by their own knowledge, skills, competencies and experience that were created in the process of interaction between individuals and the environment.

Slocum (1972) introduces the concept of rural development based on three components – "The creation of a viable economic base, institution building to provide adequate community facilities and services, and providing more adequate bases for personal growth". He was the first to understand that changes in rural areas need to be based on increasing knowledge base of human resources.

From the social point of view rural areas are characterised by significant disparities observed in technological, educational and cultural aspects as compared to urban areas.

Milić (2011) clarifies that EU rural areas are considered to be the ones that can be characterized as multifunctional areas the development of which has multiple benefits:

- Economic - the raw materials of agricultural origin, primarily resulting from the rural areas can be exchanged for other products or used to generate income;
- Sociological - durability of such a system lies in the fact that the members of rural communities feel deeper intimacy and relationship with other members of the community;
- Environmental - sustainability of natural resources is achieved through the individual actions of members of these communities to maintain and improve their own quality of life;
- Cultural - cultural heritage of rural areas is very rich and has a wider, national and international significance.

Cultural aspects of rural development are gaining importance when it comes to defining the economic potential of rural areas and rural communities.

When talking about European environment, about 57 % of the EU population live in rural areas, which account for over 90 % of the Union land area. The average population density is 115 inhabitants per $km^2$, while in remote or sparsely populated areas, such as the northern part of Finland, the density may be even 2 per $km^2$ (Gallego, 2004).

In Serbia there is no official definition of rural areas. The criteria used by the Statistical Office do not include standard factors determining rurality of an area (population size, the share of agricultural population, population density, and other indicators). It is rather considered that rural area is an area not being urban. Rural areas are all inhabited areas except cities in accordance with the Law on Territorial Organization of the Republic of Serbia (Official Gazette 129/07) which have less than 100,000 inhabitants (Government of Serbia, 2011).

According to the OECD rural areas of Serbia are defined as these with a density of population density below 150 inhabitants per $km^2$. Given this definition, rural areas include 129 out of 169 municipalities and around 3900 settlements, with about 1,365,000 households, representing 54 % of

total households in the RS. According to the strategy of rural development we can divide all rural areas in Serbia into four main regions, namely:

- Region 1: Highly intensive agricultural production and integrated economy
- Region 2: Small urban economy with intensive agriculture
- Region 3: Economies oriented on natural resources, mostly in mountainous areas
- Region 4: High tourist facilities and poor agricultural structure

Rural mountainous areas of Serbia

In this paper, emphasis is placed on the third region (Region 3) which applies to those oriented to natural resources which are located mainly in mountainous areas.

## Data on human resource in mountain rural areas in Serbia

With regard to potential of its development based primarily on agriculture it would be expected that Region 3 has the greatest potential. However it is important to determine the level of its utilisation in the context of human capital and natural resources, and what the trends of population movements are.

Mountainous region, with an economy based on natural resources is the largest rural region in Serbia covering 34 % of the territory. With regard to the entire land area of Serbia these represent 25 % of the total.

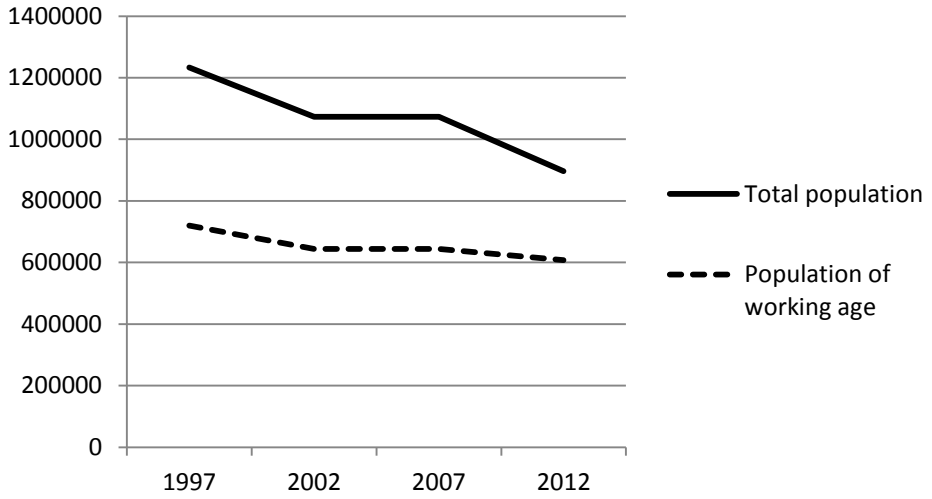
**Table 1.** *Geographical information and data on economic activities in Region 3*

| | |
|---|---|
| **Land area, km², 2004.** | 22.278 |
| **Settlements, 2004** | 1.569 |
| **Population density (per km²)** | 43,40 |
| **Arable land** | 55,36% |
| **Forests** | 37% |
| **Orchards and vineyards** | 6,51% |
| **Livestock farming** | 20,5% |

**Source:** *Own calculations*

This area has a large share of arable agricultural land (about 55%) with excellent opportunity for initiating agricultural activities. Likewise, this area is rich in natural resources, where the area covered by forests is about 37%. The area covered by orchards and crops is just over 6%. However, this area has a significant stake in livestock farming where the percentage exceeds 20%.

**Figure 1.** *Trend of population and working-age population in Region 3*

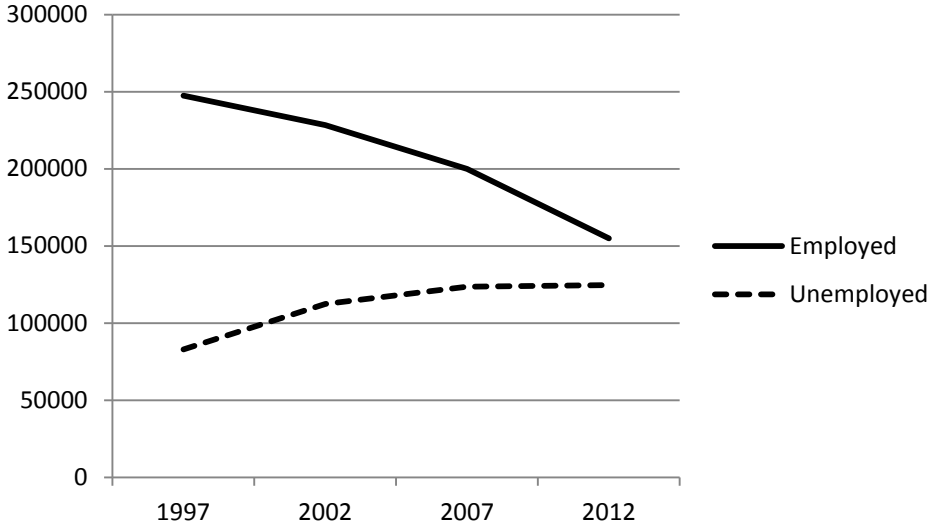



Activity rate of population is an important factor for identification of needs for development and improvement of living standard. In Serbia it is identified a drop in absolute number of working population where employment in the whole country is equal to only 34.4 %. Decline in the birth rate and natural growth rate has a significant impact on this trend as well, which is associated with the economic happiness of population.

According to Figure 1, we can clearly see the negative trend of the population in a given region. The total number of residents as compared to 1997 has declined by 27%. That clearly indicates strong migrations of population to urban and economically stable areas.

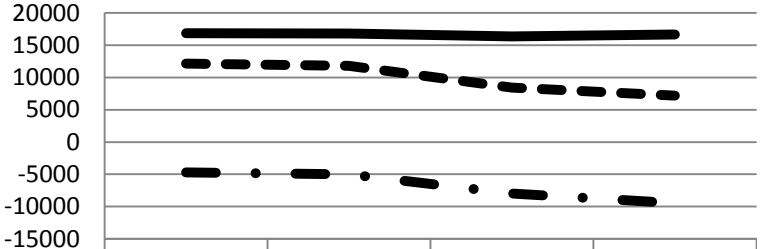
The absolute number of working-age population is also a constant fall declining for the same period by over 15%. The problem is enhanced by the fact that share of population under age of 15 has fallen to just 15% as compared to the cohort of 65+ which is growing and has reached 20%.

**Figure 2**. *Employment trends in Region 3*




As the employment trends in Serbia are negative, its logical continuation is the downward trend scenario in this region as well. Number of unemployed persons in the period 1997-2012 grew by over 50% and the number of employees decreased by over 37%. Given that this region is the largest by area, and the most indented in terms of density the level of its underutilisation in terms of natural resources becomes visible. If such trend continues and state does not help to create environment in which people could have motive to contribute to the development, certain regions could become completely abandoned.

**Figure 3.** *Trend of natural growth in Region 3*




| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Born | 12145 | 11796 | 8406 | 7176 |
| Deceased | 16838 | 16815 | 16356 | 16647 |
| Natural growth | -4693 | -5019 | -7950 | -9471 |

**Source:** *Own calculations*

The structure of the population in terms of natural growth in the period 1997-2012 is drastically deteriorating, as shown in figure 3. Number of deceased persons is contains over time while number of births is rapidly decreasing. That is adding to unfavourable structure of population living in this area. As noted above if this trend continues human population from these areas will eventually disappear.

Finally in table 2 there we have summarised major demographic indicators of population living in mountain rural areas in Serbia.

**Table 2**. *Summary of demographic indicators in Region 3*

| **Year** | **Population** | **Working age population** | **Employed** | **Unemployed** |
|---|---|---|---|---|
| 1997. | 1.233.435 | 719.869 | 247.438 | 82.878 |
| 2002. | 1.073.617 | 643.838 | 228.422 | 112.456 |
| 2007. | 1.073.617 | 643.838 | 199.936 | 123.539 |
| 2012. | 896.492 | 608.052 | 154.801 | 124.664 |
| **Change (%)** | **-27,32** | **-15,53** | **-37,44** | **50,42** |

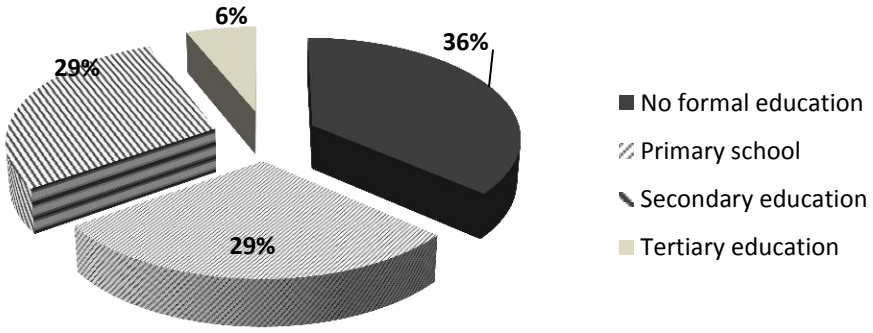
Such demographic trends are certainly not in favour of sustainable development of the mountain rural areas in Serbia. All trends are negative, with no clear sign of recovery.

The importance of rural areas in Serbia is based in the fact that 55% of the population lives in these areas, and that it generates as much as 41% of gross domestic product. Identification and scanning of the trends gives negative impression regarding the opportunities offered by a given region.

Natural resources are unused, and most importantly, a there is a constant high level of migration to urban areas. All this tells us about the non-existence of motivating factors that could encourage young and aspiring residents to return to a rural area after finishing school in cities.

A review of the educational structure of the population, as shown in Figure 4 is not favourable. Proportion of population without formal education is very high reaching 36%. Lack of motivation, support and availability of information is one of the key actors of this situation.

**Figure 4.** *Educational structure in Region 3*




Population with tertiary education constitutes only 6% of total population in the area. Higher education is provided only by three faculties located in that area. Encouraging population for higher levels of education is primarily be motivated by higher national interests. Attitudes, personal characteristics, motivation, skills and knowledge are the driving force that seeks knowledge-based economy (Vukovic, et al, 2012).

## Strategic Directions for Rural Development

Insisting on integrated rural development in recent years is gaining in importance. One-sectoral approach based primarily on agriculture needs to be transformed to an integral model. Networking and multi-layered cooperation between all sectors and at different levels of government and harmonious relations of private and public economic factors has to be achieved.

According to Milošević-Đorđević & Milovanović (2012) transition from mono to an integrated approach of rural development involves diverting attention to four key areas: 1) transport and the development of electronic communications; 2) the provision of public services; 3) evaluation of natural and cultural resources; 4) promotion of rural enterprises.

The main prerequisite in fulfilment of the above mentioned goals is to create conditions for reducing unemployment through incentives and possible intervention by both states and the EU. Based on the needs

assessment of the capabilities of specific areas, besides financial assistance it is necessary to provide knowledge and skills that are aligned with the developmental cycle of the region.

Among the most important EU rural development programs is so-called LEADER program. It is the French acronym for *Liaisons Entre Actions de Development de l' Economie Rurale*. This program is a support program for holistic development of local communities in rural areas. It supports initiatives on a bottom-up principle and is strengthening the role of local partnerships between the public and private sectors - Local Action Group (LAG). This approach stimulates not only endogenously generated rural development, but encourages transnational cooperation of European regions in the exchange of experiences and joint action in favour of rural development (Milošević-Đorđević & Milovanović, 2012).

Review of secondary data indicates high deficit in human resources in the region. If no adequate measures are taken to reduce migrations, the area could experience a complete cessation of all economic activities to the level of production needed only for own use.

Educational and employment structure shows a need for development of a variety of programs of professional support, development and expansion of knowledge and other actions that would result in the activation of the population. Integration program at its beginning requires development of the plan of human capital necessary to verify the identity of a population in a given region, which can show an interest in developing the area as well as personal qualities, skills and knowledge. As noted by Milošević-Đorđević, Milovanovic, 2012 promotion of knowledge-based economy in rural areas, requires several actions:

a. Raising awareness of contribution of the area to society and community
b. Raising motivation in the local community and encouraging self-motivation
c. Training target groups in terms of communication, negotiation and presentation skills
d. Learning the techniques of decision-making
e. Raising awareness of opportunities to apply for development and other projects

f. Training for writing projects' application
g. Identifying the domestic and foreign institutions providing support to rural development
h. Creating a Local Action Group (LAG)
i. Connecting LAG groups at local and international level
j. Encouraging entrepreneurial initiatives

In addition to the previously stated requirements for development, it is also necessary to identify levels of expertise in agriculture and tourism of local population, as they are the primary activity in the region with the highest potential for further development. The way to improve is through involvement of experts that will transfer knowledge and build quality of products and services.

Rural development as a national priority should be given more importance because of the EU integration process. One of the requirements for accession is the accessibility and transparency of national funds. Rural population primarily has to be informed and educated as to how to obtain funding.

Taking into account indicators of the demographic structure of the target population, the difficulties that may arise in the case of intensive human capital development of the area relate primarily to population age structure. Adding negative population growth, and educational structure, with a high percentage of people with no formal education can create the problem of inability development human capital. In this case, the knowledge to be transferred to the population of the target area will have no purpose. The time factor in this case has a very important role. Launching development of human capital plan should be implemented as soon as possible.

First steps in this direction have been made in 2012 with the training conducted by RARIS (Regional Development Agency Eastern Serbia ) regarding various aspects of acquiring knowledge: How to start own business - Start Up package ; Preparing business plan and dealing with the banks; Standards of quality and cost standards; Financial management, Innovation and Export. There have been organized 23

training sessions for a period of 43 days, but the number of people who answered the call was only 290.

In order to improve the structure of human resources, agriculture, and other important areas of the region it is needed to trigger the institutions at the state and local level. Stakeholders that we have identified are as follow:

- Ministry of Agriculture, Forestry and Water Management, which is responsible for rural development;
- Ministries responsible for economy and regional development, finance, infrastructure, education, environment, labour and social welfare, tourism;
- National agencies and bodies responsible for the development of SMEs, infrastructure, environment, funding for development, poverty reduction
- Chamber of Commerce
- Cooperative Associations, the Standing Conference of Towns and Municipalities, Tourist organizations, Advisory services
- Academic and research institutions
- Non-governmental organizations
- Farmers Association
- Tourism Association
- Landowners

## Conclusions

Indicators of development of the region economically oriented on resources, mainly in the mountain areas in terms of human capital do not contribute to the sustainable development of the region. Taking into account the indicators giving territorial distribution of mountain areas with a total surface RS (25 %) and the share in total rural Serbia (34 %), it is clear that this region has very high development opportunities in terms of economic activation areas, in terms of production and service potency.

Implementation of the strategy of sustainable development of the region primarily needs to be oriented towards demographic and educational aspects of the population. Indicators and population trends show high migration and cutback in the number of able-bodied personnel primarily in the areas of agriculture, fishery, forestry, and tourism and hospitality industry. The educational structure is highly unfavourable, for the largest number of people is without basic education.

In order to create environment for dissemination and transfer of knowledge to population in mountain rural areas initial steps that include the following must be undertaken:

- Finding solutions to reduce migration to urban areas;
- Promote return of the population after graduation (secondary, college, university);
- Introduction of financial and non-financial instruments to encourage motivation of population and the constant construction of interest in the development of the areas in which they live;
- Establishment of community in which knowledge, skills and abilities hereditary transfer in families.

All of these items cannot be resolved without external assistance. First of all it is necessary to intensify participation of government and other institutions in achieving the goal of reducing migration flows and other listed items in order to form an environment in which the transfer of knowledge is possible. This knowledge should focus on the real needs of the region in order to facilitate its survival. Demographic indicators are alarming and if trends continue within the next ten years there will be more unemployed persons than those who have a job.

Moreover trends of migrations will unless changed lead to potential eradication of human capital in mountain areas. If younger population, which currently constitutes 15% of population, do not return home after education, aging of population will lead to complete loss of human capital. All that associated with current educational structure of rural population in mountain areas are requiring urgent intervention.

Such intervention is necessary to create a program to people of this region that will provide necessary knowledge in the fields of agriculture,

tourism, crafts, entrepreneurship, management, economics, marketing and access to information and system of international trade. Such an initiative should not be taken individually, but it should be viewed from the perspective of the prosperity of the state and increasing the competitiveness of the market at senior international levels.

## References


1. Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. Chicago: University of Chicago Press.

2. Drucker, P. (1968). *The age of discontinuity*. New York: Harper & Row.

3. Czerwinski, S.J. (2002) *HUD Human Capital Management: Comprehensive Strategic Workforce Planning Needed*: GAO-02-839.

4. Đorđević Milošević, S., Milovanović, J. (2012) *Održivi turizam u funkciji ruralnog razvoja. - mala poljoprivredna gazdinstva i ruralni turizam u Srbiji*. Futura, Univerzitet Singidunum, Belgrade; Agroznanje, Vršac; FAO, Budapest

5. Gallego, F. J. (2004). Mapping rural/urban areas from population density grids.*Institute for Environment and Sustainability, JRC-EC, ISPRA, Italy*.

6. Government of Serbia (2011) National rural development program 2011-2013, available on *www.mpsv.gov.rs/download/4827011.0062.9-1.pdf*

7. Heyer, J., Roberts, P., & Williams, G. (2010). Rural development.

8. Iorio, M., & Corsale, A. (2010). Rural tourism and livelihood strategies in Romania. *Journal of Rural Studies*, *26*(2), 152-162.

9. Măgdoiu, L. D., Rada, I. C., Păcălă, A., Caciora, A., & Veronica, S. (2010). The Activity of Human Resources Departments and its Importance in Situations of Crisis. *Journal of Electrical & Electronics Engineering*, *3*(2).

10. Milić, B (2011) *Ruralni razvoj - praktikum za lokalne aktere*, Beograd

11. Nemes, G. (2005). *Integrated rural development-The concept and its operation* (No. 0506). Institute of Economics, Hungarian Academy of Sciences.

12. RARIS (2012) Work report of Regional Development Agency for East Serbia– RARIS, available on *http://www.raris.org/download/Izvestaj%20o%20radu%20RARIS%20za%202012.pdf*

13. Schultz, T.W. (1961) *Investment in human capital*. American Economic Review 51, no. 1 (March): 1-17

14. Slocum, W. L. (1972). Educational Policy and Rural Re-development in Post-industrial Society: The Case of the United States of America.

15. Statistical Office of Serbia (2013) *Municipalities and regions in the Republic of Serbia*, Belgrade

16. Statistical Office of Serbia (2012) *ZP11 reports*, Belgrade

17. Statistical Office of Serbia (2008) *Municipalities and regions in the Republic of Serbia*, Belgrade

18. Statistical Office of Serbia (2003) *Municipalities and regions in the Republic of Serbia*, Belgrade

19. Statistical Office of Serbia (1998) *Municipalities and regions in the Republic of Serbia*, Belgrade

20. Tzanopoulos, J., Kallimanis, A. S., Bella, I., Labrianidis, L., Sgardelis, S., & Pantis, J. D. (2011). Agricultural decline and sustainable development on mountain areas in Greece: Sustainability assessment of future scenarios. *Land Use Policy*, *28*(3), 585-593.

21. Van der Ploeg, J. D., Renting, H., Brunori, G., Knickel, K., Mannion, J., Marsden, T. & Ventura, F. (2000). Rural development: from practices and policies towards theory. *Sociologia ruralis*, *40*(4), 391-408.

22. Vuković A., Mastilović J., Kevrešan Ž., Radusin T., Novaković A. (2012) Potentials and limitations of entrepreneurship among academic institution representatives in agro food sector in Serbia. In *Proceedings of 6th Central European Congress on Food-CEFood Congress*. Institute of Food Technology, Novi Sad (Serbia)., Novi Sad

23. Whitman, I. (2003). Tertiary Education Policy in OECD Countries: developing the human resource. *European journal of education*, *38*(2), 191-198.

# EDUCATIONAL CAPITAL AS (UN)LIMITED CAPITAL IN RURAL DEVELOPMENT

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## Abstract

*Active participation of members of rural communities is the key to sustainable rural development. Moreover, active participation is possible only if rural population has sufficient educational capital. Of course, educational capital is not equally development. It`s development, as well as potentials for its improvement depend on numerous factors, especially the role of rural population in reproduction of rural way of life and their social status. Also, roles and status influence internal differentiation of rural population. Thus, the authors analyzed educational capital of rural women and rural youth. Special attention was paid on the role of extension service as a factor of improvement of their educational capital. It`s role was analysed based on empirical data on cooperation of rural women and youth with Agricultural extension service in Vojvodina. The aim of developing adequate knowledge, information and skills is to enable rural women and youth to be (equal) partner in improvement of quality of life in rural communities.*

**Key words:** *knowledge, rural youth, agriculture, rural development, extension service, rural women*

## Introduction

Today, we cannot speak of rural development and not to ask whether and in what manner knowledge of this process influence it`s performance and

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outcomes. Being complex social phenomenon, rural development requires different and diverse knowledge. Changes in theoretical and practical concept of rural development (Chambers 1983, Odora Hoppers 2002; van der Ploeg 1994; van der Ploeg, van Dijk 1995; Salvadori 2003; Самарџија 2004) influenced more scientific interest on educational capital of rural population (*indigenous knowledge*). It is considered as a development disposition and a source of comparative advantages. Under such context, we are interested in characteristics of educational capital of rural population and potentials for its improvement. Particularly, it is interesting to analyze educational capital of rural women and youth. Those social groups have specific social status which determines their possibilities to form and improve educational capital. Therefore, we analyzed opportunities for rural women and rural youth to improve their educational capital through cooperation with extension. The aim of the paper is to emphasize the significance of educational capital improvement, as well as possible mechanisms of its upgrading. Improved educational capital can be adequately implemented in development processes. Also, such educational capital enables members of rural social groups to participate actively in fulfilling their roles.

## Societies/economies of knowledge and changes in agricultural and rural social structure

Contemporary, post-industrial societies/economies are characterised by several significant features. In those economies, tertiary, quaternary and quintal sector prevail, the production is automatized and labour force is professionalized. Those are the societies of extended education. The role of education in contemporary societies is ambivalent – it tries to alleviate system of social disparities, but also reproduces it. In contemporary societies/economies, knowledge or information is at the very base of social power. It is one of the most efficient means in achieving goals. This leads to a conclusion that post-industrial societies/economies are societies/economies of knowledge[2]. Moulier-Boutange (2011) and Vercellone (2005)[3] simply named them as cognitive capitalism. In such societies/economies, knowledge and information are commodities with commercial value; they are subjects of market trade and can gain profit. Knowledge, information and skills became capital. They are

[2] With no intentions to debate on the origin of the concept, we just want to remind that in the 1960`s P. Drucker (1996) spoke of worker of knowledge, emphasizing that the knowledge is the key factor of modern economy.

3 Vercellone (2005) makes difference between the concept of knowledge-based economy and concept of cognitive capitalism, emphasizing that the first one does not take into account conflict between capital and labour.

factor of economic power. The answer to the question: what initiates/speeds up the changes in contemporary societies should be looked for in union of knowledge (especially, applicable one) and entrepreneurship (economic rationality). Together, they enable skilful combination of available resources. The market, one of the key integrative elements of contemporary societies, requests specialized and differentiated production of commodities and services. Knowledge (if owned and adequately applied) can provide satisfactory answer to segmented market demand.

Accordingly, contemporary societies are, at the same time, scientificated but also learning societies. The "holly trinity" of those societies makes unity of science, production/practice and education. Knowledge and information work as integrative social factors. Also, knowledge and information should be compatible with the requirements of social subsystems. Therefore, knowledge today should be flexible, applicable, trans-disciplinary and heterogeneous. Such characteristics should also be of those who are economically active in order to be able to adapt quickly and easily on constant changes of market/social circumstances. How mentioned global trends reflect on agricultural and rural structure, especially in transitional societies (like contemporary Serbia)? Being integrated into market and societies, contemporary agriculture and rural economy (in general) depend on factors which also influence market trends and behaviours of market actors. One of them is knowledge or educational capital. Speaking of rural economy, it is important to mention that continuous modernization (Čikić 2013, Marsden 2003) became imperative, both for the workers ("doers") and managers in all economy sectors. Therefore, strengthening educational capital of rural population enables them to understand better directions and the speed of necessary changes and innovations. Educational capital of rural population is especially significant under the post-socialist transition. Improvement of knowledge and skills is considered as an essential factor of changes in economic mentality which is one of the goals of economic (but also social) transition. This is the way peasants` conservatisms (as a relic of traditional economic mentality) loses its strength. Developed educational capital, together with the experience they have, enables rural working population to: a) be more aware of their own role and position in production/market, b) analyze possibilities to develop new rural industries and c) plan and combine available resources. Of course, it is obvious that educational capital is not evenly developed among all members of the rural communities. Its development and possibilities for its further enhancement depend on general level of rural development, position in social stratification, general development of knowledge, availability of knowledge and information resources (especially,

educational institutions), gender and generation, value system[4] etc. Thus, we analyzed educational capital of rural women an youth in Vojvodina. Besides aforementioned factors of characteristics of educational capital, we chose rural women and rural youth as an analysis subject because their expected, proactive roles in rural development, especially renewal of rural economy.

## Educational capital of rural women and youth in Vojvodina

While researching societies/economies of knowledge, contemporary sociological and economic literature uses the concept of educational capital[5]. It implies overall knowledge, information, skills, working habits and creativity of individuals/group/population which, combined with the other forms of available capital, enable them to take over or preserve certain social status. Educational capital indicates possibilities of transforming acquired knowledge, information, skills, working habits and creativity etc. into the commodity/service to be trade at the market. Why we pay so much attention to educational capital? The answer can be found in abovementioned. Without (permanent) education (or continuous improvement of educational capital), there is no reproduction of contemporary societies.

The ways educational capital are formed and developed are numerous and heterogeneous: formal and informal, institutionalized and uninstitutionalized education. However, a great deal of educational capital is still formed throughout school system. Therefore, the research of educational capital as (un)limited resources in rural development starts with the insight in characteristics of educational structure of rural population. The census data (2011) showed relatively unfavourable characteristics of educational structure of rural population in Vojvodina. Thus, 46.8% of total rural population have no education or only have (incomplete) primary education. Only one in 16 among rural population in Vojvodina has college or university education (Statistical Office of the Republic of Serbia 2013). Nonetheless, comparing to the other regions in the Republic (except of Belgrade region), rural population

[4] We think of the position of education in the system of values, as well as the perception of knowledge as value *per se*.

[5] The concept is often used correspondingly with the concepts of human, cultural and academic capital. Human capital implies inborn and acquired characteristics which enables individuals and groups to participate in labour process and create new value. Cultural capital is defined in many different ways (Lareau, Weininger 2003). It implies legitimate and institutionalized „*dominant cultural codes and practices*" (Aschaffenburg, Maas 1997). Academic capital implies knowledge and skills acquired during schooling which can be used in order to take and/or maintain certain social position.

in Vojvodina has favourable educational structure (lower ratio of population without education or only with primary education, higher ratio of population with college or university education, lower ratio of illiterate). On the other hand, comparing to the rural population in neighbouring countries (Croatia, Slovenia, Hungary, Romania and Bulgaria), educational structure of rural population in Vojvodina (and in Serbia, in general) is significantly unfavourable[6]. Differences between the characteristics of educational structures are even more prominent when comparing with the rural population in the countries which are considered as successful in post-socialist transformation (Czech Republic, Slovakia and Poland[7]).

While analyzing educational structures of rural women and rural youth in Vojvodina, we observed several characteristics. First of all, more than half of the rural women in Vojvodina (53.2%) have no education or have only primary education. Coefficient of feminisation is the highest at the lowest educational levels[8]. Nevertheless, there are more rural women with college and university degree then rural men in Vojvodina. It is the consequence of women`s escape from agriculture. Also, (college and university) education of rural women is considered as their compensation for not succeeding the family farm. Furthermore, it is contemporary version of dowry. Rural women are more frequently computer illiterate (62.0%; coefficient of feminisation among computer illiterate is 1.10[9]). Unfortunately, census data do not allow us to analyse educational structure of rural youth in Vojvodina[10]. Nonetheless, data enable the insight in structure of illiterate by age. Among the illiterate in

[6]According to characteristics of educational structure, rural population in Romania (58.5%) and Bulgaria (62.6%) are the most similar to Serbian rural population. Nevertheless, 72.1% of rural population in Hungary and even 81.7% of rural Slovenians have secondary and high education (European Commission 2013). Among analyzed countries, rural population in Slovenia aged 25 – 64 years the most frequently participate in additional forms of education (12.8%).

[7]Even 81.4% rural population in Czech Republic has secondary and high education. Also, 8.8% Czech rural population between 25 and 64 years of age participate in additional forms of education. In Poland, 84.0% of rural population has secondary and high education, and 87.4% of Slovakian rural population (European Commission 2013).

[8]Coefficient of feminisation of rural population in Vojvodina with no education is 3.18. In rural population with elementary education, coefficient of feminisation is 1.27. The lowest coefficient of feminisation is in rural population with secondary education (0.76). Coefficient of feminisation of rural population in Vojvodina with higher education is 1.16 (Statistical Office of the Republic of Serbia 2013).

[9]Apart from this, coefficient of feminisation of literate rural population is 0.92, and in partially literate rural population, coefficient of feminisation is 0.88 (Statistical Office of the Republic of Serbia 2013).

[10]Census data on education are published by region, municipalities, sex, but not by age of the population.

Vojvodina, every seventh person is between 15 and 29 years of age. Because of the mandatory primary education, only 1.2% rural youth in Vojvodina is illiterate[11]. We have noticed that among illiterate rural youth, there are more males[12]. Also, we have observed unequal regional distribution of ratio of illiterate rural youth in Vojvodina[13]. We argue that rural youth in Vojvodina have more favourable educational structure then rural women due to the bio-demographic factor (age), coverage of rural youth by mandatory education and changes in perception of value of education.

Presented data (partially) indicate the current state in educational capital of rural women and rural youth in Vojvodina. Recent researches of social exclusion of rural population in Serbia (and, therefore, in Vojvodina) have emphasised educational dimension as one of the principal in social exclusion (Cvejić et al. 2010; Bogdanov et al. 2011). Appreciating abovementioned, we based our analysis on three hypotheses. First one implies that educational capital of rural youth and (especially) rural women is underdeveloped. Also, this refers to their low educational capital in agriculture. Second, extension service in Vojvodina is considered as useful mechanism for improvement of rural women and rural youth`s educational capital. Unfortunately, cooperation of Agricultural Extension Service of Vojvodina (further: AESV) with rural youth and rural women, in particular, regarding agriculture is underdeveloped. Intensity and success of extension work depend on many factors. Hereby, we analyse two important ones: characteristics of extension agents and characteristics of rural women and rural youth that have cooperated with the AESV. Here lies our third hypothesis. We argue that characteristics of rural women and rural youth have more influence on outcomes of the extension work.

## Method and data sources

The analysis of educational capital of rural women and rural youth was based on two major data groups. First one entails census data (2011) on educational structure of rural population in Vojvodina. Second group consists of empirical

[11]Apart from this, illiterate urban youth makes 0.6% of total urban youth in Vojvodina. Illiterate urban youth makes 15.8% of total illiterate urban population in Vojvodina (Statistical Office of the Republic of Serbia 2013).

[12]Coefficient of masculinisation of illiterate rural youth in Vojvodina is 1.13.

[13]The lowest ratio of illiterate in rural youth is in district of West Bačka (0.5%), district of Srem (0.7%) and North Bačka district (0.9%). Apart from this, the highest ratio of illiterate among rural youth is in North Banat district (1.8%), South Banat district and Middle Banat district (both 1.6%) and South Bačka district (1.4%) (Statistical Office of the Republic of Serbia 2013).

data collected in three different sociological researches: *Social groups and extension service in local rural communities' development*[14], *Role of rural women in the reproduction of family farms and rural communities*[15] and *Social exclusion of rural youth*[16]". Collected data are analyzed by relevant statistical methods.

## Diffusion of knowledge and innovation as a factor of improvement of educational capital of rural women and youth in Vojvodina

Rural women and rural youth in Vojvodina are facing with numerous problems arising from their status in (rural) social structure and their general characteristics. One of the most significant is unemployment[17]. According to the research results, only 30% of rural women in Vojvodina and 43.3% of rural youth provide for living. We all are aware that resolving the issue of unemployment is a tricky business. It requires engagement of at least three major factors: financial capital[18], knowledge and information[19] and adequate personal and/or institutional support[20]. Therefore, we analyzed the role of diffusion of knowledge and innovation in strengthening the educational capital of rural women an rural youth. Its contribution is analyzed based on characteristics of cooperation of rural women an rural youth with AESV extension agents. Educational capital of rural women and rural youth in Vojvodina entails both agricultural and non-agricultural knowledge, skills, creativity, working habits. However, we have chosen to analyze only characteristics of cooperation with AESV regarding educational capital in

[14]Authors: Jovana Čikić, Ph.D. and Marica Petrović, M.Sc. Research factsheet: total scope of extension agents employed in AESV, postal survey, original standardized questionnaire (41 questions), 2013.

[15]Authors: Jovana Čikić, Ph.D. Research factsheet: sample of 503 rural women in 14 randomly selected villages in Autonomous Province of Vojvodina, survey, original standardized questionnaire (121 questions), 2013.

[16]Author: Marica Petrović, M.Sc. Research factsheet: sample of 500 rural youth in 10 randomly selected villages in Autonomous Province of Vojvodina; scientific interview, original semi-standardized interview base (107 questions), 2013.

[17]Extension agents have the same opinion. Thus, 48.8% of extension agents argue that unemployment is the main problem of rural youth in Vojvodina. Also, 39.5% agents think the same about rural women in Vojvodina.

[18]Research results show that 36.0% of extension agents think that financial capital is the most insufficient among rural women and rural youth in Vojvodina.

[19]According to ¼ of all extension agents, knowledge and information rank as second as the most insufficient capital of rural women and rural youth in Vojvodina.

[20]Beside financial and educational capital, ¼ of extension agents in AESV think that some sort of support (of local population, local/provincial/national institutions etc.) is necessary in resolving the problems of rural women and rural youth.

agriculture. Why so? First of all, it is because of their unemployment. Although extension service cannot create employment, it can be of assistance in strengthening educational, but also social and financial capitals which contribute dealing the unemployment. Secondly, improvement of educational capital in agriculture is in focus of extension service. Thirdly, rural women and rural youth in Vojvodina participate in agriculture on family farms. According to research results, 60% of all rural women and 78% of rural youth in Vojvodina living on family farms are engaged in agriculture[21]. Fourthly, according to the extension agents in AESV, most of the rural youth/rural women in Vojvodina do not have (sufficient) knowledge to practice modern agriculture[22].

Contemporary agriculture requires professionalized labour force. Developed production skills and knowledge of know-how are imperative. According to Šundalić (2009), due to the social and economic changes, agriculture today is no longer an "*industry of undereducated labour force*". One of the mechanisms of training for modern agriculture is systematic and organized diffusion of knowledge and innovation carried out by the extension services.

The success of extension work and, therefore, improvement of educational capital of rural youth and rural women depend on numerous factors which can be grouped into two main categories: a) general factors of the success of extension work and b) specific factors of success of extension work with specific social groups. The first group entails factors such as organization of extension service/extension work, intensity of extension work with clients, adequate use of extension methods, budgeting, state policy towards extension, development of rural economy in general, specifics of adult education etc. (Petrović, Samardžija, Janković 2004). On the other hand, due to their social status, rural women and rural youth are considered as vulnerable social groups. This makes their position in extension work specific. Also, this means that we have to take into account several important details while researching extension work with those social groups. First, we have to deal with motivation of rural women and rural youth to participate in extension work. Second issue is their initial educational capital or agricultural knowledge and skills rural women

[21]Results match extension agents` attitudes on engagement of rural women and rural youth in agriculture on family farms. Thus, ¾ of all extension agents in AESV think that most of the rural youth living on family farms in Vojvodina are involved in agriculture. Rural women are, by extension agents, less engaged in agriculture. This has confirmed the thesis on the absence of feminisation of agricultural labour force in Vojvodina.

[22]54% of all AESV extension agents think the same about rural youth and even 70% of extension agents argue the same about rural women.

and rural youth already have. This issue also covers the question of ways how they acquired that capital. Initial educational capital also entails the assessment whether are current knowledge and skills sufficient for participation in modern agriculture. It also means identification of underdevelopment areas of educational capital. Third, we must think of rural women and rural youth`s habits to search for knowledge. This means that we have to handle the matter of their motivation, willingness and capabilities to develop educational capital. Fourth, particularly important are the limitations for rural women and rural youth to participate in extension work. We argued that restrictions may be imposed from the "outside" and/or "inside". Under external restrictions, we included limitations imposed by the (local) social community. Those are manifested in many different ways:

- mockery of the rural women and rural youth`s efforts to improve their educational capital by extension work,
- apparent or hidden refuse of cooperation,
- explicit ban to use new knowledge and skills,
- prohibition to contact with the extension service.

External restrictions are enforced by other (parents, partners, relatives, friends, neighbours, extension agents, other rural women and rural youth etc.). On the other hand, internal restrictions are (sub)consciously imposed by rural women and rural youth to themselves. Also, legal and customary rights which disable/enable rural women and rural youth to have and manage resources have significant influence on the success of extension work (Jiggins, Samanta, Olawoye 1998). Roles of rural women and rural youth in biological, economic and social reproduction of family farm also effect extension process and outcomes. It is also influenced by the rural women and rural youth `s perception of extension service as an institution which can provide necessary advice and help.

The first step in the analysis of Vojvodinian rural women and rural youth`s cooperation with the AESV on the improvement of educational capital is to establish whether the cooperation occurred. The cooperation with extension service (aiming to improve educational capital in agriculture) mostly implies contact of the extension agent(s) with the farm owner(s). Therefore, we have started with the number of female or young farm owners that cooperated with the AESV as a preliminary indicator of cooperation. Only two (of 86 extension agents of AESV) haven`t cooperated neither with the female nor young farm owner. Nevertheless, this should not lead us to a conclusion of high intensity of cooperation between AESV and female and young farm owners. In fact, for

most of the AESV extension agents, young and (especially) female farm owners are lesser part of total farm owners they cooperated with[23]. Such intensity of cooperation is a result of several important circumstances. First of all, share of young farm owner in total number of farm owners cooperated with the AESV is low. According to available data, from July 2007 until the end of 2012, more then 4 000 so called chosen family farms cooperated with the AESV[24]. Only 5% were family farms of young owners and only 5% were family farms of female owners. Second, we should take into the consideration the one (latent) specific factor which influenced the process and outcomes of the extension work. Those are the prejudice of extension agents against cooperation with young and female farm owners. It seems that prejudices are not so manifested when speaking of relation of AESV towards young farm owners. But, we should not forget that more than 95% of young farm owners are males. Every seventh AESV extension agent confirmed that agents in general are not quite opened for cooperation with female farm owners. Third circumstance relates the perception of extension service among rural women and rural youth. When the awareness of significance and possibilities of extension work is underdeveloped, we cannot expect to have high intense cooperation between AESV and rural women and rural youth[25].

After establishing basic characteristics of cooperation between extension service and rural social group, we need to examine the importance of extension work in educational capital improvement by analysing its success. We assumed that if stakeholders perceive extension work as important, they are going to be more interested in its successful outcomes. To analyse it, we have selected three indicators of the success of extension work: a) quality of cooperation, b) initiation of cooperation and c) adoption of advices. Thereby, we analyzed selected indicators in relation to two groups of factors: a) characteristics of extension agents and b) characteristics of rural women/rural youth. The first group entails characteristics such as sex, age, working experience, extension agent`s workload. The other implies: a) willingness of rural women/rural youth to continue agricultural production on family farm (farm succession), b) their initial educational capital in agriculture and c) their

[23]According to the research results, 48.2% of extension agents stated that young farm owners make the smaller part of all farm owners they cooperate with. Even 77.6% extension agents stated the same about female farm owners.

[24]Chosen family farms are those which are selected from the extension agents for more intense cooperation.

[25]The research results showed that 46% of rural women in Vojvodina have never heard of extension service. Among rural youth in Vojvodina, only 7% of them who are working on family farms have cooperated with the AESV.

independence in decision making in agriculture. As we mentioned before, we assumed that success of the extension work is more influenced by the characteristics of rural women/rural youth then the characteristics of extension agent. We argue that there is significant positive correlation between chosen indicators of the success of the extension work and second group of characteristics. Also, we argue that development of rural women's/rural youth`s educational capital in agriculture have the most prominent influence on success of the extension work.

AESV extension agents qualified their cooperation with female and young farm owners as positive. The average score of cooperation is high[26]. Female extension agents qualified cooperation more positively. Also, young extension agents (up to 35 years of age), agents "beginners" (up to five years of working experience) and those who are moderately workload gave the higher score of cooperation. Statistical analysis showed that there is no significant correlation between the first group of factors (characteristics of extension agents) and quality of cooperation with young farm owners. Nevertheless, when we have cross-tabulated first group of factors and quality of cooperation with female farm owners, we noticed significant negative correlation with extension agents` sex (-0,338). T-test showed significant difference between means of quality of cooperation by sex[27]. That indirectly pointed out certain issues and prejudice against cooperation between male extension agents and female farm owners.

The similar is influence of characteristics of rural women/rural youth on quality of cooperation. In the case of quality of cooperation with young farm owners, like in previous, there is no factor which was distinctive by the strength and significance of its influence. On the other hand, when we analyzed the influence of characteristics of rural women on quality of their cooperation with AESV extension agents, we have noticed significant influence of two (out of three) factors: their independence in decision making in agriculture (0,843) and previous educational capital in agriculture (0,794). Data showed that extension agents more positively qualified cooperation with the female farm owners who are more independent in decision making and more educated in modern agricultural practice. It is because such female farm owners are more inclined to further improvement of their agricultural

[26]Average score of cooperation with young farm owners is 4.0, while the average score of cooperation with female farm owners is 4.07 (on the scale from 1 to 5, whereas 5 is the highest score meaning excellent cooperation).
[27]Eta squared is 0.14.

knowledge. Also, they are more willing to take advice and to implement it in production. Initiation of cooperation as an indicator of the success of extension work indirectly shows the need of improvement of educational capital. According to research results, extension cooperation is mostly initiated on mutual request (both agents and farm owners). Nevertheless, female farm owners are, according to AESV extension agents, more inclined to initiate cooperation. While we were examining initiation of cooperation in a relation to selected variables/groups of variables, we have noticed that among extension agents` characteristics, years of working experience had the most significant influence on initiation of cooperation with young farm owners (0,327). This factor has no significant impact on initiation of cooperation with female farm owners. Between variables relating to the characteristics of rural women/rural youth, independent decision making had the most important and significant influence on initiation of cooperation with young farm owners. This means that if young farm owners made decisions with others, the cooperation was more often result of mutual initiative. In case of female farm owners, previous agricultural capital (0,656) and mutual decision-making (0,656) are with more influence on mutual initiation of extension work.

Third indicator of extension work as mechanism of agricultural educational capital is adoption of advices. We tried to established how much new knowledge is being integrated in present one and how does it change working skills and practice. Of course, we should not forget that the adoption and implementation of extension agents` recommendations are influenced not only by factors relating to the diffusion of knowledge as educational process. Those processes and their outcomes are influenced by many different factors, profoundly by economic ones (Petrović, Janković 2010), state of agricultural machinery on farm, size of UUA, type of production, market orientation etc. According to the AESV extension agents (88%), young farm owners are more inclined to accept and implement knowledge and skill developed through the extension work. We think this is because rural women/female farm owners less inclined to investing, less likely made independent decisions, had less knowledge about agriculture, owned less capital to be engaged in production. Characteristics of rural women/rural youth (especially, independent decision making and previous educational capital) have more impact on adoption of advices than characteristics of extension agents.

**Table 1.** *Coefficients of correlation between the indicators of the success of extension work and selected groups of factors (a part from correlation matrix)*

| Indicators of the success of extension work | characteristics of extension agent | | | | characteristics of rural women/rural youth | | |
|---|---|---|---|---|---|---|---|
| | Sex | Age | Years of working experience | Workload | Willingness to be a farm successor | Development of educational capital | Independent decision making |
| *Young farm owners* | | | | | | | |
| Indicator 1. Initiation of cooperation | -0,015 | 0,024 | 0,327* | -0,161 | 0,186 | 0,028 | 0,259* |
| Indicator. 2. Quality of cooperation | -0,050 | 0,066 | 0,097 | -0,172 | 0,022 | 0,157 | 0,223* |
| Indicator. 3. Adoption of advices | 0,037 | 0,023 | -0,019 | -0,154 | 0,186 | 0,261* | 0,277* |
| *Female farm owners* | | | | | | | |
| Indicator. 1. Initiation of cooperation | -0,177 | -0,023 | 0,026 | -0,110 | 0,095 | 0,656* | 0,656* |
| Indicator. 2. Quality of cooperation | -0,338* | 0,082 | 0,104 | -0,127 | 0,122 | 0,794* | 0,843* |
| Indicator. 3. Adoption of advices | -0,318* | -0,016 | -0,039 | -0,164 | 0,152 | 0,801* | 0,810* |

**Note:** * significant correlation. **Source:** results of the research

## Conclusion

In contemporary societies/economies, knowledge develops rapidly. Generation, fast changes and diffusion of new knowledge and skills are particularly characteristic for the areas that are crucial for human survival and development (such as agriculture). Therefore, it is no strange that countries with developed agriculture pay special attention to farmers` education. Diffusion of agricultural knowledge implies differentiated approach to specific knowledge needs of rural groups according to their roles and status in the reproduction of family farms and rural way of life. The research showed that rural population in Vojvodina in general, but rural women and rural youth in particular, do not have sufficient knowledge on modern agriculture. Under the context of agriculture as a self-employment economic activity, role of extension service in educational capital development is even more important. As we have expected, characteristics of rural social groups (rural women/rural youth) have more prominent influence on extension work (and, therefore, strengthening educational capital). Impact of independent decision making and the development of educational capital stand out. Their influence (especially, influence of independent decision making) is more noticeable on the process and outcomes of the extension work with female farm owners. Impact of extension agent`s sex is more evident in the case of cooperation with female

farm owners which indicates necessity to research gender sensitivity of the extension work. In order to treat educational capital as (un)limited resource for rural development in Vojvodina (Serbia, in general), a couple of assumptions should be fulfilled. Some of them regard reform of extension service and others consider rural population as one of the stakeholders in rural development. Reform of extension service implies modernization of the diffusion of knowledge. It means target-driven, project orientated and group extension. It also entails extension work with no prejudice. From the rural population point of view, educational capital as a development resource involves strengthening of entrepreneurial skills. It also means creation of rural population awareness of the significance of permanent education. Of course, even though role of extension service in development of educational capital in agriculture is of great importance, we should not forget that modern rural areas are not only about agriculture. If and when Vojvodianian agriculture develops, it will need less labour force. This means that rural population have to be able to recognize other market options (market niches) on time. By that, rural population confirm its role in economic and social reproduction of family farms and rural areas. Undoubtedly, such path in renewal of rural economy requires aforementioned reform of the extension service in order to expand its role in the area of providing services in rural extension[28].

## References


1. Aschaffenburg, Karen; Ineke Maas (1997) *Cultural and Educational Careers: The Dynamics of Social Reproduction*. American Sociological Review. American Sociological Association, USA. Vol. 62, No. 4. pp. 573-587.

2. Bogdanov, Natalija; Smiljka Tomanović, Slobodan Cvejić, Marija Babović, Olivera Vuković (2011) *Access of women and children to services in rural areas of Serbia and proposed measures for improving the situation*. UNICEF, Belgrade (In Serbian).

3. Chambers, Robert (1983) *Rural development: Putting the Last First*. Longman, London – Lagos - New York.


[28] Rural extension implies both agricultural and non-agricultural extension. Non-agricultural extension is focused on improvement of the quality of life in rural areas in general.

4. Cvejić, Slobodan; Marija Babović, Mina Petrović, Natalija Bogdanov, Olivera Vuković (2010) *Social exclusion in rural areas in Serbia*. UNDP Serbia – Sector for inclusive development, Belgrade (In Serbian).

5. Čikić, Jovana (2013) *Social vitality in researcher of rural development*. Proceedings of Matica Srpska for Social Sciences. Matica Srpska, Novi Sad, No. 143, pp. 293-306 (In Serbian).

6. Drucker, Peter (1996) *Landmarks of tomorrow*. Transaction Publishers, New York.

7. European Commission (2013) *Rural Development in the European Union - Statistical and Economic Information - Report 2013*. European Commission, Directorate-General for Agriculture and Rural Development, EU.

8. Hoppers Odora, Catherine (2002) *Indigenous Knowledge and the Integration of Knowledge Systems: Towards a philosophy of articulation*. New African Books, South Africa.

9. Jiggins, Janice; R. K. Samanta; Janice E. Olawoye (1998) Improving women farmers' access to extension services. In: Burton E. Swanson, Robert P. Bentz, Andrew J. Sofranko (eds.) *Improving agricultural extension. A reference manual.* Food and Agriculture Organization of the United Nations, Rome. (http://www.fao.org/docrep/w5830e/w5830e0b.htm; датум: 01.02.2014.)

10. Lareau, Annette; Elliot Weininger (2003) *Cultural Capital in Educational Research: A Critical Assessment*. Theory and Society. Springer, UK. Vol. 32, No. 5/6 (Special Issue on the Sociology of Symbolic Power: A Special Issue in Memory of Pierre Bourdieu), pp. 567-606.

11. Marsden, Terry (2003) *The condition of rural sustainability.* Royal van Gorcum, Netherlands.

12. Moulier-Boutang, Yann (2011) *Cognitive Capitalism.* Cambridge – Malden, Polity Press.

13. Petrović, Živojin; Dejan Janković (2010) *Agricultural extension of Serbia: current state, problems and possibilities of reforms*. Faculty of Agriculture, Novi Sad (In Serbian).

14. Petrović, Živojin; Jovana Samardžija; Dejan Janković (2004) *Problems of diffusion of innovation, knowledge and technologies in peasants' agriculture of Serbia*. Acta Agriculutrae Serbica. Faculty of Agronomy, Čačak. Vol. IX. 17 (special edition). pp. 633-643 (In Serbian).

15. Salvadori, Neri (ed.) (2003) *Old and New Growth Theories: An Assessment*. Edward Elgar Publishing Limited, UK-USA.

16. Samardžija, Jovana (2004) *The use of participatiory methods in ruralsociological researches and rural development planning*. Economics of Agriculture. Institute for agricultural economics, Belgrade, Vol. 51. No. 1-2. pp. 103-118. (In Serbian).

17. Statistical Office of the Republic of Serbia (2003) *Census of population, households and dwellings in 2002, Population, Activity and sex – data by settlements*. Statistical Office of the Republic of Serbia, Belgrade.

18. Statistical Office of the Republic of Serbia (2013) *Census of population, households and dwellings in 2011. in the Republic of Serbia, Population, Educational Attainment, Literacy and Computer Literacy – data by municipalities and cities.* Statistical Office of the Republic of Serbia, Belgrade.

19. Šundalić Antun (2009) *Rural space and social structure – new identity of Slavonia and Baranja*. Economic journal. Economic journal, Osijek, No. 1. pp. 11-22 (In Croatian).

20. Van der Ploeg, Jan Douwe (1994) *Born from within*: *Practice and Perspectives of Endogenous Rural Development*. Royal van Gorcum, Netherlands.

21. Van der Ploeg, Jan Douwe; Gert van Dijk (eds) (1995) *Beyond Modernization: The Impact of Endogenous Rural Development.* Royal van Gorcum, Netherlands.

# PROTEIN SUPPLY IN AUSTRIA – FOCUS SOY COMPLEX

*Karlheinz Pistrich*[1]

## Abstract

*Both Austria and the EU are heavily dependent on soy imports to compensate the prevalent shortage of feed protein. Without feed soy, the pig and poultry production would collapse. This paper aims to characterize the current situation and to assess the cultivation potential of soybeans in Austria. The model used for assessing the cultivation potential is based on crop areas of grain maize, sugar beet and soybeans from 2007 to 2011. The agronomic cultivation potential was calculated by taking into account the four-year crop rotation restriction. In this way 125,000 hectares were identified as the agronomic cultivation potential for soybeans in Austria. The maximum utilisation of the agronomic cultivation potential would not be enough to close the gap on soybeans, but new gaps would arise regarding other crops. To close Austria´s protein gap, a minimum of 214,000 hectares would need to be cultivated with soybean.*

**Key words:** *protein supply, soy complex, cultivation potential*

## Introduction

Soy is increasingly moving into the focus of current discussions. This is based on a big gap regarding the supply of feed protein in Austria and all other EU countries. Currently, this shortage is covered with imports. The related import dependency is comparable with the energy sector. The dependence is so strong that pig and poultry production would collapse without soy feed imports under the given economic conditions.

Furthermore the discussion is also strong associated with the positive and negative side effects of soy production on environment and society. The high demand for soy causes complex problems, especially in the soybean

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producing countries of South America. The most obvious problem is the large extent of savannah and rainforest areas to be used for the strong expanding soybean production. This is a considerable point regarding climate change which is accused to the agricultural sector. Another problem of soy production is the use of glyphosate, the active ingredient of the total herbicide RoundUp. Glyphosat is seriously suspected to cause severe illnesses and deformities in humans. But also the health of the consumers can be affected by residues of glyphosate in soy. After all the dispute on genetic engineering is closely linked with soy. The majority of soy traded on the world market and thus also soy imported to Austria is GMO (genetic modified organism) soy. This is a sensitive detail for domestic consumers, because the majority of the Austrian population refuse the use of genetic technology in food. This fact is a great opportunity for the domestic soy production, which is GMO free by law.

So it becomes apparent that supply with feed protein focused on soy is a multifaceted issue, which does not only concern the agricultural sector but also the entire society. On this, the reduction of imports is one important issue which is increasingly claimed by society.

## Soybean – production and global trade

In the last decades the importance of soybean strongly increased. The worldwide acreage of soybean increased from almost 26 million hectares in 1965 to nearly 107 million hectares in 2012 (see USDA, 2012, p. 18 and FAOSTAT, 2013). The USA is the most important soy producers since a long time. About 29 percent (30.8 million hectares and near 82 million tons) of the soy acreage in 2012 was located in the United States of America. The USA constantly expanded their soy production (1965: 13.9 million hectares). The second largest soy producer is Brazil, which produced around 66 million tons soybeans on 24.9 million hectares in 2012. Brazil also strongly expanded its soybean production (from 432,000 hectares in 1965 to 24.9 million hectares in 2012). The third largest producer is Argentina, which forced its soybean production since the 1980s. It produced around 51.5 million tons on 19.4 million hectares in 2012. China is the fourth largest producer. In 2012 it produced 12.8 million tons on 6.8 million hectares. But China´s soy acreage is decreasing since 2009. The fifth largest producer is India. It produced 11.5 million tons on 10.8 million hectares in 2012. India started at the end of the 1970s and the beginning of the 1980s to expand the soybean acreage. (see tables 1 and 2)

**Table 1.** *Soybean production – most important countries and world total*

| Soybean production (tons) | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|---|
| USA | 83.504.900 | 86.998.900 | 72.857.700 | 80.748.700 | 91.417.300 | 90.605.460 | 84.191.930 | 82.054.800 |
| Brazil | 51.182.100 | 52.464.600 | 57.857.200 | 59.833.100 | 57.345.382 | 68.756.343 | 74.815.447 | 65.700.605 |
| Argentina | 38.289.700 | 40.537.400 | 47.482.800 | 46.238.100 | 30.993.379 | 52.677.371 | 48.878.771 | 51.500.000 |
| China | 16.350.213 | 15.500.187 | 12.725.147 | 15.545.141 | 14.981.000 | 15.083.000 | 14.485.000 | 12.800.000 |
| India | 8.273.500 | 8.857.000 | 10.968.000 | 9.910.000 | 9.964.500 | 12.736.000 | 12.214.000 | 11.500.000 |
| Paraguay | 3.988.000 | 3.800.000 | 6.000.000 | 6.311.790 | 3.855.000 | 7.460.435 | 8.309.793 | 8.350.000 |
| Canada | 3.155.600 | 3.465.500 | 2.695.700 | 3.335.900 | 3.506.800 | 4.345.300 | 4.246.300 | 4.870.160 |
| Urugray | 511.000 | 676.900 | 814.920 | 880.000 | 1.028.600 | 1.816.800 | 1.541.000 | 3.000.000 |
| Ukraine | 612.600 | 889.600 | 722.600 | 812.800 | 1.043.500 | 1.680.200 | 2.264.400 | 2.410.200 |
| Bolivia | 1.693.090 | 1.618.970 | 1.595.950 | 1.259.680 | 1.892.619 | 1.917.150 | 2.299.857 | 2.400.000 |
| Russia | 688.740 | 804.536 | 650.180 | 745.990 | 943.660 | 1.222.370 | 1.756.010 | 1.806.203 |
| World total | 214.478.426 | 221.983.478 | 219.707.218 | 231.392.067 | 223.258.406 | 265.049.584 | 262.037.569 | 253.137.072 |

**Source:** *FAOSTAT (2013)*

**Table 2.** *Soybean acreage – most important countries and world total*

| Soybean acreage (hectars) | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|---|
| USA | 28.834.600 | 30.190.700 | 25.959.200 | 30.222.700 | 30.906.980 | 31.003.300 | 29.856.410 | 30.798.530 |
| Brazil | 22.948.900 | 22.047.300 | 20.565.300 | 21.246.300 | 21.750.468 | 23.327.296 | 23.968.663 | 24.937.814 |
| Argentina | 14.032.200 | 15.130.000 | 15.981.300 | 16.387.400 | 16.771.003 | 18.130.799 | 18.764.850 | 19.350.000 |
| India | 7.707.500 | 8.334.000 | 8.880.000 | 9.510.000 | 9.734.700 | 9.554.190 | 10.180.000 | 10.800.000 |
| China | 9.593.710 | 9.304.485 | 8.753.868 | 9.127.074 | 9.190.000 | 8.516.000 | 7.889.000 | 6.750.000 |
| Paraguay | 1.970.000 | 2.200.000 | 2.400.000 | 2.463.510 | 2.570.000 | 2.671.059 | 2.805.467 | 3.000.000 |
| Canada | 1.165.200 | 1.201.200 | 1.171.500 | 1.195.400 | 1.383.300 | 1.476.800 | 1.542.400 | 1.668.400 |
| Ukraine | 421.700 | 714.800 | 583.100 | 537.900 | 622.500 | 1.036.700 | 1.110.300 | 1.412.400 |
| Russia | 655.840 | 810.130 | 709.900 | 712.460 | 794.200 | 1.036.300 | 1.187.400 | 1.375.200 |
| Urugray | 278.000 | 309.100 | 366.535 | 461.900 | 577.800 | 863.200 | 862.100 | 1.130.000 |
| Bolivia | 941.068 | 950.118 | 958.279 | 785.793 | 902.218 | 922.115 | 1.023.960 | 1.090.000 |
| World total | 92.523.852 | 95.308.367 | 90.155.973 | 96.480.629 | 99.011.007 | 102.619.742 | 103.604.514 | 106.625.241 |

**Source:** *FAOSTAT (2013)*

Genetic engineering is important in agricultural production. Since 1996 the commercial use of GMO plants is taking place. In that year, in the USA GMO crops were cultivated on a larger scale outside of test areas for the first time. In 2012 in 28 countries GMO crops are cultivated by over 17 million farms. Nearby 90 percent of these 170 million hectares GMO arable land is situated in only 5 countries – USA, Brazil, Argentina, India

and Canada. The main part of the GMO cultivation – with 81 million hectares nearby half of the GMO acreage – was used for soy production. 76 percent of the total soy acreage was cultivated with GMO soy. In 2012 GMO soy was cultivated in 11 countries. The main producers were the USA with 28.6 million hectares, Brazil with 23.9 million hectares and Argentina with 20.2 million hectares. In the EU no GMO soy is cultivated. Only the genetic modified Bt-maize is cultivated in Spain, Portugal, Czech Republic, Slovakia and Romania. (see James, 2012 and Transgen.de, 2014)

The global trade in soybeans and soybean meal strongly increased especially in the last two decades. The United States and Brazil are the main exporters of soybeans. In 2011/12 they covered around 80 percent of the world soybean exports. The USA are the strongest exporters of soybeans. By the end of the 1990s Brazil started to push their soybean exports. In 2011/12 Brazil exported nearly more than the USA. Further large exporters of soybeans are Argentina (7.4 million tons export), Paraguay (3.6 million tons) and Canada (2.9 million tons).

Since 2002/03 China is the largest importer of soybeans. More than 60 percent of the soybeans of the world market were delivered to China in 2011/12. Before that, the EU was the largest importer of soybeans. China´s need for soybeans increased strongly. In 1997/98, just one and a half decade ago, the Chinese import demand was around 3 million tons only. Up to 2011/12, China´s demand for soybean rose to almost the 20-fold to 59.2 million tons. China imports almost only soybeans and no soybean meal. From the world production of 253 million tons the Chinese import requirement is 23 percent (see USDA, 2013). It must be assumed that the demand of China will continue to increase. As mentioned before the EU was the largest importer of soybeans up to 2001/02. Since then it moved on the second place after China with an import demand of soybeans of 13 percent of the world´s soybean import quantity at last. Other considerable importers of soybeans are Mexico (3.6 million tons), Japan (2.8 million tons), Taiwan (2.3 million tons), Thailand and Indonesia (2 million tons each).

Referring soybean meal, the most important exporter is Argentina. It exported around 26 million tons in 2011/12. The second largest exporter is Brazil. The third largest exporter is the United States. And the fourth largest exporter is India.

Regarding the imports of soybean meal the EU is by far the largest player. In 2011/12 the EU imported about 21 million tons. The second largest importer is Indonesia with 3.3 million tons, followed by Vietnam with 2.5 million tons and Indonesia with 2.3 million tons.

The aggregated quantity traded of soybeans and soybean meal was 166 million tons (in soybean equivalents) in 2011/12. This means that two thirds of the world´s soybean production is traded on the world market. The production is mainly situated in North and South America, the main costumers are European and Asian regions. Argentina and Brazil, respectively, export almost 80 percent of its production. The USA exports nearly 60 percent and Paraguay approximately 50 percent of its production. The two biggest importers China and EU imported 98 million tons soybeans and soybean meal (converted into soybean equivalents). This was almost 60 percent of the quantity traded on the world market. This quantity is almost 40 percent of the world production. In the case of China the trend is rising. (see table 3)

**Table 3.** *Soy world trade*

| **Trade with soy beans and meal (in soybean equivalents [3]) aggregated** [million tons] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Year [1]** | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 |
| **Exports [2]** | **World total** | **124** | **129** | **140** | **151** | **144** | **163** | **167** | **166** |
| | Argentina | 36 | 38 | 42 | 48 | 36 | 45 | 44 | 40 |
| | Brazil | 38 | 42 | 40 | 39 | 47 | 45 | 48 | 55 |
| | USA | 38 | 35 | 41 | 42 | 45 | 54 | 51 | 48 |
| | Paraguay | 4 | 4 | 6 | 7 | 4 | 7 | 8 | 4 |
| | others | 8 | 11 | 11 | 15 | 13 | 13 | 15 | 18 |
| **Imports [2]** | **World total** | **122** | **129** | **134** | **148** | **142** | **154** | **160** | **166** |
| | China | 26 | 28 | 29 | 38 | 41 | 50 | 52 | 59 |
| | EU-27 | 42 | 43 | 43 | 46 | 40 | 39 | 40 | 39 |
| | others | 54 | 57 | 62 | 64 | 62 | 65 | 68 | 68 |

[1] Business year

[2] The amounts of imports and exports per year differ regarding different business year definitions of the countries and different dates of data survey

[3] Exchange ratio: 1.270 (Soymeal x 1,270 = Soybean)

**Source:** *USDA 2007, 2012, 2013; own calculations*

## Production and imports of soy in the EU

The EU is not able to cover their need of soy by their own production. The European Feed Manufacturers' Federation (FEFAC) calculated for

the EU-27 in the field of soybean meal a degree of self-sufficiency of 1.6 percent for 2008/09 (see FEFAC, 2009, p. 65). The EU imported 22.6 million tons soybean meal and about 12 million tons soybeans in 2011/12 (see USDA, 2013). This demand for soy was accompanied by a production of 863,000 tons soybeans in the EU in 2012 (see FAOSTAT, 2013). In the EU the soybean cultivation is concentrated in a few Member States. In total the EU-27 cultivated 377,000 hectares soybeans in 2012. The biggest soybean producer was Italy with 153,000 hectares, followed by Romania with 78,000 hectares and France with 37,000 hectares. On the fourth place Austria followed with nearly 37,000 hectares. Close behind was Hungary with a similar acreage. In Europe in total the largest soy acreage was located in the Ukraine, Russia and Serbia. The total European acreage of soybean was 3.5 million hectares in 2012. Of this acreage around 1.4 million hectares (41 percent) were located in the Ukraine and 1.38 million hectares (40 percent of Europe total) in Russia. The share of the EU-27 was around 11 percent. (see table 4)

**Table 4.** *Soy acreage in Europe*

| | 2000 | 2005 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|
| | 1,000 hectares | | | | | |
| **France** | 78 | 57 | 44 | 51 | 42 | 38 |
| **Italy** | 253 | 152 | 135 | 160 | 166 | 153 |
| **Austria** | 16 | 21 | 25 | 34 | 38 | 37 |
| **EU15** | 349 | 233 | 207 | 248 | 247 | 229 |
| **Romania** | 117 | 143 | 49 | 61 | 72 | 78 |
| **Slovakia** | 6 | 11 | 10 | 14 | 17 | 22 |
| **Czech Republic** | 2 | 9 | 6 | 10 | 8 | 6 |
| **Hungary** | 22 | 34 | 32 | 34 | 41 | 41 |
| **EU12new** | 147 | 197 | 96 | 118 | 138 | 148 |
| **EU27** | 496 | 430 | 303 | 365 | 386 | 377 |
| **Croatia** | 48 | 48 | 44 | 56 | 59 | 54 |
| **Moldavia** | 12 | 36 | 49 | 58 | 58 | 57 |
| **Russia** | 337 | 656 | 794 | 1036 | 1187 | 1375 |
| **Serbia and Montenegro** | 142 | 130 | 144 | 170 | 165 | 163 |
| **Ukraine** | 61 | 422 | 623 | 1037 | 1110 | 1412 |
| **Europa total** | 1105 | 1720 | 1963 | 2737 | 2971 | 3445 |

**Source:** *EUROSTAT, 2011-2013 and FAOSTAT, 2013*

The EU is a net importer of soy since long. The imports of soybeans lost their importance over the years. But on the other side the importance of soybean meal imports increased. In order to improve the comparability and to calculate the theoretical acreage requirement of the EU for soy self-sufficiency the imported amounts of soybean meal was converted

into equivalent amounts of soybeans. As in the production of soybean meal the soy oil is extracted, 1.27 tons of soybeans are needed to get 1 ton of soybean meal (see Van Gelder et al., 2008, p. 16). For the calculation of the theoretical acreage requirement to achieve self-sufficiency, the average soybean yield of the EU-27 in the year 2009 of 2.78 tons per hectare was the basis. This results in an acreage requirement of 14.4 million hectares for the EU-27. (see table 5)

**Table 5.** *Soy imports of the EU 2010/11 and equivalent acreage*

| **EU-27** | **Import** (million tons) | **Coefficient Soybean Equivalent** * | **Soybean Equivalent** (million tons) | Average Yield (tons/ha) | **Equivalent Acreage** (million ha) |
|---|---|---|---|---|---|
| **Soybean meal** | 21,714 | 1,270 | 27,577 | 2,780 | 9,920 |
| **Soybeans** | 12,465 | 1,000 | 12,465 | 2,780 | 4,484 |
| **Sum** | 34,179 | | 40,042 | | 14,404 |

* For production of 1 ton soybean meal 1.27 tons of soybeans are needed (see Van Gelder et al., 2008, 16)

**Source:** *USDA, 2012 and FAOSTAT, 2013*

## Soy in Austria

The Austrian soybean production is fluctuating. The highest production of 125,000 tons was before the EU accession, namely in 1993. In 1995, with the access to the EU, the production fell at one stroke. After that it increased again – with a temporary decline in 2000 to 2005 – up to the year 2011 to 109,000 tons. In 2012 it decreased again to around 104,000 tons. Most of the soybean production in Austria is processed in the food industry. Only a small part is used for feed. (see Finadvice, 2010, p. 29ff; Stockinger, 2010, p. 11; Krumphuber, 2008, p. 9 and Krumphuber, 2009)

It is a special feature of soy foods produced in Austria to be GMO free. Regarding the low acceptance of products made of GMO by the European and Austrian consumers the processing and marketing of foods based on GMO free soy is a great opportunity and market niche for Austrian and European soy producers. The exemption of GMO is a very important unique selling proposition on the Austrian and the European markets. Among other factors the high market share of Austrian companies in the European market of bakery improvers is based to a large extend on the use of GMO free Austrian soy. (see Vollmann, 2008, p. 8; Recknagel, 2008, p. 15; Strobl, 2010 and NÖM, 2011). Regarding the imports of soy the main share is soybean meal. It is typically used for feed. Austria

imported around 431,000 tons soybean meal (548,000 tons in soybean equivalents) in 2012. The lower part of the soy imports were soybeans. The total quantity of soy imported (in soybean equivalents) fluctuated between 503,000 tons and 815,000 tons. The estimated share of GMO free soy of these imports was 13 percent in 2010 (see Kolar, 2011). Regarding the exports of soy the largest share are soybeans. The trade balance of soy was around of 600,000 tons with a variation range from 493,000 tons to 706,000 tons. In 2012 net imports of soy were about 503,000 tons, and so situated on the lower range of the variation. (see table 6). The domestic production plus net imports of soybean equivalents gives the total demand in Austria. The total demand divided by the average yield of soybeans in Austria of the last 5 years results in the acreage for soybean that would be necessary to achieve self-sufficiency. In this way acreage of around 214,000 hectares of soybeans on the basis of an average yield of 2.84 tons per hectare (average of the years 2008 to 2012) would be necessary to achieve self-sufficiency.

**Table 6.** *Production, net import and total demand of soy in Austria*

| Year | Domestic Production (tons) | Net Import (tons soybean equivalent) | Total Demand (tons) |
|---|---|---|---|
| **1990** | 17.658 | 597.858 | **615.516** |
| **1991** | 36.770 | 573.865 | **610.635** |
| **1992** | 92.284 | 589.407 | **681.691** |
| **1993** | 125.258 | 547.489 | **672.747** |
| **1994** | 104.946 | 566.801 | **671.747** |
| **1995** | 31.121 | 549.592 | **580.713** |
| **1996** | 26.763 | 492.869 | **519.632** |
| **1997** | 33.477 | 598.162 | **631.639** |
| **1998** | 50.457 | 622.310 | **672.767** |
| **1999** | 50.449 | 576.434 | **626.883** |
| **2000** | 32.843 | 593.456 | **626.299** |
| **2001** | 33.874 | 655.151 | **689.025** |
| **2002** | 35.329 | 663.980 | **699.309** |
| **2003** | 39.465 | 706.256 | **745.721** |
| **2004** | 44.824 | 583.499 | **628.323** |
| **2005** | 60.573 | 603.563 | **664.136** |
| **2006** | 64.960 | 570.140 | **635.099** |
| **2007** | 52.902 | 603.597 | **656.499** |
| **2008** | 54.095 | 572.299 | **626.393** |
| **2009** | 71.333 | 566.834 | **638.167** |
| **2010** | 94.544 | 599.605 | **694.149** |
| **2011** | 109.378 | 549.278 | **658.656** |
| **2012** | 104.143 | 503.358 | **607.501** |

**Source:** *Statistik Austria; own calculations; ALFIS*

## Cultivation potential of soy in Austria

As the understanding of the term "potential" depends on the different perspectives and uses, it is beneficial to define this term in terms of

cultivation potential of soy in advance. In this context the term "potential" is understood as the totality of all funds available for a particular purpose (see Wissen.de, 2014). Thus the term potential used in the following can be understood in the meaning of production potential, which is an economic term used to describe that production, which would be possible with the full utilization of all production factors (see Wikipedia, 2014).

Regarding the soy production three staged potential terms are used for the assessment of the cultivation potential of soybeans. The first term is the "biological cultivation potential". This is the extent of arable land on which the cultivation of soybeans is possible in general. The second term, the "agronomic cultivation potential" is derived from the biological cultivation potential. It is the extent of arable land on which the cultivation of soybeans taking account of crop rotation restrictions is possible. Assuming a four-year rotation restriction, the agronomic cultivation potential represents one quarter of the biological cultivation potential. The "economic cultivation potential" is the third potential term and it is derived from the agronomic cultivation potential. It means the implementable cultivation extent of soybeans depending on the business conditions and on the planting decisions of the farmers. Thus it is depending on a large range of factors and conditions. Within the scope of this study it is not possible to assess the extent of the economic cultivation potential.

According to the literature and experts opinions, the arable land which is suitable for cultivation of soybeans is the same as the acreage of grain maize and sugar beet. In this meaning the assessment of the biological cultivation potential and furthermore the assessment of the agronomic cultivation potential from the current acreage of soybeans, grain maize and sugar beets in Austria is a suitable method for assessing the cultivation potential of soybeans. In this way the biological cultivation potential is assessed taken into account the acreage of grain maize, sugar beets and soybeans (see LK Niederösterreich, 2009, p. 2). As mentioned before for the assessment of the next potential, the agronomic cultivation potential, the crop rotation restriction advised must be taken into account. It is possible to cultivate soybeans every second year, but it is advised to cultivate soybeans in a four-year crop rotation. Soybean is a host plant for the fungus Sclerotinia sclerotiorum disease. So it is important to take into account a rotation break between soybeans and crops which could be affected by this fungus disease like rapeseed and sunflower. On these facts a four-year rotation restriction was used for assessing the agronomic

cultivation potential. (see Fuchs, 2007; Landesamt für Umwelt, Landwirtschaft und Geologie, s.a., p. 15 and 86f; Paffrath, 2002, p. 21; LK Österreich, 2010, p. 7f, 10; Größ et al., s.a.; Kolbe et al., 2002, p. 94; Köstenbauer, 2010, p. 32; Wiggert, 2008, p. 10; Hartl et al., 2007, p. 23; Hofer et al., 2010; Krumphuber, 2010 and Nawrath et al., 2001, p. 55)

The implementation of the methodology to assess the biological cultivation potential of soybeans in Austria follows the method mentioned before and is based on individual farm specific calculations using the IACS data from the years 2007 to 2011. In these calculations the acreage of soybeans, grain maize and sugar beets of each individual farm of the 5 years from 2007 to 2011 were included. The acreage of each of the three crops was multiplied by the corresponding breaks in crop rotation. It means that the acreage for example of grain maize of each individual farm was multiplied by 2 due to its primarily two-year crop rotation. This refers to the fact that a farm, which is cultivating grain maize in a correct two-year crop rotation on 100 hectares, must have 200 hectares of arable land eligible for grain maize cultivation. Following this logic the sugar beet and soybean acreage of the individual farms were multiplied by 4 (due to the four-year crop rotation of these two crops). But if farms cultivated these three crops in different combinations – which is the case to a considerable extent – multiplying factors were used adapted to the respective combinations. These adjusted multiplying factors were as follows:

- In the case of farms which cultivated grain maize and sugar beet: The acreage of grain maize and sugar beet summed up was multiplied by 2.
- In the case of farms which cultivated grain maize and soybeans: The acreage of grain maize and soybeans summed up was multiplied by 2.
- In the case of farms which cultivated sugar beet and soybeans: The acreage of sugar beet and soybeans summed up was multiplied by 2.
- In the case of farms which cultivated all these three crops: The acreage of grain maize, sugar beet and soybeans summed up was multiplied by 1.

The grain maize acreage of Styria (federal state of Austria) presented a special case in the calculations. Finally this acreage was not included in the assessment of the cultivation potential. This was decided due to the fact

expressed by experts that the cultivation of grain maize is strongly coupled with the pig production and that this region will of sure not give up the pip production and in this way also not the grain maize production anyway. The sum of these acreages factorized of grain maize, sugar beet and soybean is the biological cultivation potential of soybeans in Austria. This is the acreage of arable land in Austria on which the cultivation of soybeans would be possible in principle. The assessment following this methodology showed a biological cultivation potential for soybeans in Austria of around 540,000 hectares including the Styrian grain maize acreage. Without the grain maize acreage of Styria the biological cultivation potential is around 500,000 hectares in Austria. With respect to a four-year crop rotation for soybean cultivation the agronomic cultivation potential of soybean is around 125,000 hectares in Austria. (see table 7). With this agronomic cultivation potential of 125,000 hectares it would be possible to produce around 354,000 tons soybeans basing on an average yield of 2.84 tons per hectare (average of the years 2008 to 2012). The fully exploitation of the agronomic cultivation potential of soybean would not close the feed protein gap in Austria anyway, but it must be assumed that on the other side gaps in supply with another crops would arise.

**Table 7**. *Calculation of the cultivation potential of soy*

| Year | Cultivation on Individual Farm<br>Sum in hectares | | | | | | | Acreage of Corn Maize in Styria |
|---|---|---|---|---|---|---|---|---|
| | **Corn Maize only** | **Sugar Beet only** | **Soybean only** | **Corn Maize and Sugar Beet** | **Corn Maize and Soybean** | **Sugar Beet and Soybean** | **Corn Maize, Sugar Beet and Soybean** | |
| **2007** | 108.366 | 18.101 | 4.632 | 54.627 | 32.339 | 2.776 | 11.434 | 39.789 |
| **2008** | 124.443 | 16.849 | 3.537 | 63.016 | 34.603 | 1.713 | 11.150 | 44.665 |
| **2009** | 111.145 | 17.942 | 5.954 | 56.050 | 39.990 | 2.969 | 13.665 | 41.690 |
| **2010** | 105.851 | 16.304 | 8.832 | 55.431 | 48.155 | 5.456 | 18.897 | 39.951 |
| **2011** | 112.386 | 14.225 | 9.431 | 61.177 | 54.417 | 5.571 | 23.017 | 42.662 |
| Average 2007-2011 | 112.438 | 16.684 | 6.477 | 58.060 | 41.901 | 3.697 | 15.633 | 41.751 |
| Multiplication Coefficient | **2** | **4** | **4** | **2** | **2** | **2** | **1** | **1** |
| Biological Cultivation Potential | 183.125 [1)] | 66.737 | 25.909 | 116.121 | 83.802 | 7.394 | 15.633 | 41.751 |
| Sum of Biological Cultivation Potential | | | | | | | | 540.472 |
| **Biological Cultivation Potential** without Acreage of Corn Maize in Styria | | | | | | | | 498.721 |
| **Agronomic Cultivation Potential** | | | | | | | | **124.680** |

[1)] without acreage of corn maize in Styria

**Source:** *Own calculations; IACS, 2013*

## Conclusion

Especially for feeding, soybean meal isn´t substitutable caused of the high biological value of its protein. And alternative domestic protein feed are normally inferior regarding their feeding properties compared to soy feed.

The production of soybeans focuses on North and South America. With respect to this production focus the Austrian and European farms with pig, poultry, cattle or milk production strongly depend on soy imports out of these regions. But there is also a strong concentration tendency in the demand for soy. The main costumers are China and the European Union, whereby the import amounts of China continuously increased and will increase in future. In 2008/09 China overtook the EU-27 as the main importer for soy.

The fact that soybeans produced in Austria are GMO free guaranteed by law is a big advantage for domestic producers and processors. The traceability and the controlling system for Austrian soybeans strengthen the confidence and credibility to Austrian soy products. This is the basis for the unique selling proposition of domestic soybeans and derived domestic soy products. But the soy exporting countries can decreasingly guarantee GMO free soybean production. This is caused on the global increasing expansion of the use of genetically modified soy.

The implementation of the methodology for assessing the cultivation potential of soybean resulted in a biological cultivation potential of 540,000 hectares for Austria. Taking into account the crop rotation restrictions and after deduction of the Styrian grain maize acreage the calculations resulted in an agronomic cultivation potential of about 125,000 hectares in compliance with a four-year crop rotation. But even with a fully exploitation of the agronomic cultivation potential the self-sufficiency of Austria with protein feed would not be achievable. To achieve the self-sufficiency basing on the demand of 2012 the acreage of 214,000 hectares of soybeans would be necessary.

Challenges and problems of the Austrian soybean production:

- The bigger part of the world soybean production is basing on GMO soy. On this fact the import of GMO free soy is becoming more and more difficult and expensive.
- The savannah and rain forest areas of South America are increasingly threatened by the expansion of the soybean acreage. And the society partly accuses the domestic pig, poultry, cattle and milk producers of this problem.

Some possible measures to increase the domestic supply of protein are as follows:

- For feeding of cattle, soy feed could be replaced entirely by alternative native protein feed.
- In the pig and poultry sectors the domestic alternative protein feed could be reinforced resp. used at their physiological maximum limit. On this way soy protein feed could be replaced partly.
- In order to expand the Austrian soybean acreage the profitability of the domestic soybean production should be improved – especially in relation to its competition crops.

## References


1. ALFIS (s.a.): *Common Agricultural and Forestry Information System*. Time series database of the Federal Ministry of Agriculture, Forestry, Water Management and Environment of Austria.

2. EUROSTAT (2011-2013): *Onlinedatenbank der Eurostat*. http://epp.eurostat.ec.europa.eu/portal/page/portal/agriculture/data/database, (2011-2013)

3. FAOSTAT (2013): *Daten über die Sojaproduktion*, http://faostat.fao.org/, (September 2013)

4. FEFAC – Europäischer Verband der Mischfutterindustrie (2009): *Feed & Food*. Statistical Yearbook 2009.

5. Finadvice (2010): *Ergebnisse der Machbarkeitsstudie zur Ausweitung des Sojaanbaus und der Verarbeitungsmöglichkeiten in (Ober-) Österreich*. Eigenverlag. Linz.

6. Fuchs, Rupert (2007): *Hinweise zum Anbau von Sojabohnen im ökologischen Anbau in Bayern.* http://www.lfl.bayern.de/iab/oekologisch/pflanzenbau/27704/?context_/lfl/ipz/oelfruechte/, (4.8.2011)

7. Größ, Ch. und Schmidt, J. (s.a.): *Kulturblatt Sojabohne*. Beratungsunterlage der Bio Austria.

8. Hartl; Hofer und Vogt-Kaute (2007): *Weniger ist mehr*. In: Bio Austria; 4/2007; p. 22f.

9. Hofer, M.; Schweiger, P.; Putz, B. und Hartl, W. (2008a): *Produktivität verschiedener Sojasorten im ostösterreichischen Anbaugebiet*. In: Grundlagen zur Züchtung, Vermehrung, und Sorten-/Saatgutprüfung für den Biolandbau; p. 118-127.

10. James, Clive (2012): *ISAAA Briefs. Global Status of Commercialized Biotech/GM Crops: 2010*. ISAAA Brief No. 44. Executive Summary. Ithaca, NY.

11. Kolar, Veronika (2011): *Eiweißlücke in der Futter- und Lebensmittelproduktion.* In: Grenzen des Wachstums der landwirtschaftlichen Produktion. 7. und 8. November 2011, St. Pölten.

12. Kolbe, H. et al. (2002): *Körnerleguminosen im Ökologischen Anbau*. Informationen für Praxis und Beratung; Sächsische Landesanstalt für Landwirtschaft.

13. Köstenbauer, Heinz (2010): *Bio-Ackerbau mit Sojabohne*. In: Der fortschrittliche Landwirt; Heft 8; 2010; p. 32f.

14. Krumphuber, Ch. (2009): *Expert interview*. (24.11.2009)

15. Krumphuber, Ch. (2010): *Endbericht der Studie zur Optimierung des Sojaanbaues in Österreich.* Landwirtschaftskammer Österreich. Wien.

16. Krumphuber, Christian (2008): *Sojaanbau in Österreich und Europa – Situationsanalyse*. In: 1. Österreichisches Soja-Symposium. 135 Jahre Sojabohne und Sojaforschung. Wien. p. 9f.

17. Landesamt für Umwelt, Landwirtschaft und Geologie (s.a.): *Ölfrüchte im Ökologischen Landbau. Informationen für die Praxis*. Freistaat Sachsen.

18. Landwirtschaftskammer Niederösterreich (2009): *Sojabohne (Glycine max.)*. Eigenverlag. St. Pölten.

19. Landwirtschaftskammer Österreich (2010): *Soja. Eine Kulturpflanze mit Geschichte und Zukunft*. Eigenverlag. Linz.

20. Nawrath M. et al. (2001): *Anbau- und Verwertungsstrategien für Sojabohnen und Lupinen im ökologischen Landbau unter besonderer Berücksichtigung des Stickstoffhaushalts.* ITADA – Grenzüberschreitendes Institut zur rentablen umweltgerechten Landbewirtschaftung. www.itada.org/download.asp?id=122abD.pdf, (5.8.2011)

21. NÖM: *Gentechnikfrei*. http://www.noem.at/de/milch/gentechnikfrei/, (30.5.2011)

22. Paffrath, Andreas (2002): *Ökologischer Sojaanbau in kälteren Gebieten Deutschlands?* In: SÖL Berater-Rundbrief 2/02; p. 21-23.

23. Recknagel, Jürgen (2008): *Sojaanbau und Vermarktung von Soja-Lebensmitteln in Deutschland.* In: 1. Österreichisches Soja-Symposium. 135 Jahre Sojabohne und Sojaforschung. Wien. p. 14-16.

24. Statistik Austria (2012): *Außenhandelsstatistik.*

25. Statistik Austria (2013): *Anbau auf dem Ackerland 2012*. Eigenverlag. Wien.

26. Statistik Austria (s.a.): *Verschiedene Statistiken*

27. Stockinger, Josef (2010): *Die oberösterreichische Sojastrategie – Ergebnisse der Machbarkeitsstudie zur Ausweitung des Soja-Anbaus und der Verarbeitungsmöglichkeiten*. Information zur Pressekonferenz mit Agrar-Landesrat Dr. Josef Stockinger. http://www.land-oberoesterreich.gv.at/cps/rde/xbcr/SID-40368764-3EF78FC8/ooe/PK_Stockinger_12.3.2010_Internet_1.pdf, (15.5.2012).

28. Strobl, Ch. (2010): *Der europäische Markt für Speisesoja.* Vortrag am 1. Oberösterreichischen Sojasymposium am 22.2.2010 in Wels.

29. Transgen.de (2012): http://www.transgen.de/zulassung/gvo/, http://www.transgen.de/recht/gesetze/639.doku.html, http://www.transgen.de/recht/gesetze/272.doku.html, (12.4.2012).

30. Transgen.de (2014): http://www.transgen.de (January 2014)

31. USDA (2007): *Oilseeds: World Markets and Trade – Explosive Growth in Vegetable Oil Demand Exacerbates Chinese Supply Deficit, Reliance on Imports.* USDA Foreign Agricultural Service, Circular Series. Nr. FOP 12 – 07.

32. USDA (2012): *World Agricultural Production*. USDA Foreign Agricultural Service, Circular Series, Nr. WAP 04-12, April 2012.

33. USDA (2013): *Oilseeds: World Markets and Trade – Argentine Exporters Switch to Soybean Oil as Biodiesel Exports Fall*. USDA Foreign Agricultural Service, Circular Series, Nr. FOP 08 – 13.

34. Van Gelder, J.; Kammeraat, K.; Kroes, H. (2008): *Soy consumption for feed and fuel in the European Union*. A research paper prepared for Milieudefensive (Friends of the Earth Netherlands). Profundo.

35. Vollmann, Johann (2008): *Soybean Breeding for European Needs*. In: 1. Österreichisches Soja-Symposium. 135 Jahre Sojabohne und Sojaforschung. Wien. p. 7.

36. Wiggert, Markus (2008): *Erfolgreich mit Leguminosen*. In: bioland; 2/2008; p. 8-10.

37. Wikipedia (2014): *Potential*. http://de.wikipedia.org/wiki/Potential, (10.1.2014).

38. Wissen.de (2014): *Potenzial*. http://www.wissen.de/lexikon/potenzial-allgemein?keyword=Potenzial, (10.1.2014).

# THE TYPOLOGY OF RESOURCE ALLOCATION PROBLEMS IN AGRICULTURE

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## Abstract

*Resource allocation is one of the most common problems faced by decision makers in agricultural units. For this reason, the authors have developed a systematic allocation problem in the framework of some distinct classes of problems by different criteria. For each of these classes we show the correspondence between the problems, the mathematical methods required for solving them and the mathematical models of the problems. The conducted research will provide the support for a system project in resource allocation decision support.*

**Key words:** *resource allocation, scarce resources, algorithms, typology*

## Introduction

The management of agricultural units in a given time horizon involves providing the necessary resources in order to achieve the objectives. Once these resources are secured, a second problem appears concerning the allocation of the resources on goals. Typically, resource allocation is performed by the decision makers who are found on a higher hierarchy level of those who use them and/or by those outside the collective who uses them. In this paper we present some situations in which we identify the decider, the classes of problems for their allocation, as well as the appropriate mathematical models. The problems of resource allocation must answer a set of questions, namely:

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- What to allocate - which are the resources that will be allocated?
- How much we may allocate - which are the total available resources?
- From where are the resources procured- who are the suppliers?
- To whom we allocate the resources - who are the beneficiaries?
- For what timeframe do we allocate?
- Which are the allocation conditions and restrictions?
- What are the objectives and the strategies of allocation?
- What effects and consequences are to be expected?
- In what context is the allocation made, what is the state of economic and social environment for making the allocation?

The answers to these potential questions that may arise in practice represent component elements of a resource allocation problem. By analysing the ratio between the level of available resources and the one of the total demand we distinguish: balanced allocation problems, allocation problems with surplus or with deficient resources. When the need of resources could be met without difficulty, the problems that arise are focusing on establishing the correspondences between suppliers and beneficiaries and on delimitating the volume of resources that can be allocated relative to the available ones.

When allocating the scarce resources appear the most complicated allocation problem because they are limited by the restrictive nature of resources, by the existence of the lack of resources generated by time and / or place, or by the difficulty of ensuring the financial resources to purchase the material ones [2]-[7],[10]. To solve them, the allocation problems are decomposed into two sub-problems:

- the first one relates to the overall allocation and seeks to determine how much can be allocated to each beneficiary,
- the second sub-problem arises when there are several suppliers and in this case the allocation problem consists in assigning the beneficiaries to suppliers within the limits of the solution of the first sub-problem.

In terms of the number of resources that are distributed the allocation problems can be either with a single resource (financial or material or technical) or with more homogeneous or heterogeneous resources. The homogeneous resources may be substituted (totally or partially). The allocation problems of substitutable resource have a high degree of difficulty and requires methods based on heuristic algorithms.

Depending on the type of the relationship existing between resources, the allocation problems are distinguished by structural, functional or independence relationships, implying the existence of multiple resources. There is also the possibility that the resource allocation is small, but they are assigned on multiple applicants. In this case, both the volume of the allocated resource to each applicant and the total weight of each destination in the total volume are determined. The resources from an allocation problem can be stored or not, being included in the class of those with a single resource, but in some situations these can be mixed including both the stocked resources and the non-stored ones as belonging to the class with more resources.

In the allocation matters, the problem of perishable or non-perishable resources appears, being necessary to take into account the time factor. When this factor appears, explicitly the problems are of dynamic allocation for which harmonizing the allocated resources on the timeframe affected to achieve the objective is required. In the event that the time factor appears by default the problems are of static allocation for which the allocation of resources is performed based on the level of demand expressed on the time horizon.

Depending on the time horizon coupled with the hierarchical level at which the allocation problem are solved, there are the following types: the operative allocation problems in which the hierarchy level of management is low and aims for a short horizon of time; the strategic allocation problems solved at the management level of some departments and covering a high time horizon and the tactical allocation problems for which the strategic allocation problems are detailed and cover the time horizons of maximum five years.

In terms of the number of allocation criteria for performance evaluation we can identify either uni-criteria or multi-criteria problems. The most common problems are the multi-criteria ones because the decision of resource allocation is taken according to several criteria and is found in the situations where you can not quantify all the effects or where the criteria express antagonistic objectives (minimizing wage costs and maximizing physical production).

According to the number of variants of some of the allocation problem's elements and also to the possibilities of quantifying the consequences of different allocation options one can identify the following allocation

problems: under certainty, under uncertainty or under risk problems [8]-[9]. The most common allocation problems are hybrid or stochastic or vague, that might be solved by hybrid resource theory. Due to the difficulties of addressing these issues in practice the allocation problems are reduced to the allocation of resources in conditions of certainty.

Relative to the source of origin of the resources (suppliers) there are problems with a single source or with multiple sources. In the case of a single source resource the allocation problem is of global allocation, meaning in determining how much to be assigned to each beneficiary of the respective resource. In the case of multiple sources, the allocation problems appear. These can be either of direct distribution when relations between providers and beneficiaries are direct or with intermediate centres, when for certain applicants the resource allocation is done by specialized centres.

Depending on the correlation between the number of providers and the beneficiaries there are problems in which the correspondence is bi-univocal, called by damage (to each beneficiary corresponds a single supplier or for several allocated resources to each beneficiary it fully corresponds a single resource). In practice the majority of allocation problems are with multiple correspondences which constitute allocation problems.

## The general form of linear models of global resource allocation

The resource allocation within any organization is made at least at two hierarchical levels: the higher hierarchical level on which there is a decider who allocates the resources, and at the lower hierarchical level where their beneficiaries stand. At the higher hierarchical level appears the mandatory restriction to any allocation problems, namely framing in the total available amount, $R_i$, from the resource $i$ of the sum of the quantities allocated to beneficiaries $j(x_{ij})$.

$$\sum_i v_{ij} \le X_j \le \sum_i V_{ij}\ ,\ i \in I = \{1,2,...,n\}$$

For homogeneous and additive resources between which there is structural correlations in terms of their classification in the total volume of resources (e.g. 70% of the investment value for construction works and 30% for equipment purchases) occur the following relationship between the total amount of resources and the available one from each resources.

$$\sum_{i \in I} R_i = R$$

$$R_i = \wp : R$$

So, $R = \sum_i \wp : R$ with the observation: $\sum_i \wp_i = 1$; where $\wp_i \geq 0$ represents the share of resource *i* in the total amount of available resources. For the homogeneous non-additive resources we should search for the possibility to express them in the same measurement unit (conventional) by bringing them to a common denominator based on a standard or a certain characteristic. If the resources *i* and *k* are substitutable, then the expanded availability from the resource *i* will be: $\underline{R_i + j_{ik} R_k}$, where $s_{ik}$ represents the coefficient of substitutability of resource *i* with the resource *k*. In problems where the resource *i* is substituted with more resources, the expanded availability becomes: $R_i + \sum_{\substack{k \in I' \\ k \neq i}} s_{ik} R_k$,

where $I' \subset I$ represents the subset of resources that can substitute the resource *i*. If $I' = I - \{i\}$, hence, all other resources can substitute the resource *i*, then the total expanded availability *i* will be:

$$R_i + \sum_{\substack{k \in I' \\ k \neq i}} s_{ik} R_k$$

There are cases when although structural relationship between resources are met, they appear independent at higher hierarchical level. For example, in the case of allocation of finished products and of spare parts for these products, each of them will be considered independent, but the correlations will be observed only in the lower hierarchical level. A possible situation is that in which although the resources are independent, structural combinations of such resources are also allocated at a lower hierarchical level. For example, the allocation of tractors per farm may be solved either by allocating independent machines or systems of such machines (systems that can partially or totally include the independent ones). If these combinations of independent resources are integrally available and no additional resources are needed, they will not appear as distinct resources at a higher hierarchical level. At lower hierarchical level (the beneficiary), the main restrictions are:

1) Restrictions of admission to the minimum ($v_{ij}$) and maximum ($V_{ij}$) of the beneficiary j, $v_{ij} \leq x_{ij} \leq V_{ij}$; $i \in I$; $j \in J$

2) Restrictions of structural correlation with other destinations (sectors, branches) at the level of total resources ($X_j$) allocated

$$\wp_{ij}^{-} < \frac{x_{ij}}{X_j} < \wp_{ij}^{+}; \; i \in I$$

$$\sum_{i \in I} x_{ij} = X_j, \quad j \in J$$

where $\wp_{ij}^{-}$ and $\wp_{ij}^{+}$ represents minimum, respectively maximum weight of resource *i* in the amount of resources allocated to the beneficiary *j*; $X_j$ = the total amount of resources allocated to beneficiary *j*.

*Restrictions*

- For the total amount of resources allocated to the recipient j the following restriction will be required:

$$\sum_i v_{ij} \le X_j \le \sum_i V_{ij}$$

but the following conditions should also be applied $\sum_i x_j \le R$ :

$$\sum_{j=1} x_{ij} \le R_i, i \in I = \{1,2,...,m\}$$

and

$$\sum_{i \in I} R_i = R$$

- In the case of substitutable resources, then the relationship $v_{ij} \le x_{ij} \le V_{ij}$ can be reformulated as follows:

$$v_{ij} \le x_{ij} + s_{ik} x_{kj} \le V_{ij} \qquad \text{or:} \qquad v_{ij} \le x_{ij} + \sum_{\substack{k \in I' \\ k \ne I}} s_{ik} x_{kj} \le V_{ij}$$

- In the event that structural correlations between resources occur or are allocated both independently from each other and in the form of structural or functional combinations, for each beneficiary *j* appears the condition that the amount of the independent resource to be at least equal to the amount requested by the resource *r*, which integrates it in structure ($x_{rj}$) in a proportion denoted by $s_{ir}$: $x_{ir} - s_{ir} x_{rj} \ge 0$

or it can be no more than the amount of the resource that integrates it into the structure, but not through the process of allocation: $x_{ij} - x_{rj} \le 0$.

The relation can be written in several variations of formulation depending on the requirements of the problem and of the available resources. It should be noted that under the conditions of integration of independent resources, by the process of allocating, in the aggregate resources, the number of variables in the model will increase along with the number of resources (compared to the higher hierarchical level). We note with *I''* the extension of the set of resources *I*. Therefore, at the lower hierarchical level, the resources will belong to the reunion of the two sets $I'' \cup I$. Among the resources belonging to sets *I''*and *I* are the following relations:

$$\sum_{r \in I''} x_{rj} < \sum_{i \in I} X_{ij}, j \in J$$

In case the correlation between resource allocations and the beneficiaries' objectives expressed by the synthetic indicators $I_{fj}$ is considered, then:

$$\sum e_{fi} \lessgtr I_{fj}$$ , where

$e_{fi}$ - represents the level of the indicator *f* due to the allocation of an unit of the resource *i*. This restriction can capture the framing conditions of the expenditure with the resources allocated in the financial resources of the beneficiaries. The overall objective function will pursue either maximizing the effects per unit or per total allocated resources, or minimizing the unitary or global efforts:

$$[opt] \sum_i \sum_j c_{ij} x_{ij}$$ ,

where $c_{ij}$ represents the effects (the increase of production, the benefit, etc..) or the efforts (the costs) of allocating a unit from the resource *i*.
Each allocation problem has restrictions on its economic content and only some of them can be solved with linear programming method.

## Problems of resources repartition

The repartition problems involve determining the correspondences between alternative suppliers of resources and multiple beneficiaries. In the overall allocation problems, the resource is centralized at the higher hierarchical level, from where it seeks the following answers: how much will we allocate from each resource to each beneficiary, who will provide each beneficiary the required or planned resources and how much?
In practice there are many kinds of repartition problems. The simplest repartition problem consists of a *single resource repartition*. This is a basic distribution problem because most problems with several independent resources are reduced to these basic distribution problems.

*Stating the problem:* To distribute a particular available resource at suppliers *i* ($i=\overline{1,m}$), with the quantities $a_1, a_2, ..., a_n$ to the beneficiaries, (consumers) *j* ($j=\overline{1,n}$), to whom the necessary is $b_1, b_2, ..., b_n$ so that the total expenditure incurred by the transport of the resource from suppliers to beneficiaries to be minimal (or transportation time to be minimum).
For solving it, it is necessary to establish the following hypothesis: the entire amount available at suppliers will be allocated to beneficiaries who will not supply from other concerned resource centres.

We note: $x_{ij}$ = the amount of resource that will be distributed from the supplier *i* to the beneficiary *j*;

$t_{ij}$ – the transport time of a physical resource unit from the supplier *i* to the beneficiary *j*;

$d_{ij}$ = the distance in km from the supplier *i* to the beneficiary *j*;

$c_{ij}$ = the transportation cost of a physical resource unit over 1 km distance

The model restrictions are:

a) The amount delivered by suppliers is equal to the available amount;

$$\begin{cases} x_{11} + x_{12} + x_{13} + \ldots + x_{1n} = a_1 \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ x_{m1} + x_{m2} + x_{m3} + \ldots + x_{mn} = a_m \end{cases} \qquad \begin{array}{l} i = \overline{1,m} \\ a = \text{sup } pliers \\ b = beneficiar ies \\ j = \overline{1,n} \end{array}$$

b) the total amount received by beneficiary is equal to the necessary;

$$\begin{cases} x_{11} + x_{12} + \ldots + x_{m1} = b_1 \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ x_n + x_{2n} + \ldots + x_{mn} = b_n \end{cases}$$

c) the allocated amounts will be at least equal to 0. ( $x_{ij} \geq 0$ )

The objective function will have the following conditions:

-will minimize the total transport costs

$$[\min] \sum_i \sum_j c_{ij} d_{ij} x_{ij}$$

-will minimize the total transport time.

$$[\min] \sum_i \sum_j t_{ij} x_{ij}$$

$$[\min] \sum_i \sum_j c_{ij} x_{ij}$$

In formulating the problem it is assumed there is a balance between the available and the necessary amount: $\sum_i a_i = \sum_j b_j$

The most common problems in practice are those with scarce resources:

$$\sum_i a_i < \sum_j b_j \ ,$$

for very few cases there are problems with resources in surplus:

$$\sum_i a_i > \sum_j b_j$$

In the matrix structure of the model appear only two elements, one per each column, allowing specific methods for solving the problem of transport, such as: methods based on successive improvements of the solution (potential method) and the method of successive reduction of

inconsistencies. When the objective functions are nonlinear then random search methods are required. For simplicity, in the solving process, the unbalanced problems are balanced by introducing some fictitious beneficiaries or providers that appear in the objective function with zero cost, and thus the equilibrium conditions are met.

Consequently, the repartition problems represent variants of transportation problem, namely: unbalanced with prohibited routes (when there is an allocation restriction of the resource from a particular supplier to a particular beneficiary), with linked centres (when we have more resource providers in locality), with groups of linked centres (when beneficiaries of various linked centres obtain their supplies jointly through some deposits of a certain business units), with intermediate centres (when between providers and beneficiaries appear deposits which temporarily store the resource), three-dimensional (when more resources are allocated), with partially substitutionary resources, with limited transportation capacities, etc. When the resource is not homogeneous, homogenization coefficients must be entered (transformation of the supplier resource $i$ in the supplied resource $h(i=h)$), which is considered the standard or the conventional one. If we take into account transport capacities $D_{ij}$ from the supplier $i$ to the beneficiary $j$ and the solution of the problem will also include the transportation plan of the resource, the restrictions that occur are: $x_{ij} \le D_{ij}$.

Most often, in practice, there are situations in which the number of providers and beneficiaries do not stay the same over the time horizon for which the baseline allocation is made. For example, by putting into service some new production facilities, it appears the perspective of increasing both the number of suppliers and the number of beneficiaries or of reducing the number of providers if they have contracted the production with external beneficiaries or did not achieve it due to some impediments. The number of beneficiaries is reduced due to changes in manufacturing profile or in assortments' structure, eliminating the products that require the resource. Such a problem is solved by linear programming parameters.

Let $\alpha_i$ be the amount of resource available for $\Delta_m$ suppliers and $\beta_j$ the additional amount requested by the $\Delta_n$ beneficiaries. If the number of

providers and beneficiaries decreases, the two parameters, $\alpha_i$ and $\beta_j$, will have negative values. The equilibrium condition is: $\sum_{i=1}^{\Delta m} \alpha_i = \sum_{j=1}^{\Delta n} \beta_j$

The non-negativity restriction of the constant term:

$$a_i + \alpha_i \geq 0 \qquad i = \overline{1, m + \Delta m,}$$
$$b_j + \beta_j \geq 0 \qquad j = \overline{1, n + \Delta n}$$

The allocation problem with variable centres (new) will be:

$$\sum_{j=1}^{n+\Delta n} x_{ij} = a_i + \alpha_i; \quad i = \overline{1, m}$$
$$\sum_{i=1}^{m+\Delta m} x_{ij} = b_j + \beta_j; \quad j = \overline{1, n}$$
$$[\min] \sum_{i=1}^{m+\Delta m} \sum_{j=1}^{n+\Delta n} c_{ij} x_{ij}$$

In the above problems, it was assumed that there are both $\Delta_m$ suppliers and $\Delta_n$ beneficiaries. If there are only $\Delta_m$ suppliers, and the number of beneficiaries is strict, $\Delta_n$ will be null and in case of increasing the number of beneficiaries with $\Delta_n$ and constantly maintaining the number of suppliers, $\Delta_m$ will be equal to zero.

*Allocation problem with intermediate centres and a single resource*

From the economic practice it was found that the direct transfer from the supplier to the beneficiary is not economic and it is necessary to move the product through other "sources" or "destinations" before reaching their final destination. This problem can be considered an allocation problem generalized as defined in [1], in which outside the sources transfer to destinations, the transfer between sources and between destinations is also allowed. In this issue all centres can be considered both sources and destinations. The objective function aims to minimize the total costs of allocation and is performed using the function:

$$[\min] f_{(n)} = \sum_{i=1}^{n} \sum_{\substack{j=1 \\ j \neq i}}^{n} c_{ij} x_{ij} + \sum_{i=1}^{n} c_{ii} x_{ii}^{*}$$

where: $x_{ij} =$ the quantity of product that is distributed from the centre *i* to the centre *j*, for $i \neq j; i = \overline{1, n}; j = \overline{1, n}$

$x_{ii}^{*} =$ the quantities in transit in the centre *i*, for $i = \overline{1, n}$

$c_{ij} =$ the transportation cost of one unit from the centre *i* to the centre *j*, for $i = \overline{1, n}; j = \overline{1, n}$ ($c_{ij}$ could be the distance between the centres *i* and *j*).

The function is subject to the following balance restrictions for each repartition centre:

- Total consigned- Total transit = Available => $\sum_{\substack{j=1 \\ j\neq i}}^{n} x_{ij} - x_{ii}^{*} = a_i; i = \overline{1,n}$

where: $a_i =$ the available quantity in centre *i*, for $i = \overline{1,n}$

- Total received-Total transit=Necessary => $\sum_{\substack{i=1 \\ i\neq j}}^{n} x_{ij} - x_{jj}^{*} = b_j;\ j = \overline{1,n}$

where: $b_j =$ the needed quantity (requested) in the centre *j*, for $j = \overline{1,n}$

- The non-negativity restrictions: $x_{ij} > 0$ for $i = \overline{1,n};\ j = \overline{1,n}$

For the problem to have solutions:

- Total available = Total necessary => $\sum_{i=1}^{n} a_i = \sum_{j=1}^{n} b_j = L$

This model differs from the normal transportation model by the fact that in restrictions variables $x_{ii}^{*}$ and $x_{jj}^{*}$ have negative coefficients. For each centre, the amount which is in transit could not be greater than the total available of resources: $x_{ii}^{*} \leq L$

Introducing the deviation variable $x_{ii}$ we obtain: $x_{ii}^{*} + x_{ii} = L \Rightarrow x_{ii}^{*} = L - x_{ii}$

By replacing $x_{ii}^{*}$ in the balance equations we obtain an ordinary allocation problem: $\sum_{\substack{j=1 \\ j\neq i}}^{n} x_{ij} = a_i + x_{ii}^{*} \Rightarrow \sum_{\substack{i=1 \\ j\neq i}}^{n} x_{ij} = a_i + L - x_{ii}^{*}$

the same for:

$$\Rightarrow \sum_{j=1}^{n} x_{ij} = L + a_i; i = \overline{1,n}$$

$$\sum_{i=1}^{n} x_{ij} = L + b_j;\ j = \overline{1,n}$$

The objective function will have the following form: $[\min] f_{(n)} = \sum_{i=1}^{n} \sum_{j=1}^{n} c_{ij} x_{ij}$ .

The problem is solved with the modified simplex algorithm for transportation problems. The optimal solution of the problem is given by the values $x_{ii}^{*}$ through: $x_{ii}^{*} = L - x_{ii}$

Another repartition problem which can be made consists in distributing more resources. The most common situations are those in which the providers have more resources that are required by the beneficiaries in accordance to their own sources.

*Stating the problem*

We have to distribute *p* available independent resources from suppliers *i* in the quantities $Z_{ik}\left(i=\overline{1,m};k=\overline{1,p}\right)$ to the beneficiaries *j* for which the necessary is $b_{jk}$, so that the total transport expenditures of resources are minimal.

The restrictions of the problem are determined by:

1) The sum of the amounts from those *p* resources allocated by the supplier *i* to the beneficiary *j* is equal to the total amount planned to be delivered by the supplier *i* to the beneficiary *j*:

$$\sum_{k=1}^{p} x_{ijk} = a_{ij}; i=\overline{1,m};\ j=\overline{1,n}$$

where: $x_{ijk}$ =the quantity of the resource *k* assigned by the provider *i* to beneficiary *j* and $a_{ij}$ = The total amount of resources scheduled to be delivered from the supplier *i* to beneficiary *j*

2) The amount of the allocated quantities of the resource *k* from all suppliers to the beneficiary *j* is equal to the necessary (requirement) of the resource requested by him:

$$\sum_{i=1}^{n} x_{ijk} = b_{kj}; k=\overline{1,p};\ j=\overline{1,n}$$

3) The total amount of resource *k* from the supplier *i* to the *n* beneficiaries should equal the available amount:

$$\sum_{j=1}^{n} x_{ijk} = z_{ik}; i=\overline{1,m}; k=\overline{1,p}$$

4) The distributed amounts must be at least zero: $x_{ijk} \geq 0$

The objective function is to minimize the total expenditure incurred in transporting the resource p from the supplier m to the beneficiary n.

$$[\min]\sum_{i=1}^{m}\sum_{j=1}^{n}\sum_{k=1}^{p} c_{ijk}x_{ijk}$$

where: $c_{ijk}$ = the transportation cost of a physical unit of the resource *k* from the supplier *i* to the beneficiary *j*.

Assumptions on ensuring the conditions for equilibrium:

-The amount of the available quantities in those p resources at the supplier i is equal to the sum of the planned quantities that need to be delivered from the supplier i to the beneficiaries n, respectively with the total amount available at the supplier i:

$$\sum_{k=1}^{p} Z_{ik} = \sum_{j=1}^{n} a_{ij} = A_i; i = \overline{1,m}$$

where: $A_i$ = the total amount of available resources that will be delivered from the supplier *i*

-The amount of the available quantities at those *m* suppliers from the resource *k* is equal to the amount of the required quantities by those *n* beneficiaries from the resource *k*, respectively with the total available of the resource *k*:

$$\sum_{i=1}^{m} Z_{ik} = \sum_{j=1}^{n} b_{jk} = Z_k; k = \overline{1,p}$$

where: $Z_k$ = the total quantity of resource *k* to those *m* suppliers

-The amount of those p resources required by the beneficiary *j* is equal to the sum of the total quantities of resources of those *m* suppliers planned to be delivered to the beneficiary *j*, respectively with the total available (necessary) of the beneficiary *j*:

$$\sum_{k=1}^{p} b_{jk} = \sum_{i=1}^{n} a_{ij} = B_j; j = \overline{1,n}$$

where: $B_j$ = the total quantity of resource required by the beneficiary *j*

By solving the model results both the amount of the distributed resource from the supplier *i* to beneficiary *j* $x_{ijk}$ and $a_{ij}$ - the total amount of resources scheduled to be delivered from the supplier *i* to beneficiary *j*. Such a problem belongs to the class of the three-dimensional transport problems with three axial restrictions (with simple sums).

In economic practice usually the correspondences between suppliers and beneficiaries are not direct, interfering between them some intermediary centres that represent a distribution problem with intermediate centres and more resources. These intermediate centres are establishments that sell goods "wholesale" and that mediate relations between the producing enterprises of consumer goods and the commercial units of retail, warehouses of materials that assure the link between the suppliers of construction materials and construction sites, the manufacturing companies, among the centres that provide the raw materials and the consumption centres which receive the finished product.

*Stating the distribution problem* in which all resources must pass through one of the intermediate centres. The *p* products available at the suppliers *i*

in quantities $Z_{ik}\left(i=\overline{1,m};k=\overline{1,p}\right)$ should be distributed to the beneficiaries *j* $\left(j=\overline{1,n}\right)$ whose necessary (requirement) $b_{jk}$ on condition that passes through those *q* intermediate centres, so that the total transportation expenditure to be minimal.

Such a problem is tetra-dimensional. According to the available data, it will be formalized in one of the three basic variants:

- with four axial restriction (with simple sums)
- with six planar restrictions (double sums)
- with four spatial restrictions (expressed by triple sums)

They also involve knowing the following elements:

$c_{ikj}>0$ where: $c_{ikj}=$ the quantity of resource *k*, sent to the beneficiary *j* from the supplier *I*;

$a_{ikh}>0$ where: $a_{ikh}=$ the quantity of resource *k*, sent to the supplier *i* through the intermediate centre *h;*

$b_{ikh}>0$ where: $b_{jk}=$ the quantity of resource required by the beneficiary *j* and by default the set of suppliers, of beneficiaries, of resources and of intermediate centres.

*The restrictions of the model*

1) The quantity of the resource *k* received by those *n* beneficiaries from the supplier *i* through the intermediate centre *h* must be equal to the quantity of the resource *k*, sent by the supplier *i* through the intermediate centre *h*:

$$\sum_{j=1}^{n} x_{ikhj}=a_{ikh}\ ;\ i=\overline{1,m};k=\overline{1,p};h=\overline{1,q}$$

where: $x_{ikhj}=$ the quantity of resource *k*, distributed to the beneficiary *j*, from the supplier *i* and that will be sent through the intermediate centre *h*;

2) The total quantity of those *p* resources distributed to the beneficiaries *j*, from the supplier *i*, through the intermediate centre *h*, must be equal to the quantity of resource sent by the supplier *i* to the beneficiary *j*, through the intermediate centre *h*:

$$\sum_{k=1}^{p} x_{ikhj}=b_{ihj}\ ;\ i=\overline{1,m};h=\overline{1,q};\ j=\overline{1,n}$$

3) The quantity of resource *k* sent by the supplier *i* to the beneficiary *j*, through all intermediate centres must match the total resource *k*, sent to the beneficiary *j* by the supplier *i*:

$$\sum_{h=1}^{Z} x_{ikhj}=c_{ikj}\ ;\ i=\overline{1,m};k=\overline{1,p};\ j=\overline{1,n}$$

where: $c_{ikj}$ = the quantity of resource *k*, sent to the beneficiary *j* by the supplier *i*;

4) The quantities of resource *k*, sent by those *m* suppliers, to the beneficiary *j*, through the intermediate centre *h*, must match the total quantity of resource *k*, sent to the beneficiary *j* through the intermediate centre *h*:

$$\sum_{i=1}^{m} x_{ikhj} = d_{khj} \ ; \ k = \overline{1,p}; h = \overline{1,q}; j = \overline{1,n}$$

where: $d_{khj}$ = the quantity of the resource *k*, sent to the beneficiary *j* through the intermediate centre *h*

5) The distributed quantities of the resource k must be at least zero.

$$x_{ikhj} \geq 0 \ ; \ i = \overline{1,m}; k = \overline{1,p}; h = \overline{1,q}; j = \overline{1,n}$$

Such a problem aims to minimize the total transport expenditure of resources:

$$[\min] \sum_{i=1}^{m} \sum_{k=1}^{p} \sum_{h=1}^{Z} \sum_{j=1}^{n} c_{ikhj} x_{ikhj}$$

where: $c_{ikhj}$ = the transportation cost of a physical unit from resource *k*, sent by the supplier *i* to the beneficiary *j* through the intermediate centre *h*.

Assumptions for ensuring the equilibrium conditions:

- the quantity from resource *k* sent by the supplier *i* through the intermediate centres is equal to the quantity of resource *k* received by all beneficiaries, from the supplier *i*, respectively with the available quantity at the supplier *i* from the resource *k*:

$$\sum_{h=1}^{Z} a_{ikh} = \sum_{j=1}^{n} c_{ikj} \ ; \ i = \overline{1,m}; k = \overline{1,p}$$

- the total quantity of resources sent by the supplier *i* through the intermediate centre *h* is equal to the quantity received from the supplier *i* and with the total available quantity of resources of the supplier *i*

$$\sum_{b=1}^{p} Z_{ik} = \sum_{h=1}^{Z} e_{ih} = \sum_{j=1}^{n} C_{ij} = A_i \ ; \ i = \overline{1,m}$$

where: $Z_{ik}$ = the quantity from the resource *k*, available to the supplier *i*

$e_{ih}$ = the total quantity of resources sent by the supplier *i*, that will pass through the intermediate centre *h*

$C_{ij}$ = the whole quantity of resources sent by the supplier *i* to the beneficiary *j*

$A_i$ = the total quantity of resources available at the supplier *i*

- the sum of the quantities from the resource *k* sent by those *m* suppliers is equal to the quantity from the resource *k* that passes through all intermediate centres, respectively with the quantity from the resource *k* received by all beneficiaries and with the whole quantity sent from the resource *k* to all suppliers:

$$\sum_{i=1}^{m} Z_{ik} = \sum_{k=1}^{p} d_{kh} = \sum_{j=1}^{n} b_{jk} = D_k \ ; \ k = \overline{1, p}$$

where: $d_{kh}$ = the quantity from the resource *k*, that will pass through the intermediate centre *h*

$b_{jk}$ = the quantity from the resource necessary for the beneficiary *j*

$D_k$ = the total quantity from the resource *k*, sent by all suppliers

- the sum of the quantities of resources sent by all suppliers through the centre *h* is equal to the sum of the quantities of resources that passes through the intermediate centre *h*, respectively with the whole quantity received by beneficiaries through centre *h* and the total quantity of resources that pass through this centre:

$$\sum_{i=1}^{m} e_{ih} = \sum_{k=1}^{p} d_{kh} = \sum_{j=1}^{n} q_{hj} = C_h \ ; \ h = \overline{1, q}$$

where: $C_h$ = the total quantity of resources that will pass through the intermediate centre $h\left(h = \overline{1, q}\right)$

- the total quantity of resources sent by suppliers to the beneficiary *j* is equal to the sum of the quantities from each resource necessary (required) for the beneficiary *j*, respectively with the quantity of resources received by the beneficiary *j* from all intermediate centres and with the whole quantity of resources needed by the beneficiary *j*.

$$\sum_{i=1}^{m} c_{ij} = \sum_{k=1}^{p} b_{jk} = \sum_{h=1}^{q} q_{hj} = b_j \ ; \ j = \overline{1, n}$$

where: $B_k$ = the total quantity from the resource *k* necessary to those *n* beneficiaries.

$B_j$ = the total quantity of resources necessary to the beneficiary *j*

- the sum of the quantities available at the suppliers is equal to the sum of the quantities necessary from each resource and with the sum of those that pass through the intermediate centre, respectively with the whole quantity necessary for the beneficiaries:

$$\sum_{i=1}^{m} A_i = \sum_{k=1}^{p} B_k \sum_{h=1}^{q} c_h = \sum_{j=1}^{n} B_j$$

The observation that it must be highlighted refers to the resources that need to be independent and expressed in the same unit of measurement.

When the extent of the problem will be larger, it is possible to decompose into two sub-problems: the first will be the allocation of resources on intermediate centres, and the second preparing the supply plan of the beneficiaries with resources from intermediate centres.

## Conclusion

The issues presented in this paper represent a part of results found in the researches made by the authors. The topic is very large so it is almost impossible to ever have the last word in the field. Therefore, we would be honoured if other researchers in the field will support us with constructive observations. In the paper we have developed a systematic allocation problem in the framework of some distinct classes of problems by different criteria. For each of these classes we showed the correspondence between the problems, the mathematical methods required for solving them and the mathematical models of the problems. The conducted research will provide the support for a system project in resource allocation decision support.

## References


1. Andreica M. (2011), *Microeconomics forecast*, Cibernetica MC Publishing, Bucharest.

2. Andreica M.I, Tapus, N. (2010) *Algorithmic Solutions for Several Offline Constrained Resource Processing and Data Transfer Multicriteria Optimization Problems*, Scalable Computing: Practice and Experience, vol. 11, no. 1, pp. 1-17.

3. Andreica M.I, Tapus, N. (2009) *Efficient Upload Bandwidth Estimation and Communication Resource Allocation Techniques*, Recent Advances in Signals & Systems, pp. 186-191.

4. Andreica, M.I., Andreica M.E., Ardelean, D. (2009) *Efficient Algorithms for Several Constrained Resource Allocation, Management and Discovery Problems*", Proceeding of the 33rd ARA Congress, Romania, vol. I, pp.64-68

5. Andreica M.E., Andreica, M.I., Andreica, A. (2009) *Efficient Algorithms for Several Constrained Activity Scheduling Problems in the Time and Space Domains*, Proceeding of the 33rd ARA Congress, Romania, vol. I, pp.59-63

6. Ergin H.I. (2002), *Efficient Resource Allocation on the Basis of Priorities*, Econometrica, Vol. 70, Issue 6, pp. 2489–2497.

7. Katoh, N., Shioura, A., Ibaraki, T. (2013) *Resource Allocation Problems*, Handbook of Combinatorial Optimization, pp. 2897-2988

8. McCarthy, M.A., Thompson, C.J., Hauser, C., Burgman, M.A., Possingham, H.P., Moir, M.L., Tiensin, T., Gilbert, M. (2010), *Resource allocation for efficient environmental management*, Ecology Letters, 13, pp. 1280–1289.

9. Romero, C. (2000), *Risk programming for agricultural resource allocation: A multidimensional risk approach*, Annals of Operations Research, Vol. 94, Issue 1-4, pp 57-68

10. Tirsa, E.D., Andreica, M.I.,Cristea, V.,Tapus, N. (2011) *Towards Configurable Building Blocks for the Development of Distributed Services: Resource Selection and Communication Protocols*, Proceedings of the 6th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing, Spain, pp. 279-284.

# THE EVALUATION OF AGRICULTURAL LAND AND ENERGY UTILIZATION OF BIOMASS[1]

*Nedeljko Tica, Dragan Milić*[2]

## Abstract

*The research is focused on the possible ways of evaluation of agricultural land as a necessary factor for biomass production and the influence of land utilization in the production of energy on its value. Autonomous province of Vojvodina as a particularly agricultural area that disposes of significant surfaces of agricultural land within the Republic of Serbia has a tremendous potential for the production of energy gained from biomass as a result of agriculture. Biomass represents one of the renewable energy sources. The organic substance of plant or vegetable origin, which is produced on the agricultural land is used in the process of combustion and converting in the systems for production of other forms of energy (power, heat).*

**Key words:** *biomass, renewable energy sources, agricultural land, evaluation*

## Introduction

The production of biomass is not possible without the agricultural plot whose main characteristic is fertility that presents its capacity to meet the needs of plants for minerals and water. Land makes one of the basic conditions for subsistence since it is used for the production of food and energy. However, it is a limited resource, in natural and economic sense. The purpose and use of land are determined not only by its fertility but also by its location. Plots convenient for plant cultivation are mostly used for agricultural production, though in some cases the location of the plot can define the purpose of land exploitation. Despite the quality, land placed next to urban and developed area is particularly used to satisfy the

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growing residential and business needs. Moreover, land situated near plants for production of renewable sources of energy has great potential to be used in the production of biomass, as well as those cultures whose main or byproduct is used in the process of gaining energy from renewable sources. Biomass as one of the sources of renewable energy is an organic substance of plant or animal origin that is being used in the process of combustion and converting in the systems meant for producing other forms of energy (power, heat). The Republic of Serbia is the signatory of the Contract for foundation of Energetic Community of Southeast Europe, based on which directives related to the major use of renewable energy sources are applied. Regarding the Contract, it was introduced the Regulation on the establishment of the program for the realization of development strategy in energy sector of Republic of Serbia until the year 2015, with the aim of increasing the significance of power energy produced from renewable energy sources compared to the total consumption of power energy in 2007 on the national level. In order to achieve the mentioned goals and motivate the production of energy from renewable sources, the Government of Republic of Serbia has adopted the Decree on the conditions for gaining the status of beneficiary producer of power energy and the criteria for the assessment of fulfillment of these requirements. Moreover, it introduced the Decree on the measures for encouragement of the production of power energy using the renewable energy sources and the combined production of power and heat energy. In terms of concretization of aforementioned measures there has been established the Action plan for biomass in Republic of Serbia, including the precisely defined the strategy for biomass utilization as a source of renewable energy according to the current domestic legislation and European directives. Regarding the evaluation of the potential of bio renewable sources specified in this plan in Republic of Serbia, 2/3 of the total amount of biomass originates in agriculture. This potential can be much higher if besides the crop residues in crop production, the production is increased by the dedicated biomass cultivation that would not compete with food production. Having in mind the tendencies of regional energy sector and the fact that Serbia possesses abundant resources of biomass, it makes biomass one of the primary sources of energy in our country. Since the potential of land for agricultural production is defined not only by biological factors but also economic influences, the production of energy in agriculture presents one of the important determinants of the land value. In terms of economic potential for agricultural exploitation of land we consider the economic justification of agricultural production. While estimating the economic benefits of agricultural production, it is

necessary to include the value of biomass used in the process of energy production. According to this criterion for determination of land purpose, the potential of agriculture cultivation is present on plots where it is possible to achieve the yields that provide economic justification and whose value of the production overcomes the expenses necessary for the process.[1] The calculation should contain the possibility of use of biomass; furthermore besides the calculation of profit in food production, it is important to calculate the profit as a result of biomass production. Reasons for the evaluations of land are multiple and they start with the determination of economic justification of investments including agricultural land and end with the determination of value based on its turnover. The evaluation of agricultural soil is possible to perform on various ways depending on the initial assumptions taken in the process of determination of value, which is based not only on the comprehension of characteristics and significance but also on the individual contribution of various factors that influence the process. According to that, we distinguish two basic factors that influence the process of determination of value and present the baseline for two primary concepts for the evaluation of agricultural land.

First factor presents economic effects that are achieved by the use of land. This factor is a starting point for the determination of value based on the benefits coming from the use of means, respectively the evaluation using yield methods.

Second factor is a result of limitations regarding the supply and demand of agricultural land, which is a consequence of the fact that the soil is a limited resource with the tendency of decreasing its total surface. Due to the movements on the market that cause the change in supply or demand, the evaluation is mostly done according to the market or trade approach comparing the value of this natural resource with the resources of similar features whose turnover has been recorded.

Mentioned factors present the baseline for determination of value using two different but correlated approaches. If there were economic benefits from agricultural production it would lead to an increased accumulation in agriculture that can be used for investing in agricultural plots.

[1]Milić, D. Tica, N., Zekić, V., Bačkalić, Z., Ranogajec, J. Utvrđivanje vrednosti nepoljoprivrednih zemljišta, Agroekonomika br.44-45, Poljoprivredni fakultet Novi Sad, 2012

Moreover, the profits in agriculture are a motivating factor for the investor to invest in agricultural cultivation and the purchase of land. Positive economic effects in agricultural production represent a factor that influences the increase of demand for agricultural soil, which causes the increase of prices. According to this, it is present a reverse situation when the economic effects in agriculture are negative and consequently they will lead to the decrease of demand and prices.

There are various significant characteristics of the market of agricultural land that distinguish it from the markets of other agricultural goods. The market of agricultural land is less organized compared to the market of agricultural products, which means that it is needed more time for performing the transactions, and often the trade is more complex than the trade of most agricultural products and other goods. If there is no continuous supply and demand regulated by certain rules, it can hardly be spoken about the market value, since in the absence of mentioned elements in continuity it is not possible to claim that there is the market of that good, and therefore the market value. In that sense, having in mind that this is a trade that occurs sporadically, it is better to say those are exchange values than market values. The major characteristic of the turnover of this good is that in our conditions there is mostly present the trade of relatively small surfaces on the annual level compared to the total surfaces in areas of trade, so we can say that this type of exchange does not possess the features of the real market which implies the organized, continuous turnover with constant supply and demand.[2]

As before said, in terms of motive for trade, the key factor that influences the trade of agricultural land is the period of return of investment value in agricultural production that is directly connected to pure annual benefits from its use that brings also certain risks. Related to this, it should be mentioned that the uncertainty of achieving economic results has the significant influence on the trade of agriculture land.

The problem of evaluation of agricultural soil is complex due to the fact that there are numerous factors influencing its value, and therefore a great

[2]This claim does not refer to the change of capital ownership of agricultural companies in the process of privatization and other transactions, when in the process of capital sales was also included the sale of the assets containing agricultural land in social ownership mostly organized in huger parcels. This way of sales of agricultural land is not characteristic for standardize modes of buying and selling which include only the trade of land as property.

attention should be given to the choice of methods that express its value on the best possible way. Besides the factors that have an effect of every single parcel due to its individual significance on the location, the value of land has a global tendency of increase thanks to the augmented need for food on the global level and increasing involvement of agriculture in the production of energy in the form of biofuels, that consequently increases the demand for agricultural products that represent the source for production of this type of energy.

## Theoretical aspects of evaluation of agricultural land

Land presents not only one of the most significant factors of agricultural cultivation but also one of major factors for performing all kinds of economic activity. Without the existence of agricultural land it would not be possible to base and organize neither plant cultivation nor cattle breed, since it considers that the forage has to be produced on the agricultural plot. Moreover, the land represents the immovable factor and due to that the production has to be performed on the location of the land. This is considered to be a limitative factor in terms of production of energy from biomass. Biomass due to its relatively low price per unit of product does not leave options for adding high transport expenses. According to aforementioned the economic justification for the construction of plants that use biomass as a source of energy, dictates that they are located close to the land. The only possibility for allocation of gained energy is the production of power energy that can be easily transported to longer distances from the production place. Furthermore, due to the immovability of the plot, the agricultural production is exposed to the high influence of natural factors that are characteristic to the area where the plot is situated, so it is not possible to avoid completely the effect of natural forces and risks. The peculiarities of agriculture and its land that differ it from other production factors represent the baseline for establishing the approach for evaluation of agricultural land. Based on it, there can be formed three approaches for evaluation of land: Income approach 2. Expense approach and 3. Approach based on comparison.

First approach is based on economic benefits that are a result of the utilization of agricultural land. This approach is mostly convenient for the evaluation of land used for agricultural purposes. If the land is used for agricultural production, than as an initial assumption taken in the determination of its value it should be taken its capacity to create new

value. According to this, agricultural households that operate in the same or similar areas achieve different product and economic results.

Second approach for determination of value is under influence of numerous market factors in the certain area, which reflects on the expenses of its purchase, presents the expense approach.

Regarding the third approach, the evaluation of land is based on the method of comparison, respectively market or exchange value of agricultural land based on the comparison of observed land with the achieved results of the same or similar land in the area where the evaluation is made. This method is mostly convenient for the evaluation of land used for construction or other purposes whose main goal is not agricultural production.

Economically observed land presents the fixed asset that excludes the calculation of amortization since it is considered that cannot be worn up. According to the basic economic principles it is necessary to determine the rate of return of investment in the purchase of land, respectively it is important to determine the period of return of hired means. Based on the capacity of land to make profit or the surplus of value in terms of its productivity, the evaluation of this mean for production should be performed, since the economic valorization of agricultural land is based on this fact.

The agricultural production has certain peculiarities that distinguish it from other forms of production, so these features need to be taken into consideration while performing the economic valorization since their influence is significant on the achieved product as well as economic results in agricultural cultivation. The primer characteristics of mentioned specifics are reflected in the fact that agricultural production is performed using biological means and on agricultural land that is a fixes asset as a necessary condition for plant cultivation. This type of production is conditioned by various biological, natural and climate factors. Moreover, the greatest part of final goods in agriculture due to their features, are not possible to be stored and kept for a longer period of time. Due to this, there is a need for finding special approaches in the evaluation of land, since its economic valorization is under their influence.

Next to the peculiarities of agriculture as an activity, only the agricultural land as a production resource has some features that differ it from other

forms of assets, such as the fact that the **land is a property that cannot be used until the end**, since the use of land in agricultural and other purposes does not have a time limit, which in economic sense means that in the calculation of expenses of production this property is never amortized. Furthermore, **the land is an immovable factor of production**. This characteristic has a great influence on the value of land since it is not possible to allocate in on the places that demands the market, which is the case of other production resources. The market based on its basic mechanisms of supply and demand makes the allocation of resources or production means and on that way starts the turnover of goods. Moreover, the **possibilities for the purchase of land are limited** because the land surfaces have the tendency of decrease, while the needs for food and energy production are increasing due to the increase of number of inhabitants on the planet and the rise in standard of the population especially of the mostly populated countries, as well as the changes in the concept of life and the sale of land is made only in cases of extreme necessity. It is important to have in mind that **every land parcel has peculiarities that make it unique**, due to the fact that the existence of land is a consequence of various natural processes that differ in different areas, also because the different positions of the parcel compared to other important factors of agricultural production and the development of the society have greater influence on the value of the land. Viewed from the aspect of social community, **the land is highly significant for human population**, since it is a basic factor for the production of food that can be substituted and is impossible to be produced without the land. Also without it is not possible to solve the residential problem and other types of human activities, which include economic activities, sport, recreation, amusement, and the production of energy.

## The experiences of other countries related to the market and turnover of agricultural land and the ways of its evaluation

In order to gain the entire picture of the evaluation modes, ownership forms and markets of agricultural land in other countries, the review and the analysis of these factors that influence its value, due to the different historical heritage, the way of organizing the agricultural production and the role of the state in its functioning, there can be differed various groups based on the similarity of the factors. The first group of states consists of the countries that did not have the either the process of nationalization or social and state forms of ownership of the production means, including agricultural plots. This group includes the west European countries as

well as the United States of America, having in mind the differences that exist among certain states from this group. The second group includes countries where the process of nationalization and the socialization of properties were done and they have been or are on the way of the transition process which converts the ownership forms of assets, so that the public or social form of ownership is transferred to private ownership. This way in terms of ownership status of the land, states in the first and second group are equal, but the implementation of the process also considers the changes in accessing the evaluation of land.

The matter of evaluation of land characteristic for the first group of countries is based on the form of property of the agricultural land, as well as the historical heritage and the way of acquisition of ownership of this resource. In the USA the agricultural producers (family farms) besides the land in their ownership also cultivate the leased land from so called institutional investors or investment funds that made the investment of financial means in the land with the aim of achieving profit from the change of land value, as well as from the rent they become from the leasing of land. In west European countries mostly family agricultural households base its production on their own land that is mostly gained by heritage and purchase. The land they lease is the property of other entrepreneurs that gained it by heritage but have no interest or the possibility to cultivate it. What differs related to the way of organization of agricultural production is the average size of household and the way of acquisition and utilization of agricultural land. In that sense, it can be claimed that the agriculture of the USA has more flexible approach in terms of exploiting the agricultural land and has bigger potential for faster development of agricultural household compared to the European countries. These possibilities create better option for acquisition of financial means for production and the higher level of specialization of production comparing to the European producers. Also, the land is organized in bigger land complexes, which results in lower expenses of production per unit and therefore the most competitive and market-oriented agriculture. Mentioned circumstances represent important premises and factors that influence the price, the level of achieved turnover of agricultural land. West European countries due to the limitation in terms of the size of property and the possibilities for its expansion are beforehand focused on intensifying and modernization of production, which reflects on the value of land.

The countries including our country that in the 20th and the beginning of 21th century have gone through the process of transition and privatization have different experiences related to the way of evaluation of agricultural land depending on which way and pace they went through that process. In that sense it is useful to review the experiences of those countries. It specially refers to the countries of central and east Europe, which during this process changed the form of ownership of production means including agricultural land. This process makes significant experience and it is still takes place in our country. In the privatization process there has been a transformation of ownership structure in the agro complex of these countries which influenced the supply and demand for agricultural lend in the initial phase, and after on the way of organization and competitiveness of their agriculture which reflects on the price level of agricultural land. Regarding this process in certain countries we should have in mind that transitional processes are conditioned by the peculiarities of each country that reflects in the degree of its economic development, level of social connections, historical heritage related to the ownership structure, international position and political ambient. Due to these differences it is not possible directly to transfer experiences from one country to another. Nevertheless, we can make useful conclusions related to the analysis of the prices of land. In privatization of lands of central and east Europe in agriculture, most difficulties occurred in the matter of privatization of agricultural land. Besides the common features of the transition process, there are also differences in experiences of countries in transition when it comes to plot. Those differences are a result of ownership of the land before the privatization process, as well as the wanted targets that should be realized after conducting the privatization process. In some of the countries before the beginning of the privatization process the major part of surfaces (from 70 to 90 and more percent) was in public ownership within agricultural combines such as Russia, Latvia, Romania and other countries, while in some of them the ownership structure was mixed such as in our country. During the implementation of the privatization process of agricultural land some of these countries have decided to return to its previous owners, and some of them decided to make compensation to previous owners and privatize the land using various sales models. Some of the countries had a goal to preserve big commodities producers and combines, while others decided to form smaller family farms. All mentioned characteristics of the process have left various consequences on the questions related to the rights and ownership of the land, which influences the level and way of evaluation of land. What is common for a greater part of world countries when it comes to agriculture is the role of

the state in this section of economy. Related to this there are also differences among certain countries. In the states where there is no land in public ownership or the surface of that land is relatively small comparing to the entire surface, the role of the state in terms of helping the agriculture is reflected in the measures of agricultural policy, respectively in creation of legal regulative and institutional limits for achieving the best possible results in agriculture and financial support of agricultural production through various forms of subsidies and grants. Countries that have relatively significant participation of land in public ownership comparing to total agricultural surfaces, besides mentioned measures of agricultural policy and financial support, the state has a significant role in agriculture through management of this resource in private ownership. Described role of the state has influence on the turnover and price of land.

## Methods for evaluation of agricultural land

Economic valorization of agricultural land includes more aspects of observation of the problem. According to this there can be explored the researches that deal with this issue.

**The first group** of research consists of papers that deal with factors that influence on the value of land. Classical economists (**Smith, Ricardo, Peti**) emphasized the land rent as a factor for the determination of land price. Significant factors besides the rent are also interest rate, as well as the relation between supply and demand in the trade of land. The relation of supply and demand in some situations can present a key factor while determination of value of agricultural land. **The second group** of research consists of research that dealt with natural and production features of soil, based on which production characteristics and production areas distinguish the land. Special aspect of research of economic valorization of the land includes economic methods based on its productivity and yield value. This type of research represents **the third group.**

The evaluation of land can be performed using following methods:

1. **Exchange value**, which relies on the achieved value in the exchange of land on certain location in the process of evaluation.

The determination of soil value using the method of comparison or exchange value, is based on the gathering of data related to the achieved exchange values of agricultural land in a certain area, as well as other

important factors that could influence the achieved exchange value. Based on determined values of the trade of agricultural land in certain location, the comparison and the conclusions on the land value for that area in the defined period are being made. Regarding the mentioned process, this method could be called the method of market value, but than arises the question if this would be an adequate name since the market means organized supply and demand and by rule the trade of agricultural land is not organized and it is mostly decentralized. This attitude related to the market value of agricultural land prevails according to numerous authors that explored this issue.[3] The value that is determined on this way includes all expenses of the buyer while purchasing the land. This method can be applied but its major drawback reflects in the possibility of gaining inadequate value due to the possibility of manipulating and showing different values from the really achieved values in the process of formal calculation of data due to the speculative activities of the participants in the exchange in order to diminish tax obligations and other expenses that occur in this situation of land trade. Using this method on the value of land can influence directly and indirectly all the factors that determine the success of agricultural production, such as natural, social, economic factors. As it is mentioned that the evaluation according this method is based on exchange values, in the process of gathering data with the aim of determining value it is necessary to include all the relevant information and it is possible to make conclusions about the value of agricultural land in a certain area.

2. **Method of yield value** is based on the economic benefits that come from the land, the income of the owner as profits earned in agricultural production or the incomes of the owner as the rent for leasing the agricultural land. Due to that reason the determination of yield value of the land can be performed in two ways:

**First way** says that the yield value is determined as a sum of projected results achieved in agricultural production on the land in the period of projection between 5 and 10 years and the residue value beyond the period of projection. There are various ways for determination of residue value but in practice it is mostly used Gordon model. During the projection of results besides determining pure annual benefits, it is necessary to determine to rate of growth of these results. Having in mind

[3]Marko, J., Jovanović, M., Tica, N., Kalkulacije u poljoprivredi, Poljoprivredni fakultet, Novi Sad 1998. str. 330.

that the agriculture represents a specific activity that is conditioned by effect of natural forces and the respect of biological attributes of the production, it is very hard to determine the convenient rate of growth with the satisfying level of reliability.

**Second way** of determination of yield value comes from the assumption that the land is used in a limitless period of time, so it can be said that the benefits coming from the land represent the income in a limitlessly long period of time, so called "eternal rent". For the use of this way of determination of yield value it is not necessary to establish the rate of growth. This way represents the capitalization of benefits in a limitless period of time. The problem that occurs with the capitalization of annual benefits can be a correct choice of the moment to determine the annual benefit. Due to the previously mentioned peculiarities, we are familiar with the fact that describes this activity and reflects in the meaningful oscillations of benefit in different periods. In order to avoid possible problems related to a valid choice, the annual benefit is determined as an average value of this indicator on the period of 5 to 10 years. Regarding this, it is made the guidance of extreme values that can appear in certain periods of observation. Based on aforementioned, the yield value of agricultural land presents a capitalized average pure annual benefit that is calculated by:

1. Using the land in production, respectively based on the calculative land rent or
2. Leasing the land, based on the real land rent.

According to the mentioned specifics in the process of calculation of yield value of land, it is much simple to use the second way for determination of yield value, respectively the method of capitalization of pure annual benefits thanks to its satisfying level of reliability.

Pure annual benefit from the use of land in production is calculated when from annual incomes are subtracted annual expenses originating in production, but without the paid rent and the calculative interest rate on the value of land. This value actually present the **calculative land rent**[4]. Due to the fact that the use of agricultural land is indefinite and it can be used in agricultural purposes for an unlimited period of time, the

[4]Marko, J., Jovanović, M., Tica, N., Kalkulacije u poljoprivredi, Poljoprivredni fakultet, Novi Sad 1998. str.328. do 330.

calculation of land value using this method is done according to the following expression:

$$P.V.Z.(k.z.r.) = D.k. \cdot \frac{100}{s.k.}$$

Where:
***P.V.Z.(k.z.r.)*** – Yield value of land gained using the method of yield value based on calculative land rent
***D.k.***- Pure annual benefit from the use of agricultural land in agricultural production (calculative land rent), which represents the difference between incomes and annual expenses in production determined as an average value for the period of calculation.
***s.k.*** – rate of capitalization or discount rate based on which the determination of present value of future expected pure annual benefits is made.

The rate of capitalization used while determining the yield value of land applying the capitalization of calculative land rent presents the price of capital for engaged means in purchase of land and the price for risks that follow the investor who establishes the agricultural production on that land. Due to the fact that the agricultural production is surrounded by risks that are a consequence of the character and the peculiarities of agricultural production, the rate of capitalization applied in this case needs to have a higher value than the value of the capital price for risk-free investments. The measurement of the risk level and its quantification is a complex question with cannot be easily answered due to the impossibility make the quantification of indicators of risk appropriately. Because of that, as a substitute for the rate of capitalization for calculation of yield value in this case is used the average interest rate of commercial banks on the loans secured by mortgage that are intended for the purchase of agricultural land and other long-term investments in agriculture with the return period equl or longer than the period for which the average value of calculative land rent is determined. The basis for this way of determining the rate of capitalization lies in the fact that commercial banks have included in the interest rates also the risks of activities for which they give credits.

During the determination of pure annual benefits from the use of agricultural land in agricultural production (calculative land rent) it is used the method of analytical calculations for each analyzed area. The

total income per ha is determined based on the participation of different cultures in the planting structure in the analyzed areas. It is necessary that for determination of incomes in certain area average value of production of chosen representative cultures is used with the application of average purchase prices in the period of calculation.

For the calculation of calculative rent it is important to use analytical calculation with the following basic equation:

$$\mathbf{p - t = d}$$

Where:
**p** – Total income or production value for a certain line of production
**t** – Total expenses for a certain line of production that are determined based on standard expenses that originate in the production of defined cultures.

In order to achieve objective results these indicators should be determined as average values for the period between 5 and 10 year,

$$\mathbf{p = p.p. \cdot p.o.c.}$$

Where:
**p.p.** – average yield for each representative culture in calculation period
**p.o.c.** – average purchase price for each representative culture in calculation period.

The calculation of yield value of land using the **real land rent** is performed according to the following equation:

$$P.V.Z.(s.z.r.) = D.r. \cdot \frac{100}{s.k.}$$

Where:
***P.V.Z.(k.z.r.)*** – Yield value of land gained using the method of yield value based on real land rent.
***D.k.***- Pure annual benefit from the lease of agricultural land (real land rent), which represents the difference between incomes of rent and some expenses of the land owner (tax on assets and other public obligations) determined as an average value for the period of calculation.

***s.k.*** – rate of capitalization based on which the determination of present value of future expected pure annual benefits is made.

The rate of capitalization used while determining the yield value of land based on real land rent presents the price of capital invested in agricultural land and the risks that follow the investor who establishes the agricultural production on that land. Since it is simple to lease the lend, in the former period we have noticed the increase of demand for lend in rent, which led to the increase of real land rent in certain areas. The ownership of land is not questioned and the land presents a durable good, so the investment in land is considered to be an investment of low risk or risk-free investment. If mentioned assumptions are applied then the rate of capitalization can be determined based on the investments with low risk or no risk at all. These types of investments include securities issued by state and other debt instruments that are guaranteed by the state. As a rate od capitalization it can be used the average value of interest rates on foreign currency deposits.

## Conclusion

According to priory mentioned and having in mind the factors that have major influence on the value of agricultural land, while using different methods for its evaluation it is necessary to pay attention to the choice of appropriate method so that objective results of estimation could be achieved. Considering the fact that the production of energy from renewable sources in agriculture presents the opportunity for earning higher profit in agriculture, since the biomass has its own value, in the process of land evaluation it is possible to gain objective results using the yield methods. Method of yield value based on the capitalization of calculative land rent provides an opportunity to include the benefit gained from the use of biomass in the production of energy, in the calculation. This method directly enables to preview the influence of including agriculture in the production of energy on the change of value of agricultural land. Having in mind the fact that in this way the calculative land rent is increasing because on the result of operating in agriculture we add the profit from the use of biomass in energetic purposes with the application of equation for evaluation according to this method, we conclude that the land used in these processes will have higher value. Also, indirectly a similar conclusion can be mind during the application of yield method based on real land rent, if we apply the assumption that the leaseholders of the land who besides the usual agricultural production

valorize the crop residues in the production of energy will have a willingness to pay the rent of land at higher prices. Indirectly we can make a conclusion on the increase of value of land using the comparison method if we take into consideration the fact that due to the increase of economic benefits in agriculture related to the production of energy, there will happen the increase of demand for this resource comparing to the existing supply.

## References


1. Akcioni plan za biomasu 2010 – 2012, Vlada Republike Srbije, Ministarstvo rudarstva i energetike, Srpsko – Holandski projekat na nivou vlada o biomasi i biogorivima (G2G08/SB/6/3), Beograd, 2010.

2. Brkić, M. (1982): "*Biomasa kao hrana, sirovina i energija budućnosti*", Savremena poljoprivredna tehnika, 3, str. 111 – 116,

3. Directive 2001/77/EC on the Promotion of the Electricity Produced from Renewable Energy Source in the International Electricity Market', Official Journal L 283,

4. Doucha T.. Divila E.: *Possible impacts of the Czech agricultural policy after the EU accession on the land market and land usage*. Agricultural. Economics – Czech 51. 2005.. 185–193

5. Dale P.. Baldwin R.: *Emerging Land Markets in Central and Eastern Europe*. In: Csaki C., Lerman Z. (eds.): Structural Change in the Farming Sectors in Central and Eastern Europe. Lessons for EU Accession. Second World Bank/FAO Workshop. June 27–29. 1999. World Bank Technical Paper. 465. Europe and Central Asia Environmentally and Socially Sustainable Development Series. 2000.

6. Energetski bilans Autonomne pokrajine Vovodine – Plan za 2011, Vlada AP Vojvodine, Pokrajinski sekretarijat za mineralne sirovine, Novi Sad, decembar 2010,

7. Gommes, R. (1993): "*Current climate and population constraints on world agriculture*". In: Agricultural Dimensions of Global Climate Change. H.M. Kaiser and T.E. Drennen (eds.), St. Lucie Press, Delray Beach, Florida, str. 67 – 86

8. Marko. J.. Jovanović. M.. Tica. N.. *Kalkulacije u poljoprivredi*. Poljoprivredni fakultet. Novi Sad 1998.,

9. Milić, D. Tica, N., Zekić, V., Bačkalić, Z., Ranogajec, J. *Utvrđivanje vrednosti nepoljoprivrednih zemljišta*, Agroekonomika br.44-45, Poljoprivredni fakultet Novi Sad, 2012

10. Latruffe. L.. Doucha. T.. *Capitalisation of the government support in agricultural land prices in the Czech Republic*: Ch. Le Mouël1. T. Medonos. V. Voltr. Agric. Econ. – Czech. 54. 2008., 451–460.

11. White Paper: *an Energy Policy for the European Union*, COM (95) 682, Final, January 1996.

# ECO MATERIALS AND SYSTEMS OF CONSTRUCTION THE FUNCTION OF ENVIRONMENTAL PROTECTION OF SUSTAINABLE DEVELOPMENT

*Ozrislava Milinković, Snežana Trmčić*[1]

## Abstract

*To evaluate the impact of industrial objects on the environment it is necessary to consider all phases of construction, including the use of natural raw materials for the manufacture of construction products, construction method, the use of object and eventually demolition and recycling. The construction is considered as an activity that consumes the greatest amount of natural resources, such as water, wood and a variety of raw materials for the production of construction materials. The construction causes high energy consumption in the process of production of construction materials, in the phase of construction multipurpose industrial objects as well as on the exploitation of the object (heating, cooling, and lighting). With recycling and reuse of construction material need for natural resources can be significantly reduced. Besides construction food industry is considered to be one of the biggest air pollutants. Applying multi-criteria decision-making methods enable us to objectively evaluate impact of the construction object on the environment as well as his ability to meet assigned criteria. The article is devoted to analyzing materials of most commonly built modern multipurpose objects and systems of construction in construction, food industry etc. in order to determine which one is meeting environmental criteria to the fullest extent.*

**Key words:** *eco materials, systems of construction, industrial objects, sustainable development, environmental protection*

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## Introduction

In this paper subject of the analysis are industrial objects, systems of constructions. The challenge that government at all levels are facing is not only the construction of facilities, but also integration into European environmental standards that are recommending reduced consumption of resources and energy in all phases of construction, reduced emissions of $CO_2$, durability and so on. In most cases these halls are public facilities owned by the local governments It is therefore essential that persons who are in a position to make decisions on behalf of the wider population make decisions as a result of elaborate analysis and use of multi criteria decision making methods in order to choose the optimal solution that will meet European environmental standards to the fullest extent and preserve ecological balance.

Thus, the vision of sustainable development has to be followed. It implies meeting the needs of present generations without compromising the ability of future generations to meet their own needs. Sustainable development makes compromise between current and long-term objectives, local and global action on environmental issues as inseparable components of human progress. In this paper subject of the research are eco materials and their recommendation for the construction of industrial objects applied on the different construction systems observed from the aspect of ecological criteria with a purpose of environmental protection.

## Methodology

Use of relevant literature, factual information and application of "Promethee" and „Gaia“ multi-criteria decision making method. Paper presents an objective selection of different materials and construction systems in the practical example of choosing best among several commonly built industrial halls in terms of environmental criteria, with respect to environmental standards, and sustainable development.

## Results of research and discusion

In order to select object that best meets the environmental criteria, analysis was conducted on the five most commonly built industrial hall made with different materials and systems of construction: “balloon hall“ with wooden structure, steel hall made with „sandwich panels“, hall made of clay blocks with steel roof, prefabricated hall made from reinforced concrete „sandwich“ elements (AB hall) and prefabricated hall made from ferrrocement „sandwich“ elements

(FC hall). As the most important criteria from the ecological and environmental perspective following have been taken in to the account: the degree of environmental degradation during exploitation of raw material from the nature, the extent of environmental pollution during the production and processing of construction materials, harmful substances and radiation from the material, the durability of construction materials and possibility of recycling, energy needed for production of building material and energy consumption during exploitation of facility.

### "Ballon hall" with wooden structure

The supporting structure is arched and large in span usually made from laminated wood because it's impossible to find natural timber of such dimensions and shape. Laminated wood is easily produced in static modal size and dimensions. PVC materials (poly vinyl chloride) are the cheapest and most commonly used materials for covering the balloon hall. There are three types of materials used for covering object with wooden laminated structure: polyester coated with PVC, silicone coated fiberglass and teflon materials covered with fiberglass.

Properties that make this fabric attractive for use in construction are their low mass and transparency. The downside of these types of facilities is that they react quickly to the temperature changes in the external environment which significantly affects end user comfort and more power is needed for their cooling or heating. They also have very short lifespan.

### Steel hall made with "sandwich" panels

Each steel hall consists of primary and secondary structures. The primary structure consists of the supporting frame and the stabilizing elements which have a role to ensure the stability of buildings and to transmit the load to the reinforced concrete foundation. The secondary structure consists of roof and facade substructure. The steel structure is filled with water proofed steel panels which consists of two shallow profiled galvanized (275 g/m2) and painted steel sheets (0.5 mm - 0.7 mm thick) with broad, non-flammable insulating core of laminated mineral wool (50-240mm thick, specific gravity of 120kg/m3). All three layers are connected in a compact sandwich element that provides the necessary capacity, tightness and compactness. The core made from non-combustible laminated wool provides thermal and acoustic insulation and high fire resistance of the sandwich elements (Trimo, 2010).

This type of hall is built using system of strip foundation and load-bearing walls made of clay blocs with steel roof. Clay blocks are standard type of clay blocks with horizontal and vertical holes that allow the safe and economical production of the supporting and separating walls. They represent environmentally friendly product with high durability and quality. The walls made of hollow clay blocks provide good vapor permeability, sound and thermal insulation. Clay block can be insulated with polystyrene or mineral wool. For the purposes of this study we will presume that the clay blocks are insulated with 10 cm thick mineral wool.

Halls built from reinforced concrete prefabricated sandwich elements consist of two concrete layers which are mutually separated by a layer of insulation. These elements can be used as bearing walls, beams or internal walls .Interest for these types of sandwich panels is on the rise for the past two years because they represent cost-effective, attractive and energy-efficient walls that can be used for the halls as well as for the residential buildings (Keenehan, Concannon, Hajializadeh, 2012). Energy efficiency of these elements depends on the connectors used to connect elements as well as the insulation. Although there are several kinds and types of insulation on the market, concrete sandwich panels use hard insulation because their properties are the most compatible with concrete in terms of moisture absorption, stability, size and flexibility (Seeber, 1997). Ferrocement is a type of fine-grained thin-reinforced concrete reinforced with wire lath and single layer of wire mesh. There are five methods used to produce ferrocement structures from which the simplest and most efficient in practice has proved to be "MC" building system that will be described in more detail below. Halls built using "MC" system of construction are prefabricated. It consist of ferrocement, prefabricated, thermo insulated, "sandwich " type elements. These elements have a thickness of 19 cm in cross-section. The base is made of ferrocement while the thermal insulation layer is made from simprolit (Styrofoam balls dipped in cement milk). Thermo insulated layer is 15 cm thick and also serves as a protection against fire.

Elements made in such a way are transported to the construction site, assembled over auxiliary steel structures and directly connected with polygonal reinforced concrete arch which is formed on the spot. Halls constructed in such a way are completely resistant to fire, earthquakes**,** and all the storms, including hurricanes (MC system, 2014).

**Fig. 1.** Prefabricated hall made from ferrocement sandwich elements

## Criteria used for analyzing construction materials from environmental perspective

Criteria used to analyze construction objects from environmental perspective are : The degree of environmental degradation in the process of extracting raw materials from the nature.The degree of environmental pollution during production and processing of construction materials.Harmful substances and radiation from materials.Durability and possibility of recycling construction materials.Energy needed for production of construction materials.Energy needed for exploitation of object.

## The degree of environmental degradatio in the process of extracting raw materials from the nature

Pedosphere is the outer layer of the earth which consists of the land. Land is a source of energy, minerals, place where food is produced and where most of the living organisms including human beings are living. The amount of land available to man is limited and represents a non-renewable resource. Growth of population leads to deforestation, reduction of land covered with plants and increase of land used for construction of roads buildings and other infrastructural objects. All of it inevitably leads to chemical and physical pollution of pedosphere which as a consequence has pollution of underground waters, rivers, lakes, plants air pollution and climate changes. Constant pollution of air, land and underground waters has a long lasting impact on the environment endangering human health and disturbing ecological balance (Poljoprivredni institut Republike Srpske, 2009).

### 3.2 The degree of environmental pollution during production and processing of construction materials

During the production and processing of construction materials, the environment is polluted in different ways and one of the most alarming is through the emission of greenhouse gases especially carbon dioxide ($CO_2$). According to Loncaric B. (2012) polluted air is one that has received the gas, steam, smoke, dust and other materials from a variety of sources in amounts which may harm the health of people, environment and material assets. Clean air is composed of: nitrogen ($N_2$) 78.09%, oxygen ($O_2$) 20.94% ,carbon dioxide ($CO_2$) 0.03% and the remaining 0.94% consists of other dry inert gases such as helium, argon, krypton, xenon, and so on (Trmčić Snežana,2008.,2012.). The biggest air polluter is industry among them construction industry, metal and nonmetal and chemical industry take significantly high place. Consequences of air pollution are: acidic rain and degradation of land, "greenhouse gasses" effect and variety of health problems in humans.

### 3.3 Harmful substances and radiation from materials

Harmful substances and radiation from the material during the production, exploitation and destruction of construction products adversely affect the health of people and the entire planet. State agencies continue to study many chemical additives used to build and improve the performance of construction materials. Many are rated as extremely toxic, even carcinogenic. In Serbia, the prohibition or restriction the use of certain building materials and chemicals is done according to the rules of Serbian Chemical Agency. Among three most dangerous chemicals used in Serbia are: radon, polyvinyl chloride and formaldehyde. PVC stands for polyvinyl chloride or thermoplastic polymer. Over 50% of this material is used in the construction industry as a hard plastic to make window profiles or plates and as a soft plastics roof and wall insulation materials and so on. PVC increasingly replaces traditional building materials mainly due to much lower prices. PVC material is a very harmful to people's health because of the high proportion of chlorine which is used for its production. During production, use and disposal of material highly toxic and carcinogenic gas dioxin is released. Exposure to vapors of dioxin causes serious health consequences (National Library of Medicine, 2013). Formaldehyde is a colorless strong smelling chemical used in the construction industry in some insulation materials and construction adhesives. All materials that contain formaldehyde are releasing gas or emitting toxic fumes that causes serious respiratory problems and on the long run causes cancer.

All laminated wood are containing formaldehyde (American Cancer Society, 2103). Radon is an inert radioactive gas, which can be found on the surface of the entire planet Earth, comes from the decaying of radium, and it's also generated by uranium contained in the earth's crust. Radon can be segregated from deeper layers of soil and underground water but it can also be extracted from building materials that contains slag ash or red brick (United States Environmental Protection Agency, 2014).

### Durability and possibility of recycling construction materials

Each material has its own life expectancy, or the period during which it will keep its properties in the same or approximate form observing from the time it's started being used. After the loss of their properties as some materials can be used in its primary purpose some can be recycled and reused or used as raw material in further processing and some has to be disposed on the landfill. The durability of the material largely defines the lifetime of the facility and affects the energy balance of the building for a specific reference period.

### Energy needed for production of construction materials

Construction materials are generally produced by processing natural raw materials. In order to produce a certain construction material, it is necessary to spend a certain amount of energy to be able to transform the natural raw material in to usable building materials. Except for emission of harmful gasses production process often requires a great amount of energy spent. With recycling, and getting materials from recyclables the amount of energy used can be reduced. In the further chapters the amount of energy needed for most commonly used building materials will be calculated.

### Energy needed for exploitation of facilities

Most of the energy needs for heating of object due to the large surfaces and ranges that are preventing implementation of adequate insulation are by far exceeding all others. Energy consumption has a large impact on the ecology, because of the emission of harmful substances needed for the production of energy itself. This criterion should be given considerable attention since its cumulative effect over the years has a significant impact on the balance.

## Multiple Criteria Decision making method – "Promethee"

The problem of selecting the best among several types of halls according to the environmental criteria falls into bad structured problems. The problem will be analyzed using the "Visual Promethee" method. Characteristics of the "Promethee" methods are:In the first step of problem solving, criteria that are characterizing the problem, and are relevant to decision maker, should be well-defined.Alternative solutions to problem should be developed. They represent alternative versions of characteristics of buildings that need to be compared and ranked. To each criteria weight ratio is added that reflects his importance from the perspective of decision-maker ( Nikolic, Borovic, 2009).According to the criteria defined for each action appropriate values in absolute terms are entered. They can also be in unparalleled units.Elaborating the results for multi criteria analysis with verbal and graphic interpretation of the obtained ranges using "Gaia" method. When evaluating investment projects, criteria for evaluation are usually classified into four groups: economic, technical and technological, socio-political and environmental criteria. In this analysis, the focus is on the environmental criteria. For numeric processing of the problem using "Promethee" and "Gaia" methods multi criteria decision making, software "Decision Lab 2000" has been used. This is a commercial name for a software product distributed by "Visual Decision" from Canada (Promethee Gaia-net, 2014).

## Analyzing the problem of selecting best among several types of hall using "Promethee" method from environmental perspective

In solving the problem of selecting the best type of halls according to the environmental perspective: the degree of environmental degradation in the process of extracting raw materials from the nature should be as small as possible, emission of harmful substances and radiation from the material as small as possible, durability of building materials and the possibility of recycling as high as possible, energy used for production of building materials as small as possible, energy consumption needed for the exploitation of the object as small as possible.

For the reasons of the different distances of pillars for different objects (4-8m), all analyzes have been based on the halls that are 48m long. This way, we will again compare objects of the same size and volume. All analyzes are comparable and there is no reference value.

**Values used to used to analyze the degree of environmental degradation in the process of extracting raw materials from the nature**

Exploitation of raw materials from the nature results in long turn impact on the environment. This criterion refers to the creation of quarries, degradation of agricultural land, excavation sites and deforestation. The criterion is impossible to describe numerically therefore narrative criteria will be used.

**"Balloon" hall with wooden structure:** Basic raw materials which are taken from nature are natural salt, oil and wood. Exploitation of natural salt has no lasting harmful effects on the nature while exploitation of oil leads to the formation of greenhouse gases over the crude oil which is extracted from the soil. These gases are then dissipated into the air and they are increasing the level of carbon dioxide which has a lasting impact on the environment (Grec & Maior, 2008). PVC materials which are used to cover balloon hall are obtained from the oil just like synthetic polymers. The composition of wood adhesives is slightly varying from one brand to another but they are all based on PVA (polyvinyl aldehyde) and they contain synthetic polymers which are enhancing their ability of bonding. Timber is obtained by deforestation and over the years leads to erosion and climate change. Taking into account the above factors to this criterion, we assign descriptive value "bad". **Steel hall with "sandwich panels:** The basic material for insulation of the sandwich panels is mineral wool. Mineral wool is produced from the mineral such as diabas, basalt, dolomite, and others. These minerals are available in strip mine. Steel sheets are made from iron which previously has been cleaned from impurities such as sulfur, phosphorus, and silicon. Excavation of minerals and iron from the earth's crust influence the environment before during and after excavation. Consequences vary (depending on the type of ore and the extent of excavation) from erosion sedimentation, pollution of the nature around the excavation site etc. Also it is important to note that the panels are coated with PVC protective layer that is derived from oil which has already been discussed in the previous paragraph. Taking into account the above factors to this criterion, we assign descriptive value "medium". **Hall made of clay blocks with steel roof:** The basic material from production of this type of hall is clay. Clay is the type of soil which in nature appears as a consequence of rocks decomposition and its extraction. Depending on the volume of excavation can cause erosion, damage to the natural habitat of animals, degradation of rivers, etc. It should be noted that the excavation and extraction of clay releases the radioactive gas radon, which is very harmful to human health .Insulation of these halls is made from mineral wool or polystyrene. Raw materials for mineral wool have already been described. Polystyrene is product of oil. Taking into the account above

factors, to this criterion, we assign descriptive value "bad". **Prefabricated AB hall**: The base material is cement which is obtained by grinding a material called clinker. Clinker is produced by extraction and processing limestone, clay, bauxite, quartz sand etc.. In the production of this type of hall next to the cement, materials such as steel and polystyrene have been used. Polystyrene is made from synthetic polymers -styrene, which is a by-product of oil. Polystyrene can be easily recycled with minimum energy consumption, as opposed to the mineral wool. Taking into account the above factors to this criterion, we assign descriptive value "medium". **Prefabricated FC hall**: Materials used for the production of this hall are: steel, cement and polystyrene. About the origin of these materials and their impact on the environment it has been discussed in the previous paragraphs. Taking into account the above factors to this criterion, we assign descriptive value "medium".

### Values used to analyze degree of environmental pollution during production and processing of construction materials

This criterion will be calculated based on the values given in table 2.

**Table 1.** *Production of carbon dioxide for standard and alternative construction materials*

| Type of material | CO2 emission (kg/t) |
|---|---|
| Limestone | 12 |
| Portland Cement | 850 |
| Unreinforced concrete MB15-20 | 170 |
| Reinforced concrete MB 30 | 370 |
| Soft wood processed | 132 |
| Glue laminated wood(PVA adhesive 120 kg/m3) | 570 |
| Portland cement (64-73% slag) | 279 |
| Clay | 850 |
| Tile | 430 |
| Steel bars and plates | 1720 |
| Polypropylene injection | 3900 |
| Mineral wool | 500 |
| Polystyrene | 2700 |
| PVC | 2410 |

**Source:** *Office Statistical of the Republic of Serbia*

**Table 2.** *Total emission of CO2 needed for production of t halls*

| Type of construction hall | Total emission of CO2(t) needed for production of materials |
|---|---|
| "Balloon" hall with wooden structure | 34,93 |
| Steel hall with "sandwich" panels | 88,45 |
| Hall made of clay blocks with steel roof | 95,47 |
| Prefabricated AB hall | 116,88 |
| Prefabricated FC hall | 87,28 |

**Source:** *Office Statistical of the Republic of Serbia*

**Values used to analyze harmful substances and radiation from materials**

**"Balloon" hall with wooden structure:** Cooling, heating and deterioration of PVC materials used to cover balloon hall leads to the release of toxic gas - dioxin which cause cancer and respiratory problems. Laminated wood used in balloon halls and cover in industrial adhesive contains formaldehyde which evaporates and causes the cancer and respiratory problems. According to the criterion harmful substances and radiation from the material, this hall is rated as "poor". **Steel hall with "sandwich" panels:** In addition to steel, which is not harmful to human health, this type of hall consists of sandwich panels insulated with mineral wool which doesn't come in contact with the end user therefore in this case it be considered safe for human health. Sandwich panels are coated with PVC film to ensure water resistance. PVC in lesser extent emits toxic fumes discussed in the previous paragraph. According to the criterion of harmful substances and radiation from material, this hall is rated as "medium". **Hall made of clay blocks with steel roof**: Hall is made from materials that are not hazardous to human health but red clay can release toxic gas radon which causes various respiratory problems. According to the criterion of harmful substances and radiation from material, this hall is rated as "medium". **Prefabricated AB hall:** Next to the cement and mineral wool insulation that doesn't come in contact with the end user all the other materials in this type of hall are not harmful to human health. According to the criterion of harmful substances and radiation from material, this hall is rated as "good". **Prefabricated FC hall:** Next to the cement and polystyrene that doesn't come in contact with end user all the other materials are not hazardous to human health. According to the criterion of harmful substances and radiation from material, this hall was assessed as "good".

**Values used to analyze durability and possibility of recycling**

This criterion will also be described according to durability and possibilities of recycling the materials (re-use in the same or other processes). **"Balloon" hall with wooden structure**: PVC textile foils are mainly used until the end of their life cycle, which amounts to 20 years; therefore in their original form they cannot be re-used. In Serbia center for recycling PVC materials doesn't exist, instead they are disposed to landfill. Life cycle of laminated wood is 30 -50 years if maintained properly, therefore the life cycle of entire hall is measured by it. Laminated wood can be recycled and used for the production of medium density fiberboards (MDF). According to the durability and possibility of recycling "balloon" hall is ranked "bad". **Steel hall with "sandwich" panels:** When it's not in direct contact with aggressive atmospheric conditions, and when it's located in closed space with adequate protection against corrosion steel has a long lifespan, sometimes for more than 100 years. Steel is easily recycled and when it's recycled saves up to 70% compared to the production of primary raw materials. Sandwich panels are not suitable for recycling mostly because they are made of thin metal sheets reinforced with thick layer of mineral wool. Thin metal sheets are recyclable but it's very difficult to separate them from mineral wool insulation layer or anticorrosion coating. Mineral wool is not recyclable. The lifespan of sandwich panels is according to the manufacturer's declaration. If manufacturer is high quality life spam is usually about 30 years. The lifespan of mineral wool is according to the manufacturer's declaration usually around 20-40 years. Due to the large percentage of steel in the total weight of object rating of durability and recycling possibility is "medium". **Hall made of clay blocks with steel roof:** It also contains a high percentage of steel in the roof structure as well as in the reinforcement of concrete. Reinforced concrete which has been protected from the penetration of sulfates and therefore internal corrosion has a very long lifespan. Facade and mineral wool cannot be recycled. Durability of plastered façade, depending on the quality can be to 50 years. Reinforced concrete and hollow clay blocks can be used after a simple process of grinding (milling) as a basis for local roads or foundations to other construction objects. Durability and recycling possibility is rated "good". **Prefabricated AB hall**: As the name says, the basic material used is reinforced concrete. Durability of these construction halls is very large, more than 100 years. All the reinforcement is possible to recycle as well as concrete. An insulating layer which is made from polystyrene cannot be used in their original form, but it is also entirely recycled and used as a raw material in the production of polypropylene and polystyrene containers. Almost all materials that are incorporated into AB prefabricated hall are recyclable. Therefore the hall is rated "very good"

according to the criterion of durability and possibility of recycling. **Prefabricated FC hall:** The entire hall is based on reinforced concrete and insulation made from polystyrene. Plastered façade does not exist so the durability of the object is as long as durability of reinforced concrete which is more that 100 years. All the materials used in this hall are recyclable, but due to the unique method of concrete reinforcement process of recycling has to be done in several phases. Due to the more complicated process of recycling this hall is rated as "good".

### Values used to analyze energy needed for production of construction materials

This criterion will be calculated based on values given in table 3.

**Table 3.** *Energy needed for production of construction materials*

| Type of material | Energy needed for production Kwh/t | Kwh/m3 |
|---|---|---|
| Limestone | 1200 | 1600 |
| Cement | 1400 | 1900 |
| Aluminum | 15300 | 40650 |
| Wood | 190 | 100 |
| Laminated wood (PVA adhesive 120kg/m3) | 2300 | 1560 |
| Steel | 2200 | 35500 |
| Steel profiles | 4100 | 82000 |
| Copper | 8000 | 71000 |
| Sand | 9 | 15 |
| Glass | 5700 | 1500 |
| Clay blocks | 832 | 574 |
| Ceramics | 6200 | 14900 |
| Adobe | 1200 | 2200 |
| Mineral wool | 6000 | 720 |
| Polystyrene | 24600 | 490 |
| Plastic | 11000 | 11000 |
| PVC material | 21440 | 6400 |

**Source:** *Office Statistical of the Republic of Serbia*

**Table 4.** *Total energy needed for production of halls*

| Type of construction hall | Total energy needed for production of materials |
|---|---|
| "Balloon" hall with wooden structure | 215,13 |
| Steel hall with "sandwich" panels | 286,85 |
| Hall made of clay blocks with steel roof | 371,85 |
| Prefabricated AB hall | 360,30 |
| Prefabricated FC hall | 277,63 |

**Source:** *Office Statistical of the Republic of Serbia*

### Values used to analyze energy needed for exploitation of halls

Since we assume that the analyzed objects will be heated with the same or similar power source that has the same degree of efficiency, the CO2 emissions ratio for the energy used for heating, is the same as the ratio of heat loss which are creating that need.

### Numerical interpretation of the problem ranking of the action

Analyzing the problem of selecting the best among several types of the hall from the environmental perspective, for three criteria numerical values have been defined with appropriate physical unit. As CO2 emitted during the production of material from which hall have been made has an immediate effect on the environment this criterion will be allocated weight ratio 2. Emission of CO2 has twice bigger impact on the environment then other criteria; therefore all the other criteria will be allocated weight ratio 1.

Criteria which cannot be measured with numerical values were measured on the descriptive scale from 1 to 5. For each criterion desirable value has been defined, or in other words if decision-maker prefers higher or lower value for the analyzed criterion. All criteria which appear has direct environmental impacts, were analyzed linearly.

**Fig. 2.** "Promethee" software basic window

| | Environmental | Extracting ra... | CO2 emissio... | Harmful subs... | Durability an... | Energy need... | Exploitation ... |
|---|---|---|---|---|---|---|---|
| | Unit | impact | t | 5-point | 5-point | kwh | kwh |
| | Cluster/Group | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ |
| | **Preferences** | | | | | | |
| | Min/Max | max | min | max | max | min | min |
| | Weight | 1,00 | 2,00 | 1,00 | 1,00 | 1,00 | 1,00 |
| | Preference Fn. | Linear | Usual | V-shape | Usual | Linear | Usual |
| | Thresholds | absolute | absolute | absolute | absolute | absolute | absolute |
| | - Q: Indifference | 1 | n/a | n/a | n/a | 1,0 | n/a |
| | - P: Preference | 2 | n/a | 2 | n/a | 2,0 | n/a |
| | - S: Gaussian | n/a | n/a | n/a | n/a | n/a | n/a |
| | **Statistics** | | | | | | |
| | Minimum | 2 | 34,9 | 2 | 2 | 215,1 | 6,02 |
| | Maximum | 3 | 116,9 | 4 | 5 | 371,9 | 33,24 |
| | Average | 3 | 84,6 | 3 | 4 | 302,4 | 13,11 |
| | Standard Dev. | 0 | 27,0 | 1 | 1 | 57,7 | 10,13 |
| | **Evaluations** | | | | | | |
| ☑ | Balloon hall | low | 34,9 | bad | bad | 215,1 | 33,24 |
| ☑ | Steel hall | moderate | 88,5 | average | average | 286,9 | 9,45 |
| ☑ | Hall made of clay... | low | 95,5 | average | good | 371,9 | 8,86 |
| ☑ | AB prefabricated... | moderate | 116,9 | good | very good | 360,3 | 7,97 |
| ☑ | FC prefabricated... | moderate | 87,3 | good | good | 277,6 | 6,02 |

**Fig. 3.** "Promethee"software rankings

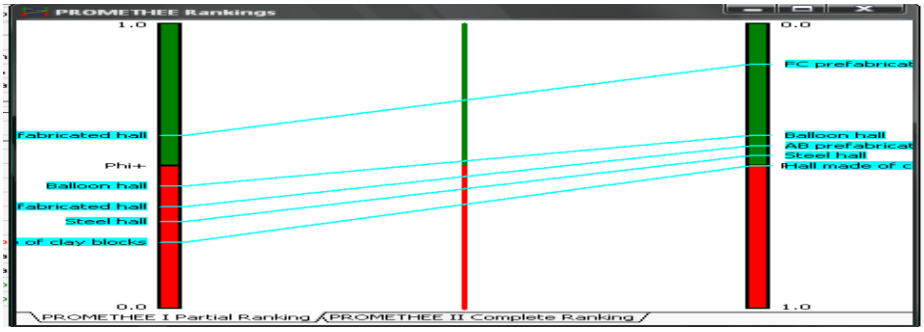



**Fig. 4.** "Promethee" software rankings

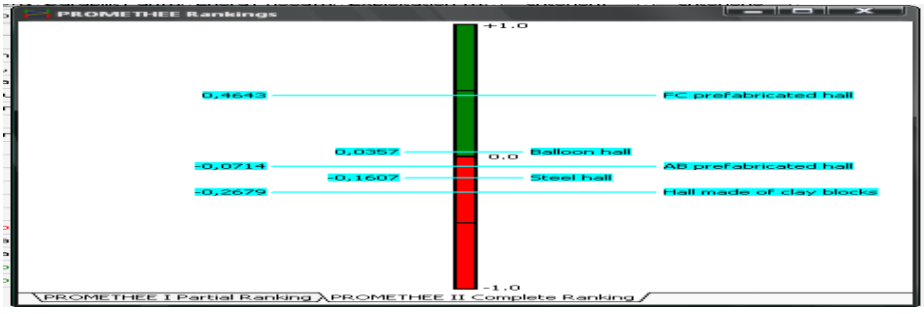


**Fig. 5.** "Promethee" software Diamant

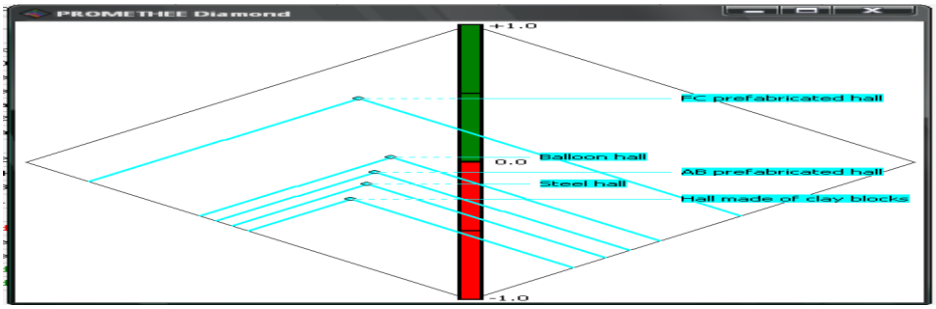
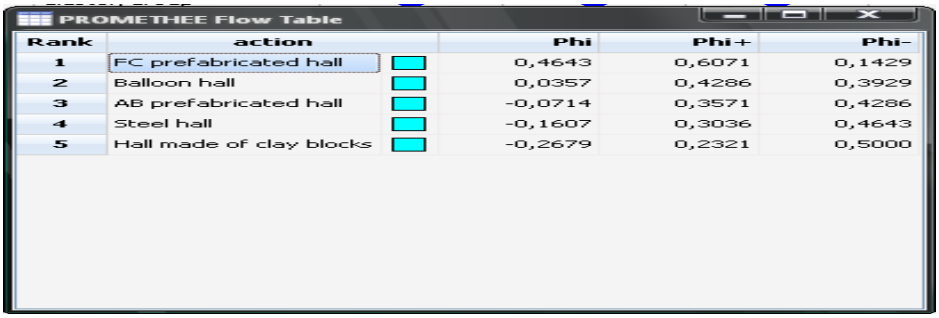
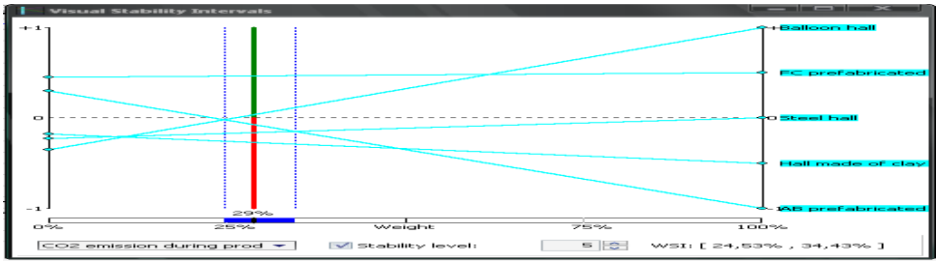



**Fig. 6.** "Promethee" software Table




| Rank | action | Phi | Phi+ | Phi- |
|---|---|---|---|---|
| 1 | FC prefabricated hall | 0,4643 | 0,6071 | 0,1429 |
| 2 | Balloon hall | 0,0357 | 0,4286 | 0,3929 |
| 3 | AB prefabricated hall | -0,0714 | 0,3571 | 0,4286 |
| 4 | Steel hall | -0,1607 | 0,3036 | 0,4643 |
| 5 | Hall made of clay blocks | -0,2679 | 0,2321 | 0,5000 |

**Fig. 7.** "Promethee" software – Stability interwals




From the above graphic descriptions and analysis of the problem we can see that all the solutions are comparable and the subsidiary. Area occupied by the highest-ranked hall covers the surface of all the others. We can see that the solutions are comparable and the subsidiary. Based on the given criteria best ranked is FC halls while the second ranked is balloon hall. Best ranked solution is stable and linear in the requested domain.

## Conclusions

Using the "Visual Promethee" method following halls have been analyzed : "balloon" hall with wooden frame, steel hall with sandwich panels, hall made of clay blocks with steel roof, prefabricated hall of reinforced concrete elements and prefabricated hall of ferrocement sandwich elements. The analysis is carried out according to the environmental criteria. Data used in the analysis are realistic and calculated on the materials used in real life. According to the environmental perspective the best hall to build is prefabricated hall made of ferrocement sandwich elements. Applying the multi- criteria decision making model made it possible to evaluate different materials, systems of constructions on the practical example of choosing best among several commonly built halls from the environmental perspective following vision of sustainable development and environmental protection. The analysis was preformed out according to the ecological criteria. Data used in analysis are realistic and calculations are based on the actual prperties of the materials used in practice. According to the ecological criteria the best building method is prefabricated ferrocement hall, which can be recommended. These modern objects have been observed from the aspect of eco materials as well as from the aspect of construction systems while honoring given ecological criteria and can be recommended as multipurpose industrial objects.

## References


1. Grec, A., & Maior, C. (2008, December). Earth oil extraction – major environmental pollution source. *Environmental Engineering and Management Journal*, *7*(6). Preuzeto sa http://omicron.ch.tuiasi.ro/EEMJ/pdfs/vol7/no6/24_Aurica%20Grec.pdf

2. Jasna Gvozdenović,VeraLazić,Snežana Trmčić(2010):"Korozija metalne ambalaže"i zaštita životne sredine.International conference XII Yucor Tara,194., ISBN 978-86-82343-13-4

3. Keenehan, J., Concannon, K., & Hajializadeh, D. (2012). Numerical Assessment of The Thermal Performance of. *University College Dublin*

4. Lončarić, B. (2012). *Zagađenje vazduha*. Preuzeto sa http://www.meteoplaneta.rs/wp-content/uploads/2012/04/zagađenja-vazduha-kao-posledice-vanrednih-događanja.pdf

5. National Library of Medicine. (2013). *Polyvinyl Chloride (PVC)*. Preuzeto sa http://toxtown.nlm.nih.gov/text_version/chemicals.php?id=84

6. United States Environmental Protection Agency. (2014). *A Citizen's Guide to Radon*. Retrieved from http://www.epa.gov/radon/pubs/citguide.html

7. Nikolic, I., & Borović, S. (2009). *Višekriterijumska optimizacija* . Beograd

8. Promethee Gaia – Net Retrieved from http://www.promethee-gaia.net/software.html

9. MC system. (2014). MC system of construction benefits. Retrieved from http://www.milinkovicco.com/index

10. Poljoprivredni institut Republike Srpske Zavod za agrohemiju i agroekologiju Banja Luka. (2009). *Osnova zaštite korišćenja i uređenja poljoprivrednog zemljišta Republike Srpske kao komponente procesa planiranja i korišćenja zemljišta*. Retrieved from http://www.vladars.net/sr-SP

11. Republika Srbija. (2013). *Republički zavod za statistiku*. Retrievedfrom http://www.stat.gov.rs

12. Seeber, K. (, 1997). State-of-the-Art of Precast/ Prestressed Sandwich Wall Panels. *PCI Committee Report*, *42*(2), 33.

13. Trimo Hrvatska. (2010). *Izolovani fasadni materijal-tehnički podaci*. Retrieved from http://www.trimo.hr/proizvodi/fasade-i-zidovi/izolirani-fasadni-sustavi-trimoterm/tehnicki-podaci/

14. Trmčić Snežana (2008): *Koncept standardaSRPS ISO 14001 i zahtevi sistema menadžmenta zaštitom životne sredine*. Tematski zbornik sa medjunarodnim učešćem Tara,str.299-304.,ISBN 978-86-82343-10-3.

15. Trmčić Snežana, M.Trmčić (2012): *Aplication of Sustainable development Concept*, International Scientific Meeting, Economics of Agriculture, pp.34-51, ISSN 0352-3462, UDK338.43:63.

# INFRASTRUCTURE AS A FACTOR OF RURAL DEVELOPMENT OF THE REGION OF FRUŠKA GORA

*Sanja Đukić, Ljubo Pejanović*[1]

## Abstract

*Rural infrastructure is an essential precondition and an important factor in rural development. Transport and telecommunications infrastructure, as part of the rural infrastructure, substantially reducing socioeconomic isolation of rural areas. The authors analyse the state of transport and telecommunications infrastructure in the region Fruška gora, and their impact as rural indicators Fruška gora. Also, the paper analyses the level of investments made in the sector of transport, storage and communication as a key factor for further improvement of these two types of rural infrastructure.*

**Key words:** *Fruška gora, infrastructure, rural development*

## Introduction

The development of infrastructure in rural areas is a key element in the success of the implementation of rural policy, and it is a good indicator of rural, and also of economic development of certain areas. In addition, lack of rural infrastructure has significant implications for the quality of life for rural residents.

In most rural areas of the Republic of Serbia there are difficulties in providing transport and telecommunications infrastructure. This paper analyses aspects of the availability of transport and telecommunications infrastructure in Fruška gora, as the indicators of rural development in the region.

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## Materials and methods

Sources of data are taken from the project of the "Master Plan of Sustainable Development of Fruška gora 2012-2022.", as well as documentation of his base, and the most important is: "Spatial plan of the special purpose of Fruška gora". In the paper was used an empirical method to identify transportation and telecommunications accessibility within the rural development of the region Fruška gora.

## Features of the region Fruška gora

Area of Fruška gora includes the municipalities: Sremski Karlovci, Petrovaradin and Beočin that are entirely in this area. Municipalities Irig, Inđija, Šid, Bačka Palanka and Ruma, as well as the city of Sremska Mitrovica partly included in the coverage of this area.

A significant part of the area of Fruška gora belongs to the "National Park Fruška gora". National Park "Fruška gora" is the first national park in the Serbia (established in 1960), and represents a natural asset of great importance for the country.

Moreover, Fruška gora is an important cultural heritage of national importance.

This specificity of Fruška gora caused the existence of three zones that are the basis for protective measures, such as[2]:

- Zone I - the zone protected areas covering an area of 27.489,60 ha (19,72%) and include: National Park "Fruška gora", part of a special nature reserve "Koviljsko-petrovaradinski rit", and strict nature reserves and natural monuments;
- Zone II - protective zone of the National Park "Fruška gora" that covers an area of 66.090,82 ha (47,04%);
- Zone III - zone of active protection, which covers 45.849,62 ha (32,88 %) and is located between the boundaries of the National Park protection zone (Zone II) and the borders of the area of Fruška gora.

[2]*Prostorni plan područja posebne namene Fruške gore do 2022. godine* (2004), „Službeni list AP Vojvodine", broj 18/04, Novi Sad.

In zone I is determined first level of protection, or there is implemented a strict protection of the natural and ecological processes, preserving habitats, communities and populations of plants and animals with a marginal benefit and the presence of man. In this sense, the development of infrastructure is strictly prohibited, such as: the construction of all buildings except those in the function of ecosystems, scientific research and so on.

In zone II is determined second level of protection, which covers most of the forest of the area of Fruška gora. In this part of Fruška gora are forbidden the construction of new public roads, and there are limitations for:

- Construction of infrastructure (except for the management of these areas);
- Asphalting of existing roads in their reconstruction;
- Lighting space (except for the traffic safety and etc.).

In zone III are located facilities and infrastructure, tourism zones and zones with cottages, where is forbidden the use of local forest roads for public transport, and there are limitations for:

- Construction of buildings and infrastructure (except for the sustainable use and management of natural resource), as well as
- Lighting the area (except for the safety of roads, etc.).

Because of these specifics infrastructure development in the region of Fruška gora should be should be observed in the framework of the limitations which are an integral part of the protection regime of this area. From the standpoint of protection of natural resources, transportation network is one of the factors threatening (deforestation, air pollution, and disturbance of wildlife).[3]

In the case of telecommunications infrastructure, existing telephone cables in the area of Fruška gora are not the major factor damaging of the environment.

[3] Nacionalni park „Fruška gora“, predlog za uspostavljanje zaštite prirodnih vrednosti, u postupku izrade zakona o Nacionalnom parku „Fruška gora“, dokumentaciona osnova, Novi Sad, 2011; http://www.pzzp.rs/uploadimage/132880030890391.pdf.

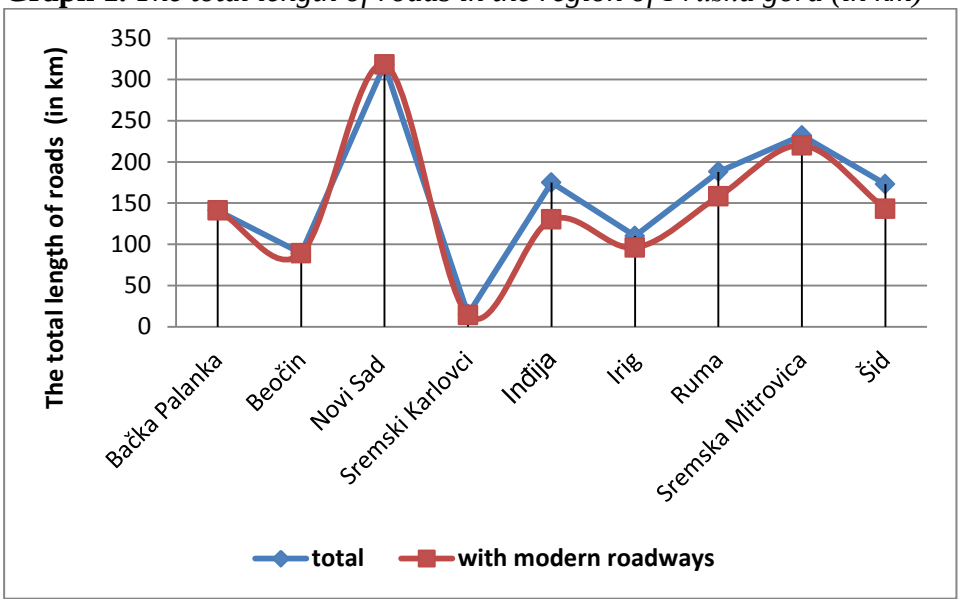
**The transport infrastructure in the region of Fruška gora**

From the perspective of ensuring of road transport, region Fruška gora has very favourable conditions. Two municipalities (Bačka Palanka and Beočin), as well as the city of Novi Sad, which are included in the area of Fruška gora, have a modern roadways in the total number of roads.

The other parts of area of Fruška gora have different share of modern roadways and is in the range of from 74% to 95% (Sremski Karlovci-93%, Inđija-74%; Irig-87%; Ruma-84%; Šid-83%, and Sremska Mitrovica-95%).[4]

In this area there are a significant number of local, as well as regional roads, and the most significant are: R-103/1, R-106, R-107, R-116, R-130 (graphs 1, 2 and 3).

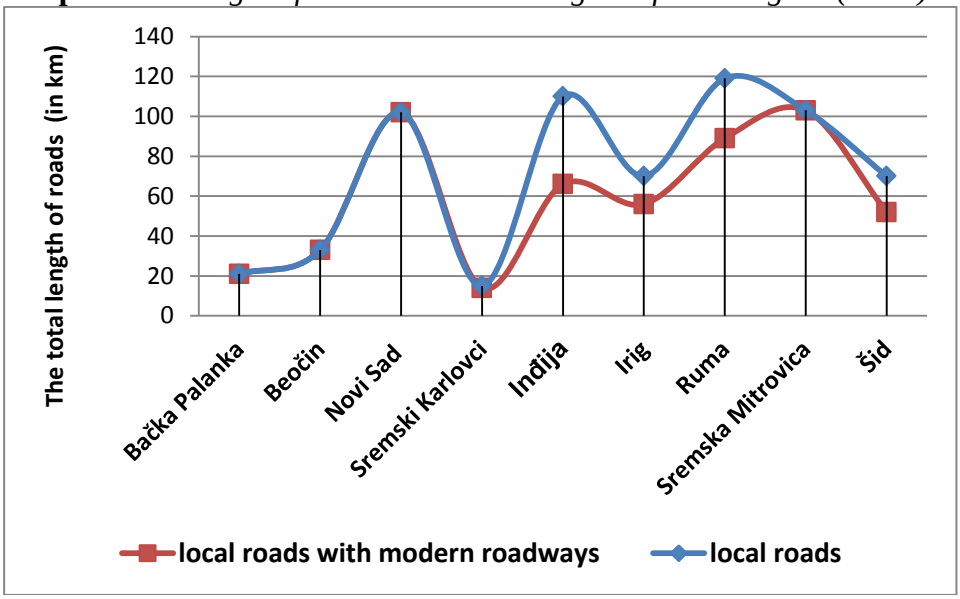
**Graph 1.** *The total length of roads in the region of Fruška gora (in km)*




**Source:** *http://webrzs.stat.gov.rs/*

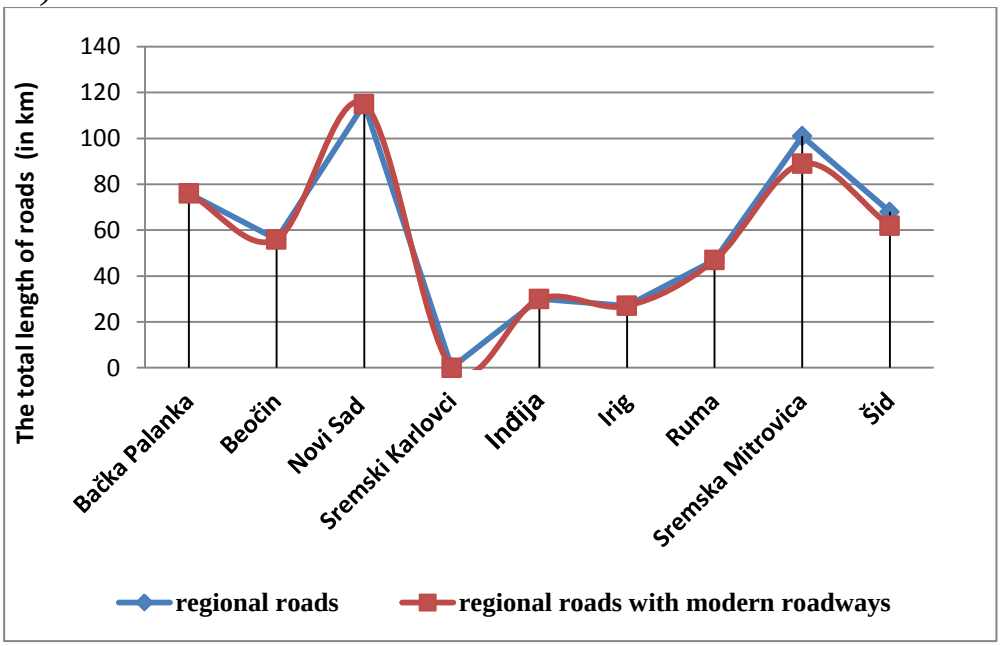
[4] Calculation of share of the in the total road network is based on the official data on the municipalities and cities of Fruška gora. In the absence of available data for the area of Fruška gora, it was given a wider spatial coverage of this indicator, which takes into account the individual parts of the municipalities and cities that are not associated parts of the this area.

**Graph 2.** *The length of local roads in the region of Fruška gora (in km)*




**Source:** *http://webrzs.stat.gov.rs/*

**Graph 3.** *The length of regional roads in the region of Fruška gora (in km)*




**Source:** *http://webrzs.stat.gov.rs/*

These roads are continuing to the network of main roads (graph 4):[5]

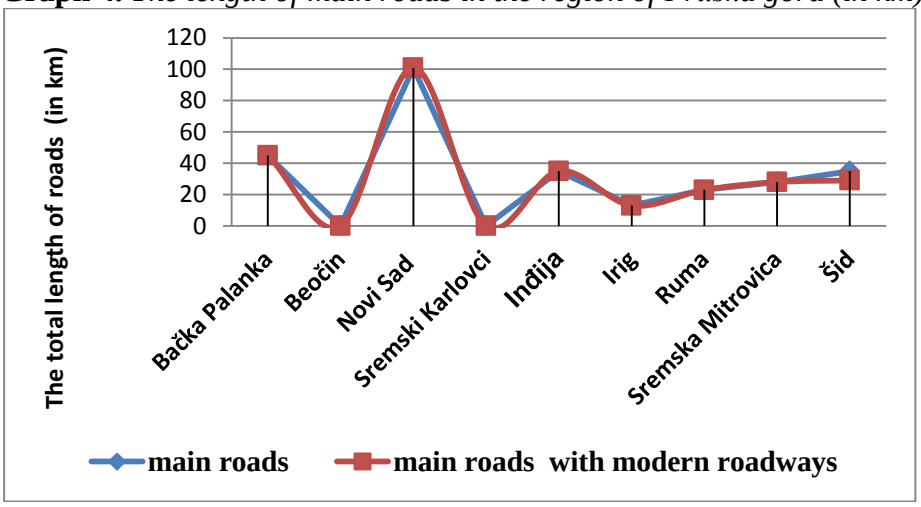
- M-21 (Novi Sad-Petrovaradin-Irig-Ruma),
- M-22/1 (Novi Sad-Inđija-Beograd),
- M-18 (Neštin-Vizić-Erdevik-Bijeljina),
- M-18/1 (Bačka Palanka-Šid-E-70).

Likewise, the area of Fruška gora has two major travel routes so-called E roads (European network of international roads), which consists of:

- E-75 (Budapest-Subotica-Beograd-Niš-Skoplje-Athens with a length of about 11 km), and
- E-70 (Zagreb-Beograd with a length of about 2,7 km).

Also, the direction of the main road E-75 is an integral part of the TEM roads (Trans-European Network of Motorways). Besides this, it is important the connection between this area and Corridor X and Xb, which represent the two major international routes. Besides road transport, in this region is present main waterway, the Danube River, linking our country with a network of waterways of Europe. In this sense, there are ports and harbours in Bačka Palanka, Novi Sad, Sremski Karlovci and Beočin.

**Graph 4.** *The length of main roads in the region of Fruška gora (in km)*




**Source:** *http://webrzs.stat.gov.rs/*

[5]Prostorni plan područja posebne namene Fruške gore do 2022. godine (2004), „Službeni list AP Vojvodine", broj 18/04, Novi Sad.

Railway traffic in the area of Fruška gora is provided by two international railway lines:

- Vienna – Budapest – Beograd – Athens, and
- Sofia – Beograd – Zagreb.

Linking this area in terms of air traffic is possible through the airport in Beograd.

In period from 2006-2012. in municipalities Beočin, Sremski Karlovci and Irig were not achieved investments in transport, storage and communications.

In Novi Sad was recorded the largest volume of investments in the observed period with a positive growth trend (graph 5).[6]

Unlike Novi Sad, in Bačka Palanka during this period (2006-2012) investment volume is significantly varied with strong negative trend of their (graph 6). The largest volume of investment in transport was achieved in two years: 2008. and 2011.

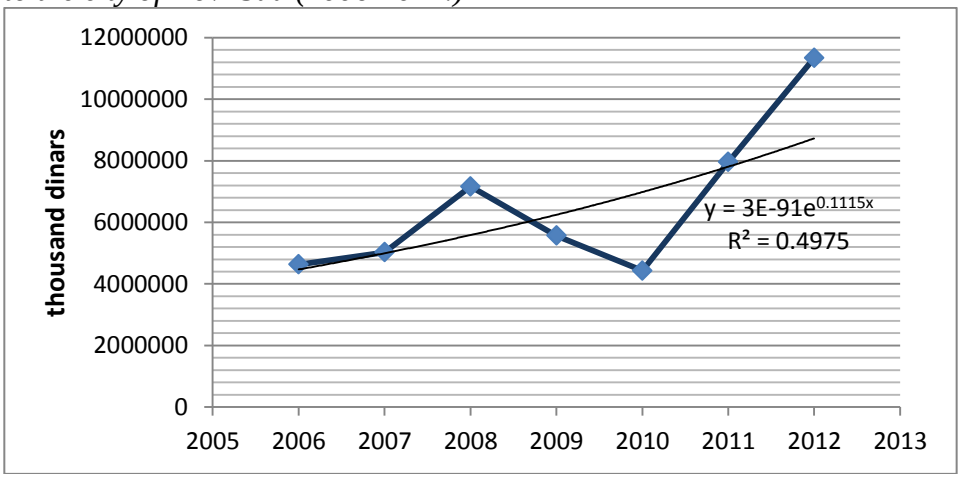
In the municipality of Inđija was realized investment volume for transport and is extremely varied in this period, with a positive trend-line, and the highest realized investments recorded in two years: 2009. and 2010. (graph 7).

In the same period in the municipality of Ruma were large variations in the volume of investments with a slightly pronounced positive trend line. The largest volume of investment has been made only in two years: 2007. and 2012. (graph 8).

[6]Calculation of share roads with modern parts in the total road network is based on the official data on the municipalities and cities of Fruška gora. In the absence of available data for the area of Fruška gora, it was given a wider spatial coverage of this indicator, which takes into account the individual parts of the municipalities and cities that are not associated parts of the area (eg. For Novi Sad, Bačka Palanka, Inđija, Ruma, Sremska Mitrovica, Šid).

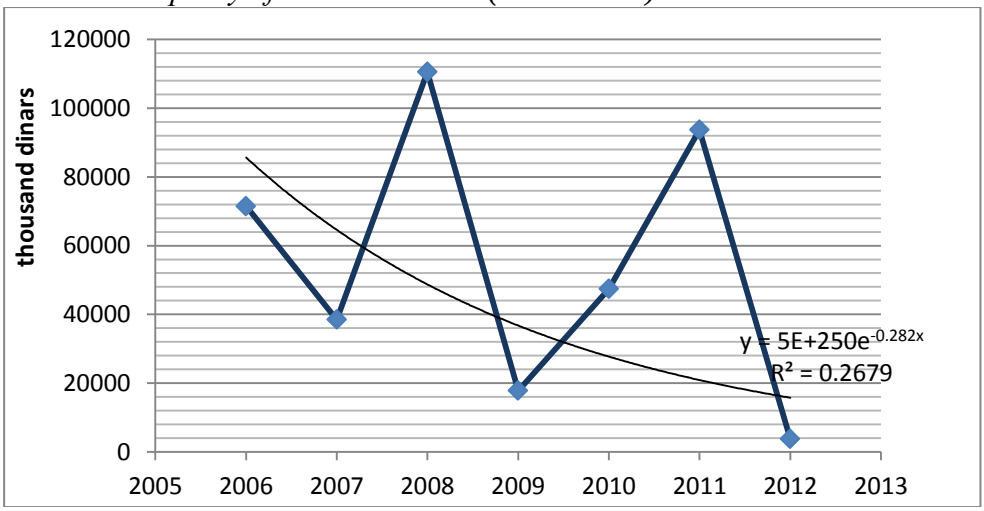
In Sremska Mitrovica, despite major investments in traffic generated in two years: 2006. and 2009, in observed period was registered negative trend in investment intended for transportation (graph 9).

**Graph 5.** *The volume of investment in transport, storage and connection to the city of Novi Sad (2006-2012.)*



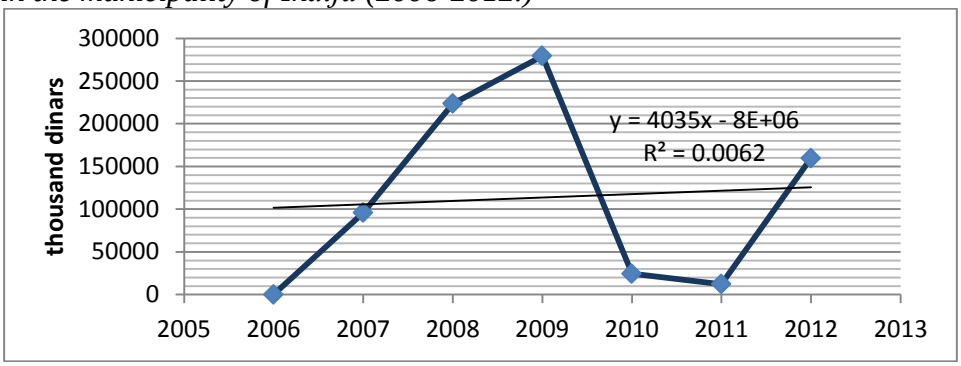

**Source:** *http://webrzs.stat.gov.rs/*

**Graph 6.** *The volume of investment in transport, storage and connection in the municipality of Bačka Palanka (2006-2012.)*



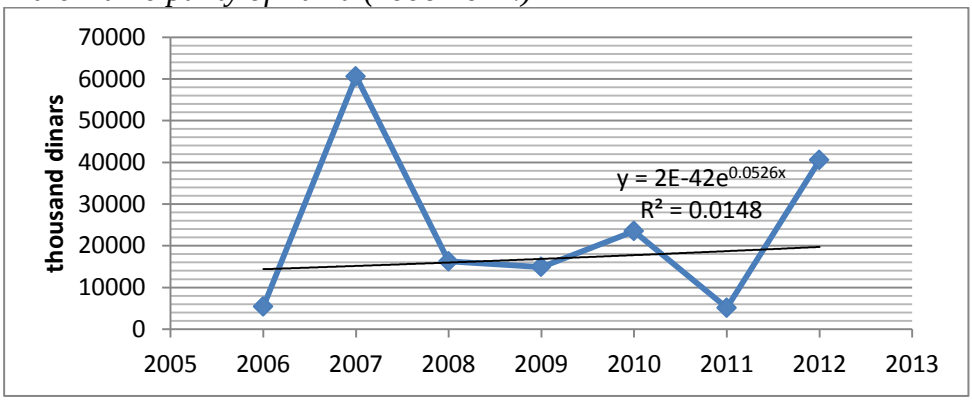

**Source:** *http://webrzs.stat.gov.rs/*

**Graph 7.** *The volume of investment in transport, storage and connection in the municipality of Inđija (2006-2012.)*



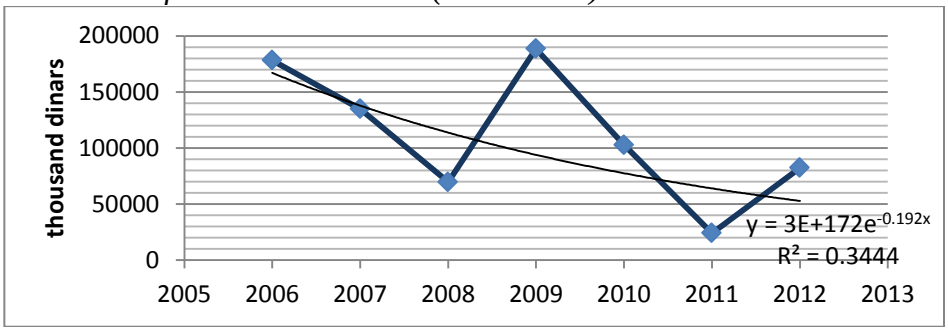

**Source:** *http://webrzs.stat.gov.rs/*

**Graph 8.** *The volume of investment in transport, storage and connection in the municipality of Ruma (2006-2012.)*




**Source:** *http://webrzs.stat.gov.rs/*

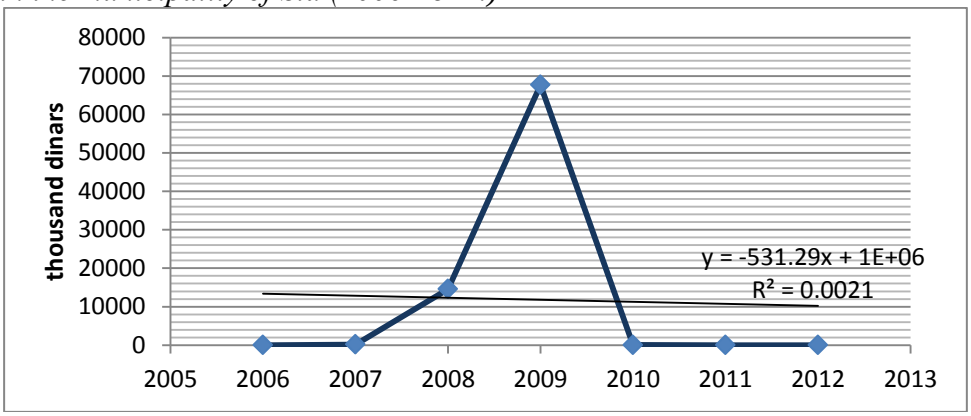
**Graph 9.** *The volume of investment in transport, storage and connection in the town of Sremska Mitrovica (2006-2012.)*




**Source:** *http://webrzs.stat.gov.rs/*

Also, in the municipality of Šid in the observed period was a decline in investments intended for transportation (except for 2009., when it was the largest volume of investments) (graph 10).

**Graph 10.** *The volume of investment in transport, storage and connection in the municipality of Šid (2006-2012.)*




**Source:** *http://webrzs.stat.gov.rs/*

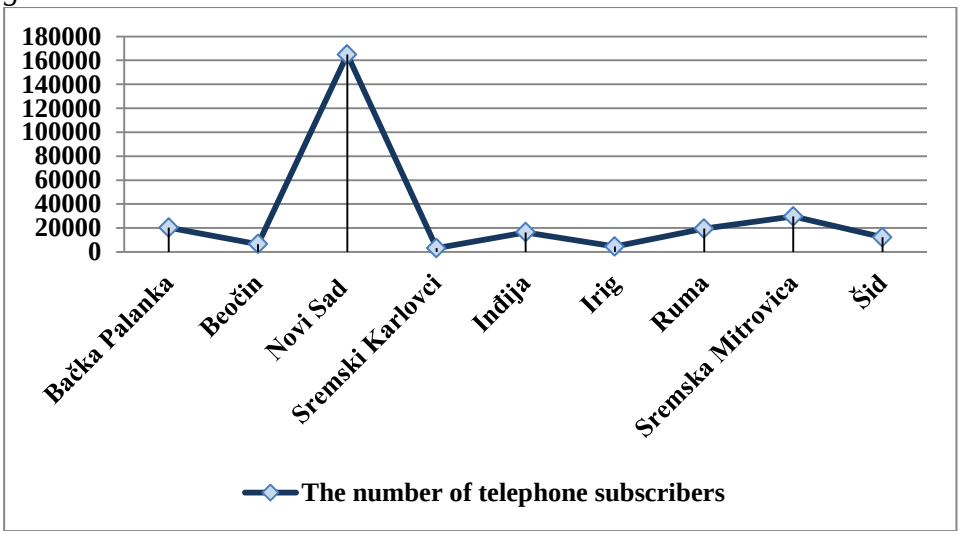
### Telecommunications infrastructure in the region of Fruška gora

Within the telecommunications infrastructure (fixed telephony) in Fruška gora there are: telecommunication facilities, telephone switchboards, connecting roads, primary and secondary network in the settlements. Telecommunications infrastructure is not satisfactory either in quality or capacity. Basically, there are is a problem unfinished automation and digitization of telecommunications equipments and systems, except in centres such as Novi Sad, Sremska Mitrovica and Šid. The connecting lines between telephone exchanges are less have been achieved through optical cables, which causes difficulty in performance of telecommunications traffic.

Also, other forms of telecommunications infrastructure in this area include the coverage of radio signals and TV signals. There are three transmitters which are set up on the territory of Fruška gora (Crveni Čot, Brankovac and Elektrovojvodina), and cover not only the area of Fruška Gora, but also the region of Vojvodina. The largest number of telephone

subscribers are the only two cities, Novi Sad (where Petrovaradin is part of area of Fruška gora) and Sremska Mitrovica (graph 11).[7]

**Graph 11.** *The number of telephone subscribers in the region Fruška gora*




**Source:** *http://webrzs.stat.gov.rs/*

## Transport and telecommunications infrastructure as a factor of rural development of Fruška gora

In most of rural areas in Serbia, agriculture is almost the only source of income generation. In this respect, it is evident link between rural poverty and inaccessibility of rural regions. Therefore, providing better transport in rural regions has positive effects on the socioeconomic status of the rural population.

Transport and telecommunications infrastructure are important indicators of rural development. In rural regionalization of AP Vojvodina (where Fruška gora is integral part), these indicators are grouped into the topic of indicators of living conditions and welfare.[8] In this context, the following

[7] In the absence of available data for the area of Fruška gora, it was given a wider spatial coverage of this indicator, which takes into account the individual parts of the municipalities and cities that are not associated parts of the this area.

[8] Njegovan Z., Pejanović, R., (2009). *Ruralna regionalizacija AP Vojvodine*, Poljoprivredni fakultet, Novi Sad, 2009.

indicators related to transportation and telecommunications infrastructure are:

- Length of roads per $km^2$, and
- The number of telephone subscribers per 1000 inhabitants.

Length of roads in km per $km^2$ is an indicator of the density of the road network and the greater mobility of the population. Rural areas generally have a less frequent road network or lower value of this indicator compared to urban areas. Municipalities and cities in the region Fruška gora have different values for this indicator:[9]

- Sremski Karlovci - 0,216;
- Bačka Palanka - 0,247;
- Šid - 0,269;
- Sremska Mitrovica - 0,332;
- Ruma - 0,352;
- Inđija - 0,462;
- Irig - 0,478;
- Beočin - 0,484;
- Novi Sad - 0,499.

Municipalities and cities within Fruška gora have a relatively good road network, and only two municipalities (Sremski Karlovci and Bačka Palanka) have lower values of this indicator.[10]

However, the quality of transport infrastructure and road equipment isn't the acceptable. Condition of road traffic of Fruška gora characterized by some specifics:[11]

- Undeveloped road network - the main problem is underdevelopment of the ring road around Irig, and part of the road network on the

[9] Ibid.

[10] Under these values are included the entire territory of the municipalities and cities, where only their individual parts within the region Fruška gora.

[11] Univerzitet u Novom Sadu (2011). *„Master plan održivog razvoja Fruške gore 2012-2022.“*,. naučno stručna studija, (koordinatori: Pejanović, R., Orlović, S., Lazić, L., Panjković, B.), Novi Sad.

west side of Fruška gora. The undeveloped road network is the main problem of insufficient accessibility to all parts of Fruška gora;
- Poor roadway condition – existing roadway construction is very bad. Holes, cracks and other damage of the roadway impair the quality and safety of the traffic;
- Lack of and poor condition of the existing of traffic signalization – vertical and horizontal traffic signalization is worn out;
- Overloaded traffic on the road direction M-21;
- High risk of performing traffic on the road M-21**.**

Measures to eliminate these deficiencies have positive outcomes for rural development of Fruška gora, and include improving transport accessibility (road construction and road facilities, reconstruction and rehabilitation of existing roads, improving road equipment). In this context, it is planned a construction of a tunnel through the mountain (between Paragovo-Irig).[12] The number of telephone subscribers per 1000 inhabitants is an indicator that refers to the possibility of providing communication services, and rural areas are characterized by a small number of telephone subscribers per thousand inhabitants compared to urban areas. For municipalities and cities within Fruška gora the following values for this indicator are:[13]

- Inđija - 285;
- Irig - 290;
- Šid - 300;
- Ruma - 315;
- Beočin - 328;
- Bačka Palanka - 336;
- Sremska Mitrovica - 349;
- Sremski Karlovci - 351;
- Novi Sad - 487.

Indicators of rural development related to telecommunications services in region of Fruška gora have extremely negative values (except for the area of Novi Sad). Rural infrastructure minimizes costs and simplifies the

[12]Njegovan, Z., Pejanović, R., Kosanović, N., Đukić, S. (2011). *Ruralni razvoj u konceptu „Master plan održivog razvoja Fruške gore 2012-2022.*", Agroekonomika, Institut za ekonomiku poljoprivrede i sociologiju sela, Poljoprivredni fakultet, Novi Sad, vol. 49-50, str. 77-87.

[13]Njegovan Z., Pejanović, R., (2009). *Ruralna regionalizacija AP Vojvodine*, Poljoprivredni fakultet, Novi Sad, 2009.

manufacturing process, and providing positive socioeconomic and environmental outcomes for rural areas. Perspectives on rural development of Fruška gora are partly based on the development of soft and hard infrastructure[14] (table 1)[15]. In the region of Fruška gora is possible to identify a number of significant participants that their activities can contribute significantly to the development of rural infrastructure:

- Governments at the national and regional level,
- The private sector, and
- Rural communities.

Rural communities should have access to rural infrastructure using them in the most effective manner for their needs. Governments should be to support investments in infrastructure development. The role of the private sector to provide investments in rural infrastructure wherever indicate adequate opportunity.

**Table 1.** *Types of rural infrastructure*

| Hard infrastructure | Soft infrastructure |
|---|---|
| • Electricity supply<br>• Housing construction<br>• Business facilities<br>• Traffic capacity<br>• Other types of transport<br>• Utility activities<br>• Schools<br>• Trading activities<br>• Storage capacities<br>• Supply of gas<br>• Telecommunications<br>• Water supply | • Financial and other business services (commercial banks, advisory services)<br>• Health and social protection<br>• Markets<br>• Postal services<br>• Training |

**Source:** *http://www.ruralfinance.org/*

[14]Pejanović, R., Đukić, Sanja, Glavaš – Trbić, Danica (2011). *Ruralni i lokalni ekonomski razvoj u regionu Fruške gore – studija slučaja*, Ekonomika poljoprivrede, specijalni broj, Međunarodni naučni skup „Sustainable Agriculture and Rural Development in Terms of the Republic of Serbia Strategic Goals Implementation within Danube Region, knjiga I, vol LVIII, Banja Vrdnik, str. 172-179.

[15]Deutsche Gesellschaft für Technische Zusammenarbeit (2003). *Guide to Rural Economic and Enterprise Development,* Working paper edition 1.0, http://www.ruralfinance.org/fileadmin/templates/rflc/documents/1131237624467_REED_engl_Guide_1_.pdf.

Further development of transport infrastructure will significantly contribute for rural and also for the economic development of Fruška gora. Flow of rural development based on improving access in rural communities is directly related to the provision of roads in rural areas, because of:[16]

- Increasing economic activity of the rural areas;;
- Increasing investment in the further development of infrastructure and other facilities;
- Reducing the cost of inputs and finished agricultural products;
- Improving the marketing of agricultural products;
- Encouraging diversification and production efficiency of farmers in rural areas;
- Facilitating the provision of social services (education and health).

Also, the development of road infrastructure would significantly contribute to the growth of agricultural production and tourism in the area of Fruška gora, which are also the main activities in the wider coverage of this protected area. Likewise, the development of telecommunications services has a significant role to further rural development of Fruška gora. The development of infrastructure in rural areas contributes to economic growth and quality of life because:[17]

- Reducing the cost of production;
- Increasing the economic diversification in rural areas;
- Through financing the infrastructure ensuring macroeconomic stability;
- Creating better benefits for the environment
- Contribute to the improvement of health and national integration.

## Conclusions

Development of rural the infrastructure is one of the important segments of the rural development of the region of Fruška gora. Area of Fruška gora has a well-developed road network, but it is not of adequate quality. Less favorable is the equipping of the area of Fruška gora with a telecommunications infrastructure. In the following period it is necessary

[16]Barrios, E. B. (2008). *Infrastructure and rural development: Household perceptions on rural development*, Progress in Planning, Volume 70, Issue 1, July 2008, Pages 1–44.
[17]Kessides, Christine (1993). *The Contributions of Infrastructure to Economic Development*, A Review of Experience and Policy Implications, World Bank Discussion Papers, Eashington, D.C.

to improve the road (as the dominant form of transport infrastructure) and the telecommunications infrastructure in the region of Fruška gora. Developed a road and telecommunication infrastructure in the region of Fruška gora will significantly contribute to: a better economic position of the rural communities in the area, reducing development disparities within within the region, and then the reduction of regional disparities. Besides, the development of these types of rural infrastructure has improved market access which affects: lower transportation costs, increase trade, and the increasing mobility of the rural population of Fruška gora. Also, the development of infrastructure has a positive impact on tourism of Fruška gore.

Further development of road and telecommunications infrastructure in the region of Fruška gora would increase the volume of investments, which would significantly impact on job creation, to reducing the unemployment rate and the development of new employment opportunities. In addition to these economic benefits, the future development of road and telecommunication infrastructure of Fruška gora has social aspects of development because of:

- Reducing the isolation of rural areas;
- Increasing the level of social integration;
- Increasing the mobility of rural residents;
- Providing greater access to social services (health centres, hospitals, schools) rural population.

## References


1. Barrios, E. B. (2008). *Infrastructure and rural development: Household perceptions on rural development,* Progress in Planning, Volume 70, Issue 1, July 2008, Pages 1–44.

2. Deutsche Gesellschaft für Technische Zusammenarbeit (2003). *Guide to Rural Economic and Enterprise Development,* Working paper edition 1.0, http://www.ruralfinance.org/fileadmin/templates/rflc/documents/1131237624467_REED_engl_Guide_1_.pdf (28.02.2014).

3. Kessides, Christine (1993). *The Contributions of Infrastructure to Economic Development*, A Review of Experience and Policy Implications, World Bank Discussion Papers, Eashington, D.C

4. Njegovan Z., Pejanović, R., (2009). *Ruralna regionalizacija AP Vojvodine*, Poljoprivredni fakultet, Novi Sad, 2009.

5. Njegovan, Z., Pejanović, R., Kosanović, N., Đukić, S. (2011). *Ruralni razvoj u konceptu „Master plan održivog razvoja Fruške Gore 2012-2022.“,* Agroekonomika, Institut za ekonomiku poljoprivrede i sociologiju sela, Poljoprivredni fakultet, Novi Sad, vol. 49-50, str. 77-87.

6. Pejanović, R., Đukić, Sanja, Glavaš – Trbić, Danica (2011). Ruralni i lokalni ekonomski razvoj u regionu Fruške gore – studija slučaja, Ekonomika poljoprivrede, specijalni broj, Međunarodni naučni skup „Sustainable Agriculture and Rural Development in Terms of the Republic of Serbia Strategic Goals Implementation within Danube Region, knjiga I, vol LVIII, Banja Vrdnik, str. 172-179.

7. Pokrajinski Zavod za zaštitu prirode (2011). *Nacionalni park „Fruška gora“, predlog za uspostavljanje zaštite prirodnih vrednosti, u postupku izrade zakona o Nacionalnom parku „Fruška gora“, dokumentaciona osnova*, Novi Sad, http://www.pzzp.rs/uploadimage/132880030890391.pdf (26.02.2014.).

8. *Prostorni plan područja posebne namene Fruške gore do 2022. godine* (2004), „Službeni list AP Vojvodine”, broj 18/04, Novi Sad.

9. Univerzitet u Novom Sadu (2011). *„Master plan održivog razvoja Fruške gore 2012-2022.“*,. naučno stručna studija, (koordinatori: Pejanović, R., Orlović, S., Lazić, L., Panjković, B.), Novi Sad.

# IMPACT OF SOWING STRUCTURE ON EMPLOYMENT ON FAMILY FARMS[1]

*Saša Todorović[2], Sanjin Ivanović[3]*

## Abstract

*By making an expedient choice of sowing structure and rational use of labour, farm business operations can become more profitable. In this regard, the aim of this study is to carry out the optimisation of sowing structure for differently sized family farms, as well as to examine the employment of labour on family farms and obtained results of business operations after the optimisation of sowing structure. The data collected through the interviews were used to develop models of the family farms. The basic method, which is experimented on the developed models, is the simplex method of linear programming. It was found that the results of business operations improve while the intensity of improvement decreases with increase of farm size. The employment of labour on family farms increases in the case of farms of up to 50 ha, while in the case of the farms sized over 50 ha, it decreases.*

**Key words:** *employment, labour, sowing structure, gross margin, optimisation, family farms*

## Introduction

Nowadays, the development of agriculture in Serbia largely depends on the development of family farms. This is due to the fact that most of the productive capacity in agriculture of the Republic of Serbia is held by family farms (79.9% of the agricultural land, 85.5% of arable land, 83.8%

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of arable fields and 97% of the total number of tractors). In doing so, they achieve 88% of the total maize production scope, about 73% of wheat production, about 65% of sunflower production and about 50% of soya bean and sugar beet (Božić and Munćan, 2007). However, as a whole, agricultural production on these farms is not sufficiently developed and it is evident that there are significant reserves of resources that are not used (Todorović et al., 2008). The complexity of the issues of improving agricultural production on them stems from the fact that it is necessary to solve not only technical and technological, but also organizational, economic and social problems.

Reducing rural poverty is one of the major challenges Serbia is faced with today considering that the living standard in Serbia shows that poverty is more significantly present in the rural areas than in urban areas (9.8% of the rural population is below the poverty threshold versus 4.3% of the urban population). Rural poverty is particularly important because the differences in poverty between city and village are deepened in the period between the two surveys on living standard (2002–2007), implied by an increase in the ratio of rural poverty to urban from 1.6 to 2.3. The depth and severity of poverty in rural areas were also significantly higher than in urban areas. In 2007, nearly two-thirds of the poor lived in rural areas.

Labour is one of the most important resources that members of family farms have and it is therefore a key strategy in the fight against poverty. Because of its flexibility, divisibility and mobility it is an important input in agricultural production.

At a time when the profitable production is sought to be achieved, a special attention must be paid to the choice of the optimal sowing structure, due to the extremely huge impact it has on the functioning and success of business operations of the family farm (Bastajić and Živković, 2002, Todorović and Munćan, 2009, Todorović et al., 2010a; Todorović et al., 2010b). By making an expedient choice of sowing structure and by rational use of labour, farm business operations can become more profitable, and the living conditions of farm members can be of better quality.

Taking all the above mentioned into account, the objective of this research is:

- to carry out the optimisation of sowing structure for differently sized family farms and

- to consider the employment of labour on family farms and the obtained results of business operations after the optimisation of sowing structure.

## Material and method

The material for this research was collected during 2013 through the interviews with the selected holders of family farms in the territory of Srem administrative district. The collected data were used to develop a model of a family farm.

The main features of a developed model are as follows:

- the family farm is situated in a lowland region;
- possesses only arable area (other patterns of land use are neglected) of uniform quality and optimal plot size,
- arable area is used for growing cereals (maize and wheat) and industrial crops (sunflower, soya bean and sugar beet) with respect to crop rotation restrictions,
- for market-oriented crop production, the whole arable area is used,
- production technology is typical for the given crops and region in which the farm is located,
- 2 family members are constantly engaged on the farm and
- the farm has at its disposal necessary mechanisation (except for combine harvester for sugar beet) for implementation of the designed production technology (10 kN tractor, 20 kN tractor, universal combine harvester and proper implements).

Regarding the activities and restrictions for determining the optimal structure of crop production and its insurance by production factors, the crop rotation, agricultural practices of distributed crops, necessary tractors and combine harvesters, obtained results by certain enterprises and so forth are elaborated.

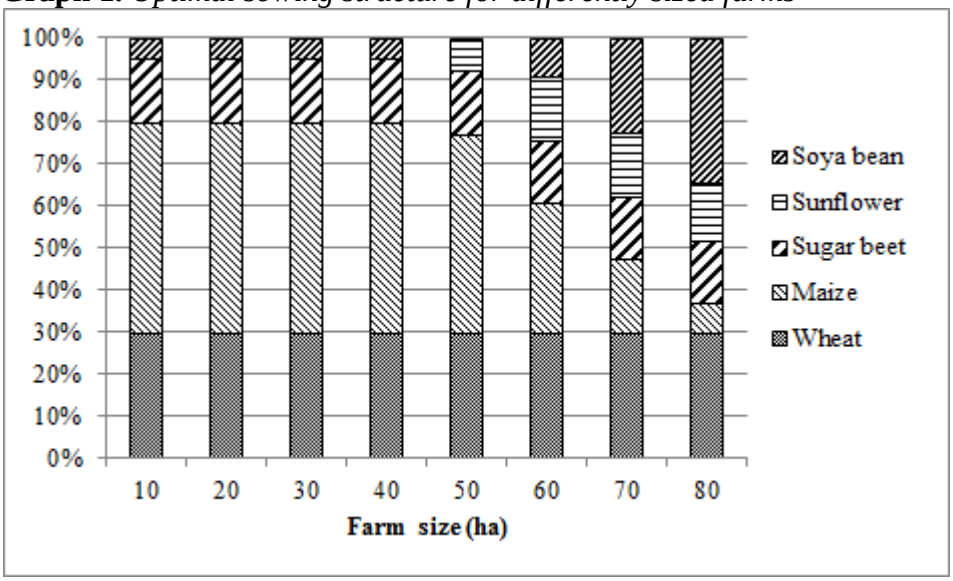
The basic method, which is experimented on the developed model of family farm, is the simplex method of linear programming. By changing only one production factor (arable area), the optimal sowing structure was obtained for different farm sizes and it is in accordance with the available

capacity and objectively existing restrictions and it enables generating maximum gross margin. When applying this approach it is possible to consider the employment of labour on family farms and obtained results of business operations after optimising sowing structure.

## Results and discussion

The advantage in using available resources of the farm is given to those crops whose minimum of share must be reached due to respecting crop rotation restrictions, and then to the crops that provide the highest gross margin (Graph 1).

**Graph 1.** *Optimal sowing structure for differently sized farms*



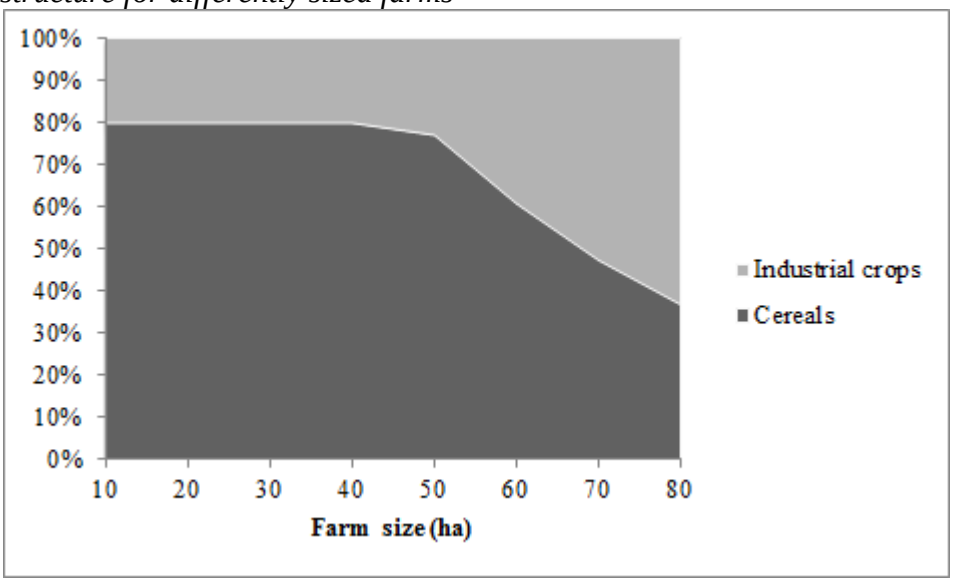

**Source:** *Authors` calculation*

Therefore, although wheat has the lowest gross margin regarding the distributed crops, it participates with 30% in optimal sowing structure, and sugar beet as a crop with the highest gross margin participates with a maximum of 15% in optimal sowing structure of farms of all sizes[4].

[4]Index of gross margin of crops distributed on the farm: gross margin in wheat production=100.00; maize=169.67; sugar beet=321.50; sunflower=145.21 and soya bean=146.83.

The most notable change in optimal sowing structure that occurs with increasing farm size is reflected in the distortion of the proportions of cereals-industrial crops in favour of industrial crops (Graph 2).

**Graph 2.** *Proportion of cereals and industrial crops in optimal sowing structure for differently sized farms*




**Source:** *Authors` calculation*

Growth in the share of industrial crops in the optimal sowing structure of larger farms is the result of an increase in the share of soya bean against the decrease in the share of maize starting from farm size of over 45 ha. The reasons for these trends should be sought in the index of labour expenditure in crops distributed on the farm[5].

It is evident that soya bean has a lower gross margin compared to maize, but it is evident that less labour per ha is required than in the case of maize, which is especially important in situations where labour becomes a limited resource. Namely, the increase in the farm size in certain months of the year leads to a labour shortage.

[5]Index of labour expenditure of crops distributed on the farm: labour expenditure in wheat production=100.00; maize=132.25; sugar beet=207.72; sunflower=116.50 and soya bean=103.56.

Considering temporal distribution and dynamics of the consumption of labour per certain months, it can be noticed that on the family farms directed at crop production, available amount of working hours is completely used in April and October, since these months are the periods of intensive work in crop production, and only in the case of the farm sizes of over 45 ha for October and of over 70 ha for April (Munćan et al., 2008). Bearing that in mind, we can see that just starting from the farm size of 45 ha the distortion of ratio of cereals to industrial crops occurs (Graph 2).

Thus, so as to cultivate the available amount of land in the months when there is labour shortage in the optimal sowing structure, a displacement of maize occurs, since it requires greater expenditure of labour per hectare compared to soya bean, which requires less expenditure.

While doing so, it is important to point out that these are spring crops that compete in the same months for limited human resources, so that in these situations (when there is no possibility of hiring additional labour from the market) to make the best use of the land, preference is given to soya bean and hence distortion of ratio of cereals-industrial crops.

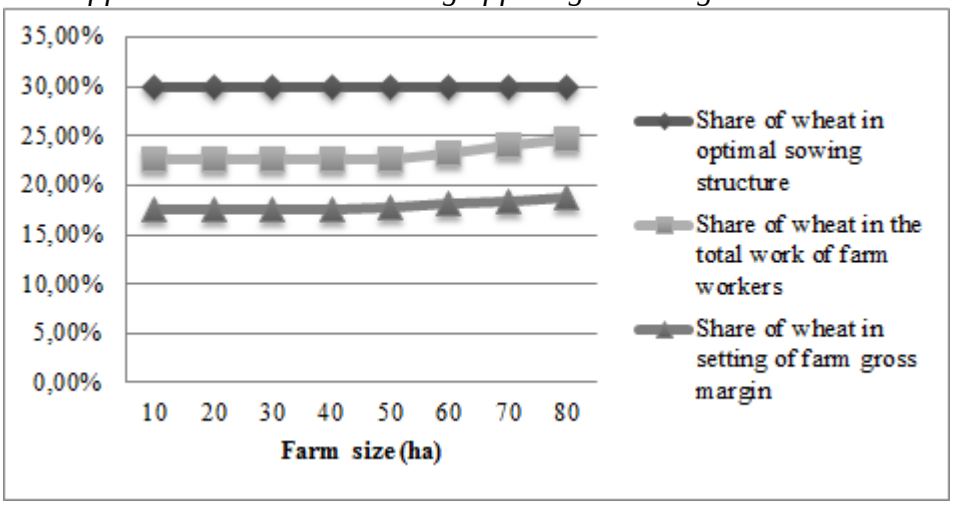
In order to accurately perceive the employment of labour on the family farms as well as the results obtained after optimising of sowing structure a comparative overview of the share of each crop in the optimal sowing structure, its share in total work of the farm workers as well as its contribution to setting of farm gross margin for all farm sizes is provided.

In this regard, it was found that in the case of farms of all sizes, the share of wheat in total work of farm workers is smaller than its share in the optimal sowing structure (especially on the smallest farms).

What has a negative impact on business results of farms is the fact that the share of wheat in total work of farm workers is significantly higher than its contribution to setting of farm gross margin (Graph 3).

On the other hand, it should be noted that the wheat is a crop whose minimum share in the optimal sowing structure must be reached due to crop rotation restrictions, although wheat has the lowest gross margin.

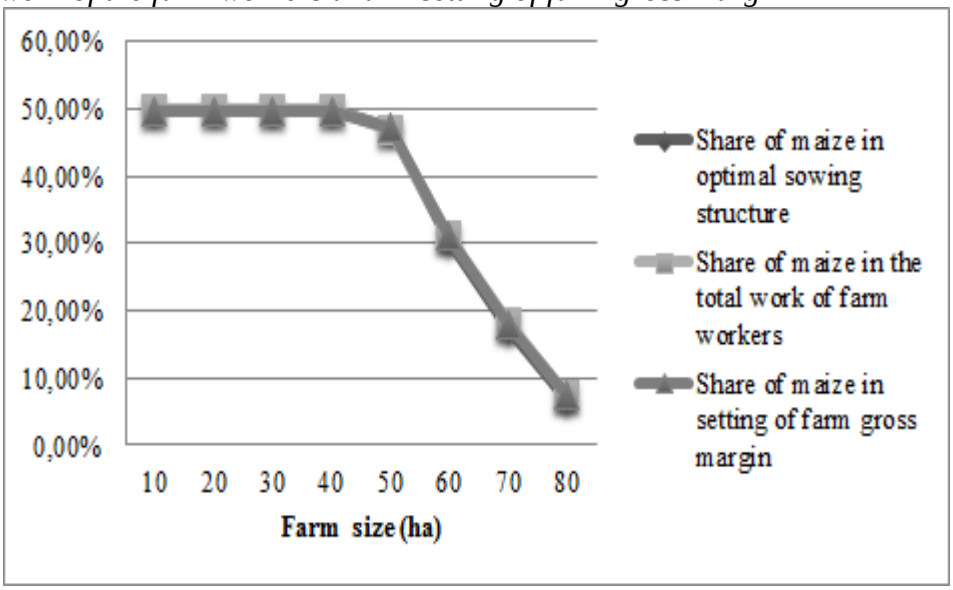
**Graph 3.** *The share of wheat in optimal sowing structure, in the total work of farm workers and in setting of farm gross margin*




**Source:** *Authors` calculation*

It is evident that in farms of all sizes, maize has almost balanced share in the optimal sowing structure, the total work of farm workers as well as n setting of farm gross margin (Graph 4).

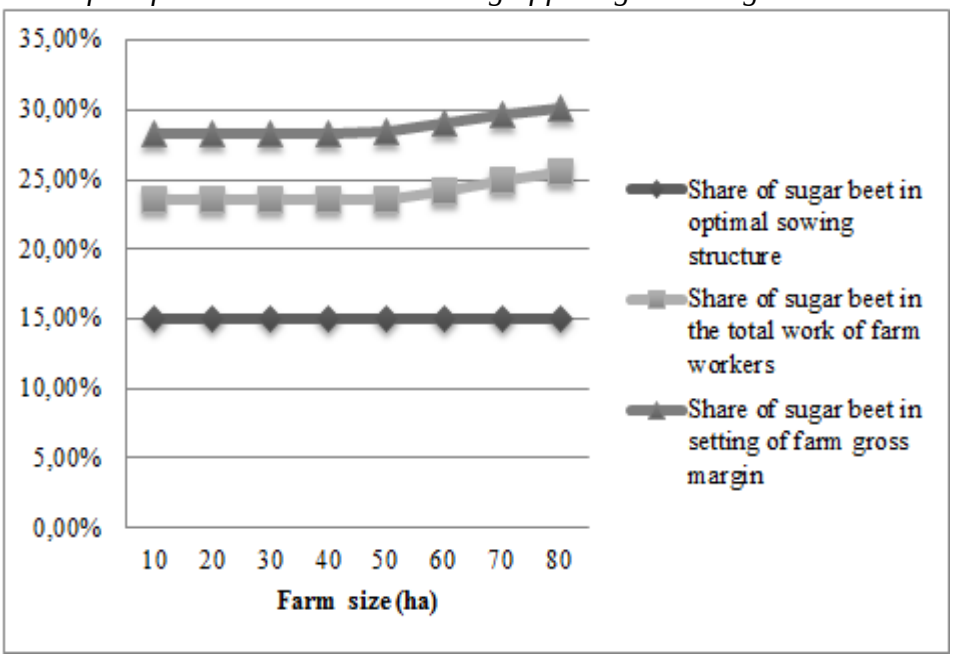
**Graph 4.** *The share of maize in optimal sowing structure, in the total work of the farm workers and in setting of farm gross margin*




**Source:** *Authors` calculation*

When sugar beet is concerned, its significantly higher share in the total work of the farm workers in relation to its share in the optimal sowing structure can be seen in the farms of the all sizes. However, what is particularly good is the fact that the contribution of sugar beet to setting of farm gross margin is higher than its share in the total work of the farm workers (Graph 5).

**Graph 5.** *The share of sugar beet in optimal sowing structure, in the total work of the farm workers and in setting of farm gross margin*

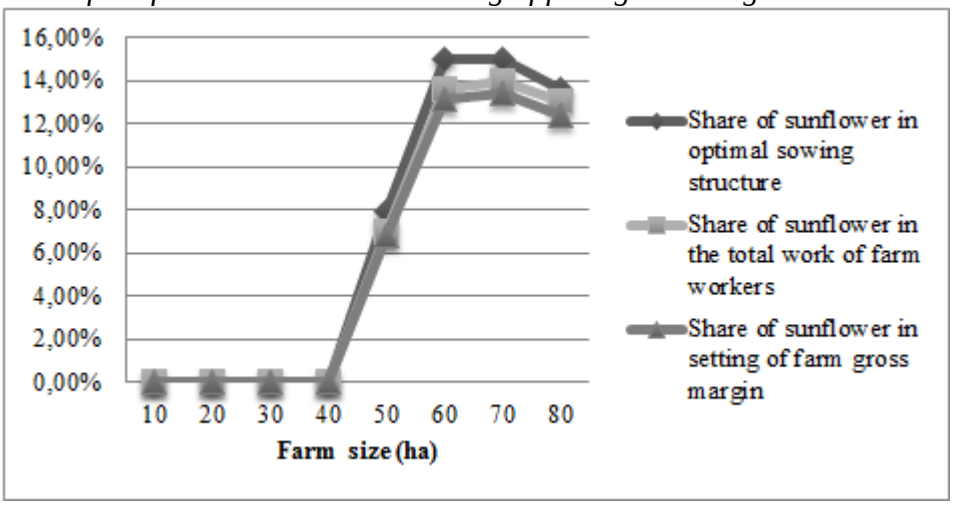



**Source:** *Authors` calculation*

It is notable in the case of the farms of all sizes that the share of sunflower and soya bean in the total work of the farm workers is smaller than the share of sunflower and soya bean in the optimal sowing structure of farms when the farm size increases there is an increase of this gap.

On the other hand, what has a negative impact on business results of farms is the fact that the share of sunflower in the total work of the farm workers is significantly higher than its contribution to setting of farm gross margin (Graph 6).

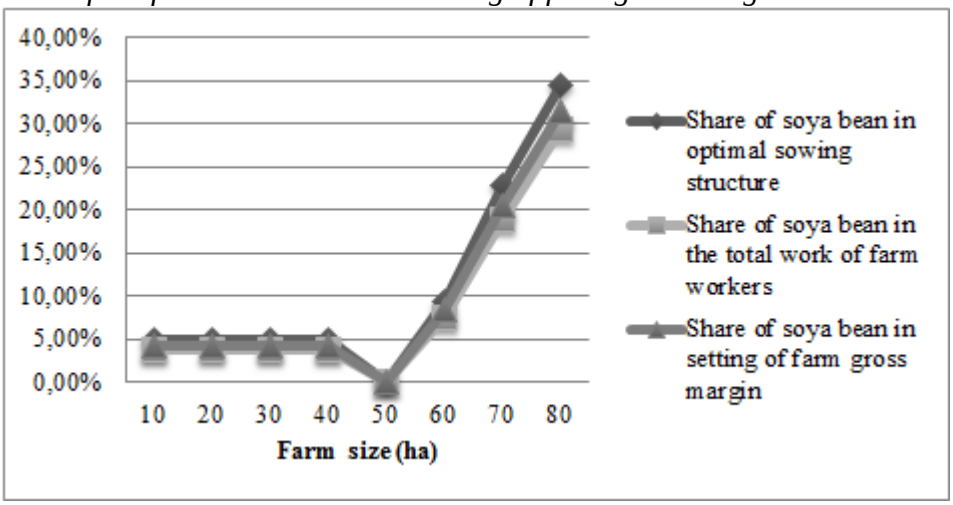
**Graph 6.** *The share of sunflower in optimal sowing structure, in the total work of the farm workers and in setting of farm gross margin*




**Source:** *Authors` calculation*

Unlike sunflower, the share of soya bean in the total work of the farm workers is smaller than the contribution of soya bean to setting of farm gross margin (Graph 7).

**Graph 7.** *The share of soya bean in optimal sowing structure, in the total work of the farm workers and in setting of farm gross margin*



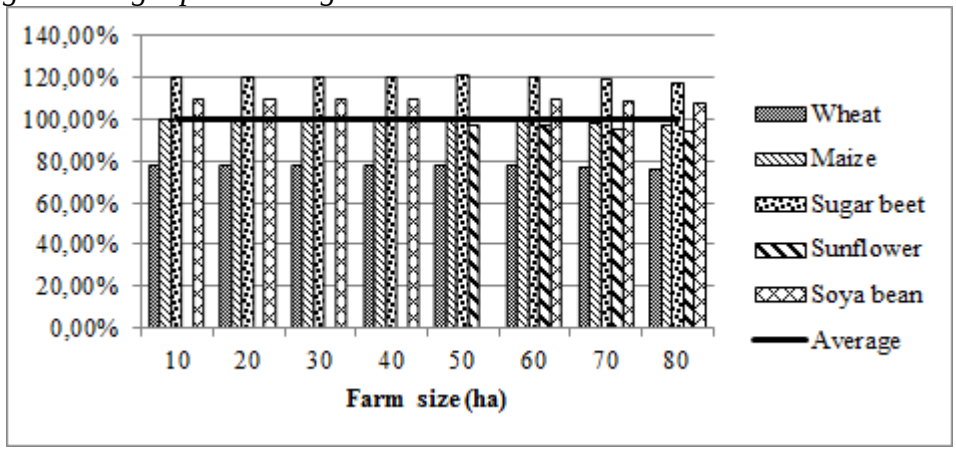

**Source:** *Authors` calculation*

The analysis shows that of all distributed crops on the farm, sugar beet is the only one that in a larger percentage engages labour of the farm

compared to its share in optimal sowing structure, which classifies it into labour-intensive crops on the farm. In these terms, sugar beet as a labour-intensive crop has a high impact on the additional employment of the family farm members, given the level of gross margin and business results of the farm. On the other hand, it was found that in the cases of wheat, sunflower and soya bean a smaller percentage of farm labour is engaged compared to their share in the optimal sowing structure on the farms of all sizes (especially small farms), where regarding the gap, wheat stands out (with a reduction of the gap in the case of larger farms) while in the cases of sunflower and soya bean the gap grows with increasing farm size. Therefore, it indicates that in the case of small farms (prevailing in the Republic of Serbia) with a high percentage of wheat (and cereals generally) in sowing structure, the degree of employment of the labour is inadequate, that is, sowing structure does not encourage high employment of labour. Maize only of all distributed crops has almost balanced share in the optimal sowing structure, in the total work of the farm workers as well as in setting of farm gross margin.

The reasons for the noticeable discrepancy between the share of distributed crops in setting of gross margin at the farm level and the total work of the farm workers should be sought in the deviation of gross margin of distributed crops per working hour from the average gross margin per working hour (Graph 8).

**Graph 8.** *Deviation of gross margin per working hour from the average gross margin per working hour*



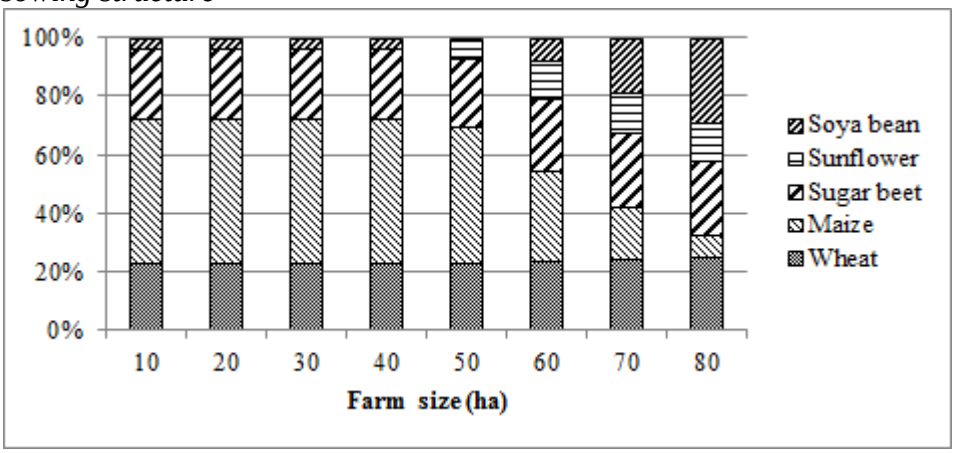

**Source:** *Authors` calculation*

Only those crops which have higher gross margin per working hour than the average gross margin per working hour have a higher contribution to setting of farm gross margin compared to the share in the total work of the workers and they should be particularly taken into account, and in this case these are sugar beet and soya bean.

On the other hand, the reason for the noticeable discrepancy between the share of distributed crops in the optimal sowing structure and their contribution to setting of the total gross margin of the farm should be sought in the departing of gross margin of distributed crops per hectare from the average gross margin per ha[6]. Only those crops which have higher gross margin per ha than the average gross margin per ha have a greater contribution to setting of farm gross margin compared to the share in the optimal sowing structure and they should be particularly taken into account, and in this case these are sugar beet and maize.

The share of the distributed crops in the total work of the farm workers at farm level for differently sized farms shows that increasing the farm size results in redistribution of working time spent in the production of distributed crops starting from the farm size of 50 ha (Graph 9).

**Graph 9.** *Working time spent in the production of crops in the optimal sowing structure*



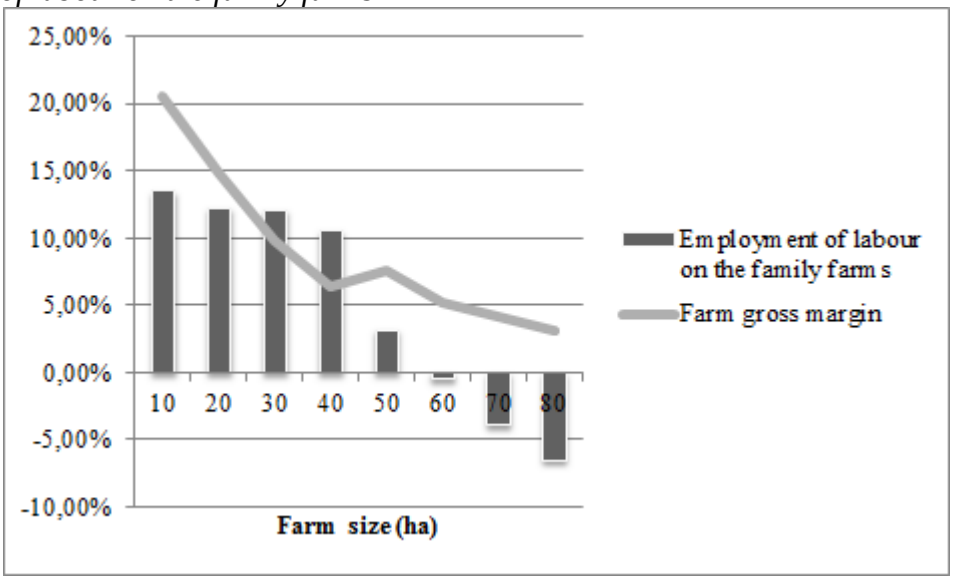

**Source:** *Authors` calculation*

[6]Average gross margin per ha=100.00; wheat=60.32; maize=102.35; sugar beet=193.94; sunflower=87.60 and soya bean=88.58.

It is evident that there is an increase in the share of labour expended in the production of industrial crops against cereals, that is, the increase in the share of labour expended in the production of sunflower and soya bean against labour expended in the production of maize. This corresponds to the previous conclusion about the change in the optimal sowing structure with increasing of farm size.

Optimising the sowing structure maximizes business results of the farm. Nevertheless, the question about the way in which optimising the sowing structure affects the employment of labour on family farms of different sizes still remains. In this regard, it was found that optimising of sowing structure contributes to the increase in gross margin of farms of all sizes in relation to data from farms that have been collected by the survey. In addition, the intensity of increasing decreases with the increase in the size of the farm (Graph 10).

**Graph 10.** *Increase of farm gross margin and change in the employment of labour on the family farms*



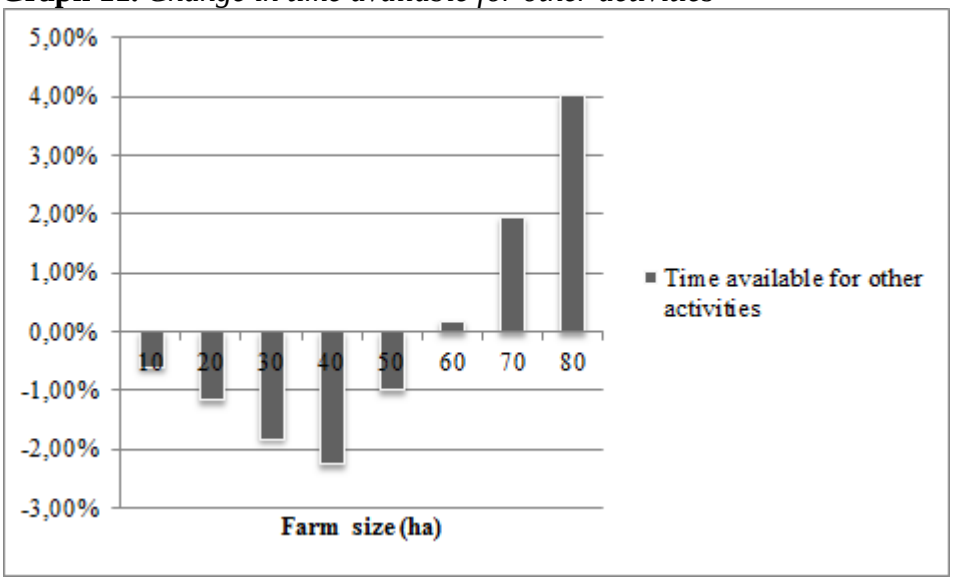

**Source:** *Authors` calculation*

On the other hand, employment of labour on the family farms increases for farms of up to 50 ha when optimising of sowing structure. Growth in employment is the highest in the case of the smallest farms, while for the farm size of over 50 ha, employment decreases mostly in the case of the largest farms. The aforementioned trends in employment of labour on the

family farms primarily affect the amount of time available for the off-farm work. The general rule is that the increase in farm size reduces the time available for the off-farm work (McNamara and Weiss, 2005). However, the amount of time available for the off-farm work does not depend solely on its size, but also on other factors such as the type of production that is present on the farm (more or less labour-intensive production, seasonal or continuous production, etc.), degree of technical equipment, intensity of production and the like. Thus, for example, it can be expected that on the farms engaged in crop production there will be more time available for off-farm activities, compared to the farms engaged in vegetable or livestock production (Todorović et al., 2011). Here, it is necessary to take into account other characteristics of particular production that affect the engagement of the labour. Hence, the vegetable farms engaged in organic production will require much greater involvement of the labour force than the farms engaged in the same production, but in a conventional way.

Based on the established model of crop farms of different sizes, it was observed that the amount of time available for off-farm work in this case is primarily dependent on the farm size (Graph 11).

**Graph 11.** *Change in time available for other activities*




**Source:** *Authors` calculation*

It is evident that the time available for other activities by optimising the sowing structure reduces in the case of the farm size of up to 50 ha, mostly for farm size of 40 ha, while for the farm size of over 50 ha it increases and in the case of the largest farms it increases most.

The amount of work spent on the farm can also be expressed in AWU, and this is term used by FADN methodology[7]. According to the above mentioned methodology, the annual number of working hours of persons who worked on the farm, and the number of AWU (Annual Working Units) are followed. FADN requires classification of labour into unpaid and paid, and within each category classification into the permanent and temporary labour is made.

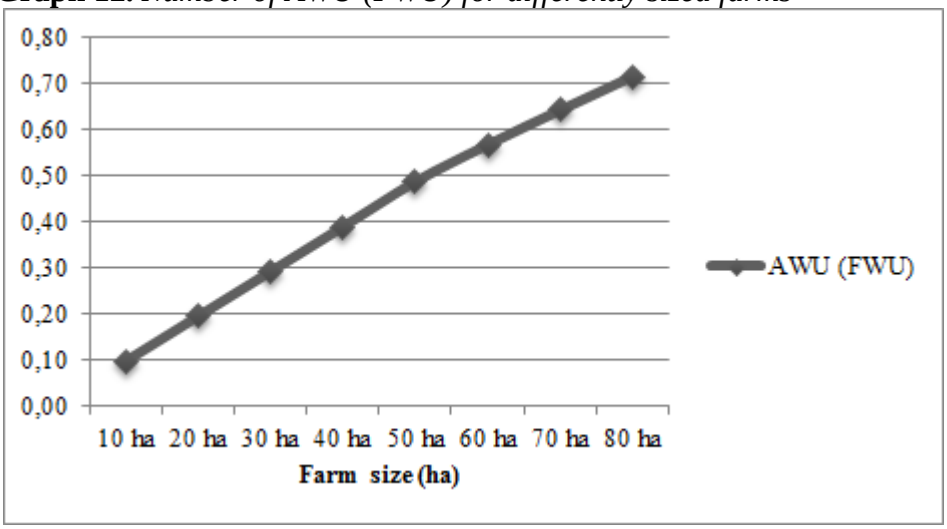
According to FADN regulations, during work labour does not include activities related to fixed assets, e.g. construction, repair or demolition of buildings, repair of agricultural machinery and the like. In addition, the annual number of working hours of people who worked on the farm does not comprise work related to the farm of the holder or the manager of the farm.

Annual working units (AWU) express work of permanently employed labour force, regardless of whether it is paid or not. This indicator, according to EU regulations, involves 1,800 hours annually, or 225 working days per year. In addition to the aforementioned indicators (AWU), when analysing the labour force on farms based on collected FADN data, FWU (Family Work Unit) can be also calculated, which would in fact represent an annual unit of work of farm members (unpaid labour). In this paper, AWU and FWU are equal (regardless of farm size) since only farm members are engaged on the analysed models of farms.

It may be noted that the number of AWU (FWU), depending on the size of the farms, ranges from only 0.10 for the smallest farms to 0.70 for the largest observed farms (Graph 12).

[7]COMMISSION IMPLEMENTING REGULATION (EU) No 385/2012 of 30 April 2012 on the farm return to be used for determining the incomes of agricultural holdings and analysing the business operation of such holdings.
COMMISSION REGULATION (EC) No 868/2008 of 3 September 2008 on the farm return to be used for determining the incomes of agricultural holdings and analysing the business operation of such holdings.

**Graph 12.** *Number of AWU (FWU) for differently sized farms*




**Source:** *Authors` calculation*

The number of AWU (FWU) determined in this way can be very useful for making appropriate business decisions on the farm when compared with similar farms in the Republic of Serbia, as well as in the region.

## Conclusion

The most notable change in optimal sowing structure that occurs with increasing farm size is reflected in the distortion of the proportions of cereals-industrial crops in favour of industrial crops. Consequently, there is an increase in the share of labour expended in the production of industrial crops against wheat, that is, the increase in the share of labour expended in the production of sunflower and soya bean against labour expended in the production of maize.

As for the share of labour expended in the production of distributed crops, the conducted analysis shows that of all distributed crops on the farm, sugar beet is the only one that in a larger percentage engages labour force of the farm compared to its share in the optimal sowing structure, which classifies it into labour-intensive crops on the farm. On the other hand, it was found that in the cases of wheat, sunflower and soya bean a smaller percentage of farm labour is engaged compared to their share in the optimal sowing structure on the farms of all sizes (especially small farms), where regarding the gap, wheat stands out (with a reduction of the gap in the case of larger farms) while in the cases of sunflower and soya

bean the gap grows with increasing farm size. Therefore, it indicates that in the case of small farms (prevailing in the Republic of Serbia) with a high share of wheat (and cereals in general) in the sowing structure, the degree of employment of the labour force is inadequate. Maize only of all distributed crops has almost balanced share in the optimal sowing structure, in the total work of the farm workers as well as in setting of farm gross margin.

In this regard, only those crops which have higher gross margin per working hour than the average gross margin per working hour have a higher contribution to setting of farm gross margin than the share in the total work of workers and they should be particularly taken into account, and in this case these are sugar beet and soya bean. On the other hand, only those crops which have higher gross margin per ha than the average gross margin per ha have a greater contribution to setting of farm gross margin than the share in optimal sowing structure and they should be particularly taken into account, and in this case these are sugar beet and maize.

When the results of business operations are concerned, it was found that the optimisation of sowing structure contributes to improving gross margin of farms of all sizes when the intensity of improvement decreases with increasing of farm size. On the other hand, the employment of labour force on the family farms increases when optimising the sowing structure in the case of the farm size of up to 50 ha and mostly for the smallest farms, while for the farms size of over 50 ha it reduces and most in the case of the largest farms.

In this regard, it is evident that the time available for other activities by optimising the sowing structure is reduced for the farm sizes up to 50 ha and most for the farm size of 40 ha, whereas for the farm sizes of over 50 ha it is increased and most for the largest farms.

## References

1. Bastajić, Lj., Živković, D. 2002). Ekonomski efekti poslovanja različitih tipova zemljoradničkih gazdinstava na području donjeg Srema. Ekonomika poljoprivrede, 49(1-2), 37-52.

2. Božić, D., & Munćan, P. 2007). Family farms – the factors of agricultural development in Serbia. In D. Tomić & M. M. Ševarlić (Eds.), Development of agriculture and rural areas in Central and Eastern Europe (pp. 221–230). Novi Sad: Serbian Association of Agricultural Economists.

3. Mcnamara, K. T., Weiss, C. 2005). Farm Household Income and On- and Off-Farm Diversification. Journal of Agricultural and Applied Economics, 37(1), 37-48.

4. Munćan Mihajlo, Todorović Saša, Ivkov Ivana (2008): Model porodičnog gazdinstva kao osnova za eksperimentisanje u agroekonomskim istraživanjima. Simpozijum agroekonomista: Agroekonomska nauka i struka u tranziciji obrazovanja i agroprivrede. Tematski zbornik. Poljoprivredni fakultet. Beograd. str. 211:221

5. Todorović Saša, Munćan Mihajlo, Ivkov Ivana (2008): Značaj i uloga modela u agroekonomskim istraživanjima. Simpozijum agroekonomista: Agroekonomska nauka i struka u tranziciji obrazovanja i agroprivrede. Tematski zbornik. Poljoprivredni fakultet. Beograd. str. 201:210

6. Todorović, S., Munćan, M. (2009): Optimiranje strukture setve porodičnih gazdinstava u nestabilnim uslovima poslovanja. Ekonomika poljoprivrede, 56(2):329-339

7. Todorović, S., Bratić, S., Filipović, N. (2010a) Ekonomska opravdanost kupovine merkantilnog kukuruza na primeru tova junadi. u: Zbornik kratkih sažetaka: Stočarstvo, veterinarska medicina i ekonomika u ruralnom razvoju i proizvodnji zdravstveno bezbedne hrane, Divčibare. str. 12.

8. Todorović, S., Bratić, S., Filipović, N. (2010b). The change of sowing structure as a strategy for improving competitiveness of family farms directed at the final production of fattened beef cattle. Journal of agricultural sciences, 55(2), 183-193.

9. Todorović, S., Ivanović, S., Munćan, M. 2011). Mogućnosti povećanja uposlenosti radne snage na porodičnim gazdinstvima promenom smera proizvodnje. Ekonomika Poljoprivrede, 58(SB 2), 105–124.

# TOURIST EVENTS IMPORTANT ECONOMIC AND CULTURAL GENERATORS OF SUSTAINABLE DEVELOPMENT IN SERBIA

*Snežana Štetić,*[1] *Sanja Pavlović*[2]

## Abstract

*In the last three decades events have become an important means for communities to realise economic, social and ecological goals. The influence of planned events in tourism is gaining on their importance for destination competitiveness in the market. For transitional countries, these events are a means of streamlining tourist offers and marketing toward attractive tourist values and locations. Well-established events have: permanent attention of tourism organisations and tour operators, reputation compliant with the destination image, support of the local community and media, opportunities to add more attractive contents.*

*The goal of the survey study presented in the paper was to determine how well students of the College of Tourism are informed of the events in urban and rural areas of Serbia, what their motives for going to the events are, what their means of getting information on the events are, what their opinions are on the importance of local administration in organising events, what the limitations for improvement of event tourism in Serbia are. The results of the survey study show that students are not informed on the number of events in Serbia, but the students do know which events are the most visited, the students are aware of the importance of local administration in organising and improving event tourism and the students are aware of the limitations for improvement of event tourism in Serbia. Even though socialization is the motive for visiting an event, the students do not neglect the desire to be educated in traditional values, and to experience and see other characteristics of the area in which the event is being organized.*

**Key words:** *tourist events, sustainable development, rural areas, Serbia*

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## Introduction

Academic interest in tourism events is a relatively new phenomenon. This type of tourism has mostly started to develop, especially in the seventies of the last century, not only as a response to the growing interest and acceptance of the value of events for the economy, society and culture, but for regeneration of the environment as well. In time, the creators of politics, planners and managers of destinations have become aware of the potentially important role of these events at certain locations, from Olympic Games to community festivals. Event tourism is a dynamic field for study and research. Event tourism is described as planning, development and marketing of events, as tourist attractions, so as to increase the number of tourists participating in the events as a primary or a secondary attraction. The trend of using significant events and festivals as tourist generators is an international one. Traditionally, event tourism destination includes the ones acquired through competitive offers, as well as those that crated for tourism and various community events. The corporate, market led framework implies that the strategy of event tourism can be focused on major and local events that are important tourist generators, which gives primacy to the economic impacts of the events (Stokes, 2008).

Cities have added such events as expositions, fairs, trade fairs and festivals to their traditional offers (monuments, museums) in order to attract more tourists and prolong their stays. Events are more and more being used in marketing purposes and they offer numerous advantages (Gibson, 1998, Getz, 2008). Events can attract national as well as international tourists and visitors, help getting attention and promote attractions and infrastructure and enable maximal and rational use of certain regions. Conservation of these spaces can lead to financial benefits and affirmation of cultural heritage. Through cultural events, areas can attract not only tourists, but investments as well. Tourism industry that supports events generates employment and economic diversification (Baptista, Campo'n Cerro, Ferreira, 2010). Tourism can contribute economic diversification and profitability through increased employment, improvement of basic services and ever-growing economic equality between the urban and rural population (Byrd et al., 2009). The event is a vital component of the programme to attract tourists. Small and rural communities use festivals and events to realise equal benefits as the large communities. Small events demand more modest investments, since the necessary infrastructure already exists (Flognfeldt, 1999). The interest of other disciplines in events is evident, especially in sociology, economy and marketing. A wide variety of methodologies and methods of fundamental disciplines closely connected to professional fields are appropriate and

necessary for creation of knowledge and development of theories in event tourism. Economic dimensions of this form of tourism have previously been emphasized, thus it was expected that scientists would seek a balance in the research. The research of social and cultural effects of events extends to occasional anthropological studies (Getz, 2008). A broad variety of social sciences journals publish studies and comments on existing papers on events tourism.

In the tourist destinations there is an increased number of special events of which the creation and presentation are caused by strategic motives of, primarily, economic nature (Štetić, Šimičević, 2014). However, the role of the events within the tourism offer goal is also important for the tourists and social and cultural features (Getz, 2008), as well as their role in the local and regional development (Wood, 2005, O'Sullivan, Pickernell, Senyard, 2009). The events are the measure for culture, tradition and customs (Hong, 2010), social cohesion, cultural and social development (Fredline, Faulkner, 2000), which represent the features of the different events (Trošt, Klarić, Dropulić-Ružić, 2012). Events have a number of consequences to the local communities. A number of researchers are focused on evaluating the influence. The majority of the social influence studies use predefined quantitative evaluation techniques. These evaluations limit the interviewee ability to point out to the diversity of social consequences that they might experience, and they are distinguished as positive or negative. There is a lack of studies on social consequences in rural communities, which is the reason for the necessity to identify the number of social consequences after the event (Sacha, 2007).

According to Getz (2008), the influences of tourist events have the following dimensions: economic, social, cultural and political and environmental. Studies of the economic effect are used to assess the influence of certain events on the economy. Gelan (2003) concludes that the studies of economic effects are useful in marketing decisions and those developers and local politicians may justify public funding citing the economic benefits of the event for the entire community. Goldman et al. (1997) claim that economic influence studies focus on the fact that the project might affect the community by creating jobs, revenues and helping spatial organization. Comprehending economic influences of large-scale events has improved through analyses (Baade, Matheson, 2004), through which the effects have been studied for several years after the events through regional economic statistics for the year the event had been organized (Andersson, Lundberg, 2013).

## Tourist Events in urban and rural parts of Serbia

The initial events in Serbia with a tradition, that exist even today, appeared in the second half of XIX and the early XX century. These are: Carnival of Flowers in Bela Crkva (1852), Wine Exhibition in Vršac (1857), village fairs (trade events) in Valjevo, Ćuprija, Topola, Kraljevo, Požega and Zaječar, Smederevo Autumn (1888), Rajac Scythe Festival (1892), Dužijanca (*family celebration and thanksgiving to God for the successful completion of the wheat harvest*, prim.prev.) in Subotica (1911), Slovak Folk Festival in Bački Petrovac (1919) (Bjeljac, 2010). Even though the cited events are usually held in towns, they present traditionalism and a culture of rural areas, with an emphasis on agricultural characteristics. Event tourism in Serbia might contribute to an increase of tourist demand for natural and anthropogenic values of locals or regions. In 2010 in Serbia, 2426 tourist events were held. Events like *Exit Festival* and *Guča Brass Bands Festival* attract a large number of both local and foreign tourists. In contrast to these events, there is a large number of those that are under-acclaimed. Regardless of financial benefits, each of these events affect the local economy and to a certain extent reflects the spirit of the location it is being held in (Lović, Bjeljac, Cvetković, 2012).

There is a growing number of festivals and other special events that take place in rural and peripheral areas. Event organizers ought to strategically plan and control countryside events, not only for long-term sustainability, but also to maximally accentuate the benefits, and minimize expenses (Štetić, Cvijanović, Šimičević, 2014). Geography, history and cultural heritage favour the development of events that could be efficiently integrated into the local tourism product. The majority of events have been modified, which indicates the readiness to maximize the benefits of event tourism. However, despite the recent turn to formal organization and planning, studies or strategic plans are conducted (Higham, Ritchie, 2001). It is possible in our country to visit numerous fairs, cultural, sporting, business and other events, organized for different causes and with a different content. Local and foreign tourists pay considerable attention to events dedicated to the preservation of tradition, national customs, folklore and craftworks. These events are held throughout the year. Tourist locations record increased attendance during these events. Various performances, especially the ones with long traditions, have regular audience, which comes to see the event, and experience it. Events and performances give a new dimension to the tourist offer of a location. Numerous events express the wealth and diversity of national creative work of Serbia, and with accordance with old and traditional, build and develop modern creations.

Some of the local and regional events have tourist potential that might develop and gain national value, which requires investments, but some are not interesting for tourism. The question of conservation of cultural authenticity and local control arises when the tourism goals are connected to the local and regional events (Getz, 2008).

As is the case with any traditional celebration or conservation activity, cultural events confirm the identity, existence and a way of life. The organisation of event implies the care of customs and cultural heritage, but also promotion of tourism products. The role of these events is manifold, and a balance between social and financial goals is necessary in their organization. Rural culture is more traditional than the urban. In a world that is being modernized and globalized, traditionalism is compared to backwardness and underdevelopment. The rural population has been trying to reduce the level of traditional culture year after year. The wealth of this culture has only managed to exist in the most isolated areas. Nevertheless, in the last decades the rural culture has been revealed again, with the help of events. With the development of ethno tourism, a new market for locally specific products and services has provided activities in the economically most underdeveloped areas. The rural population and the broad public have again begun to value rural cultural traditions (Nemes, 2005). Rural events are important for the consumers of local products – agricultural food and non-food products, wines and spirits, local gastronomy products and handicrafts. Customs are connected to traditional food, celebrations and religious holidays, which offer various possibilities for filling out the tourist deals in rural locations.

Events have a potential to raise a self-awareness of the local population and to contribute to the return of local community cohesion through collaboration. Original rural events have traditionally been organized in the intervals between agriculture labours, after the harvest or in the time of religious holidays. Organizers of modern events are usually individuals, enthusiasts. Even though most rural events have a certain financial support of the public sector or donators, they are rarely organized by professionals. Rural events are an opportunity to represent the value of traditional cultural heritage, ethical values, as well as the traditional relationship of the local community with the natural resources. The possibilities of the events rooted in the natural and cultural heritage may be a factor of the rural economy.

Rural events receive an ever so integral character. Although they are usually organized around a celebration of a certain agricultural activity or product,

religious holiday or historical date, they include a presentation of the cultural heritage of local communities like folk music and dances and they might include local sport activities and crafts. The majority of those are of local and regional importance, but a minority of them have a national or international popularity. Some of the best known ones have more visitors, but they loose the rural character. Events in rural locations in Serbia express the rural way of life – celebration of harvest, the end or the beginning of gathering season, hunt, fishing, grazing in the high mountains, the beginning or end of a season – spring, summer, autumn, winter, especially the seasons of preparing or consuming of the local products... Further, Serbian villages might be the locations for events that are not directly related to the rural way of life like art colonies. These events entail hospitality of the local population, but the rural population does not participate in them, and it only observes or serves the event participants. Both types of events – rural and the ones that only take place in rural locations – may have a form of a holidays, congress, festival, art colony and they can bring benefit to the rural communities the space of which they use, but only if they are promoted ad well organized (Djordjević–Milošević, Milovanović, 2012).

Key factors of success and main challenges of the approach to the events based on the integrated rural tourism (IRT) studies on the characteristics of the interested parties for a collective planning and implementation of marketing strategies on a local level (Panyik, Costa, Rátz, 2011). The fundamental role of the external financial support for tourism means that rural communities must mobilize and organize to get governmental funds. Financing the public infrastructure is connected with the support of local administration. The existence of collaboration between the local rural and tourism entrepreneurs is the main factor in successful development of tourism and it supports the community to be involved in tourism (Štetić, 2011) . The development of rural tourism and entrepreneurship cannot exist without the participation and cooperation of businessmen who are directly or indirectly involved in tourism (Wilson, Fesenmaier D., Fesenmaier J., Van es., 2001).

The community constituents play an important role in the organization of events, and the development and economic support for the local events and festivals might be included as well. Organizational structure can be such that it includes a maximal engagement of community stakeholders, such as interest groups and/or individuals. Collaborative decision strategy is possible in rural and small communities, but not in capital and large towns. It is obvious that events in towns cause individualism rather than collectivism to define strategies (Stokes, 2008).

Events are held in places without a tourist character as well (unused natural or anthropogenic tourism value, underdeveloped tourism industry). For such locations, local events represent the basis for attracting visitors, mostly from a local area, region. If such a event has some activity and a unique quality, it can become, through advertisement, a valuable factor that can with a broadening of its contents contribute to development of a settlement, which is especially important for lesser-developed and underdeveloped rural locations. Expected results from organizing these events are economic benefits for the community, as well as cultural, social and educational benefits for the local population and visitors. Economic effects of events in Serbia cannot be adequately analysed, because there is no precise data on revenues from events, because organizers do not reveal them, which is especially the case with non-governmental organizations (Bjeljac, Ž., 2010). The importance of tradition, folklore, customs and the old way of making staff, presented in the ethnographic tourism events, is verz important (Bjeljac Ž, Ćurčić N, 2005; Bjeljac Ž, Ćurčić N, 2008; Brankov et al., 2009). The ethnographic events in underdeveloped (Bjeljac Ž, 2006) and rural locations (Todorović M, Bjeljac Ž, 2008) are especially important for the tourism offer of Serbia.

**Tourism events in Serbia from the aspect of students of tourism**

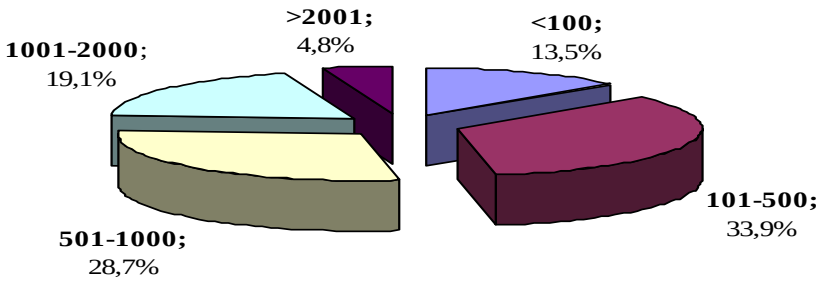
A Survey study has been conducted amongst the students of the College of Tourism in Belgrade. The objective of the study was to learn how much the young people, who will in the future work in the tourist trade, are informed about tourism events in Serbia, that can significantly contribute to the tourist trade and economic and cultural development. The goal of a comparative analysis of information on events in urban and rural areas in Serbia was to determine whether the young people have the knowledge about events that condition the preservation of traditional values in rural areas, which events are being held in urban areas, which are the motives for visiting events, which are the means of gathering information on events, what the opinions on the influence of the local administration on starting and preserving events are, what the necessary thing is for event tourism in Serbia to reach a higher level of development. A total of 242 students participated in the study and on the basis of their answers, the study was analysed. Amongst the participants there were 64 males and 178 females.

The questionnaire was used to gather information because it is simple to use, it is precise and has clear questions. The types of questions used in the survey were "the open type" to which the participants gave their opinions, based on

knowledge and experience, "the closed type" for which the participants were given answers, as well as "pivot" questions ("from-to" questions).

The students were from the following towns: Belgrade, Čačak, Smederevo, Užice, Bajina Bašta, Paraćin, Vršac, Požarevac, within which rural areas a major number of events is held. The hypothesis posed was that these students are informed on events held in rural areas. The number of students from Belgrade was 114, and 128 students were from other areas of Serbia. The participants were supposed to give an answer on the number of annual events held in Serbia. The answers given were: up to 100, 101-500, 501-1000, 1001-2000, more than 2001.

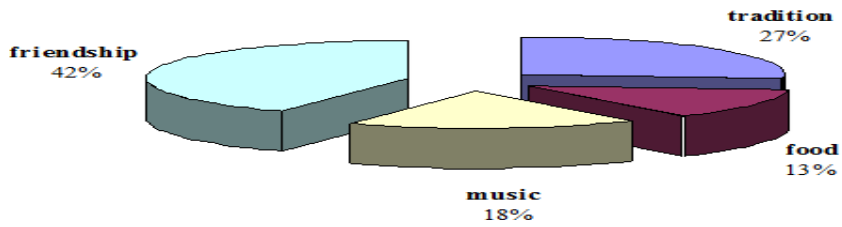
**Graph 1**. *The number of events in Serbia*




Only 4.8% of students knew that more than 2000 annual events are organized in Serbia. The majority of participants (33.9%) thought that between 101 and 500 annual events were held in Serbia. The total percentage of participants who have visited any event is 85.95%, which is not a negligible fact, and 14.05% have not. A large number of students have visited some of events held in Serbia. Out of 242 participants, 208 of them have visited a event (events), which tells us that young people are interested in attending the aforementioned regardless of the poor promotion and infrastructure. More than a half of participants (137, or 56.6%) is not informed about events being held in their own municipalities.

The reasons for visiting events can vary. Four groups of reasons are featured: *socialisation, music, food and tradition*. It is evident that students visit events mainly for socialisation. A significant percentage of participants (27%) gave tradition as a main reason for visiting a event, then music and food.

**Graph 2.** *Reasons for visiting events*

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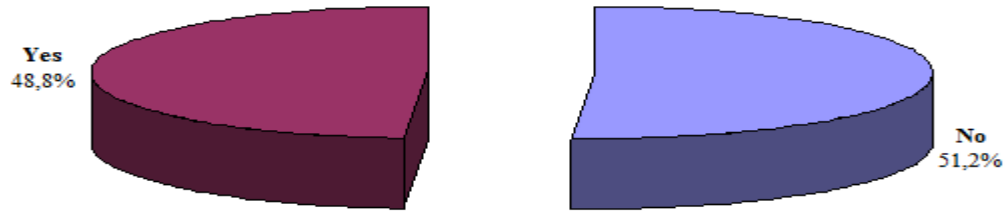
Studying the motives for visiting tourism event is necessary for identifying the visitor needs, marketing and coordinating the elements of the events with the requirements. The decision to visit a event is propelled with a desire to fulfil a certain necessity (Crompton, McKay, 1997). When holding an event it is not only the event that is being sold as an economic, tourism product, but other uses of the product as well, such as entertainment and experience. If an image of the event is created, other uses can be emphasized: excitement, happiness, relaxation, social interaction, prestige, ego satisfaction, education (Bjeljac Ž, Ćurčić N, 2008).

**Graph 3.** *An enumeration of the three events in Belgrade*

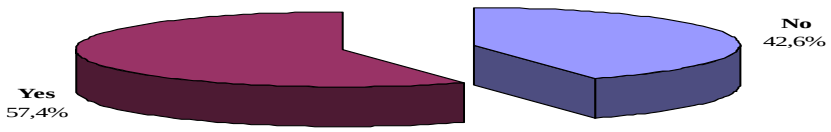



Only 48.76% of all the surveyed students could list three events in Belgrade. This number is surprisingly low, because Belgrade is the capital city with a large number of events, but on the other hand the number was expected since only 47% of participants are from Belgrade. Some students who could not list three events listed only one or two events held in Belgrade. They mostly listed events as Belgrade Beer Fest and various trade fairs.

The previous question was about events in Belgrade, while another question of the questionnaire was about events organized outside the capital city. The participants were supposed to list three events held outside of Belgrade,

keeping in mind that there is a large number of those events and that some of them are internationally known.

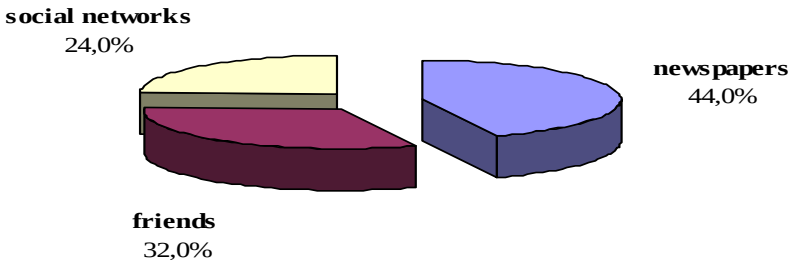
**Graph 4.** *An enumeration of the three events which are not held in Belgrade*




Unlike the larger number of students who could not list events in Belgrade, now a larger number of students can list three events that are held outside of Belgrade. One of the explanations for this is the fact that 53% of students come from various regions of Serbia, i.e. outside of Belgrade.

Next to the most famous events such as Guča Brass Bands Festival and Exit Festival, the participants also listed the following events: Kupusijada (Cabbage Festival), Nishville, Župa Grape Harvest, Grožđebal, Zaječar Guitar Festival, Days of Mokranjac, Carnival of Vrnjaci... Some of the listed events promote rural economy and traditional values (Kupusijada, Župa Grape Harvest, Grožđebal), while events like Nishville, Zaječar Guitar Festival and Days of Mokranjac present musical and literary works.

**Graph 5.** *The source of information about events*

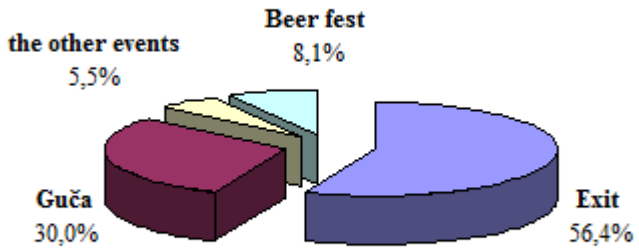



The media promotion influence is an economic criterion that represents the presence of the event in printed and electronic media, promotional actions on

markets and fairs, with a goal to determine the importance of media for promotion and holding of the event (Bjeljac, 2010).

The majority of participants (44%) claimed that they were informed about events through newspapers, which had not been expected regarding the popularity and large use of internet, and therefore the social networks, which were in the last place with only 24%. For gathering information on events, the participants gave priority to newspapers (124 participants), 89 participants learned of events through friends, while 66 participants used social networks (Facebook, Twitter...).

**Graph 6.** *Event visited by the largest number of foreign tourists*



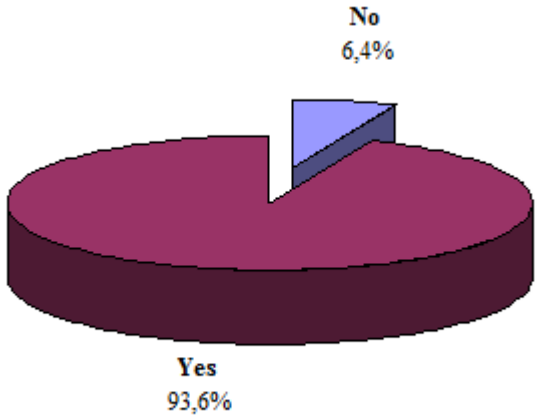

**Source:** *The work of authors*

As expected, the events that the participants considered would attract the most foreign visitors were, according to many the three most visited events: Exit Festival, Guča Brass Bands Festival and Belgrade Beer Festival, accordingly. This is understandable since these are entertainment events and the main motive for visitors is socializing, pleasant atmosphere and a good time, which was already concluded through one of the previous survey questions. The lowest number of participants (5.5%) considers trade fairs (tourism, wine, auto-motto) to be the most visited events.

A majority of foreign tourists (over 30% festival visitors), a relatively large daily expenditure, young people with differing images and cultural characteristics, concerts and accompanying events contributed to the Exit Festival becoming the largest music event in the region during the last decade

and an event popularizing Serbia all over the world. Some 50 years ago, at the first Dragačevo Brass Band Festival, the contents based on folk art, handicrafts and tradition were the fundaments of the event programme. The Dragačevo Brass Band Festival is one of the most visited events in Serbia, with guests from all around the world. The commercial character of this event influenced changes in its contents, while traditional values are declining in the wake of the modern lifestyle.

**Graph 7.** *The impact of local government on the development and promotion of events*




**Source:** *The work of authors*

The majority of students, 93.6%, deems that the local administration can have a major influence on the development of events. Without the local administration financial support it would be difficult to organize and promote certain events. The most answers of participants regarding the activities necessary for Serbia to become a country of events were related to investments in accommodation capacities, infrastructure, promotion and event organization. The limiting factor the students noted was the infrastructure, or the inaccessibility of the areas where local events are held. A large number of events are inaccessible owing to inferior transport links and the absence of direct bus lines to the local event locations. The second problem is the lack of accommodation capacities in the event areas. The accommodations are usually privately organized by the local population, but it is still insufficient.

## Conclusion

Holding events contributes to: the promotion of tourism for certain destinations through visits from outside of the local community, which influences creation of image; the increase of the local population awareness of the importance of traditional values; the increase of tourists' expenditure; the creation of new contents and the local infrastructure improvement. Authentic events in rural local communities, with unique cultural values and traditions could generate a high degree of visitor satisfaction.

An important activity in the development of event tourism in Serbia is defining the profile of the target group of tourists for various types of events and defining the best means of communicating with them with intensive information on organizing specific events. Events as tourism products, with adequate investments, could contribute to tourism prosperity. For further development of this specific tourism type a strategic approach, that includes implementation of global standards and continual quality control, is necessary.

Our of a large number of events in Serbia only a few, which are held in urban and rural areas, have the popularity that crosses state borders and attract an impressive number of foreign visitors. For numerous other events to become attractive a more adequate organization and popularization are necessary. It is evident that the competitive shortcomings of event tourism are: the adequate positioning in the local and foreign markets, the low level of awareness of events in Serbia, the insufficient accommodation and catering facilities of adequate quality, a low number of specialized markets connected to the local products and traditions (souvenirs, handicrafts, local food), inadequate guideline for promotion and development of locally significant events, a low level of public transport and accessibility of destinations, inconsistency in prices and quality. For those types of activities professional teams and institutions that work in event development and promotion are necessary. Permanent research of this specific field is necessary as is a continual following of its influence on the development of tourism in Serbia as a whole, especially in the rural areas. Events could reach a higher level, through private and public partnership, and the cooperation between event organizers and the local population is especially important, since it increases dedication to events. Local population should learn that the event benefits could be manifold: renting accommodation, selling souvenirs and other products, part time jobs in organization teams, additional jobs in catering. Forming a database of tourism events in Serbia is an important step in better promotion and organization. In that regard event potentials may be defined and their development plans could

be created. Through marketing and a combination of local specificities and modern and dynamic organized events, with strategic governmental support and long-term planning, better effects and renown for Serbia as an event country could be achieved.

## References


1. Andersson, T., Lundberg, E. (2013). *Commensurability and sustainability: Triple impact assessments of a tourism event*. Tourism Management, Elsevier, 37, 99-109, (http://ac.els-cdn.com/S0261517713000034/1-s2.0-S0261517713000034-main.pdf?_tid=30101d26-8c15-11e3-bc84-00000aacb35f&acdnat=1391351018_5821155c1333d90000e732fb6aa3b4fd)

2. Baade, R. A., Matheson, V. A. (2004). *The quest for the cup: assessing the economic impact of the world cup*. Regional Studies, Vol. 38, No. 4, Taylor&Francis, 343-354, (http://web.b.ebscohost.com.proxy.kobson.nb.rs:2048/ehost/pdfviewer/pdfviewer?vid=3&sid=f8f083be-7826-47c5-a44c-8091d342d963%40sessionmgr112&hid=127)

3. Baptista, A. H., Campo´n, C. A. M., Ferreira, M. A. V. (2010). *Impacts of small tourism events on rural places*. Journal of Place Management and Development, Emerald, Vol. 3, No. 1, pp. 22-37, (http://www.emeraldinsight.com/journals.htm?issn=1753-8335&volume=3&issue=1&articleid=1845945&show=abstract)

4. Bjeljac, Ž., Ćurčić, N. (2005). *Ethnographic Events in Vojvodina as Part of Tourist Offer*. Geographica Panonica, University of Novi Sad – Faculty of Science – Department of Geography, Tourism & Hotel Management, No. 9, 59-64, Novi Sad.

5. Бјељац, Ж. (2006). *Туристичке манифестације у недовољно развијеним просторима Србије*. Гласник Српског географског друштва, Српско географско друштво, 86 (1), 245-256, Београд.

6. Бјељац, Ж, Ћурчић, Н. (2008). *Туристичка валоризација жетелачких свечаности у Србији*. Зборник радова Географског института Јован Цвијић, ГИЈЦ, св. 56, 177-192, Београд

7. Бјељац, Ж. (2010). *Туристичке манифестације у Србији* (ISBN 978-86-80029-52-8). Посебна издања, књ. 82, ГИЈЦ, Београд.

8. Brankov, J., Bjeljac, Ž., Popović, B. I. (2009). *Haymaking on Rajac mountain – tourist event, analysis according to gender and age structure.* Journal of Geoghraphical Institute Jovan Cvijić SASA, Geoghraphical Institute Jovan Cvijić, 59 (1), 54-70, Belgrade

9. Byrd, E.T., Bosley, H.E., Dronberger, M.G. (2009). *Comparisons of stakeholder perceptions of tourism impacts in rural eastern North Carolina*. Tourism Management, Elsevier, Vol. 30, No. 5, pp. 693-703, (http://ac.els-cdn.com/S0261517708001623/1-s2.0-S0261517708001623-main.pdf?_tid=ad0ba1b0-8c15-11e3-acbb-00000aacb362&acdnat=1391351227_05d9132bf94f3237e2a914ccecfff670 )

10. Crompton, L.J., McKay, L.S. (1997). *Motives of visitors attending festival events.* Annals of Tourism Research, Elsevier, Vol. 24, No. 2, 425–439, (http://ac.els-cdn.com/S0160738397800102/1-s2.0-S0160738397800102-main.pdf?_tid=10c2b55c-8c18-11e3-b1dd-00000aacb362&acdnat=1391352254_32481bbc26c69d7b7b4203e5b02e93c0)

11. Djordjević–Milošević, S., Milovanović, J. 2012. *Održivi turizam u funkciji ruralnog razvoja – mala poljoprivrena gazdinstva i ruralni turizam u Srbiji* (ISBN 978-86-86859-27-3). Fakultet za primenjenu ekologiju Futura, Agroznanje, FAO, Beograd–Vršac–Budimpešta.

12. Flognfeldt, T. (1999). I*mpacts of short-time visitors on local communities in the mountain areas of Southern Norway.* International Journal of Tourism Research, Wiley Online Library, Vol. 1, Issue 5, pp. 359-373, (http://onlinelibrary.wiley.com.proxy.kobson.nb.rs:2048/doi/10.1002/(SICI)1522-1970(199909/10)1:5%3C359::AID-JTR202%3E3.0.CO;2-9/pdf)

13. Fredline, E., Faulkner, B. (2000). *Community Perceptions of the Impacts of Events.* Events Beyond 2000: Setting the Agenda, Proceedings, July 15–16, Sydney, Australian Centre for Event Management, School of Leisure, Sport and Tourism, University of Technology, 60–74

14. Gelan, A. (2003). *Local economic impacts: the British open*. Annals of Tourism Research, Vol. 30, No. 2, pp. 406-425, (http://ac.els-cdn.com/S0160738302000981/1-s2.0-S0160738302000981-main.pdf?_tid=82437ebe-8c18-11e3-a663-00000aacb360&acdnat=1391352444_5e8cf27112b2ac535f57e4a34c80d89a)

15. Getz, D. (2008). *Event tourism: Definition, evolution, and research.* Tourism Management, Elsevier, Vol. 29, Issue 3, 403–428, (http://ac.els-cdn.com/S0261517707001719/1-s2.0-S0261517707001719-main.pdf)

16. Gibson, H. (1998). *Sport tourism: a critical analysis of research*. Sport Management Review, Sport Management Association of Australia and New Zealand, Vol. 1 No. 1, pp. 45-76, (http://ac.els-cdn.com/S1441352398700993/1-s2.0-S1441352398700993-main.pdf?_tid=9efd1db6-8c19-11e3-adc0-00000aab0f02&acdnat=1391352922_d676a58b58f6ea832045dd5478591161)

17. Goldman, G., Nakazawa, A. and Taylor, D. (1997). *Determining economic impacts for a community*. Economic Development Review, EBSCOhost, Vol. 15, No. 1, pp. 48-51, (http://web.a.ebscohost.com.proxy.kobson.nb.rs:2048/ehost/detail?vid=4&sid=a0e44c75-e283-46bd-a484-26cdbcb33f19%40sessionmgr4005&hid=4209&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=buh&AN=9710292710)

18. Higham, J.E.S.; Ritchie, B. (2001). *The Evolution of Festivals and Other Events in Rural Southern New Zealand*. Event Management, Ingentaconnect, Volume 7, Number 1, pp. 39-49, (http://www.ingentaconnect.com.proxy.kobson.nb.rs:2048/content/cog/em/2000/00000007/00000001/em136)

19. Hong, S. (2010). *Revitalizing tradition through festivals: the role of tourism in the production of a "traditional" festival.* The Tamnaguk Ipchun Gutnori on Jeju, S. Korea, Paper presented at the Global Events Congress IV: Events and Festivals Research: State of the Art, Leeds, UK, July 14–16

20. Ловић С., Бјељац Ж., Цветковић М. (2012). Туристичка манифестација „Дани шљиве – шљиво моја" у Блацу – анализа географског порекла посетилаца и њихових одређених демографских

карактеристика. Зборник радова Географског института Јован Цвијић, ГИЈЦ, 62(2), 83–95, Београд

21. Nemes, G. (2005): *Integrated rural development. The concept and its operation* (ISBN 963 9588 46 6). Institute of Economics, Hungarian Academy of Sciences, Budapest

22. O'Sullivan, D., Pickernell, D., Senyard, J.M. (2009). *Public sector evaluation of festivals and special events*. Journal of Policy research in Tourism, Leisure and Events, Taylor&Francis Online, 1 (1), 19–36, (http://www.tandfonline.com/doi/full/10.1080/19407960802703482#.Uu5oVuXdN34)

23. Panyik, E., Costa, C., Rátz, T. (2011). *Implementing integrated rural tourism: An event-based approach*. Tourism Management, Elsevier, Volume 32, Issue 6, 1352–1363, (http://ac.els-cdn.com/S0261517711000124/1-s2.0-S0261517711000124-main.pdf?_tid=f91c88ca-8c16-11e3-9f74-00000aab0f27&acdnat=1391351785_98e7b2141e6a98765756ac866e7563a0)

24. Тодоровић, М., Бјељац, Ж (2007). *Основе развоја руралног туризма у Србији*. Гласник Српског географског друштва, Српско географско друштво, 87 (1), 135-148, Београд.

25. Sacha, R. (2007). *Identifying Social Consequences of Rural Events*. Event Management, Ingentaconnect, Volume 11, Numbers 1-2, pp. 89-98, (http://www.ingentaconnect.com.proxy.kobson.nb.rs:2048/content/cog/em/2007/00000011/F0020001/art00010)

26. Stokes, R. (2008). *Tourism strategy making: Insights to the events tourism domain*. Tourism Management, Elsevier, Volume 29, Issue 2, 252–262, (http://ac.els-cdn.com/S0261517707000763/1-s2.0-S0261517707000763-main.pdf?_tid=3686068c-8c17-11e3-b630-00000aacb361&acdnat=1391351887_0f252e4d8883575fa1017bb2aaa876e4)

27. S. Štetić, (2011), Poslovni turizam, LI, Beograd.

28. S. Štetić, D.Šimičević, N. Ćurčić (2013), Specifični oblici turizma, LI , ISBN 978-86-84887-09-4 Beograd

29. S. Štetić, D. Cvijanović, D. Šimičević (2014), Posebni oblici turizma Dunavskog regiona Srbije, Institut za ekonomiku poljoprivrede, beograd

30. S. Štetić, D.Šimičević, (2014), Menadžment turističke destinacije, Visoka turistička škola, Beograd

31. Trošt K., Klarić S., Dropulić-Ružić M. (2012). *Events as a Framework for Tourist Destination Branding - Case Studies of Two Cultural Events in Croatia*. Turizam, University of Novi Sad, Faculty of Science, Department of Geography, Tourism and Hotel Management, Volume 16, Issue 2, 65-77, (http://www.dgt.uns.ac.rs/turizam/arhiva/vol_1602_3.pdf)

32. Wilson S, Fesenmaier D., Fesenmaier J, Van es J. (2001). *Factors for Success in Rural Tourism Development*. Journal of Travel Research, SAGE, Volume 40, Number 2, 132-138, (http://jtr.sagepub.com.proxy.kobson.nb.rs:2048/content/40/2/132.full.pdf+html)

33. Wood, E. (2005). *Measuring the economic and social impact of local authority events*. The International Journal of Public Sector Management, Emerald, 18 (1), 37–53, (http://www.emeraldinsight.com/journals.htm?issn=0951-3558&volume=18&issue=1&articleid=1463600&show=abstract)

# EDUCATIONAL POTENTIAL OF RURAL AREAS AND RURAL DEVELOPMENT

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**Abstract**

*The authors point to the educational potential of rural areas as important factor of rural development. Current educational potential in Serbia are inadequate in certain regions and areas which slow down rural development. Trend of uneven rural development is present in contemporary Serbian society. Thus, it is necessary to reduce the existing disparities in the level of development. Educational potential has special role in such process. In order to improve the educational potential of the rural areas some activities are necessary to facilitate transformation of rural areas. By emphasizing the importance of the educational potential of rural areas, the aim of this paper is to point out its role, but also importance and research of the new rural reality based on rural resources in the context of rural development.*

**Key words:** *educational potential, rural areas, rural development, improvement*

## Introduction

Educational potential plays a significant role in the development of rural areas. It changes educational structure of the population and contributes to the transfer of jobs. Also, it leads to the change in concept of education which is regarded as a development engine. The key of success and competitiveness is the ability to adapt, disseminate and applicate modern technology in rural areas, primarily in the agricultural sector but also in other sectors. The goal is to speed up the modernization and, thus, rural development and to enable balanced social development in general.

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According to the Census (2011), the data indicate that there has been an improvement of educational resources in Serbian rural areas.[3] However, there are still some differences in educational structure of rural population (by gender, age, regions, areas and type of settlement) which slows down the development of agriculture, other rural industries and rural development, in general. Based on the data of the rural population's educational structure and their analysis by region, we establish that there are significant disparities in educational potential of rural population.

Therefore, it is necessary to take certain measures to revitalize rural areas. Those measures should be focused, among other, on educational potential in order to reduce the existing educational disbalances. All of this should contribute to the development of modern agriculture and rural areas. However, future rural development will increasingly emphasise not only agricultural development, but also other activities in rural economy. Educational potential and its improvement will have an increasingly important role in such economic and social process.

## Educational potential in rural areas in Serbia

Serbian educational system has experienced very dramatic changes in the second half of the last century. Number of primary and secondary schools and also universities has grown as well as number of teaching staff. Although there was and still is an expansion of educational institutions, sociologists have noticed that access to all levels of education and the achieved educational success are disproportionately distribute among the population. Thus, there are noticeable regional differences, disparities between rural to urban areas, differences that are a product of the social characteristics of the family of origin. Also, education is considered as the most important social mobility channel of the population in all modern societies because it is the most important link to the labor market (Stanojevic 2013).

Our society is facing structural and developmental problems, especially concerning rural areas and population. Deagrarization were with numerous rural structural and functional effects. This process was often carried out randomly, sometimes slowly and with difficulties, at times too fast and too painful, but most of the time with the needless waste of

[3]Compared to the previous census, the proportion of illiterates decreased from 3.45% to 1.96%.

almost all rural and agricultural potentials. With such tendencies in social heritage and in situation in which cannot be a delay in resolving structural and development problems in rural areas, the question is what are the possibilities of educational potential (and education as a process) in reconceptualization of villages in rural development and development of the Serbian, in general.

In the previous period due to rural migration, trend of rural depopulation is present. Young went to the cities in search for an employment or to continue their schooling. That influenced decline in population of rural students and closing down rural schools.

More than 1,500 villages in Serbia (out of 4,600) have no schools, while 750 rural schools have fewer than 15 students to one teacher. Of 3,145 rural primary schools, 2,621 have less than 300 students. 2,121 rural schools have students from first to fourth grade, while 1,022 schools are eight grade (Nenadić 1997). In Serbia, there is process of the continuous increase in the number of small rural settlements with fewer and fewer students and a large number of small schools (Jelić, Jovanović 2013).

**Table 1.** *Rural population aged 10 and over in regions of Serbia, according to gender and literacy (2011)*

| | **Total number** | | | **Number of illiterate** | | |
|---|---|---|---|---|---|---|
| | **Total** | **Male** | **Female** | **Total** | **Male** | **Female** |
| **Republic of Serbia** | 2652264 | 1325039 | 1327225 | 87762 | 14975 | 72787 |
| SERBIA - NORTH | 995477 | 494428 | 501049 | 21944 | 5105 | 16839 |
| Belgrade | 282810 | 140539 | 142271 | 4856 | 847 | 4009 |
| Vojvodina | 712667 | 353889 | 538778 | 17088 | 4258 | 12830 |
| SERBIA - SOUTH | 1656787 | 830611 | 826176 | 65818 | 9870 | 55948 |
| Šumadija and West Serbia | 970113 | 486322 | 483791 | 34467 | 4610 | 29857 |
| South and East Serbia | 686674 | 344289 | 342385 | 31351 | 5260 | 26091 |

**Source:** *Census of Population, Households and Dwellings in the Republic of Serbia 2011*

Educational potential of rural population in Serbia is analyzed based on data on literacy and educational attainment. The educational structure of

the population aged 10 and over in rural areas in Serbia has improved but is still unfavorable, as reflected in the census data (2011)[4].

The share of illiterate people in the regions is different (Tab. 1). Compared to the national level, illiterate ratio is greater in Šumadija and Western Serbia and region of South and East Serbia. However, when analyzing rural areas, differences in the proportion of illiterates are higher and range by approximately 1.5 times compared to the total population. According to the data, population of region of North Serbia is less uneducated while in population of region of South Serbia there is higher proportion of uneducated. Based on the data by regions, number of illiterate women is higher than the number of illiterate men. There are five times more illiterate women than illiterate men. The illiterate ratio is lower in male population. Among population in Southern Serbia, there is more illiterate than in the population of North Serbia. The percentage of illiterates is twice as high in the Serbian South then in the north of Serbia (3.97%). By regions, the highest percentage of illiterates is in Southern and Eastern Serbia (4.57%).

The tendency of decrease of the illiterate population in the total population are still evident in regions and areas. Differences in the proportion of illiterate people in the total population are slightly smaller. However, the illiterate ratio is more evident in rural areas, which significantly affects the slower rural development.

**Table 2.** *Total number of illiterates aged 10 and over, by gender in the villages in Serbia (2011)*

| **Type of settlement** | **2002.** | | | **2011.** | | |
|---|---|---|---|---|---|---|
| Other settlements | Total | Male | Female | Total | Male | Female |
| Illiterate | 173.849 | 26.175 | 147.674 | 87.762 | 14.975 | 72.787 |
| The rate of illiterate | 5,90 | 1,79 | 9,92 | 3,31 | 1,13 | 5,48 |

**Source:** *Census of Population, Households and Dwellings in the Republic of Serbia 2011*

[4]These figures do not include the area of Kosovo and Metohija.

While analyzing educational potential, we have noticed uneven illiterate ratio by regions. Compared to the national average, higher illiterate ratio is evident in the regions of Šumadija and Western Serbia and South and East Serbia. In rural areas, the average illiterate ratio is higher than in the total population. It is because of the fact that illiterate ratio of rural population is influenced by specific determinants such as territorial distribution of villages, the spatial isolation of villages and population, infrastructural facilities of the village and the distance from the center of the municipality, areas and regions and social exclusion of the population in terms of education.

The analysis indicates that the greater the distance from the urban center is, the higher is rural illiterate ratio. In such case, we can speak of significant effect of spatial/territorial isolation of the village on education of rural population. It is a result of the reduced ability to attend school due to lack of road infrastructure and long distances between homes and school. In such situation, rural residents adapt to the circumstances and lifestyle.

As we have mentioned before, educational structure of rural women is unfavorable in relation to the educational structure of rural male population. In the case of illiteracy among women, $^{3}/_{4}$ of illiterate women live in the Serbian countryside. One in five Serbian rural women is illiterate. This phenomenon was expressed due to greater ratio of older women in the age structure of rural women in Serbia. Also, an important role have other factors such as the patriarchal value system, professional role of rural women, their role in the reproduction of rural families, etc. (Čikić, Petrović 2012)

The largest number of illiterate in the villages of Serbia has 65 years and over. The minimal number of illiterate is in rural population between 10 to 14 years of age. We have noticed the trend of growth in total number of illiterate rural population with the increase of years of age. This phenomenon may be related to the migration of young people in the cities. In addition, today's generation know that primary education is mandatory why the parents are trying to make their children complete at least primary school. Further studies depend on the financial resources of the family and of the decisions of the child. While observing literacy by gender, we have concluded that the illiteracy rate among women aged 65 and over is higher compared to men. With a reduction in ages of rural

population this ratio evens out, and at the age of 20-34 years, the number of illiterate men exceeds the number of illiterate women (Census 2011).[5]

Young rural women migrate more to the cities because they want to be educated and to find a better job. That affects rural socio-demographic structure, leaving older women with poor education in villages. A high percentage of illiterate among older rural women is also associated with gender differences which derives from the patriarchal family system. Household assets were limited, so the advantage of education had male children. Those women have a difficult position on the farm. They are helping memebers of a rural household, without pay, lack of health, pension and disability insurance.

**Table 3.** *Total and rural population aged 15 years and over by educational attainment and gender in Serbia (2011)*

| **Republic of Serbia** | Total population (%) | | | Other settlements (%) | | |
|---|---|---|---|---|---|---|
| Level of Education | T | M | F | T | M | F |
| No school | 100 | 18,57 | 81,43 | 100 | 17,66 | 82,34 |
| Incomplete primary education | 100 | 35,60 | 64,40 | 100 | 39,36 | 60,64 |
| Primary education | 100 | 46,40 | 53,60 | 100 | 50,24 | 49,76 |
| Secondary education | 100 | 53,51 | 46,49 | 100 | 57,69 | 42,40 |
| Higher education | 100 | 49,70 | 50,30 | 100 | 52,94 | 47,06 |
| High education | 100 | 47,35 | 52,65 | 100 | 48,95 | 51,05 |
| Total | 100 | 48,26 | 51,74 | 100 | 49,87 | 50,13 |

**Source:** *Census of Population, Households and Dwellings in the Republic of Serbia 2011*

According to data (2011), among the rural population in Serbia aged 15 and over, the largest number of people have secondary education

[5]In rural areas number of illiterates is 87 762 (3.31%) where 14,975 (1.13%) are men, and 72,787 (5.48%) are women. 15-19 years old, 661 are men, and 563 are women; 20-34 years old, 2,327 are men and 2,331 are women; 35-49 years old, 2,214 are men and 2,768 are women; 50-64 years old, 2,938 are men and 6,294 are women; 65 years and over, 6,347 are men and 60,435 are women.

(1,063,177). The number of rural women without education is almost five times greater than the men. Also, the number of rural women with higher education is bigger than the number of rural men. The minimal number of rural population aged 15 years or more with no professional qualification what so ever is among rural population in Northern Serbia, Belgrade region. In the region of Šumadija and Western Serbia, there is the most rural population with incomplete primary education. In all the regions, number of rural women with no education or with incomplete primary education is higher than the number of rural men (Tab. 3).

The majority of the rural population in the region of Šumadija and Western Serbia has primary and secondary education. In Belgrade region, there are more women with primary education than men. In the South of Serbia, this number is higher for men in both regions. In all Serbian regions, ratio of men with secondary school (which lasts less than 4 years) is greater then the ratio of women. Rural children often choose vocational schools, because they do not plan to continue their education. Urban children more often choose high school, because they consider that it is best to continue their education.

15,313 inhabitants of villages in Serbia have higher education. Majority of them are men, except in Vojvodina where the majority of rural population with higher education consists of women. 73.760 inhabitants of the Serbian villages have university education. Majority of them are women, except in the Southern and Eastern Serbia.

## Some problems of education in the villages of Serbia

The educational system in Serbia has a long tradition, developed institutional network and high results in raising the educational level of the population and the provision of professional staff. But even so, there are still major differences between the quality of education and it`s outcomes in rural and urban ares.

There are several problems related to the education of the rural population in Serbia. Thus, we can speak of territorial isolation of villages, inadequate learning conditions in schools, educational programs, financial problems, lack of enrollement of rural children in kindergartens, early dropping out of school etc. The spatial isolation of villages is one of the most serious problems in schooling of rural population. The road infrastructure is inadequate. It is not uncommon for rural children to have

to walk to school for several kilometers, under various weather conditions. This is even more evident problem in mountainous areas where houses are scattered and population density is small. Mountain villages often do not have schools, so students have to travel to the other village where there is school or even to the nearest town.

Process of education is conditioned by many factors. One of them is the social, economic and cultural environment in which pupils attend school and learn. If the environment is appropriate, developed and inspiring, learning outcomes and success in learning will be greater. Even today, there are rural schools in Serbia with any basic schooling requirements. Also, many rural schools in Serbia have been closed down or are facing closure due to the small number of school children (Jelić, Jovanović 2013).

There are no adequate content of the educational programs for rural schools. These contents must be adapted to the needs of life in rural areas. Also, there are not enough classes and learning examples concerning rural way of life. The state has to provide rural children with education that will meet their needs.

Also, in education of rural children, we are often confronted with the issue of dropping out of scholl, either before or after the end of primary school. This happens because of the need for children to engage in activities on the farm. There is still present opinion that farming does not require continuance in education. Dropping out of school is also a consequence of insufficient financial resources, lack of transportation etc. (Stojanov 1976, Čikić 2012).

To improve the state of education in rural areas in Serbia, it is necessary to improve physical and social infrastructure in these areas. Also, there is a requirement for improving communication, introducing internet, improving comfort and hygiene in rural schools, opening of kindergartens. Improvement of education in rural areas also includes introducing modern educational methods and programs that are relevant for the rural population[6].

[6]For example, the municipality of Jagodina in the 2010th launched the program of education of farmers in the premises of the National Library. For farmers was created an electronic library and Market "AgroLib." Aim was to them to sell their products over the internet and to be informed about modern agriculture.Farmers find it difficult to accept innovations, and refused

Education in the future will involve the reconstruction of the educational system. That means reforms of the entire educational system, development of the concept of permanent education that will keep track of the changes in society. In addition to knowledge and skills, education needs to develop creativity, responsibility, flexibility, independence, thinking and decision-making capacity (Komlenović 2004).

## Unbalanced regional development and its determinants

In the past few decades in Serbia, trend of unbalanced regional development is present. It has particularly influenced rural areas which differ among themselves according to their natural, economic, social, political and demographic characteristics. Based on the development as criterion, rural areas can be divided into two main categories.

**Areas with high agricultural productivity and integrated economy** are Vojvodina and the northern parts of Central Serbia around rivers Sava and Danube. Agriculture in these areas has high productivity, due to the application of modern machinery and production technology. In those areas, there are also more developed industrial and service sectors which facilitated integration of agriculture with the food industry. That resulted in higher GDP per capita (compared to other parts of the Serbia). Compared to other industries, there is a higher level of specialization in agriculture. In Vojvodina and the northern parts of Central Serbia, there are favorable geographic and natural conditions for agriculture such as fertile soil, favorable climate with small temperature inversions during the year, low altitude and favorable terrain configuration for machinery use, closeness of rivers and canal system for irrigation, good transportation links and developed road infrastructure. Intensive farming and connections to urban areas provide certain improvement in living standards in rural areas within these regions which manifested as less noticeable rural-urban migration, especially comparing to mountainous regions. Age, gender and educational structure of the rural population are more favorable comparing to similar demographic structures in other regions. That provides relatively adequate human capital in agriculture.

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this type of education. The training was organized later during the winter months when they have the most free time. This program was further expanded and is now used by 52 Jagodina villages. "AgroLib" has won many awards and prizes. Ministry of Culture has an interest in collaboration with billionaire Bill Gates and his foundation to introduce this program to all 311 rural libraries in Serbia (Lopušina, 2013).

Close to the urban centers in Central Serbia, along the rivers and in valleys, there are areas with high agricultural productivity and non-integrated economy. These areas are characterized by a diverse economy, while GDP per capita is at the average level. Agriculture is developed, competitive and mainly market-oriented. Agricultural production is less specialized because of the fragmentation of agricultural land, weaker integration with the food industry and a greater presence of mixed farms. There are problems with environmental pollution in some areas of Vojvodina and the northern parts of Central Serbia (especially Pomoravlje as industrial zone of central Serbia.) due to the presence of industry.

**Areas with low agricultural productivity and extensive agriculture** include mainly mountainous areas, especially in mountainous regions of Southeast Serbia. They are characterized by low population density, scattered rural settlements, underdeveloped road infrastructure, rough terrain, etc. Agriculture is underdeveloped, extensive and extremely unspecifyed, based mainly on livestock and fruit production and exploitation of natural resources (forests, mushrooms and herbs). Compared to the national average, GDP is extremely low. Migration of population in these areas is the most distinct. Social and age structure of the rural population is extremely adverse, which reflects in lack of labor force in agriculture and other industries.

In order to improve chances for rural development and make regional development more balanced, some measures and programs have been undertaken. Therefore, state has established funds for financing agricultural development[7]. Also, Organization for Economic Cooperation and Development (OECD), along with the international funds, has provided funding for the implementation and enforcement of the "Green Plan" [8]. It main purpose is to intensify agricultural production, to strengthen of agricultural holdings, to improve rural quality of life, to develop rural service sector, rural infrastructure, etc. However, in conditions of the unstable economy, monetary disturbances and the gray economy, these funds could not give the expected results.

[7]Fund for the development of underdeveloped regions; Program for revitalization (revival) of villages; Development Fund of the Republic of Serbia.

[8]Under the "Green Plan", the funds were transfered to agricultural households over state enterprises and cooperatives. Thus, state, in addition to farm also helped agricultural enterprises and cooperatives.

In this sense, every package of support measures for any sector of the economy means financial support, development of strategies and support in the form of the adoption of legislation that will help the deployment and implementation of the planned measures and plans. Innovation in the economic system requires the development of regulations, to monitor and prescribe its use. Our country has the potential for the development and promotion of agriculture, but agriculture has not been paid appropriate attention. Based on the current situation`s analysis (SWOT analysis) of rural Serbia, interested parties, along with their active participation in the process of rural development, drafted and approved a vision for rural Serbia until 2013, which is a triptych composed of three "sub-vision": one for agriculture, one for the food industry and for marketing and one for rural economy of Serbia as a whole.[9]

## Strategy of agriculture and rural development of Republic of Serbia 2014 – 2024

Rural development policy reforms in 2013 planned to include six priorities: encouragement of knowledge and innovation transfer; competitiveness increase; promotion of the food chain and risk management; restoration, preservation and enhancement of ecosystems; promotion of efficient use of resources and support to transition to economy with low emissions of carbon dioxide; resistance to climate impacts in agriculture, food and forestry sectors; promotion of social inclusion; poverty reduction and economic development in rural areas. These priorities can be implemented by different measures. EU brings a list of measures. Key measures are those who support various capital investments in production and processing of agricultural products and forestry; land operations, investment in human resources, improvement of quality and safety of food ... Rural development measures will include measures to improve the quality of life and diversification of economic activities in the countryside. These are actions that go beyond agriculture and forestry.

Achievement of the vision requires the full implementation of the strategy, which significantly depends on various external factors: the existence of political stability and the rule of law, institutional reforms,

[9] Plan a strategy for rural development in Serbia, 2009-2013, Republic of Serbia, Ministry of Agriculture, Forestry and Water Management, February 2009, p.21

strengthening of administrative capacity and creation of environment for the operation of the market economy.

In accordance with the vision was set out the strategic development goals such as:
1 The growth of production and the stability of producers income;
2 The increase of competitiveness of domestic and foreign market demands by adapting to technical and technological improvement of the sector;
3 Sustainable resource management and environmental protection;
4 Improvement of quality of life in rural areas and poverty reduction;
5 Effective management of public policies and improvement of institutional framework for the development of agriculture and rural areas

Based on the above-mentioned activities are formulated to achieve the defined objectives:

- improvement of competitiveness of the agricultural, forestry and food sectors;
- preservation and improvement of the environment and ensure sustainable use of natural resources,
- preparation and promotion of local initiatives to improve competitiveness and quality of life in rural areas,
- improvement of the quality of life and promotion of diversification of activities in rural areas.

## Conclusion

Characteristics of rural educational potential in Serbia are unfavorable. There are a significant proportion of illiterate among rural adults and children, which slows down development of rural economy and rural areas, in general. However, it should be noted that there is favourable trend of reducing the number of rural illiterate population, in general and by gender. Although, gender related differences in educational structure are still present. Positive trend in the reduction of rural illiterate ratio is noticeable in all regions and areas, but the most distinctive disparities are between North and the South Region of Serbia.

Educational potential has great importance for rural development in terms of improvement of agricultural production and application of modern technical and technological achievements. Enhancement of educational

level of population (especially, labour force) and acquisition of the necessary and appropriate skills is very important, especially from the improvement of production process point of view. It is well known fact that agriculture provides raw materials for other industries/sectors. Therefore, it is necessary to improve the primary sector by strenghtening the labour force knowlegde, skills, creativity. Since Serbia strive to access European Union, it would be necessary to increase agricultural productivity and ensure national food security. This would affect the establishment of a social and political security in the country, as well as the increase in exports of higher-level processing. Food that is produced in the village would be healthy safe, with as little negative impact on the environment as possible, and with efficient use of all resources. The state should affect more improvement of condition of rural education by reducing financial costs of scholling of those who are prepared to be proffessionally engaged in rural areas. Also, role of state in improvement of rural population`s education refers to the establishment of institutions concerning agricultural development, where farmers could gain some knowledge about the modernization of agriculture,[10] as well as introduce other forms of adult education to improve educational potential, in order to ensure faster and more balanced rural development. Future development of rural areas should be based on solving existing structural problems with the increasingly important role of adequate educational potential and modern concept of revitalization of rural areas.

## Reference


1. Anon (ND). *Obrazovni turizam*. [Internet]. Available at: http://obrazovniturizam.rs/obrazovni_turizam/ [Accessed: 10 December 2013].

2. Babović, M., Vuković, O. (2008). *Žene na selu kao pomažući članovi poljoprivrednog domaćinstva: položaj, uloge i socijalna prava*. Beograd, Scons.

3. Beta (2012). *U Srbiji nema jednakog pristupa visokom obrazovanju*.. [Internet]. Available at: http://www.euractiv.rs/ljudska-prava/4405-u-srbiji-nema-jednakog-pristupa-visokom-obrazovanju [accessed on 10 December 2013]


[10]It should be open more services in addition to the existing 12 in Vojvodina and 22 in Central Serbia (www.poljop.gov).

4. Bogdanov, N., Tomanović, S., Cvejić, S., Babović, M., Vuković, O. (2011). *Pristup žena i dece uslugama u ruralnim oblastima Srbije i predlog mera za unapređenje stanja*. Beograd: UNICEF Srbija

5. Bogdanov, N. (2007). *Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija*. Beograd: UNDP

6. Branković, J., Šabić, N., Babin, M., Lažetić, P. (2012). *Istraživačke politike, finansiranje i produkcijaj – Hratska, Srbija i Slovenija u uporednoj perspektivi.* Beograd, Centar za obrazovne politike.

7. European Comission (2011). *EU Agricultural Economic Briefs*. [Internet]. Available at: http://ec.europa.eu/agriculture/agrista/economic-briefs/2011/04_en.pdf [accessed on 20 December 2013].

8. EP Library (2012). *Rural areas in the European Union*. [Internet]. Available at: http://epthinktank.eu/2012/11/28/4589/ [Accessed 20 December 2013].

9. Gucijan, S. (2010). *SANU traži „belu knjigu" o seoskom obrazovanju*. Politika online [online]. February 4. Available at: http://www.politika.rs/rubrike/drustvo/SANU-Bez-razvoja-sela-nema-buducnosti.lt.html [accessed on December 10, 2013].

10. Gucijan, S. (2013). *Nepismene žene u zapostavljenim selima*. Politika online. [online]. 22 December. Available at: http://www.politika.rs/rubrike/drustvo/Nepismene-zene-u-zapostavljenim-selima.lt.html [accessed December 22, 2013].

11. Gulan, B. (2009). *Obrazovanje i kultura u selima Srbije*. Agropress. [online]. 11 June Available at: http://www.agropress.org.rs/tekstovi/11221.html [Accessed December 12, 2013].

12. Jelić, S., Jovanović, T. (2013), *Institucije kulture kao činioci regionalnog ruralnog razvoja*, Sociološko društvo Republike Srpske, Časopis, Sociološki godišnjak, No. 8, p. 257-274.

13. Koković, D. (2008). *Sociologija obrazovanja*, Banja Luka, NUBL.

14. Komlenović, Đ. (2004). *Školski kirikulum u svetu i primena iskustava u nastavi geografije Srbije.* Ph.D. Thesis, Novi Sad: Faculty of Sciences in Novi Sad

15. Kuleto, V. (n.d). *Strategija obrazovanja do 2020 - 30% više fakultetski obrazovanih*. [Internet]. Available at: http://www.valentinkuleto.com/2012/03/711/ [Accessed December 10, 2013].

16. Lopušina, M. (2013). *Jedinstven program na svetu za obrazovanje seljaka: U njivu s motikom i laptopom*. Večernje novosti online. [online]. 16 November. Available at: http://www.novosti.rs/vesti/naslovna/reportaze/aktuelno.293.html:464052-Jedinstven-program-na-svetu-za-obrazovanje-seljaka-U-njivu-sa-motikom-i-laptopom [accessed on December 10, 2013]

17. Marjanović, M., Markov, S. (2011). *Osnovi sociologije*. Novi Sad, PMF.

18. Markov, S. (2007). *Promene u obrazvonoj strukturi stanovništva Vojvodine*, Zbornik Matice srpske za društvene nauke, 122: 87-104.

19. Nenadic, M. (1997). *Novi duh obrazovanja*. [Internet]. Available at: http://users.beotel.net/~nenadic/selo.html [accessed December 14, 2013].

20. Pavkovic M. (2012). *Obrazovanje seoskog stanovništva*. [Internet]. Available at: http://www.mogucasrbija.rs/Konkurs/4/Konkursi/375/Obrazovanje%20seoskog%20stanovni%C5%A1tva.html [accessed on December 12, 2013].

21. Petovar K. (2013). *Kultura ruralnih zajednica: obrazovanje, nove forme udruživanja i društveni položaj žena*. [Internet]. Available at: http://www.madmarx.rs/2013-02-12/Kultura-ruralnih-zajednica-obrazovanje-nove-forme-udruzivanja-i-drustveni-polozaj-zena [accessed on December 12, 2013].

22. Petrović, Ž., Janković, D., Čikić, J. (2010). *Problems in the extension work and farmers' needs in Serbia*. Economics of Agriculture. Vol. 57. No SI-1 (1-323). p. 91-98.

23. Petrović, Ž., Janković, D. (2010). *Poljoprivredno savetodavstvo Srbije – Stanje, problemi i mogućnosti reforme*. Poljoprivredni fakultet, Novi Sad.

24. Republic Institute for Statistics (2011). Census. [Internet]. Available at: www.rzs.gov.rs [Accessed December 10, 2013].

25. Serbian Academy of Sciences and Arts (2013). *Savet za spas sela*. [Internet]. Available at: http://www.vreme.com/cms/view.php?id=1113286 [Accessed December 12, 2013].

26. Stanojevic, D. (2013) *Međugeneracijska obrazovna pokretljivost u Srbiji u XX veku*, in Lazic, M., Cvejić, S., Promene osnovnih struktura društva Srbije u periodu ubrzane transformacije, Institute for Social Research, Faculty of Philosophy, University of Belgrade, Belgrade, pp. 124-127.

27. Stojanov, M. (1976). *Profesionalizacija rada u poljoprivredi i položaj poljoprivrednika*, Novi Sad, Matica srpska.

28. Čikić, J. (2012). *Obrazovna struktura seoskog i poljoprivrednog stanovništva u Srbiji*. Agroekonomika, Vol. 53-54, br. 3, str. 49-63.

29. Čikić, J. (2012). *Porodično gazdinstvo i razvoj seoskih zajednica* (doktorska disertacija). Novi Sad, Biblioteka Filozofskog fakulteta

30. Čikić, J., Petrović, Ž. (2013). *Diffusion of knowledge in agriculture in Serbia*. In: Škorić, D., Tomić, D., Popović, V. (eds.) Agri-Food Sector in Serbia – State and Challenges. Belgrade: SANU-DEAS. Str. 91-118.

31. Wordpress (2012). *Školovanje iz sela*. [Internet]. Available at: http://sviuselo.wordpress.com/skolovanje-iz-sela-na-daljinu-od-kuce/ [Accessed December 14, 2013].

# PRODUCTION CONDITIONS FOR CARP FARMING IN SERBIA

*Stevan Čanak, Vladan Ugrenović*[1]

## Abstract

*The term carp fish farm in Serbia denotes a fish farm for producing freshwater fish species, i.e. carp and related fish species. Agriculture with fishery takes up an important position within the Serbian economy, whereby aquaculture products have a more relevant position than fish catching in open waters and fish processing. Fish production on carp fish farms holds the most significant place both in terms of quantity of produced fish and its value. Carp fish farms in Serbia are mostly located in the territory of Vojvodina and are related exclusively to the Danube basin as the watercourse for their water supply. Also, future expansion of capacities under carp fish farms is for the most part possible in the same geographical territory. Analysis of natural, socio-economic and conditions relevant for carp fish farms in Serbia has been conducted in the study as well as analysis of legal regulations. Based on that the global assessment of these conditions has been made. The analysis has demonstrated that Serbia has at its disposal excellent conditions for conducting this economic activity, whereby the natural conditions are among the best ones within the European continent.*

**Key words:** *carp fish farms, natural conditions, socio-economic conditions, characteristics of the location*

## Introduction

When conducting any activity, the success of a business venture depends on a range of factors and conditions influencing that particular activity. Agriculture has many specific features with the most important one being dependence on numerous natural conditions. Carp farming represents one of agriculture branches which is exceptionally well developed in Serbia, with possibilities for its further manifold development. Position of carp farming in Serbia and its development in the upcoming period depends on a series of conditions which

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may roughly be divided into natural and social ones. Some of the conditions change slightly over time and remain practically constant, such as soil fertility, climate, etc. while other conditions such as legal regulations or prices of fish and raw material may be subject to major and sudden changes. The goal of this study is to define the most important conditions which influence the production in carp fish farms in Serbia and to conduct an analysis and assessment of their condition and strength, which holds a special importance as our country is moving towards the European Union.

## Carp production in Serbia

In Serbia, carp is produced on carp fish farms, whereby, in our conditions, the term carp fish farm is considered equal to the term warm water pond. Apart from carp which is the main breeding species, other fish species are being bred alongside carp. There are somewhat different data for the area taken up by carp fish farms in Serbia. The data that carp fish farm water mirror amounts to about 12 thousand hectares (Ćirković et al, 2002; Bugarčić, 2007) may be considered correct while the areas under exploitation, according to the data from the Republic Statistical Office (RSO), change year after year. Carp fish farms may be classified based on various criteria, with the most important classification done based on the farms' hydro-construction and production and technological characteristics (Čanak, 2012). Different classifications may be found with other authors, based on several criteria but they may be summed up in the above mentioned manner[2]. Based on their hydro-construction characteristics, carp fish farms in Serbia may be divided differently:

1) According to the type of construction,
2) According to the place of construction,
3) According to their size,
4) According to the water supply method.

According to the type of construction, there are fish farms made of soil – the so-called earth farms, cage farms and silo farms. Earth farms are dominant in terms of number and size; while there are several cage farms and only one silo farm for carp production in Serbia. If the criterion of a farm's place of construction is taken into account, there are farms constructed within river branches, carp fish farms with longitudinal dams, farms on wetland terrains and fish farms on dry terrains surrounded by dams. Orlovat fish farm is an example of a fish farm

[2] For other classifications refer to the studies by Marković (2009), Marković, Mitrović-Tutundžić (2003), Bohl (1999), Bogut et al (2006), Huet (1994), Livojević et al (1967).

constructed within a branch located on river Tamiš. An example of a fish farm with longitudinal dams is located in Baranda, at the fish farm of the same name. Fish farm Živača is an example of a farm developed on wetland terrains as well as Ečka fish farm, part of which was constructed by cultivation of the swamp area. Fish farms surrounded by dams are the most common ones in Serbia and they are the most favoured ones as well. The production facilities – ponds are built on dry terrain (e.g. fields), while the dams are constructed on the existing land area. Carp fish farms in Serbia may be divided in terms of the area they occupy.

**Table 1.** *Classification of carp fish farms in Serbia according to their size*

| Fish farm size (ha) | Number of fish farms (units) | Share in number of fish farms (%) | Fish farm area (ha) | Share in fish farm area (%) |
|---|---|---|---|---|
| ≤ 10 ha | 13 | 16,2 | 92 | 0,8 |
| from 10 to 50 ha | 25 | 33,8 | 542 | 4,7 |
| from 50 to 150 ha | 12 | 16,2 | 1.075 | 9,3 |
| from 150 ha to 500 ha | 19 | 25,7 | 5.460 | 47,2 |
| > 500 ha | 6 | 8,1 | 4.395 | 38,0 |
| **Total** | 75 | 100,0 | 11.564 | 100,0 |

**Source:** *Čanak, 2012*

Based on Table 1, it is evident that large fish farms occupy the largest areas, with farms over 150ha taking up 85,2% of the areas, where at the same time their number is only 33,8% in the total number of the fish farms. The most numerous fish farms are those in the category between 10ha and 50ha, while the fish farms with areas between 150ha and 500ha are the most represented ones in terms of the area they take up. According to the water supply method, fish farms are divided into those with pump filling and gravitational emptying, then there is opposite case, where the filling is gravitational and emptying is conducted by pumps and into fish farms where both filling and emptying are gravitational. In Serbia, the most dominant ones are those fish farms with pump filling and gravitational emptying. Živača fish farm has gravitational filling while emptying is conducted by pumps and Kapetanski rit fish farm and part of Baranda fish farm have gravitational filling and emptying. Based on their production and technological characteristics, fish farms in Serbia may also be classified on the basis of several criteria:

- Completeness of their production process,
- Farming system,
- Fish farming method,
- Structure of the culture.

With regard to completeness of the production process, a difference may be made between the full-system and semi-system fish farms. There are only three full-system farms in Serbia (Sutjeska, Uzdin and Ribnjačarstvo Sremska Kamenica) which are engaged in production of all age categories of carp. With regard to the farming system, there are extensive, semi-intensive and intensive systems. Within the semi-intensive system a higher level of semi-intensive system of farming has been developed within the last ten years, achieved by means of applying complete carp food (extruded or pelleted). A term "partially intensive system" of farming may be seen in some authors' studies (Ćirković et al, 2002). In Serbia, semi-intensive farming system is the most dominant one. In terms of the farming method criterion, i.e. time needed to obtain fish for consumption, there are two types of plants – two years and three years ones. The two years plant is related to an intensive farming system and possibility of selling smaller carp for consumption, while the three years plant is the most present method of carp farming in Serbia, primarily due to the market demand for larger fish. When it comes to structure of the culture, there are monocultures and polycultures. The quantities of the fish produced in carp fish farms in Serbia have changed considerably in the period from the year 2000, i.e. from 3,9 thousand tons (2001) to 12,8 thousand tons (2010). However, since 2005, there has been a constant increase in production, from about 6 thousand tons to more than 11 thousand tons in 2008.

**Table 2.** *Production and structure of production according to fish types for the period 2008-2012.*

| Type of fish | Production structure per years (%) | | | | | |
|---|---|---|---|---|---|---|
| | **2008** | **2009** | **2010** | **2011** | **2012** | **2008-2012** |
| Production (kg) | 11.232.567 | 12.515.036 | 12.794.057 | 11.227.276 | 12.345.524 | 60.114.460 |
| Carp | 79,6 | 82,7 | 83,4 | 82,1 | 79.9 | 81.6 |
| Catfish | 0,3 | 0,3 | 0,4 | 1,5 | 2.2 | 1.0 |
| Silver carp | 11,9 | 12,7 | 9,7 | 7,7 | 10.0 | 10.4 |
| Grass carp | 3,5 | 2,7 | 5,0 | 3,3 | 2.5 | 3.4 |
| Pike | 0,1 | 0,1 | 0,03 | 0,05 | 0.02 | 0.05 |
| Pike perch | 0,1 | 0,1 | 0,05 | 0,1 | 0.1 | 0.1 |
| Other | 4,5 | 1,4 | 1,3 | 5,3 | 5.3 | 3.5 |
| **Summary** | 100,0 | 100,0 | 100,0 | 100,0 | 100.0 | 100 |

**Source:** *Calculated from the data of the Republic Statistical Office*

In Table 2. it is evident that, in the observed period, carp has been the dominant farmed species with 81,6%, followed by silver carp with 10,4% and grass carp with 3,4%. The predatory species are barely represented with hardly over 1,1%, while the other, mainly weed fish species, have a share of 3,5%.

## Carp farming conditions in Serbia

When evaluating conditions for carp production in Serbia one may start from the general conditions for conducting and development of agricultural production (Novković, Šomođi, 2001), where special attention must be paid to specific features of freshwater fishery. Apart from the natural, socio-economic and conditions present in the farm itself, it is very important to take into account the legal regulations directing the business operations of carp farming. The main conditions for agricultural production adjusted to carp fishery of Serbia include the following characteristics:

1. Natural conditions for production in carp fish farms in Serbia:
   - Soil,
   - Water,
   - Climate,
   - Biological and production characteristics of farmed fish;
2. Socio-economic conditions for carp production:
   - Needs of the population for fish consumption,
   - Development of production resources,
   - Distance of markets,
   - Risk from production and business operations,
   - Price parities,
3. Location characteristics – conditions present at fish farms include :
   - Vicinity of roads, electric power, water sources for supply of fish farms,
   - Production tradition of fish farms,
4. Legal regulations directing the business operations of carp fish farms in Serbia.

## Natural conditions for production in carp fish farms in Serbia

When **soil** characteristics are taken into account with regard to renewal and development of production in carp fish farms in Serbia, one must consider quality of the soil, microrelief of the soil, availability for further expansion of areas under fish farms and construction of new fish farms. Significance of the pedological content of the soil is reflected in the fact that better quality soils provide conditions for better development of natural food in the fish farms. Some authors emphasize the role of the pedological content of the soil which influences the physical volume of production, as well as the economic success of the company (Miljković, 1966). Some authors define the concept of natural productivity of fish farms which depends on the pedological content of the soil. In line with this criterion, they classify fish farms as low production, average

production, good production and excellent production fish farms (Horvath et al, 2002). Apart from fertility which is an important condition, another necessary condition is for the soil to have a layer which is water resistant and which should be located at a depth of 1m to 2m, with thickness between 1,5m and 2m (Hristić and Bunjevac, 1996; Rudić et al, 2003). Salted soils are quite adequate for construction of fish farms due to their low price, satisfactory productivity and the fact that no other agricultural production may intensively be used there. Thus they are considered to be the most adequate soils for carp fish farms in Serbia. Soil microrelief has an important role in fish farm construction, whereby the investments for levelling micro elevations and micro depressions may greatly influence the total necessary investments necessary to obtain the investment facility. The most favourable case is the naturally levelled terrain with a mild slope on one side for easier emptying of the pond. Soils adequate for further increase of areas under carp fish farms are located in the territory of Vojvodina and are especially concentrated in Banat. There are estimates that the areas under carp fish farms in Serbia may be increased by over 10 times (Marković et al, 2007) as well as that there is an area of over 100.000 ha in Banat adequate for construction of carp fish farms (Marković, Mitrović-Tutundžić, 2005). Water supply of carp fish farms in Serbia is conducted in the following manner – from the following recipients: rivers (running waters), canal network and underground waters (wells), while emptying of the ponds is conducted into rivers and canals. All the recipients which are used to supply the carp fish farms belong to the Black Sea basin, with the Danube being the gathering river of this basin.

**Table 3.** *Recipients of the carp fish farms in Serbia*

| Recipient | Active surface (ha) | Number of fish farms (pcs) | Share in farm surface (%) | Share in farm number (%) |
|---|---|---|---|---|
| DTD-system | 4.344 | 19 | 37,6 | 25,3 |
| Tamiš | 2.625 | 10 | 22,7 | 13,3 |
| Tisa | 1.450 | 2 | 12,5 | 2,7 |
| Kereš | 550 | 1 | 4,8 | 1,3 |
| Begej | 435 | 5 | 3,8 | 6,7 |
| Jegrička | 393 | 4 | 3,4 | 5,3 |
| Zlatica | 379 | 1 | 3,3 | 1,3 |
| Bunari | 363 | 18 | 3,1 | 24 |
| Dunav | 346 | 2 | 3,0 | 2,7 |
| Kanali | 332 | 10 | 2,9 | 13,3 |
| Other | 340 | 3 | 2,9 | 4,0 |
| **Summary** | **11.557** | **75** | **100** | **100** |

**Source:** *Calculated and amended based on the studies by Bugarčić (2007), Ćirković et al (2003)*

In terms of their area and their number, most of the carp fish farms are using the DTD canal system for their water supply, then there is river Tamiš, also in terms of fish farm numbers and their area. There is also significant data that 18 fish farms with the total area of 363 ha are supplied by water from wells, which is related to intensive fish farms and production of the progeny.

**Water quantity** is an important parameter of a certain recipient, at the moment when a fish farm is being filled with water, as well as during the summer period when it is necessary to re-fill and refresh water in the fish ponds. Huet (1994) mentions that climate conditions in Europe are such that carp fish farms lose about 1 l/s per hectare of evaporating water. The ratio between the maximum and the minimum flow is very important because it indicates the existence of high waters as well as dry periods and it is advisable for it to be as close to value 1 as possible. Table 4 provides the data on flows of some of our water courses from which the carp fish farms in Serbia are being supplied from the most upstream water meter stations for which the data are available.

**Table 4.** *Flows for some of carp fish farms recipients in Serbia in 2012*

| Recipient | Water flow in $m^3/s$ | | Ratio max/min |
|---|---|---|---|
| | maximum | minimum | |
| Tamiš | 90,6 | 1,55 | 58,5 |
| Begej | 56,9 | 10,1 | 5,6 |
| Danube | 3.120 | 1.700 | 1,8 |
| Sava | 1.360 | 241 | 5,6 |

**Source:** *Calculated based on the data from the publication "Testing results of quality of surface and underground waters for the year 2012"*

It is evident from the previous table that some of the recipients have the ratio of maximum and minimum flow rate below 10:1, except in the case of river Tamiš where the said ratio is 58,5:1.

When it comes to **quality of water** for supply of the carp fish farms, there are recommendations in specialist literature (Marković, Mitrović-Tutundžić, 2005) as well as in the laws (Regulation on classification of waters, Official Gazette SRS 70/67). Thus, recommended water for carp farming should not be lower than the second quality class. On the other hand, all our water courses from which the carp fish farms are supplied are classified in certain quality classes and for them the prescribed required quality is the one belonging to class II (Regulation on categorisation of water courses, Official Gazette SRS 5/68). The actual quality of all running waters from which the carp fish farms in Serbia are being supplied occasionally deviate from one or more prescribed value

parameters, and that is mostly happening during the summer months when the best quality water is necessary the most. Quality of water for supply of carp fish farms in Serbia however is not a considerable limiting factor for successful production, because deviations from the prescribed quality are not great. Almost all carp fish farms in Serbia are located in the territory of Vojvodina. Vojvodina is located, as is the rest of Serbia, within the moderate continental climate area. The main characteristic of Vojvodina is its uniformity in terms of elevations with the exception of Vršački breg and Fruška gora, while the microrelief is variable and depends on the locality.

Average annual **temperatures** in Vojvodina for the period between 1981 and 2010 have ranged in the interval of 11,1-12°C according to the data of the Republic Hydrometeorological service of Serbia. Data about tropical days with temperatures above 30°C are relevant since fish farm water may be heated to more than 28-30°C when carp feeding should be suspended. High temperatures of fish farm water are dangerous since they spoil other chemical parameters of the water, mainly they reduce the content of dissolved oxygen and simultaneously increase in the content of ammonium, which represents the most frequent cause of fish dying during the summer in carp fish farms in Serbia. In the same observed period (1981-2010) Vojvodina had an average of 31-40 tropical days a year in the majority of its area.

The feeding season which is determined with number of feeding days in carp fish farms is consistent with the vegetation period in crop farming cultures. The usual practice is to start with the feeding when water temperature reaches 15°C, which occurs in the second half of April or at the start of May. Carp feeding is done until the water temperature goes above 28-30°C when it is temporarily suspended. The feeding is completely suspended however when the water temperature drops below 15°C again, which occurs in October. That way it is possible to achieve no more than some 180 feeding days while the average is about 150-160 feeding days which is the greatest number of feeding days in Europe (Pažur, 1966). According to the same author, length of the vegetation period in Hungary is 5 – 6 months, in Czech Republic 4,5 – 5 months and in Germany and Poland 4 to 4,5 months a year. Huet (1994) notes that, in the Western Europe climate conditions, it takes 3 years to produce carp fit for consumption, while in Central and Eastern Europe it takes 2 years. It takes three years to produce carp fit for consumption in Germany, with a mass between 1kg and 1,5kg (Geldhauser und Gerster, 2002). Schaeperclaus (1998) has made calculations with a mass of 1,25kg for three years old consumption carp. Other authors also note that, due to seasonal changes in water temperature, the consumption size of carp from 1kg to 1,5kg is reached after three years (Horvath

et al, 2002). Winkel (2005) also mentions the cases of consumption carp breeding of 4 years in Germany in the Province of Sachsen. In carp fish farms in Serbia it is possible to obtain the mentioned mass already after two farming seasons.

During the winter months, farm fish are in the state of hibernation, most often densely stocked with the purpose of surviving the winter in special facilities – the so-called winter ponds. Climate occurrences which are relevant to winter hibernation of carp fish species are the number of icy days with maximum temperatures below 0°C, between 11 and 30 of them in Vojvodina and the number of frosty days with minimum temperatures below 0°C. There have been 71-90 of those in the same period. These temperatures ensure the possibility of proper winter hibernation of the fish.

When it comes to precipitation, Vojvodina is among the more dry areas of Serbia with an average annual **precipitation** of up to 700mm. Value of precipitation per months, together with the data about high summer temperatures, reduced relative humidity of air and stronger wind influence the increased evaporation of water from the farm facilities and are included in the calculation of water losses during construction of fish farms (Rudić et al, 2003).
In Vojvodina, **winds** are blowing from two dominant directions, South-East and South-West. Average annual wind speeds at an elevation of 10m are mostly the same for the entire Vojvodina area, with the exception of Vršac where the speeds are higher (Katić et al, 2008). The winds over carp fish farms have strong positive and negative influences. The most positive influence of the wind is reflected in aeration – enrichment of the fish farm water with oxygen which improves the living conditions of the farmed fish. Contrary to that, the same waves damage the dams and thus incur significant reconstruction costs, as well as greater initial investments during construction of the fish farms (Petković, 2003; Petković et al, 1998).

**Biological and production characteristics of the farmed fish species** which are especially important for production are growth tempo, feed conversion rate, survival; cleaning losses, etc. and depend on the carp variety. Institute Szarvas in Hungary has conducted the tests with over 31 different carp varieties where those from former Yugoslavia have also participated (Bakosz, Gorda 2001). The tests have shown a significant deviation from production characteristics depending on the carp variety. Also Steffens (2008) notes that, according to the carp scale variety scale carp and mirror carp achieve higher yields. The difference in the achieved conversion coefficient has a very strong influence on feed costs and may depend exclusively on the carp genetic origin, which must be

taken into account. In Serbia, the carp is mainly bred from progeny obtained from unselected parent fish, so in this segment a significant improvement may be achieved.

## Socio-economic conditions

**Fish consumption** in Serbia (about 7kg per capita) is not at a high level when compared to the European neighbours (about 22kg per capita), however carp consumption has a very long tradition. Serbia represents a traditional market for carp, the consumption of which is of an extremely seasonal character and is connected to the Orthodox Lent periods. Consumption is especially increased during the Christmas Lent and St. Nicholas holiday when greater portion of the produced carp for consumption is sold from the carp farms. Production of fish for consumption in carp farms in Serbia has ranged between 7,4 and 8,3 thousand tons during the last 5 years, which is a consumption of about 1kg per capita in Serbia. Customs and needs of the population related to fish are much greater than production in carp fish farms in Serbia so there is room for further increase in production.

Development of **production strengths** in carp fishery in Serbia may be estimated based on knowledge and experience of employees as well as on quality and availability of the production material.

**Table 5.** *Full-time employees in carp fish farms in the period 2008-2012.*

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2008-2012 |
|---|---|---|---|---|---|---|
| Full-time employees | 587 | 634 | 605 | 583 | 542 | 590 |
| Production (kg) | 11,232,567 | 12,515,036 | 12,794,057 | 11,227,276 | 12,345,524 | 12,022,892 |
| Area under exploitation (ha) | 8,021 | 8,524 | 8,940 | 8,517 | 8,704 | 8,541 |
| Area per employee | 13.664 | 13.445 | 14.777 | 14.609 | 16.059 | 14.5 |
| Production per employee (kg) | 19,136 | 19,740 | 21,147 | 19,258 | 22,778 | 20,371 |

**Source:** *calculated from the data of the Republic Statistical Office*

In the observed five years period there was an average of 590 full-time employees in carp fish farms in Serbia, with a 14,5ha load per employee. It may be observed that the total production per employee has been slightly rising in the mentioned period with an average of about 20 t per employee.

**Competence of employees** may be estimated based on a long tradition of carp culture in Serbia. The consequence of this long tradition is a number of experienced experts at all levels of employment in fishery, from fishery workers and masters to production technology officers. Due to adequate higher education institutions for educating fishery experts and long and rich tradition of fishery, it may be concluded that work of the people in carp farming of Serbia has been developed in a satisfactory way.

**Production material** which is the most significant in carp farming is: carp larvae for production of carp fry, grains used for carp feeding, mostly corn and wheat, as well as complete carp feed (pelleted and extruded). Quality of carp larvae produced in Serbia may be estimated as satisfactory with room for improvement, while availability may be estimated as excellent considering the fact that there are several carp hatcheries in the territory of Vojvodina. Quality and availability of other most important production materials is one of the greatest advantages of carp farming in Serbia. Carp fish farms are located in the territory of Vojvodina which is, at the same time, a traditional manufacturer of quality grains, so availability of this carp feed is excellent. Several large factories of extruded carp feed are also located in Vojvodina (DTD Ribarstvo, Soja Protein, Eco Feed, etc.) so quality and availability of all carp production feed may be estimated as excellent.

Almost entire fish quantity produced in carp fish farms in Serbia is sold at the local market. A difference may be made between three large markets, market of Vojvodina where smaller fish for consumption is used (carp up to 2kg), market of Belgrade where there is no strictly defined limit regarding the size of fish for consumption and market of Central Serbia where large fish for consumption is used, with masses over 3kg.

That way, there are three average distances from manufacturers to markets, i.e. about 70 km for Vojvodina markets, around 100km for Belgrade market and about 250 km for Central Serbia market. Apart from distance from the market, quality of road networks – routes is also important for fish transport, which may be estimated as satisfactory for the Serbian territory.

Freshwater fish is quite specific as goods for transport. The prevailing manner of transport and sale is with fish being alive which increases the costs of transport per fish kg when compared to transport of recently killed fish. Differences in transport costs originate from the quantity of the transported fish and from the need to provide oxygen for transport.

**Risks** originating from the length of production time and climate conditions are the most significant risks in carp farming. These risks may be treated differently. One of the ways is to use the multiannual average data for losses for each age category and farmed fish species when analysing the results or planning the production. These data are known in our specialist literature and practice. The other way is to review the risk separately and to regard it as likelihood that, due to unforeseen circumstances, production might experience a complete collapse. Thus defined production risk is calculated as variable cost in adequate calculations (Bohl, 1999, Schaeperclaus, 1998).

**Price parities** which are the most important ones in carp production in Serbia are certainly ratios of prices of consumption carp and grains which are used the most for its farming.

**Table 6.** *Price parities for carp, wheat and corn for the period 2004-2012*

| Name of product | Price | Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2004-2012 |
| Wheat | din/kg | 7.0 | 7.5 | 9.1 | 11.1 | 15.2 | 9.8 | 12.3 | 18.1 | 21.6 | 11.2 |
| Corn | din/kg | 9.0 | 6.5 | 7.5 | 12.2 | 9.8 | 8.9 | 13.5 | 17.1 | 20.8 | 10.5 |
| Consumption carp | din/kg | 140.8 | 154.2 | 155.5 | 165.5 | 208.5 | 218.3 | 270.8 | 292.2 | 346.2 | 195.2 |
| Carp:wheat | - | 20.2 | 20.5 | 17.0 | 15.0 | 13.7 | 22.3 | 21.9 | 16.2 | 16.0 | 17.5 |
| Carp:corn | - | 15.6 | 23.9 | 20.8 | 13.5 | 21.2 | 24.5 | 20.1 | 17.1 | 16.6 | 18.5 |

**Source:** *Calculated from the data of the Republic Statistical Office*

Table 6. contains price parities for carp and grains mostly used according to the average annual prices. The parity between the price of carp and the price of wheat ranges between 13,7:1 and 22,3:1 in the observed period with an average ratio of 17,5:1. The parity between the price of carp and the price of corn has values between 13,5:1 and 24,5:1 with average ratio for the observed period of 18,5:1. Great differences between the parities in certain years are characteristic for carp fishery in Serbia.

## Location characteristics – conditions prevailing at fish farms

**Characteristics of the location** where construction of new fish farms or expansion of the existing fish farm areas are planned have very important and often deciding role in the economic results of an investment.

**Vicinity of watercourse** for supply and release of water has an influence on the amount of investments during the construction of inflow/outflow canals and on

increased costs of water filling and maintenance through loss in longer canals. The most advantageous case is when the watercourse for water supply is directly next to the fish farm location (Banatska Dubica fish farm, Vršac..) while the long inflow canals are not appropriate (Živača carp farm, Baranda...).

**Vicinity of roads** is the distance from the good quality, mostly asphalt road to the location at the fish farm where reloading of production material and batches of fish for sale is conducted. This length represents the smallest length of the road which must be built within the investment at the beginning and it also increases maintenance costs in case the distance is greater. Examples of a favourable position close to a good quality road are fish farms Živača, Baranda and Ečka – Lukino Selo, while in fish farms Vršac and Neuzina there are great distances between the fish farms and the road.

**Vicinity of electric power source** is a feature of the location which must be taken into account during construction of the fish farm. Investments with the purpose of connecting to electric power for supply of pumps and other consumers as well as maintenance costs are increasing proportionally to the length of this distance.

The area of Vojvodina, where almost all carp fish farms in Serbia are located is distinguished by an extremely well developed infrastructure. Also, there is a great number of rivers in that same territory, a wide canal network and sufficient quantity of underground waters from the first aquifer, thus it may be estimated that location characteristics may have a very positive influence on further development of carp farming in Serbia. The year 1989 is considered to be the starting year of carp culture in Serbia, when a first fish farm – Belo jezero at the fish farm Ečka was built. Shortly thereafter, at the start of the XX century, organised production of fish on the Živača fish farm close to Belgrade was initiated. There is also a long **tradition** in commercial fishing which is mostly related to big rivers such as the Danube, Sava, Tisa, Begej, Tamiš in Serbian fishery. Most of the large carp fish farms in Serbia had been built in the period between the II World war and the eighties of the last century. After summing up the above mentioned, it may be estimated that Serbian fishery tradition is certainly not an obstacle in further development of this field.

## Legal regulations

Apart from the laws which are common with other branches of economy and which regulate business operations of commercial entities, the following laws are specific and have special importance for carp fishery in Serbia:

- Law on agricultural land ("Official Gazette RS" no. 62/06; 65/08/ and 41/09),
- Law on planning and construction ("Official Gazette RS" no. 47/2003; 72/2009),
- Law on waters ("Official Gazette RS" no. 46/91; 53/93; 67/93; 48/94; 54/96; 30/10)
- Law on livestock farming ("Official Gazette RS" no. 41/09),
- Law on protection and sustainable development of the fish fund ("Official Gazette RS" no. 36/09).

In the Law on agricultural land, fish farm areas have been defined under the term "fish farm" as agricultural land which is not arable. Importance of this fact is reflected in the fact that, in order to construct a carp farm on some of the arable land categories, it is necessary to obtain an approval from the Ministry of agriculture and environmental protection about the change of land purpose. Articles 47-71 of the same law are especially important, where the conditions for lease of state-owned agricultural land are prescribed.

In a number of rule books originating from the Law on planning and construction, conditions and procedures for obtaining special permits for fish farm construction are prescribed.

In the Law on waters, waters are protected as the state property, and the manner of their use is defined. In the Rule book originating from this Law (Rule book on the content and form of application for issuing water documents and content of the opinion in the procedure for issuing water conditions, "Official Gazette RS" no. 30/10) there are detailed requirements for obtaining permits for the use of waters. The Regulation on the amount of water fees for the year 2014 ("Official Gazette RS" no. 15/2014) is also important. The manner of calculation and amount of fees for the use of water are prescribed in that document.

Fish production on fish farms is, as a field, classified under agricultural activities in the Law on livestock farming. Definition of aquaculture may be found in this Law as well as other terms relevant to carp fishery. One of the important consequences of this Law is the existence of strictly defined requirements during the farming of parent fish, spawning, production of progeny and open water fish harvesting.

In the Law on protection and sustainable development of the fish fund ("Official Gazette RS" no. 36/2009) there is a manner prescribed for protection of the fish fund in the fishing waters. Article 25 of this Law, where it is prohibited to set up cages for fish farming, is especially important for carp fishery.

This way cage breeding of carp and trout in Serbia is prevented. In the same Law, ways of open water fish harvesting are prescribed as well as fish species which may be used for that purpose. Harvesting with grass carp and silver carp as autochthonous fish species is no longer allowed. Regulation on distribution of incentives in agriculture and rural development in 2014 ("Official Gazette RS" no. 8/14) should also be mentioned. There the amount of monetary incentives is defined for keeping broodstock and production of fish for consumption in the current year. Even though it is still not possible to reply to the question whether the amount of 7 din per kilogram of the produced fish for consumption is enough for competing with fishery of neighbouring countries where fish export is financially supported, this step is by all means positive. After a long time, in the course of last year and in this year, the government has decided to support the field of fishery.

## Conclusion

Conditions for carp production and development of carp fishery in Serbia have been analysed in the study. The analysis included a number of conditions of various nature and impact of action. The analysis of natural conditions has demonstrated that Serbia has lands of adequate quality for construction of carp fish farms at its disposal, whereby areas for additional increase of land under fish farms is estimated at over 100.000 ha.

The quality of water for farming carp species occasionally deviates from the prescribed class in certain parameters, but may certainly be considered good. Quantities of water available for supply of existing and new fish farms are large. The climate for production in carp fish farms is among the most favourable ones on the European continent.

An analysis of the socio-economic conditions has demonstrated that carp fishery in Serbia satisfies only a smaller part of the population' needs for fish, therefore a further increase in production is certainly justified. Production facilities are at a high level of development, and it must be stressed that quality and availability of production materials are at an extremely high level. Distance from the market and quality of the transport network do not represent an obstacle for business operations. Price parities of the carp and the most important grains are subject to great fluctuations in different years.

Testing the conditions in fish farms themselves demonstrates that there are good quality locations in Serbia for further expansion of areas under carp fish farms. Tradition of carp farming in Serbia is significant and supportive of further

development of carp fishery. Legal regulations which define construction and business operations of carp fish farms may be estimated as precise and possibly strict, however a positive improvement must be emphasized in terms of support from the state during the recent period.

## References


1. Bakocs, J., Gorda, S. (2001): Genetic Resources of Common Carp at the Fish Culture Research Institute, Szarvas, Hungary. Rome. FAO Fisheries technical paper 417.

2. Bogut, I., Horvat, L., Adamek, Z., Katavić, I. (2006): Fish farming. Osijek. Faculty of Agriculture.

3. Bohl, M. Et al (1999): Zucht und Produktion von Suesswasserfischen. Muenchen. Page

4. Bugarčić, P. (2007): Geographic characteristics and functions of artificial lakes in Vojvodina. Novi Sad. Faculty of Natural Sciences and Mathematics. Department for Geography, Tourism and Hotel Management.

5. Čanak, S. (2012): Economic effects of establishment and exploitation of the carp fish farms in Serbia. Doctoral dissertation. University of Belgrade. Faculty of Agriculture.

6. Ćirković, M., Jovanović, B., Maletin, S. (2002): Fishery, biology, technology, ecology, economics. Novi Sad. Faculty of Agriculture – Department for Livestock Farming.

7. Geldhauser, F., Gerstner, P. (2002): Der Teichwirt. Eugen Ulmer GmbH.

8. Horvath, L., Tamasz, G., Seagrave, C. (2002): Carp and farm fish culture. Second edition. Blackwell Science.

9. Hristić, Đ., i Bunjevac, I. (1996): Breeding of freshwater fish. Second, enlarged edition. Belgrade. International Contact Agency.

10. Huet, M. (1994): Textbook of fish culture. Willey. Second edition.

11. Katić, V., Popov, Z., Čorba, Z., Dumnić, B., Porobić, V., Rajković, B., Hatziargyriou N., Babić N., Ruman, A., Nenadov, V., Belić, D., Ivanković, D., Drašković, M. (2008): Wind atlas of AP Vojvodina. Study. Faculty of Technical Sciences, University of Novi Sad.

12. Livojević, Z., Sabioncelo, I., Fijan, N., Marko, S., Mihajlović, I., Bojčić, C., Aganović, M., Orešković, D., Đenadić, D., Svetina, M., Kapac, E., Kindij, Z., Ristić, M., Pažur, K., Plančić, J., Tomašec, I., Mitrović, V., and Francetić,

13. M. (1967): Manual for freshwater fishery. Zagreb. Agronomski glasnik.

14. Marković, Z. (2010): Carp – Farming in fish farms and cage systems. Belgrade. Prof. Dr. Z. Marković.

15. Marković, Z., Mitrović-Tutundžić, V. (2003): Fish breeding. Belgrade. Andrejević endowment.

16. Marković, Z., Mitrović-Tutundžić, V. (2005): Problems and perscpectives of aquaculture development in Serbia. Collection of lectures. Faculty of Agriculture. Belgrade. Page 26-32.

17. Marković, Z., Poleksić, V. (2009): Fishery in Serbia. Belgrade. Issue of the book realised within the programme of the project "Improvement of sustainable aquaculture". Belgrade. Prof. Dr. Zoran Marković.

18. Marković, Z., Poleksić, V., Mitrović-Tutundžić, V. (2007): Aquaculture in Serbia. Collection of lectures. Faculty of Agriculture Belgrade. Page 35-40.

19. Miljković, N. (1966): Pedological research for the needs of establishment of artificial fish farms. Ribarstvo Jugoslavije 1: Page 13-14.

20. Ministry of Energy, Development and Environmental Protection. (2013): Results of tests on quality of surface and underground waters for the year 2012. http://www.sepa.gov.rs/download/KVAneks2012.pdf accessed on 13.3.2014

21. Novković, N., i Šomođi, Š. (2001): Organisation in agriculture. Faculty of Agriculture Novi Sad.

22. Pažur, K. (1966): Economics of freshwater aquifer of Yugoslavia. Zagreb. Agrar institute.

23. Petković, S. (2003): Possibilities for protection of dams in carp fish farms. Seminar – Trout and carp farming. Collection of lectures. Belgrade. Faculty of Agriculture of the University of Belgrade. Page 31-37.

24. Petković, S., Vasić, G., Rudić, D. (1998): Project for sanation of damaged slopes of "Vršački Ritovi" fish farm dams. Belgrade. Faculty of Agriculture, Institute for soil amelioration.

25. Republic Hydrometeorological service of Serbia (2013). Serbian climate characteristics. accessed on 15.3.2014 http://www.hidmet.gov.rs/podaci/meteorologija/Klimatske_karakteristike_Srbije_prosirena_verzija.pdf

26. Republic Hydrometeorological service of Serbia (2014). Annual bulletin for Serbia for the year 2013. accessed on 9.3.2014 http://www.hidmet.gov.rs/, podaci/meteorologija/ciril/2013.pdf

27. Republic Statistical Office (2013): Production of fish for consumption and progeny in fish farms. Data obtained upon request.

28. Rudić, D., Marković, Z. i Mihajlović, P. (2003): Principles for designing trout and carp fish farms. Collection of lectures. Faculty of Agriculture, Zemun. Belgrade. Page 20-30.

29. Schaeperclauss, W., Lukovics, M. (1998): Lehrbuch der Teichwirtschaft. Auflage:4. Neubearbeitet. Berlin. Ulmer.

30. Steffens, W. (2008): Der Karpfen. Westarp Wissenschaften.

31. Winkel, S. (2005): Oekonomie der Karpfenteichwirtschaft. Sächsische Landesanstalt für Landwirtschaft. August-Böckstiegel-Straße 1, 01326 Dresden.

# ECONOMIC ASPECT OF CARBON EMISSION

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## Abstract

*Due to economic differentiation in the world negative effects occurred at a global level. Non-global approach to the problem in rich countries caused the pollution to become a global problem because of their policies of transferring 'dirty' technologies into 'third world' countries. This is why it is necessary to introduce the solution of the global problem in economic dimension by introducing oxygen as the fifth main productive element, the others are soil, labor, capital and knowledge,. In connection to this, growing consumption and feedback in production cause growing oxygen consumption through their visible forms.*

**Key words:** *carbon dioxide, carbon monoxide, global temperature growth, carbon dioxide emission coefficient.*

## Introduction

Besides the main product, the problem of modern business operations is that they impose a great number of side products, one of which is carbon. Societies face negative consequences of growing carbon concentration in the environment at the beginning of 21st century such as global warming and related consequences, pollution of eco-system factors and many other problems. Negative effects of such consequences reflect in everyday monitoring of carbon concentration, primarily in air, but also in other elements important for environment protection. Economic dimension of the solution to this global problem can be found in accounting as a fundamental economical discipline which deals with planning, recording, control, analysis and reporting of business events. Only the correctly established global accounting – information system that can stop, that is, reduce global effects in increased carbon emission.

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Mathematically and economically speaking global accounting system would reduce the number of multinational and transnational corporations to ordinary national companies, because it would incorporate national economy into a global accounting-information system. By doing this we would be able to monitor and express values of carbon emitters, the largest oxygen consumers. As market rules request, consumption has to be charged, and production paid off. In this way, payment obligation would be imposed upon the largest oxygen consumers, and the largest producers would be paid for their production. Market management viewed in this way needs to have certain reference points, based on which the system could be established. Therefore, social consciousness of the strongest and largest participants in global social life is necessary. Unfortunately, problems of humankind, as well as everything else in the society, are solved 'at the very last moment'. Social responsibility is reflected through numerous conventions on environment protection, on harmful gases emission reduction, on millennium goals, etc. Besides thus presented elements necessary for environment protection, we cannot disregard financial dimension which imposes the need for constant profit growth. Due to constant wish to have the largest profit possible, great number of companies want to locate their production capacities on the territories where general costs (taxes and local taxes) are lower. This leads national economies to adjust to general race for fresh capital and so reduce fiscal dues, thus reducing compensational possibilities for environment protection. By introducing oxygen and carbon into the production system as a main factor on a global level and through global accounting – information system, these problems could be overcome and a new base for arranging production relations would be created.

## World carbon emission

Air is a mixture of gases that form the atmosphere, and consist of approximately 80% nitrogen, 20% oxygen and very small portions of noble gases, carbon dioxide, hydrogen, ozone, water vapor and various impurities. Carbon, as a chemical element can be found everywhere: in nature, food, fat acids and proteins. Unpolluted air is a base for good health and life of people and whole ecosystem so the problem occurs when this balance is disturbed. Air pollution depends primarily on pollutant type. Polluted air has multiple effects on the entire ecosystem and people's health as well. Combustion of heating materials in individual consumption are main sources of air pollution, as well as industrial activities and traffic. The most frequent pollutants are carbon monoxide (CO), sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), soot micro particles.

Air polluting substances may be, besides others, lead, cadmium, manganese, arsenic, chrome, zinc and other heavy metals and organic compounds, appearing as a result of different activities. Carbon monoxide (CO) is created at incomplete combustion of fossil fuels and it is a very poisonous gas, colorless, odorless and flavorless. Binding itself to an ozone atom, it weakens its structure and thus contributes to the reduction of its size. Emissions mainly come from traffic, thermoelectric power plants and similar. Carbon monoxide is toxic in high concentrations and indirectly contributes to global warming. Carbon dioxide is besides carbon monoxide an even more important pollutant. Quantities of carbon dioxide emitted into the atmosphere at the beginning of world economic crisis in 2008 were reducing, but in 2009 and 2010, the pollution tempo returned to its previous level. 36.4 billion tons of carbon dioxide was emitted into the atmosphere in 2010, which is an increase of 45% compared to 1990.[3]

An estimate of sulfur dioxide emission ($SO_2$) in Europe is of 39 M-tons annually. Sulfur dioxide is created through fossil fuel combustion and occurs in the form of winter smog, most intensively and most frequently in central, south and southeast Europe. Because of this the authorities in countries of these regions initiated the campaign for traffic reduction in central urban areas.[4]

Industrial development imposes the need to monitor and measure the factors created as side products of industrial plants operations. Carbon dioxide ($CO_2$), as a combustion product, has been largely increasing globally with the industrial development, and it is necessary to find the way which makes quantification of its release possible, in order to enable monitoring and influencing its growth. That could be achieved by a formula expression which could be used to calculate the quantity of carbon dioxide created by combustion of certain fuel. Emission coefficient for carbon dioxide ($ECCO_2$) shows the quantity of carbon dioxide released from combustion of certain type of fuel per unit of such obtained heat quantity. Mathematical formula is expressed in the following way:[5]

[3]Valent, V, & Krgovic, V., & Kršikapa, M., & Nikolić, S. (2008.) Energy potentials in the world and their significance in celulose-paper industry, *Chemical Industry* 62(4), p. 223-232

[4]Milojković, J. V., Stojanović, M. D., & Grubišić, M. S. (2009). Greenhouse gases with high global warming potential value - GWP. *Ecologica*, 16(54), p. 197-204.

[5]Živković, M., & Ivezić, D. (2009). Contribution to definition of natural gas carbon dioxide emission coefficient, *Ecologica*, 16(56), p. 610-616

$$CE_{co_2} = 3,67 \frac{fc}{H}$$

where:

- fc stands for carbon in fuel (non-dimensional number in units [kg/kg] or [t/t],
- H stands for thermal fuel power (can be high or low thermal power) in units [MJ/kg or GJ/t],
- 3.67 stands for coefficient of stoichiometric equation of carbon combustion.

The formula shows that the carbon dioxide emission coefficient is expressed in units [kg/MJ] or [t/GJ]. Since both high and low thermal power values can be used at calculation, when presenting the value $CEco_2$, it must be pointed out which one is used. Quantity of $CO_2$ emitted at some fuel combustion, directly depends on quantity of consumed fuel, carbon content in that fuel and thoroughness of carbon combustion. Thus calculated coefficient takes into consideration only so-called direct emission of $CO_2$, that is, the one from the combustion process, disregarding emission from the production process. The coefficient calculated in this way may differ significantly, which is particularly important for biofuels. It should be mentioned that in such combustion, carbon binding oxygen is used and as such represents the base of our presumption for introduction into reproduction process.

**Table 1.** *Carbon dioxide emission coefficient for different fuels*

| **Fuel** | **Emmission, kg$CO_2$/GJ** |
|---|---|
| Biomass | 109,6 |
| Peat | 106,0 |
| Stone coal | 101,2 |
| Brown coal | 97,09 |
| Lignite | 96,43 |
| Diesel | 77,4 |
| Crude oil | 74,1 |
| Kerosene | 73,3 |
| Petrol | 71,5 |
| Liquid oil gas | 63,1 |
| Natural gas | 56,1 |

**Source:** *Besermenji, S. (2007). Pollution of air in Serbia, Collection of Papers of Geographic Institute "Jovan Cvijić", SANU, (57), 495-501*

We can suppose, based on the data obtained in the above table[6], that the most favorable fuel from ecological and economical point of view is a natural gas. It has the lowest carbon dioxide emission coefficient, i.e. the lowest quantity of oxygen consumption for the same realized thermal effect which comes from its composition where methane is definitely most present and then other, lower hydrocarbons.

Natural gas has such composition that it has the least participation of carbon related to other fossil fuels (fc), which is why combustion, besides carbon dioxide, also emits a significant quantity of water vapor. Contrary to natural gas, biomass represents renewable source of energy and is considered $CO_2$ neutral. During its combustion, the same quantity of carbon dioxide that a plant can bind during photosynthesis when growing is released which is, of course, economically relevant in the conditions of equivalent consumption and production.

There isn't a catastrophe in our past or future that could cause such a disastrous effect on civilization and the life on our planet as can be caused by global warming, based on the report of the National Health Academy of U.S.A. Such consideration of this phenomenon demands realistic connections with the theory of limited resources and closed system. So far, the most relevant study on this issue is considered to be the study published after the end of the Intergovernmental Panel on Climate Changes held in 2001 within the United Nations (IPCH), which anticipates that the temperature on the Earth surface could rise from 1.4 to 5.8ºC by 2100. This study foresees that such growth of temperature could cause iceberg and Arctic polar ice caps melting, sea level rise, storm occurrence, animal habitats destabilization and animal migrating north, drinking water salinization, forest massive destruction, accelerated disappearance of plant species and major draught.[7]

If we consider that, due to man's activity, the quantity of $CO_2$ emitted into the atmosphere in this century will be doubled; the circumstances for sudden climate change at a global level could mature, perhaps in the interval of a few years. Such assumptions are acceptable if the oxygen resources at a global level are not increased.

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[6]Besermenji, S. (2007). Pollution of air in Serbia, *Collection of Papers of Geographic Institute "Jovan Cvijić", SANU*, (57), p. 495-501

[7]Lambić, M. (2009, jun) Energy Technologies – Contribution in Environment Pollution Reduction, *Paper presented at the meeting of Ecological safety in post-modern environment*, Banja Luka, BiH.

## The role of economy in carbon emission reduction

The phenomenon of globalization at the level of entire humanity as a global village is an unstoppable process. It is built on sound and modern basis and it is necessary for several reasons. Some of them can be found both in realization and maximization of exploitation of resources which are limited, which evolves from the very title. Each social system consists of two parts: commercial and non-commercial. Within so differentiated parts we can observe four sectors: external, monetary, real and public sector. In order for the society to develop, it is necessary to harmonize relations of these sectors filled with three types of subjects: workers, business subjects (here we think of an enterprise in its economic sense) and state. Business subjects have interest to obtain larger profit, exploiting resources as cheaply as possible. This principle applies to workers, while it goes for state, too, but in modified form. In economic theory and practice so far, the differentiated production factors are: labour, capital, land and know-how.

A new production factor is missing in this sequence, and it is oxygen. The question is why oxygen. Oxygen is an integral part of ozone which is the Earth safety fuse, and therefore, mankind refuge. Carbon is an integral part of all organic compounds on Earth, used to produce energy. Humanity shall exist on the planet of Earth until there is oxygen and possibility for energy production. It is impossible, at an existing level of technological development, to search for a way out in discovering a new solution for life existence in the form of ozone protection by technical means only. This is not only a wrong course but also a wrong direction for solving humanity crisis.

In our research, we find assumptions for solving planetary crisis in monitoring oxygen consumption. Contrary to taxing solution, our solution is directed towards oxygen purchase and selling.

## Accounting aspects of carbon emission

It is impossible to change anything which cannot be recorded using accounting methods. Accounting – information system finds the role in solving this problem in its base. We will explain further on the proposal reproduction system functioning, viewed in this way. By performing their functions, workers and business subjects realize certain profit, which is base for whole society is functioning. State, as an arbiter in economic relations, regulates redistribution of domestic product and thus enables satisfaction of life needs of the whole society (public expenditures). By performing its function in society,

state has become its integral part, and as globalization process accelerated, it strengthened its apparatus. With globalization process acceleration, state assumes its role of a service, just like a car repair service, business subjects and workers being taken as cars.

Such state acting is enabled by existence of non-designated public revenue (tax), which for business subjects and workers means contributions, which, translated to accounting and technical sense can be identified with payment of some obligation without a bill. Such state acting complicates the process of harmonization of international conduct norms and makes reproduction process more complex. Contributions for environment protection are insufficient, since they are not system-solved. It is only system solution which can stop environment destruction. When this problem is observed from different aspect, environment protection aspects are not sufficiently protected in accounting and technical sense. This problem becomes more complex with exhaustion of resources that can be found on the planet Earth. Endangered existential conditions oblige man to look for a new place for living, and so new celestial bodies beyond Solar system are discovered, which indicates that social elite lost hope of survival on the planet Earth. Solution of this very complex problem can be found only in: designating all public revenues (public revenues represent monetary assets that a state accumulates in order to cover public expenditures, they increase state net property at all levels of power and are characterized by: collecting cash, collection regularity, not risking property at making payments and covering costs of general character), introduction of life factors (primarily oxygen) in reproduction process in the form of production factor (production factors regulate material which needs to be input in the process of creating values) and accounting treatment[8] (accounting treatment is primarily linked to accounting aspect of possibility to make quantification records of economic events, and to other accounting aspects of planning, control and analysis of global economic processes) of these processes.

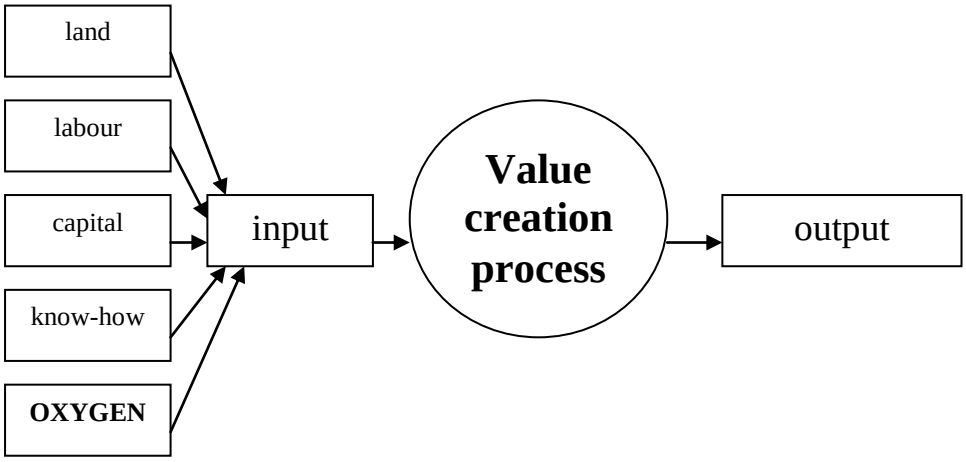
Designation of public revenues gives space to competition, which represent main precondition of mankind survival. Contesting with marketing means, business subjects will exercise influence on resource exploitation reduction and repeated research in the technology field. Population has to know final destination of all their contributions, which is conditioned by technical development. As can be seen, there would be constant upgrade of production forces and production relations, alternately, in this sense. Tax contributions

[8]Milojević, I. (2011). *Accounting*, Beograd, Republic of Serbia, Center for Economic and Financial Research.

prevent the man to follow his money up to a final spending. This kind of attitude would be inevitable at a low level of technique and technology development when it was impossible to designate almost all public revenues.

This kind of designation would be conditioned by globalization process, role of state in global society, as well as by technical capacities. When we speak about globalization process, we have to say that conditions for humanity survival are connected with international integrations which are inevitable. At a global plan, it is necessary to set standards which would be binding for all, on the condition that their definition is linked to logically just and feasible factors. State will have to renounce its strong role at an international plan and thus enable the business subjects to adjust and come closer, aiming at optimization of natural resource exploitation. Such role of state shall be necessary for mankind functioning in the future, as it will turn into a business subject which will perform necessary functions, but in the form of business subject. Technical potentials are the base for introducing current accounts, electronic signature, global accounting system, internet, etc. Production factors upgrade in the form of oxygen implementation in a reproduction process as a production factor builds up a new aspect of modern society development.[9]

**Figure 1.** *Production factors in global reproduction process*




Oxygen, as an integral part of ozone will be, in a global reproduction system one of production factors (global reproduction system represents a system of value creation at a level of global village, which entails a new social system

[9] Milojević, I., & Cvijanović, D., & Cvijanović, G. (2012) Economics aspect of global ecological problems solving, TTEM, BiH, 7(3) 8/9

administration, international business standards (one of them being International Accounting Standards), full mobility of production factors, etc.). Oxygen considered in this way, would implement the existence of a value system which would have functional effects on environment, taken at a global plan. This production factor would require numerous technical and technological solutions, which would primarily reflect on: its measurability, its ownership, purchasing methods, etc. Measurability is conditioned by technical characteristics which can be achieved by measuring scales and measuring gas units. In the previous part, we brought up a formula for carbon monoxide calculation, which can be used to calculate oxygen, too.

Ownership is, in fact, a motive for its introduction to a reproduction process. Production will be rewarded, while consumption will be paid for, which will create conditions for the possibility of just globalization. For example: if an industrialist produces steel and consumes oxygen quantity H in a steel plant, maximum permitted oxygen quantity for consumption is Y (such observed value of maximum permitted oxygen quantity consumed at a level of business subjects would represent an equivalent of today non taxable profit), whereas the amount paid above this maximum would be designated unlike tax which is not designated), difference H-Y is represented by value $\Omega$ which represents the total amount of oxygen consumption. This consumption multiplied with price $\alpha$ gives the amount of oxygen consumption $\delta$.

To this process, we should add the quantity of carbon emitted. For each quantity of produced steel, certain quantity of carbon is released, generated during combustion of fuel needed for production. Now, besides steel as a final product, we have a by-product which pollutes environment. Here we arrive to global challenge which is related to the fact that wherever a producer consumes oxygen (which is present everywhere in the world, its quality is everywhere the same), while the impact of carbon release and related climate changes on the environment is not the same everywhere. Its influence on the environment has increased so much during the last hundred years, so that the differences in carbon effects on different parts of the world have been largely reduced.

The manner of sale and purchase of this production factor is a process which is tied to a state as a business subject, unlike the other production factors. State would represent a sale and purchase service for this production factor, it would redistribute global gross product to the producers of this factor and its consumers. Oxygen included in this way would realize equal starting position in globalization process of technically developed and naturally rich countries.

Accounting treatment of these processes represents the most complex and procedurally hardest part for realization. In the global system of financial transaction system accounting treatment, it would be necessary to establish: business records, book keeping documents and accounting procedures. Within thus established global accounting system it would be necessary to establish an account of these resources, and the concept of a global layout of chart of accounts, as well as an account for treatment of externalities, which would contain all contributions of business subject related to harmful effects to the environment (noise, various waste material, etc.). Some factors have local influence (noise, waste) some have global impact (ultraviolet radiation), so, from this aspect it is necessary to include them in the subject evaluation process. Global oxygen account would be treated by consumers as oxygen cost, and by producer as a global product account. Global externalities account would represent an account of non-material values for business subjects which would, according to automatism principle, reflect their value. Accounting and information system of this kind would solve problems of resource allocation, establish possibility for centralized monitoring of ecosystem sustainability, define the base for reporting fair values of business subject and create possibility for extending human existence on the planet Earth.

**International agreements and conventions about carbon emission**

After becoming aware of the fact that its activities influence the climate change and ozone layer destruction, the world community started taking a series of steps in order to prevent the catastrophic consequences of human activity to the environment. With this goal, a number of international agreements have been signed obliging the countries to protect the environment.

The first World Conference on Climate, held in 1979, acknowledged climate changes as a serious problem. This scientific gathering explored in which way climate changes can influence human activities. The issue of climate changes at a global level was resolved by the United Nations Framework Convention on Climate Change (UNFCCC). The Convention was adopted in New York, in April 1992 and signed at a Summit in Rio de Janeiro in May of the same year.

The most important international agreements related to the protection of the environment are:[10]

[10] Cvijanović, D., & Cvijanović, G., & Puškarić, A. (2011). *Marketing and Ecological Agriculture*, Beograd, Republic of Serbia, Institute for Agriculture Economics.

- Rio Declaration on the Environment and Sustainable Development,
- The Vienna Convention for the Protection of the Ozone Layer,
- The Montreal Protocol on Substances that Deplete the Ozone Layer, and
- The Kyoto Protocol on Greenhouse Gas Emission Reduction.
- The Vienna Convention for the Protection of the Ozone Layer was signed in Vienna on March 22, 1985. In 1985, 21 European countries ratified the Vienna Convention undertaking to protect human health and environment from harmful effects which can arise due to ozone layer damage. Signing countries agreed to take appropriate measures to protect ozone layer from anthropogenic activities.

The Montreal Protocol on Substances that Deplete the Ozone Layer is an international agreement also introduced with the goal to protect ozone layer. The Protocol was signed on September 16, 1987, and became effective on January 1, 1989, and thus made possible for the Vienna Convention for the Protection of the Ozone Layer to become operative. This Protocol accurately determines certain substances with harmful effects and prescribes measures and deadlines for complete abolishment of their production and usage. These are man-made substances, and all of them have common properties to be consistent in lower layers of atmosphere, contain chlorine or bromine, remain in the air for a long time and gradually reach all parts of atmosphere, and even stratosphere, where they are disintegrated under the influence of Sun radiation, releasing chlorine or bromine atoms in the process, which destroy the ozone layer. The Montreal Protocol includes a plan for termination of production and consumption of the ozone layer depletion substances, and control measures for production, export and import of these substances. The Montreal Protocol anticipates gradual reduction of specified substances production, and for some of them not later than 2030. The Montreal Protocol has 191 signing countries so far. If The Montreal Protocol is complied with, it is expected that the ozone layer will recover by 2050.

After the scientific community reported in 1995 that due to increased greenhouse gas emission, climate changes, which are consequence of global warming, already in progress, and that the Earth warmed up for 0.5°C during the last century, the world public started taking measures which would help reduce greenhouse gas emission. In a Japanese city of Kyoto, a conference was held on December 11, 1997, where the text of the United Nations Framework Convention on Climate Change (UNFCCC) Protocol was adopted and is

known as the Kyoto Protocol.[11] With this Protocol, industrial world countries set the goal to reduce greenhouse gas emission for 5.2% in the period from 2008-2012 compared to the reference year 1990. Goals for individual countries are different: from 8% reduction to 10% emission increase. The Kyoto Protocol became effective 90 days after 55 Convention countries whose $CO_2$ emission is minimum 55%, ratified the Annex and the Protocol. Those 55% emission was achieved in 2004, when the Kyoto Protocol was signed by Russia. The Kyoto Protocol officially became effective on February 16, 2005. That concretely means that 30 industrially developed countries have legal obligation to reduce and limit greenhouse gas emission. The Annex I countries are divided in two groups:

1. developed industrial countries, majority of which are members of OECD (Organization for Economic Cooperation and Development), and
2. countries undergoing transition to market economy – Economies in transition (EIT).

All other countries belong to a group of developing and poorer countries (non-Annex I states).

The first national statement of Serbia to the United Nations Framework Convention on Climate Change (UNFCCC) was yet another step further for Serbia in intensification of efforts for reduction of carbon intensity in economy as a part of obligations undertaken by the Energy Community Treaty, and of the process of joining European Union. This will include adoption of national strategy about greenhouse gas emission reduction (GHG). Energy sector (power and heat) produce a great deal of greenhouse gas emission (GHG) in Serbia. It is becoming more and more important to improve understanding of present and future emission in energy sector, as well as of existing measures for alleviation of those emissions. Besides that, Serbia will have to further develop policy and legal frame related to climate and energy in compliance with legal norms of European Union. Particular attention will be devoted to the European Union Emissions Trading Scheme about the large emittents in energy sector, which will become the main instrument of the policy for managing greenhouse gas emissions in energy sector.

[11]Ducić, V., & Đurić, S. (2003). Emission of Carbon-dioxide –Projections and Limitations with critical analysis of the Kyoto Protocol, *Collection of Papers –Faculty of Geography, University of Belgrade*, (51) p. 65-88

The main international conventions which regulate carbon emission financing mechanism in the Republic of Serbia are:

1. Serbia is now a Non-Annex I Party (NAI) in compliance with the United Nations Framework Convention on Climate Change (UNFCCC),
2. Serbia ratified the Kyoto Protocol,
3. Serbia endeavors to become a member of European Union,
4. Membership in the European Union also affects the status of Serbia) in compliance with the United Nations Framework Convention on Climate Change.

The need to implement international conventions and agreements in medium developed countries results from the example of Serbia. In Serbia, 6.2 tons of carbon dioxide ($CO_2$) are annually emitted per capita, which is two times more than in the countries with the same level of income and development , and 28% of energy is spent on transport in Serbia, which is an important pollutant through carbon dioxide emissions. Reduction of pollution in transport may come through public transportation improvement and reduced usage of vehicles using oil derivates. The EU priority is to complete the Trans-European Transport Network by 2050. Before that, by 2030, corridor network should be completed in Europe, including Corridor 10, important for Serbia.[12]

**National solutions for reduction of carbon emissions in some countries**

Carbon dioxide is a gas that is transparent for shortwave Sun radiation and absorbs long-wave Earth radiation, and the temperature in lower atmosphere layers is because of his presence higher than if it was not there. In the last century, the quantity of carbon dioxide in atmosphere increased for about 25%. Carbon dioxide effect is joined lately by some other gas influence (chlorofluorocarbon, or Freon, methane, nitrogen oxide and ozone in troposphere) artificially emitted in atmosphere.

The global goal of reducing carbon emissions has significant contributions by some of the most industrially developed countries. An example can be taken of China, which has plans to obtain 30% of its electrical energy production from renewable resources by the year 2020. In 2005, it adopted the Law on

[12]Boti-Raičević, E., & Žbogar, Z. (2005). Analisys of thermal power plant operations done by Electrical Economy of Serbia in the function of the Kyoto Protocol requirement. *Elektroprivreda*, 58(3),p. 79-83.

Renewable Energy Support. We can find such legal foothold in Germany, too, which also adopted the Renewable Energy Law (EEG).

For example, Australia applies the Law which obliges around 300 largest pollution producers to pay 24$ per ton of greenhouse gas produced. Tax on carbon dioxide emission is necessary for fulfillment of obligations imposed in order to prevent climate changes. In the developed world, Australia is a country with largest gas emission per capita, but due to relatively low population, contributes with 1.5% of gas emission at a global level. Tax on gas emission in the European Union countries varies between 8.7 – 12.6$ per carbon dioxide ton, and it affects most mine industry, air companies, steel plants and energy companies.[13]

With the development of dynamic industrial progress, collecting taxes on gas emission polluting the environment has developed as well. Its beginnings can be found in the need of legislator to tax in some way something that endangers the environment, and the money thus collected can be used for new scientific projects which would help to find new and clean industrial capacities, whose work would provide the same productivity but less harmful gases. Global approach is missing to all this, as gases circulate throughout Earth atmosphere, from one continent to another, and not only around those states which tax harmful gases. It should be added that besides industry, harmful effects are released into the atmosphere by animals, too, which caused even cow taxing in Australia.

**Financial dimension of economy based on carbon dioxide emission**

Modern developed companies are owned through different types of ownerships. They are linked to business subjects through their accounting and legal connections and represent the base for their operations. We will process two main types of property for our research, private and state property, which will contribute to methodological distinctness of research subject statement.

In the observed global financial and accounting system, regulation of ownership over production factors is one of the most important issues. Ownership at a global level should be approximated to a micro level, on the

[13]Lambić, M. (2009, jun) *Energy Technologies – Contribution to environment pollution reductione*, Paper presented at the meeting of Ecological safety in post-modern environment, Banja Luka, BiH

condition that its elements contain main characteristics of modern ownership, such as inviolability. In accordance with thus observed ownership characteristics, existing forms of business subjects, such as: entrepreneurs, proprietorships and partnerships, and corporations, would require its evolutionary character. This evolutionary character would mean in the first sense, respect of ownership rights.

An example of this can be illustrated on the change of pubic into private property. This example shows the role of state which represents transmission mechanism in this process. Business subjects which were born in the form of shareholding companies with social property (shareholding company can have different forms of share ownership, which can appear in the form of: private, state, public, etc. share property).

They have found their accumulation of capital primarily in labor, which is in compliance with the labor value theory, which gave rise to public property. Such share capital accumulation in thus defined shareholding company had public character (public share character is a type of ownership where the ownership is dematerialized, and beneficial ownership dispersed to several parties) which was to be changed into private property. State as a mediator in this case conducts transmission of ownership without assuming ownership, which is in fact needed in order to materialize shares in shareholding company such as this one, which turns group beneficial ownership into individual one.

Frequent example for this kind of ownership change can be found in the term privatization, which cannot be essentially identified with change of ownership of business subjects. Establishing ownership over this new production factor will represent serious problem, unless essential process is implemented into a formal problem of future global reproduction system. The first thing to consider is a model of ownership definition which we presented, where private property will be dominant compared to all others. Private property and accounting statement of business subject value will enable rationalization of production factor consumption which will imply environment protection.

In the domain of oxygen ownership, there are consequences that are identical to those with public property in socialist countries. That is why, a precise and clear establishment of beneficial owner over oxygen has to be carried out in the domain of finance, as some consume (use) oxygen, which is a general good of all people on the planet, for their own interests, without giving any compensation to the others.

## Conclusion

Industry development, resource mobilization and their modern exploitation requires a new overall approach in consideration, monitoring carbon emission as a by-product which affects the environment. Over the past decades carbon concentration has rapidly increased, through knowledge mastering and objectification, increased investment in science and education, expansion of the need for a higher quality life style.

World carbon emission primarily depends on the type of pollution producer it comes from. Whether pollution comes from thermal power plants, traffic, various impurities or chemical industry, it is necessary to express it with mathematical formula in order to be able to express it quantitatively and monitor it. Carbon dioxide emission coefficient represents that very indicator, but its disadvantage is that it shows carbon dioxide obtained from combustion process, neglecting emission from production process. The least emission coefficient is obtained from natural gas combustion due to methane content, while biomass represents a renewable energy resource and is $CO_2$ neutral. Economic globalization as a motor of climate changes enforced itself as a higher stadium of economic integrations. Today, countries are connected into a network of financial, social connections, which resulted in productivity increase within certain branches of national economy. This exposure brought improvement in other branches within national economy. However, a by-effect may occur, which is that those branches simply cannot sustain the tempo of accepting new technologies and work principles. Direct foreign investments go to those branches where there is a domestic factor of competitiveness, which domestic enterprises cannot support.

Economy finds the way in rationalization and maximization of global resources exploitation, which results in social system consisting of commercial and non-commercial part. Society development depends on harmonization of relations among workers, companies and state. Taxing carbon dioxide emitters is a new approach to the solution of climate changes aiming at using accumulated funds for researches in the field of environment protection, development of clean types of industry and its capacities. Europe and Australia are only ones of several global factors, which devoted themselves to this kind of solving and controlling carbon dioxide emission.

Accounting and information system basically finds the role in solving this problem. Contributions to environment protect are insufficient. Only system oriented solution may stop environment destruction. This problem may be

observed also from other aspect, the aspect of environment protection which is not, in accounting and technical sense, protected enough. This problem is becoming more complex with wearing off resources that can be found on Earth. Endangered existential conditions compel humankind to search for the new place of living. Destination of public revenues provides space for competition, which represents the main precondition for man's survival. Fighting with marketing instruments, business subjects affect the resource consumption reduction, and repeated research in technical field. Population has to know the final destination of their contributions, which is conditioned by technical development. Technical potentials create base for introduction of current accounts, global accounting system, internet, etc. Upgrade of all production factors in the form of introducing oxygen and carbon into reproduction process as a production factor, creates a new aspect of shaping modern society.

## References


1. Besermenji, S. (2007) *Pollution of air in Serbia*, Collection of Papers of Geographic Institute "Jovan Cvijić", SANU, (57), p. 495-501

2. Boti-Raičević, E., & Žbogar, Z. (2005) Analisys of thermal power plant operations done by Electrical Economy of Serbia in the function of the Kyoto Protocol requirement. *Elektroprivreda*, 58(3),p. 79-83.

3. Cvijanović, D., & Cvijanović, G., & Puškarić, A. (2011). *Marketing and Ecological Agriculture*, Institute for Agriculture Economics, Beograd, Republic of Serbia,

4. Ducić, V., & Đurić, S. (2003) *Emission of Carbon-dioxide –Projections and Limitations with critical analysis of the Kyoto Protocol*, Collection of Papers –Faculty of Geography, University of Belgrade, (51) p. 65-88

5. Lambić, M. (2009, jun) *Energy Technologies – Contribution in Environment Pollution Reduction*, Paper presented at the meeting of Ecological safety in post-modern environment, Banja Luka, BiH.

6. Milojević, I. (2011) *Accounting*, Center for Economic and Financial Research, Beograd, Republic of Serbia,

7. Milojević, I., & Cvijanović, D., & Cvijanović, G. (2012) *Economics aspect of global ecological problems solving*, TTEM, BiH, 7(3) 8/9

8. Milojković, J. V., Stojanović, M. D., & Grubišić, M. S. (2009). *Greenhouse gases with high global warming potential value – GWP*, Ecologica, 16(54), p. 197-204.

9. Valent, V, & Krgovic, V., & Kršikapa, M., & Nikolić, S. (2008.) *Energy potentials in the world and their significance in celulose-paper industry*, Chemical Industry 62(4), p. 223-232

10. Živković, M., & Ivezić, D. (2009) *Contribution to definition of natural gas carbon dioxide emission coefficient*, Ecologica, 16(56), p. 610-616

# ASSESSMENT OF ECONOMIC EFFECTS OF IRRIGATION IN THE AREA OF THE DANUBE REGION IN SERBIA

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## Abstract

*The assessment of economic effects of irrigation presents a contemporary problem both in practice and scientific research as well. After considering the achievements and approaches to assessment of irrigation effects, here are suggested algorithms which provide more successful and more complex assessment of irrigation effects. Verification of the suggested methods was carried out on 4 regional irrigation subsystems located in Serbia. The subsystems are of different area and on different locations. These systems constitute the water management infrastructure, and were built with the aim of providing water in a water intake. For all 4 selected systems, 18 parameters of economic efficiency were calculated. Those parameters were theoretically explained in the financial, economic and risk analysis. Based on these parameters, it is possible to rank the systems according to the order of construction. The methods suggested in this case are the following: AHP, Promethee and Electra.*

**Key words:** *irrigation systems, financial, economic effects, risk, ranking of systems*

## Introduction

Assessment of irrigation effects is marked by a number of specific features compared to other agro-technical operations (fertilization, plant protection, basic soil cultivation). In this case, the efficiency of an irrigation system which belongs to an agricultural holding is being assessed.

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This efficiency could either be estimated before or after the construction of the system in any year of exploitation. Moreover, assessment of irrigation efficiency can be performed from the aspect of a regional system/subsystem of irrigation, by choosing a different approach. (Potkonjak et. al., 2008)

In assessing the effects of irrigation, there are numerous methods, methodologies and software developed by various institutions of (CB analysis of the EU, World Bank guide, methodology by OECD etc.). There is a wide range of opinions on how to approach the assessment of irrigation effects, from both macro and micro aspects (Potkonjak et al., 2011).

In this case, there is a lack of research into the way in which to perform the ranking of a larger number of potential systems for realization and to suggest the order of construction, having in mind a larger number of effectiveness parameters (technical and economic).

Considering the fact that the expansion of irrigated areas in the following years is expected in the Republic of Serbia, particularly within the Danube region, this assessment of irrigation effectiveness becomes a current issue of even more significance (Potkonjak et al., 2011.)

The research in this paper was based on the development of algorithms for assessment of irrigation effects from the aspects of agriculture and water management. From the aspect of agriculture and by applying advanced search techniques (GIS, GPS), it is necessary to select and define areas suitable for irrigation of particular crops. Depending on the size of potential areas, the type and distance of the recipient, terrain topography etc., water management experts plan the development of a particular regional hydrosystem or subsystem. Since there is a larger number of options for realization, it is necessary to calculate and include the largest possible number of parameters (economic, social, environmental) and rank them by applying contemporary methods of system analysis (Srđević, 2006, Draginčić and Marković, 2013, Zoranović et al., 2013, Raju, 2006) such as: **AHP, Promethee, Electra, DEA.**

The obtained results may serve as the support in making decisions about realization and construction order of regional and local irrigation systems within the area of the Danube region in the Republic of Serbia.

## Macro and micro approach to determining the effects of irrigation

The effects of irrigation within the Danube region in the Republic of Serbia can be evaluated from the macro and micro aspect. The macro aspect includes the assessment of effects in the cases when the country itself is interested in expansion of irrigated areas. On the other hand, the micro aspect includes the assessment of effects in the cases when agricultural holdings (small, medium and large) show interest in the construction of irrigation systems on their own land.

Measures of agricultural and water policy enable the country to encourage the development of regional irrigation systems which constitute the water management infrastructure, making it possible for a larger number of agricultural holdings to use water from the facilities of a regional system. In these cases, a regional system sells water to agricultural holdings according to previously determined rates. Selling of water provides revenue for a regional system, whereas for an agricultural holding, the buying of water is the expense of particular production/crops which uses water for irrigation.

In addition, through agricultural policy measures, a country can stimulate agricultural producers to build local irrigation systems on their own land, and buy water from a regional system.

In this case, the economic interest for the development of irrigation is the following. Management of a regional system should be able to ensure income which would cover the total annual cost of operating of a regional system and make some profits as well, by selling water and water management services.

Planning of the total income is done for every year of exploitation of a regional system/subsystem in the following way:

$$UP = PC_{\text{delivered water}} \cdot QV \quad \text{(dinara, €)}$$

Annual amount of profit in this case is:

$$D = UP - UT \quad \text{(dinara, €)}$$

Where is:

UP – total income from selling water,dinara or €

$PC_{delivered\ water}$ – selling price of delivered water, dinara/$m^3$ or €/$m^3$

QV – planned quantity of water for sale, $m^3$/yearly

D – expected profit from the sale of water, dinara or €

UT – total annual operating costs of regional system, dinara or €

On the other side, by buying water for irrigation, an agricultural holding in this case is faced with the expenses of water on the "water intake" or "hydrant", plus the total cost of irrigation of a local system which is its property, and which includes: amortization, maintenance, driving energy, labour, insurance and interest rate.

Economic interest of agricultural producers for the construction of a local irrigation system on their own agricultural holdings is also the improvement of economic indicators of their business (productivity, economic efficiency, profitability). This can primarily be achieved by pre-structuring of agricultural production and increasing the yield in chosen productions which can cover the total cost of irrigation. Those costs are the following:

**The price of water at a water intake + costs of local system irrigation + increased costs of harvest/ picking for certain products + increased costs of drying, storage, transport and marketing of agricultural products.**

Assessment of irrigation effects from the aspect of local systems of various sizes is carried out in several phases:

- Optimization of the structure of agricultural production (before and after irrigation) on the system for which the assessment of effects is carried out;
- Making of analytical calculations for each crop from the optimal program;
- Calculation of the profit and loss account for each crop by the scheme: ***financial result (+ or -) = total revenue – total production costs;***
- Profit and loss account and performance indicators for the whole agricultural holding;

- Assessment of the contribution of irrigation to the improvement in the economic position of a holding.

Such way of revenue and expenditures calculation with regional and local systems of irrigation establishes economic relations between sellers and buyers of water.

## Developing of an algorithm for assessment of irrigation effects

Expansion of irrigated areas within the Danube region in the Republic of Serbia can be realized in two ways:

- By activating the existing capacities of the Hs Dunav-Tisa-Dunav (Danube-Tisa-Danube) through construction of large and small local irrigation systems
- By constructing new regional hydrosystems and subsystems on the territory of North Backa, Srem and the lowland of Negotin.

The decision making regarding the order of construction and the choice of systems should be supported by financial-economic assessment for the potential systems.

With that respect, a methodology was developed which provides the assessment of economic effects for each system individually. The final phase is the ranking of existing systems according to a larger number of selected parameters, by which the priorities for realization are set.

By including technical and technological parameters in the analysis and ranking, the final selection of systems for realization is suggested.

Generally speaking, the choice of systems for realization interferes with two sectors: agriculture and water management, since irrigation connects the two most significant factors of agricultural production: soil and water.

The role of the agricultural sector in this case is to suggest best locations on which regional and local irrigation systems can be built. The algorithm which relates to the sector of agriculture (figure 1) has been considerably improved by the advancement of new methods and technologies for identification and choice of locations for future systems (GIS, GPS, sensor reading, board computers).

Precision agriculture which is increasingly applied on large holdings encompasses all new innovations and integrates them owing to these new technologies. By using GPS receivers in this case, it is possible to map more precisely the borders of a hydosystem, roads, local irrigation systems and other structures related to a hydrosystem. Moreover, in the exploitation phase of an irrigation system, the data about the beginning of irrigation, fertilization and plant protection can be collected more precisely, ensuring additional benefits for agricultural holdings.

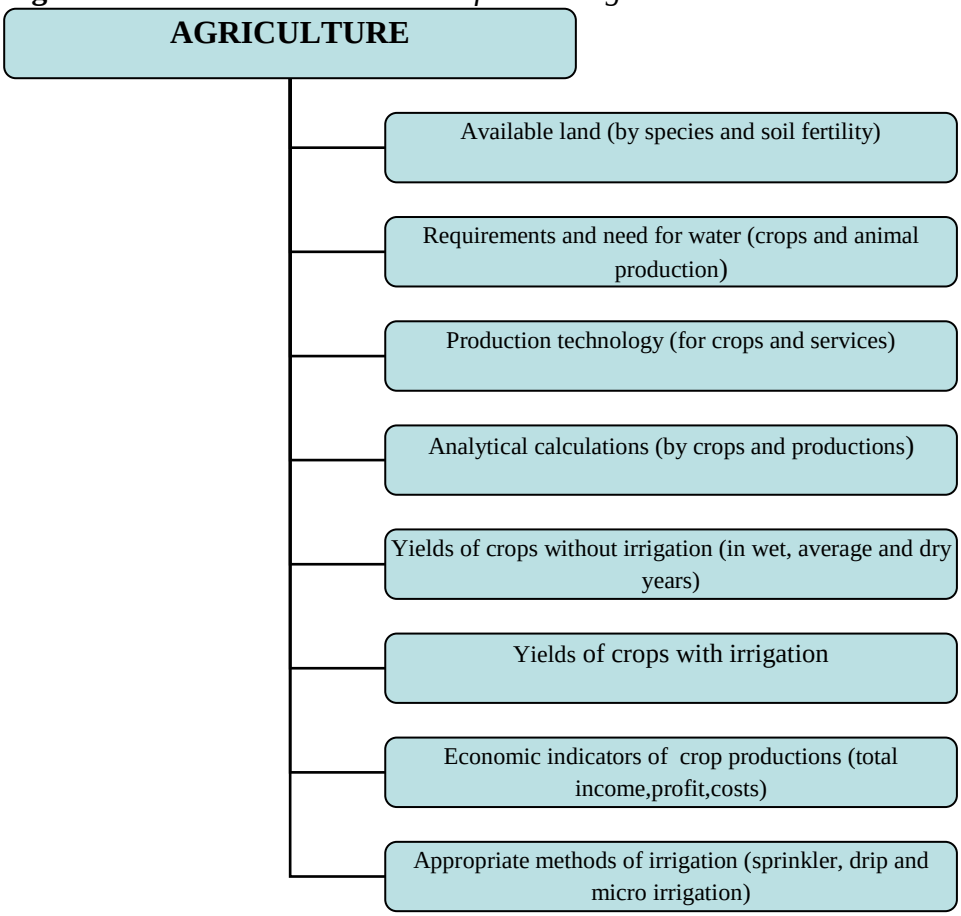
Detecting plant diseases and other ways of soil amelioration can also be done by applying GPS and GIS. The required data in this case are collected from agricultural holdings and advisory services. The obtained data provide assistance to planners and project designers of a particular regional hydrosystem in determining of the system location (regional and local), position and place of a water intake, the size of parcels for irrigation, position of road networks, arrangement of major structures of a hydrosystem (accumulation, pumping stations, canals, pipelines), the choice of irrigation equipment etc.

Apart from precision agriculture, there is also precision irrigation. In recent years, considerable progress has been made in the packages of computer programs which were developed as the support in planning and management of irrigation, such as: IMS, Lora, Irma, Irrisa, Cropwat etc. (Potkonjak et al. 2010). By choosing the right irrigation technology, savings in terms of water and energy should be achieved.

The role of the water management sector is to provide such water infrastructure which will enable local irrigation systems to draw water from common structures. In this case, the first phase is the identification of potential projects of regional irrigation systems on the suggested areas at the level of preliminary project designs and the feasibility assessment of suggested options.

The algorithm which relates to solving of these problems is shown in figure 2. Methodologies and programs used for designing of regional and local irrigation systems have also advanced in recent years.

**Figure 1.** *Flow chart to collect data from the agriculture sector*




**Source:** *Authors own illustration*

The data from the sector of water management are used in identification of potential projects of regional and local systems. In this phase, the area and the form of a system, as well as the technical solution, are defined. Based on these parameters, it is possible to give the cost estimation, installed power for the operation of pumping stations, as well as the number of new employees.

The use of contemporary software for designing of these systems can suggest several options for realization. From the aspect of irrigation technique and technology, it is essential to assess feasibility of each of the suggested options.

The available software which are applied in planning and designing of irrigation systems are: **Micro Cad, IRRICAD Pro, Overlap, WCADI, WinSRFR, IRRSIM** etc.

Suggested options undergo the feasibility analysis. The criteria for feasibility assessment would be the following: the length of construction period (in years, months), the length of the exploitation period (in years, months), possibility of phased construction, i.e. division into subsystems.

According to the suggested methodology, there are three types of analyses carried out in the following steps: **financial, economic and risk analysis** (figure 2).

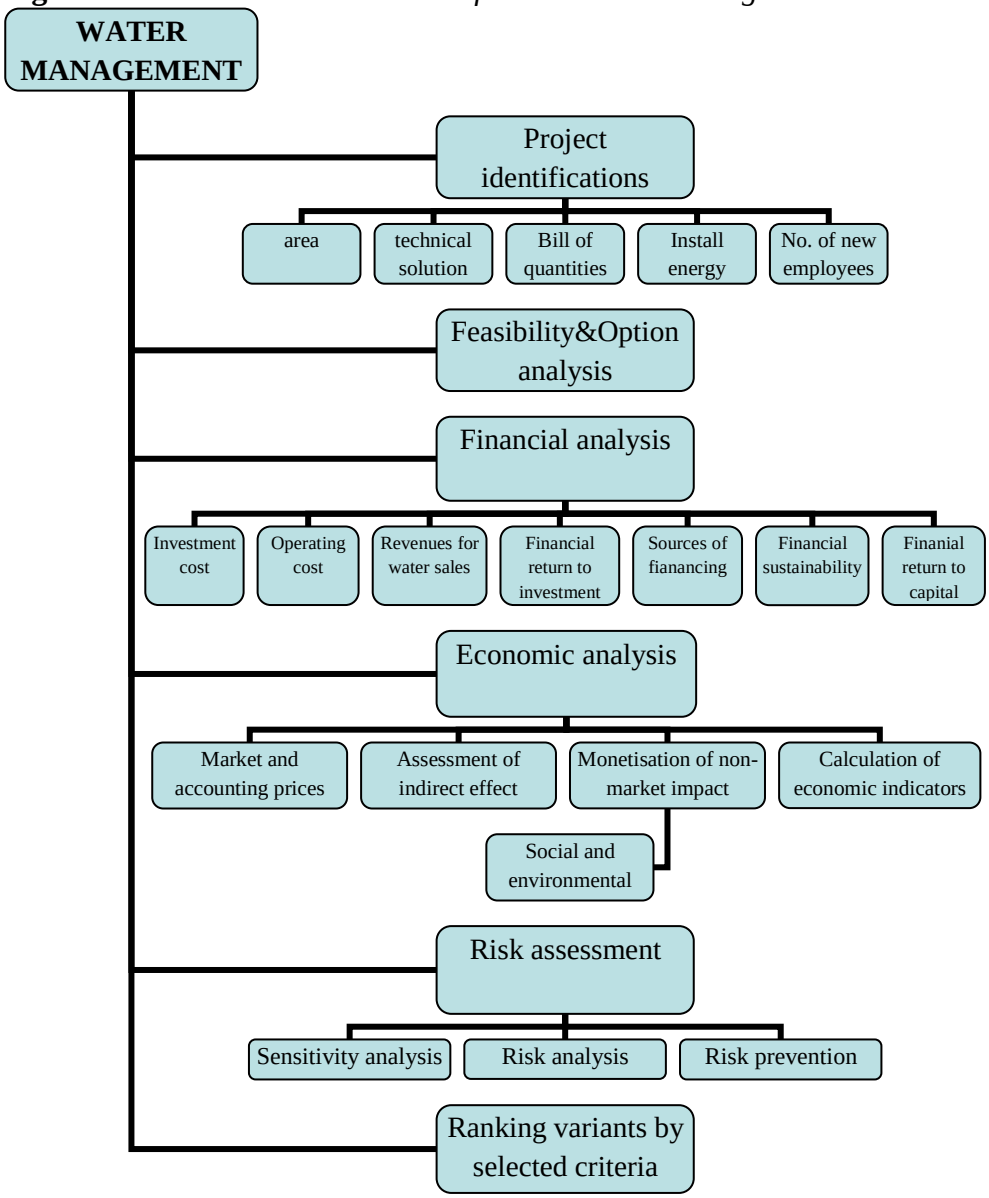
Suggested options are subject to financial analysis. It firstly comprises the estimation of investment, operating costs as well as the projection of revenue from water sales, or the projection of costs of irrigation system exploitation. The research conducted in the area of the Danube region in Serbia (Potkonjak and Zoranović, 2012) indicates that the potential systems for construction (regional, subregional and local) are specific in the way of calculating these parameters and each requires the individual approach. The cost of water for irrigation (regional systems) or the irrigation costs (local systems) ultimately depend on the method of financing the construction of the system.

Based on the previous experience in constructing of regional hydrosystems, subsystems, local systems (small and large), and also on the additional information available, potential sources of funding for this system would be: **budgets, funds, own assets, donations, public-private-partnership, credits.**

Public-private partnership presents one of the options available to municipalities for funding of significant infrastructural projects, in this case of water management services.

Contracts which can result from such partnership should be based on the long-term cooperation between the public and the private sector. The range of cooperation is much broader and comprises activities of funding, implementation and operationalization of projects in the field of construction of water management infrastructure and provision of water management services (Bajčetić, 2010).

**Figure 2.** *Flow chart to collect data from the water management sector*




**Source:** *Authors own illustration*

Partnership models which would be most appropriate in this case are: **Operation&Maintennance Contract (O&M), Build-Own-Operate-Transfer (BOOT), Operation License**, **Finance Only.**

Economic analysis, in which social benefits of regional systems are assessed, is presented in five steps (figure 2). In this phase, market prices should be corrected into accounting prices used in the financial analysis, which is achieved by applying standard and specific factors of conversion.

All the projects of the irrigation system should be the subject of risk and uncertainty assessment. Variables for which irrigation systems should be tested (Potkonjak et al., 2012) are: water consumption $m^3$/ha, construction costs, price of water, utilization of the system.

Further research into this problem should be based on risk prevention, i.e. identifying causes which could reduce or increase economic effect of regional systems projects.

An important phase in summarizing of the effects of irrigation and the choice of realization system is the ranking of potential project variants. This is significant due to the fact that the amount of funds necessary for the realization is considerably greater than the funds available through different sources of funding.

This is particularly the case with loans (World Bank or some other financial institution) where it is necessary to fit within the total of funds available, accepting at the same time the conditions of financing (repayment of loan and interest rate).

Due to these requirements, several methods of operating researches were examined, all of which could be applied in this case. Among others, the suggested methods are:

**Analytic Hierarchy Process (AHP)** is used in the water management sector, especially when multiple and conflicting goals are concerned, and when apart from quantitative, qualitative parameters important for decision-making should also be taken into consideration.

In our country, this method was used in evaluating the dispositions of pumping stations in Vojvodina (Srđević and Kolarov, 2005), choosing the irrigation technology (Srđević et al., 2004), allocation of water depending on the finantial budget (Srđević, 2006), when choosing the most optimal solution for the lining of irrigation canals (Draginčić et.al., 2013) etc.

**Promethee metod** (Preference Ranking Organization Method for Enrichment of Evaluation) is also recommendable in this case for the ranking and choice of the most optimal variant of the regional system / subsystem. Application of this method is more suitable if there are no more than 7 criteria for the ranking.

Research also shows that the improvement of a compromised solution is achieved by combining the AHP and Promethee methods (Dragičić and Marković, 2013).

Method **ELECTRA 1 and 2** belongs to methods of multicriteria optimization, where compromise programming is used in problem - solving. Application of this method requires forming of the matrix of value criteria of functions with system variants and criteria.

This method can be used in the ranking of investment alternatives of projects of water management systems with different purposes, with the existence of multiple criteria. It is necessary to determine relative importance of particular criteria and determine the weight coefficient of differently structured criteria.

Research carried out in our country relates to the choice of irrigation systems (Zoranović and Potkonjak, 2011), i.e. to "multicriteria ranking of the construction of regional systems in the Republic of Serbia" (Zoranović et al., 2013).

Other methods that can also be recommended for the ranking of irrigation systems projects are TOPSIS (Technique for Order Performance by Similarity to Ideal Solution), DEA (Data Envelopment Analysis).

In the case of more complex problems of the choice of projects for realization, it is necessary to use several methods of multicriteria ranking, with the aim of comparison of obtained results, as well as objectivity in examining the projects for realization.

## Assessment of effect on actual systems in practice (case studies)

In order to test the proposed methodology, 4 regional subsystems for irrigation were selected.

**Table 1.** *Comparison of indicators of the efficiency of the irrigation sub-systems*

| No. | Indicators / subsystems | ADA North | ADA South | INĐIJA | GROCKA |
|---|---|---|---|---|---|
| 1 | Area for irrigation, ha | 5317 | 4800 | 1700 | 900 |
| 2 | Total investment, EUR | 19.115.643 | 19.803.838 | 11.199.244,00 | 6.716.970 |
| 3 | Investment in irrigation equipment, EUR | 8.804.952 | 7.948.80 | 2.917.200,0 | 1.479.400 |
| 4 | Investment in infrastructure, EUR | 10.310.691 | 11.855.038 | 8.282.044,00 | 5.237.570 |
| 5 | Unit investment, EUR/ha,infrastructure | 1.939 | 2.470 | 4.872 | 5.819 |
| 6 | Investment per new employee,EUR | 1.288.836 | 1.481.879 | 1.380.341,00 | 1.047.514,00 |
| 7 | Unit cost of exploitation, EUR/$m^3$ | 0.1077 | 0.1225 | 0,2786 | 0,2996 |
| 8 | Unit cost exploitation without amortization , EUR/$m^3$ | 0.10 | 0.12 | 0,1162 | 0,1076 |
| 9 | Selling price of water, for a discount rate of 6% | 0,12 | 0.13 | 0,30 | 0,31 |
| 10 | NPV, (for r=6%), EUR | 1.132.254,00 | 688.883 | 610.036,00 | 72.189,00 |
| 11 | IRR, % | 5.95 | 5,52 | 6,69 | 3,11 |
| 12 | Break even point, % | 88,94 | 93,52 | 91,99 | 96,23 |
| 13 | The minimum quantity of water to deliver, m3/year | 8.723.200 | 8.537.892 | 2.763.383 | 1.602.155,00 |
| 14 | The minimum selling price during the loan repayment, EUR/m3 | 0,1077 | 0,12 | 0,2787 | 0,2999 |
| 15 | Number of new employees | 8 | 8 | 6 | 5 |
| 16 | The cost of electricity, EUR/m3 | 0,0085 | 0,006 | 0,032 | 0,040 |
| 17 | Annual labor costs, EUR | 57.600 | 57.600 | 45.600,00 | 33.600,00 |
| 18 | Annual annuity with 0% interest (infrastructure), EUR | 687.379 | 790.336 | 552.136,00 | 349.171,00 |
| 19 | Annual annuity with 3% interest (infrastructure), EUR | 941.423 | 1.082.431 | 756.196,00 | 478.219,00 |

**Source:** *Authors own calculation*

**Subsystem 1**: The subsystem "Ada North" belongs to the territory of Kanjiza and Senta municipalities. The proposed technical solution relates to the area of 5317 ha. The technical solution proposes the transition of water from the "Tisa-Palic" subsystem by a water intake structure of the capacity of 3.0 $m^3$/s. This subsystem is made up of three parts. Investments in the water infrastructure of this subsystem are estimated to10.31 mil. € and the total investment (along with the irrigation equipment) to around 19.11 mil. €. Unit operating costs of exploitation amount to 0.1077 $m^3$/ha.

**Subsystem 2:** Subsystem ''Ada South" covers the area of 4800 ha. By building of the pumping station ''Kaloca'' with the capacity of 4$m^3$/s, it provides irrigation of 800 ha, and by building of the secondary canal network, it irrigates additional 4000 ha. Investments in the water infrastructure of this subsystem amount to around 11.855 mil. € and the total investment in the subsystem (along with the irrigation equipment) to around 19.8 mil. €. Unit operating costs of irrigation amount to 0.1225 €/$m^3$.

**Subsystem 3**: This subsystem is located on the territory of the municipality of Indjija (Vojvodina). It covers the area of 1700 ha. The technical solution of the system proposes the construction of a pumping station, with the capacity of 720 l/s and the lifting height of lifting of about 82 m, installed power of about 780 kW and a reservoir of 12000 $m^3$ of total capacity. Also, the construction of a booster pumping station is planned, with the flow of 900 l/s, 35m of lift height and installed power of 420 kW. Investments in the water infrastructure amount to around 8.3 mil. € and the total investment with the irrigation equipment amount to around 11.2 mil. €. Operating costs of irrigation are around 0.1162 €/$m^3$, and the planned number of newly employed workers is 6.

**Subsystem 4**: It belongs to the territory of the municipality of Smederevo. The area of this subsystem amounts to 2000 ha and is composed of 4 parts, with the area for realization in this phase amounts to 900 ha. The technical solution plans the construction of a water intake with pumping stations, main pipelines, reservoirs, distributive pipeline network and irrigation equipment. Total investments in the construction (with irrigation equipment) were estimated to 6.71 mil. €. Investment into water infrastructure would amount to around 5.24 mil. € and the unit operating costs around 0.2996 €/$m^3$.

Within the research, the testing of the application of the Electra method (Zoranović et al., 2013) was carried out. The example analyses 4 subsystems but only with 4 parameters. The input data are shown in table 2.

The results of the ranking showed that the Ada North subsystem had the highest rank and consequently was considered to be the best one. In any case, the list of parameters for ranking should be expanded.

According to the suggested methodology for all 4 subsystems, 18 parameters of economic effectiveness were calculated. By doing so, the list of parameters was considerably expanded. In order to make a valid decision about the order of construction, what should be added to this list of economic parameters are also: technical, social and environmental parameters.

The matrix for ranking in this case would consist of two groups of parameters: quantitative and qualitative. Thus the selected method should be the one that can use both groups of parameters, such as Electra, AHP.

**Table 2.** *The parameters of regional subsystems for ranking*

| **Indicators Subsystems** | **Total investment, mil. €** | **Unit cost of using, €/m$^3$** | **Selling price of water for 6% discaunt rate, €/m$^3$** | **Area of subsystem, ha** |
|---|---|---|---|---|
| Ada North | 19,11 | 0,11 | 0,12 | 5317 |
| Ada South | 19,80 | 0,12 | 0,13 | 4800 |
| Inđija | 11,19 | 0,28 | 0,30 | 1700 |
| Grocka | 6,71 | 0,30 | 0,31 | 900 |
| function | min | min | min | max |

**Source:** *Zoranović et al., 2013*

## Conclusion

The assessment of irrigation effects on the area of the Danube region in Serbia presents the final aim of the research. Since the emphasis was on the construction of the higher number of regional systems, the research was oriented in that direction. Advancements of methods in technical design and methods of system analysis, resulted in the improvements in methodology for the assessment of economic effects of irrgation. The procedures in the form of algorithms were developed, making it possible to assess and valorise future systems by applying valid indicators.

In addition to financial, this group of systems also requires the analysis from the social aspect (economic analysis). In that case, it is necessary to determine specific and standard coefficients of conversion as well as conversion from market to economic prices. The risk analysis should be supplemented by prevention. For each of the projects, it is necessary to identify causes and pay attention to them during the realization. Since there is a larger number of systems for realization, it is essential to rank the projects, i.e. determine the order and time of construction, as there are cases when the funds for the construction or the capacities of a contractor are limited. It is not possible to make such decisions without the methods of multicriteria optimization. The results of the research in this case show that the best ranking is achieved by applying the following methods: Electra, AHP and Promethee.

## References


1. Bajčetić M. (2010): *Sistem vrednosti vodoprivrede*. Prometej, Novi Sad, page 390.

2. Draginčić J., Marković V. (2013): *Kombinovanje metoda AHP i Promethee pri izboru najpogodnijeg rešenja oblaganja kanala za navodnjavanje*. Vodoprivreda, 45:275-280.

3. Florio M. at all. (2008): *Guide to Cost-Benefit Analysis of investment projects*. EU commission, Milano, page 259.

4. Montazar A., Zadbagher E. (2010): *An Analytical Hierarchy Model for Assessing Global Water Productivity of Irrigation Networks in Iran*. Water Resources Management 24:2817-2832.

5. Potkonjak S., Bajčetić R., Škorić M. (2008): *Pristup planiranju razvoja regionalnih hidrosistema.* Agroekonomika, broj 39-40, str. 38-45.

6. Potkonjak S., Bošnjak B., Mačkić K (2010): *Ekonomika vodoprivrede i menadžment vodnih sistema*. Zbornik radova I naučno-stručne konferencije „Vode Srbije“. Fakultet tehničkih nauka i Međunarodna menadžerska akademija, Novi Sad, 12. Maj, str. 83-87.

7. Potkonjak Svetlana, Zoranović Tihomir (2012)*: Investments and costs of irrigation in function of agricultural sustainable development.* Sustainable Agriculture and Rural Development in terms of the Republic of Serbia, Strategic goals realization within the Danube region, Institut of Agricultural Economics, Belgrade, Serbia, page 627-644.

8. Potkonjak Svetlana, Božić Mile, Bajčetić Marko, Bošnjak Biljana (2011): *Techno-economic aspects of construction of regional irrigation systems.* 5th Croatian water conference with international participation: “Croatian waters facing the challenge of climate changes“, Proceedings, Opatija, 18-21 May, page 855-863.

9. Potkonjak Svetlana, Mačkić Ksenija, Zoranović T. (2011): *Procena uticaja izgradnje regionalnog hidrosistema na ruralni razvoj*. Ekonomika poljoprivrede, Specijalni broj 1. Beograd, page 389-396.

10. Potkonjak Svetlana, Mačkić Ksenija, Zoranović T. (2012): *Functional Dependence between Planning and Using Irrigation Systems in Conditions of Risks and Uncertaintes*, 5th Conference of Water, Climate and Environment, Ohrid, Republic of Macedonia.

11. Raju S., Kumar N. (2006): *Ranking Irrigation Planning Alternatives Using Data Envelopment Analysis*. Water Resources Management 20:553-566.
12. Savva A., Frenken K. (2002): *Financial and Economic Appraisal of Irrigation Projects.* FAO Sub-Regional Office for East and Southhern Africa, page 73.

13. Srđević B., Kolarov V. (2005): *Varijanta AHP vrednovanja dispozicija crpnih stanica na slivnom području*. Vodoprivreda 37(216-218):203-214.

14. Srđević B. (2006): *LP, AHP and synergy in allocating water related financial budgets*. Vodoprivreda, 38(1-3):85-95.

15. Zoranović T., Potkonjak S. (2011): *Izbor sistema za navodnjavanje primenom višekriterijumskog metoda ELECTRE*. Agrooekonomika 51-52:66-74.

16. Zoranović T., Potkonjak S., Berković I. (2013): *Multicriteria Analysis of Data for Ranking in Construction of Regional Irrigation System in the Republic of Serbia.* Proceedings of International Conference on Applied Internet and Information Technologies, Serbia, Zrenjanin, October 25:177-180.

# STATE OF THE PRODUCTION AND THE COLLECTING OF MEDICINAL PLANTS IN THE REPUBLIC OF SERBIA[1]

*Vladimir Filipović[2], Vesna Popović[3]*

## Abstract

*In relation to the period of 25 or more years ago, the sector of medicinal, aromatic and spice plants (MASP) in Serbia has been on a constant rise, developing new technologies, standards and markets. Nowadays, unfortunately, in spite of the exceptionally rich biofund of this group of plants, production, processing and export of medicinal plants are far below levels of the late 1980s. The cessation of the operation of several major public companies, together with the lack of sufficiently favorable political situation has directed some of the foreign, as well as domestic customers towards the acquisition of raw materials and products in some other markets. Therefore, to restore this sector to the place it deserves, it must act vertically and horizontally. Vertically, towards the institutions that directly or indirectly determine the state of the sector (ministries, chambers, associations, etc.). Horizontally should be acted on the participants in the production and processing.*

**Key words:** *medicinal, aromatic and spice plants (MASP), plantation growing, collecting, quality, product*

## Introduction

The interest in natural medicinal raw materials in the world is growing, it is being invested in the research and the promotion of phytoremedies, standards

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are being introduced (GAP, GACP, Organic, etc.) and continuous education is being implemented concerning the importance of using these raw materials, which primarily refers to the younger population. The growing needs of the international market and for a foreign exchange indicate the importance of adaptation, i.e. the transformation of the production of medicinal plants. Based on the analysis of this sector of the Republic of Serbia, it can be concluded that there are few manufacturers that offer sufficient amounts of export of quality medicinal plants. Serbia has lost its dominant position in the export of medicinal plants in recent years. According to Ignjatijević (2010), during the year 2008, it was at the 31$^{st}$ position in the world by export value. Although, by the early 1990s, Serbia had been the largest exporter of medicinal and aromatic plants to the countries of today's European Union, in the past twenty years or so, we have been pushed out of the acquired positions by Bulgaria, Poland and Hungary, out of the European countries, as well as China and India, out of the Far East ones. Unfortunately, most commonly, we still sell raw materials to foreign buyers and only in a minority of cases, semi-finished products or products of a higher level of processing – extracts, essential oils and phytoremedies.

In the global market of medicinal and aromatic plants dominate European, especially German companies. The greatest concern that deals with plant raw materials in Europe is "Martin Bauer Group" (a holding company from Germany), positioned as a "natural connection" with the branches in 50 countries on 5 continents, and with an annual turnover of 350 million €. Other leading companies include the German "Madaus Group" and the Italian "Indena", with a turnover of 330 million € and 170 million € respectively (Pavlović and Kostić-Nikolić, 2006).

In Germany, an important role in the trade of medicinal and aromatic plants is held by the company "Dr. Willmar Schwabe Arzneimittel", with an annual turnover of over 400 million €, of which over 300 million € comes from phytopharmaceuticals. In Germany today, there are about twenty major wholesalers and seven representatives for medicinal and aromatic plants and their products (essential oils and plant extracts).

For the past period of time, in addition to international ones, there were a large number of domestic firms that bought medicinal raw materials. Some of them were: "Jaka 80" Radoviš, Macedonia; "Alkaloid", Skopje, Macedonia; "Krka", Novo Mesto, Slovenia; "Droga", Portorož, Slovenia; "Lek", Ljubljana, Slovenia; "Aphrodita" Rogaška Slatina, Slovenia; "Pliva" and "Franck", Zagreb, Croatia; those were just some of the enterprises bought up

raw materials from the territory of Serbia. Unfortunately, most of the above mentioned no longer acquire raw materials in the region, which has affected the engagement in this industry, which has been largely decimated. However, in the Serbian market in the last twenty years, there have emerged several, mostly family, businesses, which increase productivity and competitiveness in the domestic and international markets year in year out (Turudija-Živanović et al., 2010).

In our country, experts say, there are many places where such production could be organized. We have the sort of soil that plants need, water resources and favorable climatic conditions. In the rich genofund of medicinal, aromatic and spice plants, the greatest importance is born by the genetic diversity of economically important species (chamomile, mint, sage, St. John's wort, yarrow, wild marjoram, bearberry, valerian, plantain, primrose, etc.), as well as the types of limited native plants and those which are in decline for various reasons. Not enough attention is paid to the evaluation and monitoring of the state of the population of genetic resources of medicinal and aromatic plants and to the need for their conservation. According to the latest voluminous study on medicinal plants, the total number of medicinal and aromatic plant species in our flora is around 700, of which, 420 are officially registered, and around 280 are in trade, based on data from the "Strategy of medicinal plant protection in the Republic of Serbia" (Amidžić et al., 1999).

But in spite of all of the above mentioned, the production of these plants tends to decrease, whereas the interest in their collecting is gradually increasing. On the other hand, as compared to the collecting of wild plants, plantation growing has several advantages. The basic advantages are that, through the means of plantations, natural resources are preserved and raw materials of a more uniform quality are obtained, and there is a choice of acceptable conditions for the production and control of all its phases through the introduction of various standards.

## On the territory of the Republic of Serbia 20,000 hectares of MASP were grown in 2013

The needs of our market for medicinal raw materials are mainly satisfied through collecting; as a matter of fact, 90 percent of plants in trade come from nature. In the last ten to fifteen years, the areas under plantations have been ranging from very important to symbolic ones. According to the data from the Serbian Chamber of Commerce, in 2012, there was 1,337 hectares under grown plants (1,419 hectares in 2011). If we add to it a portion of the areas

under spice plants that are listed as vegetables and a portion of the areas on which it is produced for foreign customers, it makes a total of approximately 20,000 hectares.

According to the areas of growing, the Republic of Serbia can be divided into two production regions: the lowlands (Vojvodina) and the highlands (Central Serbia). In the former region, the most commonly grown ones are: chamomile, peppermint, marigold, lemon balm, coriander, lavender, white and black mustard, valerian, fennel, parsley, basil, cumin, dill, tarragon, marshmallow, celery, thyme, sage and some other less included species. In the hilly and mountainous part of our country, there are plantations of the following: marigold, lemon balm, arnica, lavender, gentian, sage, St. John's wort and others (Table 1).

**Table 1.** *Some of the more sought for plantation grown medicinal plants*

| ordinal number | common name | plant species | grown as |
|---|---|---|---|
| 1 | chamomile | *Chamomila recutita* | Annual |
| 2 | peppermint | *Mentha piperita* | Biennial |
| 3 | marshmallow | *Althaea officinalis* | Annual or biennial |
| 4 | lemon balm | *Melissa officinalis* | perennial |
| 5 | sage | *Salvia officinalis* | Perennial |
| 6 | marigold | *Calendula officinalis* | Annual |
| 7 | valerian | *Valeriana officinalis* | Annual |
| 8 | thyme | *Thymus vulgaris* | Perennial |
| 9 | basil | *Ocimum basilicum* | Annual |
| 10 | fennel | *Foeniculum vulgare* | Perennial |
| 11 | St. John's wort | *Hypericum perforatum* | Biennial |
| 12 | yarrow | *Achillea millefolium* | Perennial |
| 13 | wild marjoram | *Origanum vulgare* | Perennial |
| 14 | nettle | *Urtica dioica* | Perennial |
| 15 | parsley | *Petroselinum sativum* | Annual and biennial |
| 16 | angelica | *Angelica archangelica* | Annual |
| 17 | dill | *Anethum graveolens* | Annual |
| 18 | ribwort plantain | *Plantago lanceolata* | Perennial |
| 19 | buckwheat | *Fagopyrum esculentum* | Annual |
| 20 | white mustard | *Sinapis alba* | Annual |

**Source:** *The presented data have been obtained in touch with suppliers of medicinal raw materials for the needs of production of the Institute for Medicinal Plant Research "Dr Josif Pančić" from Belgrade, located in Pančevo.*

The production and processing of medicinal plants is specific, and is greatly in common with the production of tobacco, vegetables, fruits and flowers. The technological level of production is high in some areas, whereas, in certain other areas, there is a lot of the unknown regarding the growing and collecting of medicinal plants and in those areas, one can encounter inadequate technology of growing and collecting, along with a low level of the training of producers and collectors.

One of the institutions that unify the work in scientific research, practice and production is the Institute for Medicinal Plant Research "Dr Josif Pančić" from Belgrade. This institution is engaged in the studying, producing, processing and trade of medicinal plants and phytoremedies, with a tradition of more than sixty-five years. For the past period of time, the Institute has participated in the design and implementation of the most significant studies, reports and projects in the field of medicinal plants in our country and the countries of former Yugoslavia. Some of the results of the past work can best be noted on the territory of South Banat, for instance, where the attitude towards the technology of growing, the work on the introduction and domestication of medicinal, aromatic and spice plants (Filipović and Ugrenović, 2013). Another scientific research institution that has done a lot in the field of medicinal plants in Vojvodina is the former Department of Hops, Sorghum and Medicinal Plants, which is today's Department of Alternative Plants within the Institute of Field and Vegetable Crops from Novi Sad, with the headquarters in Bački Petrovac. The work of this institution is the most apparent on the territory of Bačka.

**Considerably greater opportunities for growing and export**

The natural conditions in Serbia and particularly, some of its regions, in terms of climate and soil, are very favorable for the growing of these plants. The technology of their growing has partly been developed and made available to future producers and in other words, it is possible to secure rich raw material bases, both from the standpoint of variety and of quantity. Some construction projects that have previously been built can be adjusted to the needs of this sort of production, the market for final products has been developed, and there is also a possibility of securing funding for such production.

Some of the difficulties are related to crop establishment, the protection from weeds, diseases and pests, determining the moment for harvesting and the method and time of drying. The machinery intended for this production is relatively little used, although there are some good individual solutions. The

buying-up is frequently disorganized, with insufficiently defined quality criteria. Of the existing capacities for plant distillation, only some ten percent are in use, and of those for the extraction, about 30 percent.

To eliminate most of the above mentioned difficulties, it is most important that all those who make the sector of medicinal, aromatic and spice plants work together. That is the only way to make progress in this field. It is particularly important to introduce European and international standards for product quality. It is also necessary to prepare and adopt a law and related acts in connection with these plants and provide the seed-breeding and nursery production of those species, the constant specialization of personnel at home and abroad, and to encourage domestic research more intensively. Financial support is supposed to encourage the purchase of new equipment, particularly for the purpose of increasing processing capacities. The market for these products, including the export, should also be developed.

Growing does not only solving the issue of the supplying domestic pharmaceutical industry with necessary quantities of medicinal raw materials of sustainable quality and pharmacological effect, but also, the export of these raw materials, given that cultivated medicinal, aromatic and spice plants are more wanted and appreciated by most of the importers in the European Union. One of the ways of reducing the pressure on the exploitation of wild plants it is their breeding apparently. Although plantation growing can be used as a good and effective way to provide large quantities of raw materials and products, as well as a larger market, it has also got a number of limitations. Among other things, one should bear in mind that not all species can easily be grown, and that some take several years to reach the maturity when they can be gathered.

## How and what to produce and collect?

Due to the limited demand for raw materials of plant origin and consistency of supply and demand, both in this country and in the world, the increasing of the areas must be planned, which means that the production should be based on a familiar customer. The expert services of the Institute "Dr Josif Pančić" recommend beginners that the growing of one or more species should start on smaller areas.

For marigold blossom, for example, the demand has been considerable in the long term, the price of a kilogram of dried blossom ranged from 500 to 700 dinars in 2013. If we take into account that from one hectare, about 500 kilograms of dried blossoms of this plant can be obtained, it can be concluded

that it is exceptionally interesting for growing. The gathering of marigold, however, requires a lot of human labor which, if seasonal workers are hired, can make the production significantly more expensive. If it is a family business, growing medicinal plants is best to be initiated on smaller areas of 10 to 20 acres per plant species, in order to avoid possible losses and increase revenue per unit of production.

Mass production of medicinal plants should be developed in the plains, whereas, in the highlands, there should be the growing and collecting of those species that thrive there. For the purpose of the protection of medicinal, aromatic and spice plants in their natural habitats, endangered species should be introduced in the production, as well as those for which there is an increased demand. In terms of nature protection, the species that should be grown are: *Achillea sp.*, *Aconitum sp. Acoruscalamus* (sweet flag), *Adonis vernalis* (pheasant's eye), *Allium victorialis* (victory onion), *Arctostaphylos Uva Ursi* (bearberry), *Centaurium umbellatum* (centaury), *Cnicus benedictus* (blessed thistle), *Colchicum autumnale* (meadow saffron), *Corylus colurna* (Turkish hazel), *Crocus sp.*, *Gentianalutea* (gentian) *Gentiana punctata* (spotted gentian), *Gypsophila paniculata* (baby's breath), *Helichrysum arenarium* (dwarf everlast) *Menyanthes trifoliata* (bog-bean), *Micromeria sp.*, *Orchis sp.*, *Primula sp.*, *Herniaria sp.*, *Inula helenium* (elecampane), *Ruta graveolens* (rue), *Satureja sp.*, *Sideritis scardica* (ironwort), *Veratrum sp.* and others. By their introduction, first through experiments, and then, in production practices, it should become generally accepted practice. One of the studies of that type was given by Vukomanović and Bojanić (1999), who experimentally researched the economy of growing lemon balm, thyme, valerian and peppermint with the goal of determining the technological and economic parameters of the feasibility of their growing in the region of Kučevo Mountains, in a so-called ecologically clean area in Serbia. The obtained economic results were encouraging for all four medicinal, aromatic and spice plants.

One of the measures that contribute to the protection of endangered medicinal and aromatic plants in nature is their plantation growing. Plantation growing considerably reduces the uncontrolled collection of wild plants and thus prevents their complete destruction. The growing of medicinal plants in our region is linked to the beginning of the 20$^{th}$ century. More intensive plantation growing dates back to the 1950s, and, since 1970s, some medicinal and aromatic species have been fully introduced to culture, such as, for example, *Valeriana officinalis* L. (valerian), *Satureja montana* L. (winter savory), *Helichrysum arenarium* (L.) (dwarfeverlast), Scopolia carniolica Jacq.

(henbane bell), *Borago officinalis* (borage) and others. The salt-marshes of Banat are suitable for the production of chamomile, whereas, for example, the area of Tara is suitable for the production of gentian and arnica, and that of Sokobanja for the growing of wild marjoram and heather.

In order to make a producer and a buyer-up satisfied the resulting raw materials, some of the requirements of production must be met. For instance, meeting the sowing date. The sowing date with chamomile is in late August and in the course of September. The deficiency of this date, that is, the autumn sowing, is a possible drought, which affects the percentage of germinated seeds. If this term is missed, the sowing can also be done with a lot of risk in February or early March. Late winter or early spring sowing is not recommended, primarily because of the achievement of fewer yields, in some cases, even by 50%. On the occasion of this sowing, there is a greater risk in the production – the plants are due for harvesting at a later time, and the possibility of the appearance of weeds is significantly higher. The gathering starts in May, so that the sown plots can also be used for another plant species. Seed is available, and the price of one kilogram of seeds with pulvis was from 2,000 to 11,000 dinars in the course of the year 2013. The yield of dry heads ranges from 400 to 500 kg $ha^{-1}$, and the yield of pulvis is from 200 to 250 kg $ha^{-1}$. The purchase price depends on the quality of the very blossom and the content of essential oil in it. In the past two years, the purchase price of dried chamomile were generally uniform in most places of purchase, so 1 kg of dried chamomile blossom cost from 350 to 500 dinars, and a kilogram of pulvis about 200 dinars.

Apart from chamomile, on poorer-quality soils, among other things, the following can be grown: licorice, sage, chicory, lavender and many others. Most grown medicinal plants, however, thrive best in deep, fertile soils, particularly in the conditions of moderately humid climate. Those annual and biennial are grown in rotation, whereas the perennial ones are grown in permanent crops, separately from crop rotations. To ensure a quality sowing and uniform germination of plants, the soil should be ploughed in autumn, and then prepared with the preceding crop. At this stage, the used machinery is mainly the one which is also applied in conventional crop and vegetable production.

Plant nutrition is certainly important. Manure or compost is entered in the basic processing or under the preceding crop and mineral fertilizers – in the primary treatment or during the growth season as supplementary nutrition, depending on soil fertility and the needs of plants. For certain plant species

from this group, depending on the needs, foliar nutrition can be performed just as well. Seeding, inter-row cultivation, fertilizer application and protection also use common machinery. When it comes to the reproduction, the most common and the safest way, especially for those species with small seeds, is transplant production. Successful production also depends on the quality of seeds. It must meet prescribed germination and purity. It is also important to carry out the sowing at a right time and in an appropriate manner, as well as plant nutrition and other care measures. The largest number of specific machinery in this area is required at the time of gathering. The time and method of gathering depend on a plant, i.e. on the parts which are to be collected. The gathering of chamomile blossoms, as well as those of other plant species uses accessory machines – both towing and mounted. The towing ones have their own side wheel and storage space. With the mounted ones, the gathering mass is stored in the trailer over the elevator. There are various models of these machines in the world, with different technical characteristics. They are often confined to own making or making within small series. The average price of this equipment is 10 to 15 thousand euros. With such machinery, considerable savings can be achieved in labor and the length of gathering duration on larger plantations.

## Collecting medicinal plants

In many regions of Serbia, there are also good natural resources for the collecting of medicinal plants, but they are not fully utilized. Massive gatheringon a larger scale takes place in the south-east andlately isalso organizedin the east parts of the country. In the regions where berries are grown, buyers-up purchase medicinal fruits as well (blueberry, elderberry and others). The average annual quota for the collecting of certain types of fruit is: up to 2,000 tons of juniper berries, up to 5,000 tons of wild roses, up to 150 tons of wild strawberries, up to 2,000 tons of wild blackberries, up to 2,000 tons of blueberries etc. (Turudija-Živanović et al., 2013). All in all, for this not at all easy work, it takes a lot of collectors. According to estimates by the associates of the Institute "Dr Josif Pančić", there are around 4,000 organizedhouseholds of collectors, which is about 12,000 collectors (Turudija-Živanović, 2010). The active gathering season lasts from April until October. At different times of the year, different plants are collected, that is, their different parts. So, for instance, of nettle, the above-ground part and leaves are collected in April, May and June, whereas the root-rhizome is collected in October–November, and less frequently in the course of February–March.

To successfully collect medicinal and spice plants, it is necessary to master some basic rules and skills. The education of medicinal plant collectors is carried out, especially through the following: collectors are familiarized with the principles that should be followed during the collecting of wild plants and forest fruits, concepts that are encountered in this field, (pharmacognosy, plant-based drugs, the quality of raw materials...), the ways and methods of collecting are indicated, as well as the time of collecting by plant species and organs (the medicinal plants collector's calendar)and the ways and methods of the drying and packing, the basic pieces of information are given on the quality parameters, as well as the guidelines and procedures that should be respected in order to serve organic, i.e. bio-production, etc. (Savić et al., 2008). In order to gain better familiarity with the field of the protection of certain medicinal plants, it is necessary to take into account some of the existing documents relating to the matter. This primarily refers to: the Law on Environmental Protection (the Official Gazette of the Republic of Serbia, 36/2009 and 88/2010); the Regulation on the Transboundary Movement and Trade of Protected Species (the Official Gazette of the Republic of Serbia, 99/2009); the Ordinance on the Proclamation and Protection of Strictly Protected and Protected Wild Species of Plants, Animals and Fungi (the Official Gazette of the Republic of Serbia, 05/10 and 47/11); the Decree on the Control of the Use and Trade of Wild Flora and Fauna (the Official Gazette of the Republic of Serbia, 31/05, 45/05, 22/07, 38/08, 9/10 and 69/11); the Order of the Prohibition of the Collecting of Certain Protected Species of Wild Flora and Fauna in the Year 2014 (the Official Gazette of the Republic of Serbia, 23/2014); the National Strategy for Sustainable Use of Natural Resources (the Official Gazette of the Republic of Serbia, 33/2012) ; the Strategy for the Biodiversity of the Republic of Serbia for the Period from the Year 2011 until 2018 (the Official Gazette of the Republic of Serbia, 13/2011). The persons who obtain the permission to collect protected species are bound to provide by the prescribed deadline the relevant Ministry and the Institute for Nature Protection of Serbia with the data on collecting (by species and collecting stations), the use and market placement on the prescribed forms. Those persons who deal with the growing of protected species are also bound to provide the Ministry with the prescribed information.The organizations (legal entities and entrepreneurs) which are engaged in the collecting of protected species are obliged to train potential collectors (to train vocationally) for that kind of work, to perform the testing of their knowledge, and to issue appropriate certificates to them (valid for a single season of collecting, a collector has to have it at hand at the time of collecting, and is bound to show it to an authorized person). Also, when purchasing collected protected species, a legal entity or an entrepreneur is obliged to issue a sales/purchase coupon of

purchases and to keep records of every purchase separately: with the data on the collector, the bough-up species and quantity, the price, the collection area (Katić et al., 2006).Bearing in mind that this about is seasonal working engagement, plant collecting cannot provide economic survival for a large number of families. During the summer season, a collector can earn 20 to 50 euros a day, which can be a total of 1,500 to 3,500 euros. According to our experience so far, the most collected species are: yarrow, St. John's wort, wild thyme, nettle, horsetail and many others that can be found in our area. The most wanted wild medicinal plants, apart from the above mentioned, include:centaury, marshmallow, lemon balm, (common) cowslip, hawthorn, gentian, common juniper, lime tree, wild marjoram, winter savory, elderberry, agrimonia, bearberry, bear's garlic, wild rose and dog rose (Table 2).

**Table 2.** *Some of the more sought for wild–collected medicinal plants*

| ordinal number | common name | plant species | collected in the course of |
|---|---|---|---|
| 1 | bearberry | *Arctostaphylos uva ursi* | April – July |
| 2 | horsetail | *Equisetum arvense* | May – October |
| 3 | stinging nettle | *Urtica dioica* | April – October |
| 4 | (common) yarrow | *Achillea millefolium* | June – August |
| 5 | alder buckthorn | *Rhamnus frangula* | March – April |
| 6 | Birch | *Betula alba* | July – August |
| 7 | rose hips | *Rosa canina* | May – October |
| 8 | St. John's wort | *Hypericum perforatum* | June – August |
| 9 | (spiny) restharrow | *Ononis spinosa* | October – November |
| 10 | wild thyme | *Thymus serpyllum* | July – September |
| 11 | coltsfoot | *Tussilago farfara* | April – June |
| 12 | wild marjoram | *Origanum vulgare* | July – September |
| 13 | cowslip | *Primula officinalis* | March – October |
| 14 | common hawthorn | *Crataegus monogyna* | May – October |
| 15 | bear's garlic | *Allium ursinum* | April – June |
| 16 | lime tree | *Tilia* | May – June |
| 17 | common juniper | *Juniperus communis* | August – November |
| 18 | centaury | *Centaurium umbellatum* | July – October |
| 19 | elderberry | *Sambucus nigra* | April – July |
| 20 | winter savory | *Satureja Montana* | July – October |

**Source:** *The presented data have been obtained in touch with suppliers of medicinal raw materials for the needs of production of the Institute for Medicinal Plant Research "Dr Josif Pančić" from Belgrade, located in Pančevo.*

The preservation of the quality of wild medicinal plants directly depends on the primary processing realized in the period from the collectingto the corresponding way of packing and storage. The most common method of primary treatment is dehydration – drying. The blossom and the leaf are naturally driedin a closed and drafty place from three to eight days, and the root in the sun even up to fifteen days. Kiln drying is much faster than natural. They are very practical and easy to work with, and take little labour, so they are recommended to primary producers and plant collectors. In them, temperature, relative humidity and air flow can be adjusted. The drying temperatures also differ depending on the part to be produced or collected. The blossoms and leaves are dried at temperatures from 35 to 40, and the root at 45 to 55 degrees Celsius. Higher drying temperatures are not desirable for the majority of these plants, because their medicinal matter is lost. In addition, plants are also primarily processed by steam distillation and the extraction with solvents. The processing of plant raw materials takes specific equipment.

The dried plant parts are packed in different types of wrapping material: boxes, bags, sacks, and the material that wrapping is made of can be: natron, jute, plastic, wood, glass, metal and more. The packed material is kept in dry, clean, well-ventilated storehouses on wooden shelves or pallets secured from the presence of rodents and insect pests. Plants that have fragrant components must be separated from the others to avoid scent mixing.

**Organic medicinal, aromatic and spice plants**

One of the possible directions of the development of domestic agriculture is organic production, which has been more and more present in our area year after year. The greatest importance in the practice in our country so far hasbeen shown by organically certified raw materials obtained from the collectors' sector, but also, increasingly, raw materials obtained from production plots. He adds that a considerable share in this sector belongs to medicinal, aromatic and spice plants whose processing and purposes are different.

The benefits of organic certification of plantation and collected plants, in addition to the environmental, communal and social role,the introduction of this production is reflected in the price of organically produced medicinal plants. Compared to conventionally produced plants, the price of organically produced products is higher by about 20-30% on average, although there are large deviationsfrom this frame, depending on supply and demand.

In some cases, when demand exceeds supply, the prices can be up to 100% higher than the conventionally produced raw materials. To illustrate, in Table 3, the wholesale prices were given of a German enterprise that are related to conventional and organic MASP (Stepanović and Radanović, 2011).

**Table 3.** *Wholesale prices for organic MASP in Germany,*

| product | Latin name of drug | conventional product cost (€/kg) | organic product cost (€/kg) | Increase (%) |
|---|---|---|---|---|
| nettle leaf | *Urticae folium* | 3.60 | 5.20 | 44 |
| marshmallow root | *Althaeae radix* | 9.30 | 10.00 | 7 |
| St. John's wort above-ground biomass | *Hyperici herba* | 5.20 | 5.70 | 10 |
| lime flower | *Tiliae flos* | 5.20 | 11.00 | 111 |
| yarrow above-ground biomass | *Millefolii herba* | 3.90 | 4.10 | 5 |
| wild thyme above-ground biomass | *Serpylli herba* | 5.20 | 6.70 | 29 |
| winter savory above-ground biomass | *Saturejae montanae herba* | 4.10 | 8.00 | 95 |
| ribwort plantain leaf | *Plantaginis folium* | 4.10 | 6.20 | 51 |
| absinthium above-ground biomass | *Absinthii herba* | 3.10 | 3.90 | 26 |
| birch leaf | *Betulae folium* | 3.60 | 4.70 | 30 |
| valerian root | *Valerianae radix* | 5.20 | 9.00 | 73 |
| wild rose | *Cynosbati fructus* | 1.10 | 1.60 | 45 |

**Source:** *Alfred Galke GmbH, Germany cited in Stepanović and Radanović, 2011*

The demand for the plants grown and controlled this way in fresh and dry condition has steadily been rising in the past fifteen years. It is particularlyemphasized on the occasion of the demand for fresh organic spice plants, with the highest demand for: garden parsley, basil, coriander, wild thyme and thyme (Filipović et al., 2010). Spain and Italy are the leaders in the European Union when it comes to the organic production of these plants. Spanish experts have suggested that our entire production of this plant should be converted to organic, as well as that the areas should be significantly increased, primarily because of the good quality of our raw materials. On the other hand, Italian experts estimate that in our country organic production could be arrangedon approximately 300,000 hectares, mainly with medicinal plants.

To ensure a proper quality of medicinal plants, that is, of medicinal raw materials, it is necessary that the production and collecting go onin accordance with the Guidelineson Good Agricultural and Collection Practices (GACP). Their further processing, the primary processing, must go on in the most optimal manner, using standardized equipment and procedures as prerequisites for obtaining standard quality plant raw materials, that are prescribed in the methods of organic production.

Generally, the production of these plantsby the principles of organic agriculture, which is current in the whole world, has its future position has in our country, too, especially in the highlands. They are, on the one hand, environmentally acceptable for this type of industry, and, on the other, encompass the native habitats of the majority of medicinal and aromatic species.

## Export of medicinal, aromatic and spice plants

According to Dajić (2011), in 2010,the foreign exchange was realized in the amount of $24.3 million, that is, $19.8 million worth of medicinal, aromatic and spice plants was exported, and 5.3$ million worth of plants was imported. In contrast, according to the data by the Chamber of Commerce of Serbia, in the same period in 2011, the foreign exchange was realized in the amount of $25.7 million dollars for a total amount of 6,500 tons. Of that, from Serbia, 5,000 tons of medicinal, aromatic and spice plants were exported, worth $19.8 million. During the same period, 1,500 tons of medicinal, aromatic and spice plants were imported, worth $5.9 million. According to the same source, in the year 2012, the overall foreign trade of medicinal, aromatic and spice plants was achieved, worth $22.9 million, of which the export amounted to $15.2 million, and the importto $7.7 million. As can be seen appears from the above mentioned, in the last year of the processed period, the export of our plant products decreased, and the import increased.

Within the foreign trade in the year 2012, medicinal, aromatic and spice plants achieved a positive balance of $7.5 million dollars. The total export of theseplant products in the year 2012, the largest share has the export to the European Union countries, which is 51% ($7.7 million), followed by the CEFTA countries – 44% ($6.7 million), and 5% ($781,000) to other countries. When it comes to the import of medicinal, aromatic and spice plants, the largest share in the year 2012 was held by the group of spice and aromatic plants – 62% percent of the total import ($4.8 million), followed by medicinal plants – 29% ($2.2 million) and tea plants –9% ($669,300).

In the period from 1991 until 2000, The European Union represented one of the largest markets in the world for the trade in medicinal and aromatic plants, with the import of 120,000 tons, andvalued at US$200 million (based on the wholesale price of dry raw materials). The annual growth rate ranged from 5 to 10 % on average. The EU is also a major producer of medicinal and aromatic plants, which are grown on 62,700 ha. France and Spain are the largest growers with 25,000 haand 19,000 ha of sown area respectively. Within the EU, Germany is the largest importer of medicinal plants, with about 38%, which is over 45,000 tons per year, followed by France, with 17 %, and Italy, with 9 % of the total import (Commonwealth Secretariat, 2001). Germany, with an annual export of 15,000 tons to the USA and other European countries, is Europe's largest exporter of medicinal and aromatic plants at the same time. In order to create the possibilities for a more productive and better quality production, it is necessary to devisea development strategy for this sort of production too (Simić et al., 2003).

## Conclusion

Although it has favorable agroecological conditions, as well as certain experience in the field of growing and collecting medicinal, aromatic and spice plants, the Republic of Serbia "has debased itself" from the leading positionin the region as an exporting country to the position of a statewhich symbolically participates in this sector. Tomake a position such as this better, the state unfortunately still does not provide great means to encourage the production and processing of medicinal plant raw materials, so the existing and interested stakeholders in this sector are on their own. Compared to our country that has a large number of plant species (Serbia has about 3,600 plant species), Germany, although with a far smaller number of plant species, uses phytotherapy500 times more than we do. By the extension and increaseof the production of raw materials and finished products, for our country, medicinal plants could represent is a potentially significant development opportunity for the advancement and prosperity of a large number of economic and environmental factors.

## References

1. Amidžić, L., Dražić, S., Kostić, M., Maksimović, S., Mandić, R., Menković, N., Panjković, B., Popov, V., Radanović, D., Roki, Đ., Sekulović, D., Stepanović, B., Tasić, S. (1999). Strategija zaštite lekovitog bilja u Srbiji. Ministarstvo zaštite životne sredine Republike Srbije i Institut za proučavanje lekovitog bilja „Dr JosifPančić", Beograd.

2. Dajic Stevanović, Z. (2011). Herbal sector of Serbia: General Overview Serbia, (taken 12th March 2014 from: (http://www.amapseec.org/Herbal%20sector%20of%20Serbia%20overview.pdf)

3. Filipović, V., Glamočlija, Đ., Radivojević, S., Jaćimović, G. (2010): The demand for fresh spice herbs in the world and in Serbia. 6rd Conference on Medicinal and Aromatic Plants of Southeast European Countries, The Association for Medicinal and Aromatic Plants of Southeast European Countries (AMAPSEEC), Antalya, Turkey. 18 – 22 April 2010, Book of Abstracts, 120.

4. Filipović, V., Ugrenović, V. (2013): The Composting Of Plant Residues Originating From The Production Of Medicinal Plants. International Scientific Meeting „Sustainable agriculture and rural development in terms of the Republic of Serbia strategic goals realization within the Danube region - Achieving regional competitiveness. Editors: DragoCvijanović, Jonel Subić, Andrei Jean Vasile. The Institute of Agricultural Economics Belgrade.Topola, Serbia, hotel „Oplenac“, December 5-7th 2013. Economics of agriculture, ISBN 978-86-6269-026-5, UDK 631(4-924.5)(082)(0.034.2), 338.434(082)(0.034.2), 502.131.1(082) (0.034.2), 330.15(082)(0.034.2), 504:33(082)(0.034.2), COBISS.SR-ID 203206156. Thematic proceedings, 1283 – 1301.

5. Ignjatijević, S. (2010). Economic aspects of production and exportation of medicinal and aromatic herbs. Zbornik radova (Fakultet za ekonomiju i inženjerski menadžment), 3(4), 65-79.

6. Katić, B., Savić, M., Mijajlović, N. (2006). Mogućnosti plasmana šumskih plodova, lekovitog i aromatičnog bilja. Ekonomika poljoprivrede, 53(3), 767-783.

7. Savić, M., Mijajlović, N., Bekić, B. (2008). Ambiental, social and economic estimation of gathering and processing of indigenously plants. International Scientific Meeting „State, possibilities and perspectives of rural development on area of huge open-pitminings“, Belgrade–Vrujci, 24-25th April 2008, ISBN 978-86-82121-55-8, Cobiss.SR-ID 148134412, CIP 338.43(082); 502.521:622.271(082). Themetic Proceedings, 350-356,

8. Pavlović, V., Kostić-Nikolić, S. (2006). Uticaj vlasničke structure na efikasnost preduzeća za gajenje i preradu lekovitog i aromatičnog bilja. Ekonomika poljoprivrede, 53(2), 461-475.

9. Simić, J. D., Bogdanović, J., Stevanović, S. V. (2003). Determinants, past results and perspective of medicinal and aromatic plant production and processing.Ekonomika poljoprivrede, 50(2), 117-128.

10. Stepanović, B., Radanović, D. (2011): Tehnologija gajenja lekovitog i aromatičnog bilja u Srbiji, Institut za proučavanje lekovitog bilja ″Dr Josif Pančić″, Beograd.

11. Turudija-Živanović, S. (2010): Trendovi srpskog tržišta lekovitog i aromatičnog bilja. Lekovite sirovine 2010; (30): 3-14.

12. Turudija-Živanović, S., Marković, T., Živanović, T. (2010). Potentials of mountainous region of Serbia for MAP [medicinal and aromatic plants] sector development. International scientific meeting: Multifunctional agriculture and rural development (V) – regional specificities. Editors: Milan Milanović et al. The Institute of Agricultural Economics Belgrade. BanjaVrujci, Serbia, 2-3 December 2010. Economics of agriculture, Special issue – 2. ISBN 0352-34-62, UDK 633.88:631.111 (23.01), Vol. LVII, SI-2 (1-372), 2010. Belgrade, Book of Proceedings, 204 – 210.

13. Turudija-Živanović, S., Vasiljević, Z., Vuković, A. (2013). Legislation in Serbia in the field of collecting medicinal and aromatic plants.Fourth International Scientific Symposium "Agrosym 2013".University of East Sarajevo, Faculty of Agriculture, Republic of Srpska, Bosnia. Book of Proceedings, 760 – 764.

14. Vukomanović, L. M., Bojanić, S. V. (1999). Rearing economics of some market important medical, aromatic and spice plant species in the region of Kučevo. Ekonomika poljoprivrede, 46(1-2), 103-112.

# POSSIBILITIES OF USING RENEWABLE RESOURCES AS A FUNCTION OF INTEGRATED LOCAL DEVELOPMENT[1]

*Vladislav Zekić, Helena Hiršenberger*[2]

## Abstract

*Appreciation of the concept of sustainability and sustainable development as an important criterion in the last few decades has changed the classic approach of evaluation of individual technologies. In the domain of these approaches of evaluation renewable resources and materials obtained by the process of recycling have found their place. Since an opportunity for the development of entrepreneurship in rural areas is located in the area of agriculture, tourism and small capacity of light industrial production, basing on renewable resources is an appropriate course of development. If the concept of sustainable rural development is included in the state planning, it would create conditions for solving a whole range of problems and achieving the country's development in general.*

**Key words:** *renewable resources, rural regions, development.*

## Introduction

Preservation of the environment is one of the biggest challenges that the scientific community has set for the future. The concept of sustainable development is gradually occurring 70-years of the last century, in response to the challenges of intense technological and economic development, which did not take into account the protection of natural resources. The definition and the term "sustainable development" was redefined and became globally known through the report "Our Common

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Future" or as it is also called "Brundtland report" of the World Commission (WCED, 1987) from 1987. From the report, it is clear that sustainable development incorporates social, cultural and economic aspects that must be considered globally and in a long term. This concept eventually became widely accepted by experts and governments in many countries. Business and financial world has also embraced the concept in a way that defines the three main dimensions of sustainable development: social, environmental and economic.

The consequence of this is a growing number of environmental standards, regulatory requirements and restrictions that are forcing businesses to work with no harmful effect on the environment. Industry due to being based on production processes that have many harmful effects on the environment is generating waste materials of various kinds. On the other hand, the majority of the production processes spend non-renewable natural resources. Development of knowledge about the effects of technological processes on the environment and human health has created a need for the industry transformation, from direct pollutant into an important factor in protecting and preserving the environment. At first, the reduction of negative impacts on the environment came down to the use of technology for purification, which just repaired the negative impacts of the production process. This approach did not give satisfactory results and required a large investment. A preventive approach took place, which in advance prevents environmental pollution with adequate technological and organizational measures. A preventive approach to environmental protection requires an adjustment of the development strategy of enterprises with permanent principles of sustainable development. These adjustments include the following changes in the production process: 1) lower consumption of primary raw materials and energy, 2) recycling and reuse of waste, 3) the use of secondary raw materials in production, 4) optimization of transportation, 5) adequate working conditions and so on.

The development of chemistry and the creation of so-called clean technologies is a precondition for sustainable development, which includes major changes related to the chemical and process industries. Chemistry aims to develop safer chemical processes and chemical processes that would be harmless to humans and the environment using 12 basic principles (Anastas and Warner, 1998): 1) prevention of waste generation, 2) designing safer products, 3) use of less hazardous chemical synthesis, 4) use of renewable raw materials, 5) use of a catalyst, 6)

avoidance of chemical intermediates, 7) minimizing carbon economy, 8) acceptable use - solvent and safer reaction conditions, 9) increased energy efficiency, 10) creation of chemicals and products that can be degraded after use, 11) apply an analysis in real time and use the control for prevention of contamination and 12) minimize the potential for the occurrence of accidents (Poliakoff and Anastas, 2001).

If we take into account that a significant role in environmental protection occupy recycling and reuse of waste and the use of secondary raw materials in the production, it is clear that rural regions and agro-industrial sector have a special place in the environment protection. In addition, proper routing of this kind of development requires precise methods and instruments for assessing individual technologies.

Previous studies show that improving the quality of life in China in the period in 1950 and 1990 led to an increase in carbon dioxide emissions per capita for seven times (Milutinović, 2004). The above facts indirectly indicate that the energy crisis is not an expression of the poor state of natural resources, but the consequence of global politics and irrational exploitation of existing energy sources.

It is an extension of the monopolistic policies of big capital. In an indirect way, we can conclude that the lack of energy is a product of current technological development and founded the new world order. In other words, the natural energy reserves in the country are practically inexhaustible, but the existing technology uses these resources in a highly irrational way. The lack or abundance of energy is determined by the direction of technology development and economics.

## Sustainable development

Sustainable development of human is based on the method of obtaining raw materials. Used raw materials determine many aspects of the overall process of production, usage and consumption. Securing raw materials for an industrial process can create significant (negative) environmental impacts, and at the same time cause a significant impact on the social situation in the society. The abundance or shortage of raw materials and their availability for a long period of time will have a significant impact on global issues such as peace and security in the world.

Mankind will always seek to rely on the natural resources and it is clear that there are many resources that will be available for human needs for improved living conditions. Regardless the need for sustainable development is certainly affected by the change in the direction of rational use of resources. It is clear that the fossil and mineral resources which include radioactive materials must have their place in a sustainable society. The problem for each of these resources is to define a specific place and to create structures and processes for their use and possible ways of their care after their service life. In the concept of sustainable development special place has renewable sources, above all biomass. In the framework of sustainable development this type of raw materials will have to provide a wide range of products and services in the future. This especially applies to the provision of energy and raw materials. The general concept of biomass is very wide and includes organic matter of vegetable or animal origin. However, according to the estimates of total biomass occurred on Earth it is used less than 4%. Of this approximately 1.2% is used for human and animal food, 1 % for the production of paper and paperboard, and only 1 % is consumed for energy purposes and as fuel. Unfortunately, the use of biomass energy is largely confined to the wood as fuel for heating, which is usually not environmentally feasible and can be the basis for further increasing the use of biomass.

Products based on bio-renewable resources will occupy a significant position in construction and infrastructure. Moreover, biogenic materials will take many application areas and services that are currently provided by the use of fossil raw materials as well as some areas that are currently covered by mineral resources. Biogenic raw materials, together with the direct use of solar energy in the form of photo solar collectors and wind energy and hydro reservoirs will become the dominant technical systems on which will be based a sustainable society.

## Characteristics of organic raw materials

The structure of technological systems that use certain types of materials is defined by the properties of these materials. It is therefore very important to analyse the characteristic of raw materials of biological origin in order to understand the basics of the technology they use. Analysis and comparison of the properties of raw materials of biological origin with properties of materials currently used in processing technology indicates the necessary changes in the technological structure on its path towards sustainability.

As a very important characteristic of almost all organic raw materials can be highlighted a few: 1) limited infinity, 2) decentralized resources, 3) low densities and 4) time limitations.

The term "Limited Infinity" is a paradox, but very precisely explains the main sustainable characteristic of biomass and renewable energy resources. They are renewable, but at the same time they are not unlimited in use. Biogenic raw materials are a result of activity of solar energy. Every natural growth process requires energy which is mainly provided by the sun. For growth is also necessary: material resources, water, oxygen and carbon. All of these materials are part of the global cycle that takes place under the influence of solar energy. Without the sun it definitely would not be life on our planet and therefore no biomass available for use. From the perspective of the needs of our society sun is not limited. On the other hand, the capacity of the planet to collect and use solar energy is limited. The Earth receives solar energy at its surface. Accordingly, there is a plentiful but limited growth biosphere. In addition, the use of the biological raw materials has to be effective. Destruction and reduction in soil quality can directly decrease the production of biomass.

In addition, the increase in the use of biomass involves significantly increase in the current biosphere exploitation. Sustainability in the case where mankind is increasing its exploitation of the biosphere is very uncertain. These circumstances cannot escape the fact that the biosphere is the main source of raw materials for future technological industrial processes. The above mentioned requires the greatest possible efficiency in the use of these resources and the preservation of ecosystems.

There are a number of studies on bio-energy and the future potential in the world (Fischer and Schrattenholzer 2003, Smeets et al., 2007). In the results is no consistency so there is no proper quantitative assessment.

The term "Decentralized Resources" shows the main differences of biomass and other renewable sources of energy in comparison to other types of resources, especially fossil resources. Crude oil, natural gas and coal are derived from sources which are clearly delineated spatial units. Accordingly the use of biomass and other renewable resources as inputs for the process industry require changes in logistics resources and energy. Logistics have to shift from individual sources to space widespread resource base.

This means that it will have to build a logistics system that will collect more resources through massive installation and transporting them to the point of use. It is necessary to collect raw materials and energy from the larger geographic area.

Attribute "Low Densities" also has a significant impact on the exploitation of biomass and other renewable sources. Once created, these raw materials have low density and high humidity compared to conventional fuels, especially crude oil, which today is the basic raw material for industrial production. In addition, these materials have not gone through the process of stabilization, which is the case with fossil material, so that they have a significantly lower caloric value. From the standpoint of raw material logistics, these circumstances are of great importance. When resources become dispersed and with low content of useful substances, the volume of the transmission is becoming a limiting factor.

On the other hand, certain types of biomass are different, so it is illogical to generalize on this issue. The most important physical properties of biomass in the possible range are given in the following table (Oka and Jovanović, 1997).

**Table 1.** *The most important physical properties of biomass*

| Physical properties | Value |
|---|---|
| Thermal power | 5-15 MJ/kg |
| Density | 400 – 900 kg/m$^3$ |
| Bulk density | 40 – 600 kg/m$^3$ |
| Thermal power per m$^3$ | 0,7 – 12 MJ/m$^3$ |
| Moisture content | 8 – 50% |
| Ash content | 1 – 10% |
| Content of volatile fuel matter | 50 – 70% |
| Temperature of ash sintering | 650 – 800 $^o$C |

**Source:** Oka and Jovanović, 1997

Time limitation means that the biomass and other renewable sources are related to natural and life cycle and the processes of growth and degradation. On the other hand, this is a significant difference as compared to all other resources. No mineral or fossil resources are subject to a qualitative change over time.

This contributes to the complexity of the technical and logistic systems using biomass and other renewable sources. The primary role of renewable resources of energy and biomass can be divided into two segments: 1) the provision of energy, and 2) the provision of raw materials for industrial production.

## Renewable energy resources

Energy can be made by the following methods: 1) Direct combustion of biomass, 2) Briquetting of biomass, 3) Gasification of biomass, 4) Biogas production, 4) Production of biodiesel, 5) Production of ethanol.

Direct combustion of biomass can be made through the reconstructed power plants using liquid fuels (heating oil and fuel oil) and solid fuel or combustion in power plants that use biomass as the primary fuel. It is believed that the funds that are invested in these programs can be paid off in three to four years. The overall economics of the business user becomes increased. In this way, the costs of fuel supply are minimized because the supply is made from their own waste materials. This provides economic and technological safety of the user. When it comes to technological safety of users, it is primarily referring to the greater energy self-sufficiency and technological processes thereby greatly reducing the risk of total production. As a final step in the development of combustion technology, it is possible to start a specialized biomass production solely for the purpose of energy production. Cost-effectiveness of this process is still under consideration, but there are also developing solutions for its assessment (Walsh and Becker, 1996).

Unlike programs of direct combustion of biomass, biomass briquetting programs are intended to supply by other users (mainly individual sector). In order to biomass become suitable for this form of application it is necessary to concentrate the energy (compressed) and to convert to a form and a size suitable for handling and transportation. In this way, the use of biomass becomes available to multiple users (becomes a commodity that can participate in market transactions), but with the additional costs of processing, transport and trade. For these reasons, this method is applicable only where the biomass cannot be used close to the production or collection, as it usually occurs as a by-product. Technical and technological processes for the production of biomass briquettes are in the world and in our country solved, but the question of their effectiveness and competitive with other energy sources is still uncertain, which is still

in the testing phase and demonstration of practical application. Equipment and processes of combustion of pellets and briquettes are not much different from those used for burning wood. But, while the pellets and briquettes are in uniform size, it is easier to perform automation of these processes. Research in the world is moving in the direction of the development of such systems designed for generating energy in rural areas, with maximum autonomy system (Bass, 2001). In this case, it is a small furnace intended for individual households. Other studies research combination of growing biomass plantation associated with briquetting technologies that are based on the production of high volume (Hitoshi, 2001).

Incomplete combustion of biofuels is a two-stage energy conversion. In the first stage from biofuels with the process of incomplete combustion (gasification) is produced mixed gas - biogas (which is dominated by CO with some $CH_4$). After cooling and purifying biogas can be used for different purposes: for internal combustion engines, for heating buildings and so on. Without purification biogas can be used directly for the production of heat in the drying process of agricultural products. The technology to produce biogas gives a gas with calorific value ranges from 4 to 7 $MJ/Nm^3$ in simpler process technology up to 18 $MJ/Nm^3$ in sophisticated technology that involves no oxygen gasification and which is rarely used. Gasification technique was current 50 years ago, when wood, coal and cobs were used as a fuel. Today, this problem reaffirms the domain of research on the energy potential of agriculture. As a potential fuel being explored cobs, corn stalks, straw, sunflower stalks, etc.

Biogas is produced in the anaerobic fermentation of manure (without the presence of oxygen) with the activity of battery culture contained in the fertilizer. In the first phase, under the influence of bacteria, carboniferous substances exceed to the volatile acid and water, and in the second phase acids turn into methane and carbon dioxide. In this process, organic material of solid waste is reduced to 50% to 70%, while the biogas is obtained also fermented manure containing nitrogen, potassium and phosphorus (Mulić, 1995). Any of an organic material which is a source of the necessary ingredients in the process of biogas production, such as carbon, nitrogen, phosphorus, potassium, magnesium, can be used as a raw material for the biogas production. It is best to use for this purpose municipal and industrial wastewater, human and animal excretions and plant biomass. Frequently on large farms in sufficient quantities are liquid

manure and byproducts of farming, so they are mainly used as raw material for biogas production. Biogas as a fuel containing 70% to 75% methane and its calorific value is of 20 to 25 MJ/$m^3$, which corresponds to 0.7 to 0.8 kg of coal equivalent or 0.6 $m^3$ of natural gas. With the application of fermented manure fertilizers significantly can be saved and the environment could be protected. The existing animal production in our country produces large quantities of manure, of which large quantities are in the form of liquid manure. This manure is often a source of environmental hazards and environmental contamination. It is believed that in the biological sense farm of 50,000 pigs is polluting the environment as a settlement of 250,000 inhabitants. This problem can be productively solved by the processing of the waste, which can produce significant quantities of biogas. It is very important that the same process is getting also fermented manure, which is a substitute for mineral fertilizer.

Cost-effectiveness of biogas production has not yet been proven, but it is assumed that it can be profitable if you count all three effects of this process (energy production, production of fermented manure and environmental protection). Changes in approach of implementation of the concept of energy production and consumption in Serbia are still ahead, which is mainly caused by the provision of the required energy and the need to preserve the environment. Accordingly, the technology of biogas production which currently does not allow for cost-effective production has a long-term perspective. The problem of pollution is particularly present in the intensive production of pig, where it is performed on a large farm capacity and the effects of pollution are concentrated and visible. We must not neglect the less conspicuous pollution from smaller producers, but because of the small individual capacity and spatial dispersion does not create significant problems and therefore is not subject of interest. However, the cumulative effects of such pollution are certainly manifest in the long run.

In our situation, biogas production should be oriented to the pig manure, since its low biological value. Waste from crop production is not the cheapest raw materials in the fermentation process. Cellulose, which is the main source of carbon in the production of biogas, in its composition contains lignin, which is very difficult to decompose and it makes it difficult to break down the cellulose.

Accordingly, it is necessarily physical, chemical or physical-chemical treatment, which causes additional costs. In addition, agricultural wastes have a very low content of nitrogen, which enables reproduction of microorganisms involved in the fermentation process. Therefore, they can only be used in a mixture with other nitrogen-rich substances.

Wastewater from food industry in the process of purification is process with anaerobic fermentation. Due to the high content of organic substances is achieved successfully ferment with obtaining significant quantities of gas. A special advantage of this wastewater is a high temperature, so it does not need additional energy. The main disadvantage is the high content of sulphur compounds, which is transformed to the sulphur-hydrogen. Utilities water is a source of low essential elements in the production of biogas. It is not used as a raw material for the production of biogas. Fermentors for the anaerobic fermentation are only part of the plant for wastewater treatment.

The share of energy produced by biogas in the country's balance may be significant. This increase can be achieved if the majority of the available raw material is processed. In the case of some consumers, biogas can cover a larger part of the energy needs and increase energy independence. Biogas can be a complementary source of energy in the cases where is needed continuous activity of certain parts of the plant. In addition to the energy production through the application of fermented manure, fertilizer is saved and the environment is protected. Consideration of economic aspects of biogas production should be based on the application of differential calculations and sensitive analysis of costs. In this way it is possible to test any given solution to changing conditions and monitor changes in costs. Introduction of effective biogas production creates the possibility of improving on the economic performance within pig production. Economic evaluation of the impact on the environment can be analysed only at the level of society and the financial support that is provided by the state (Zekić and Jovanović, 2007).

Increase gas prices, the reduction of crude oil reserves, an effort to find fuel with improved ecological performance, preserving the economic independence of the oil exporters are increasingly indicating a number of researchers in the world and in our country to use biodiesel fuel that can be produced from oils of vegetable origin. While the technological process of biodiesel production is less-more known, it is not the same situation with his economic analysis.

Historically, the idea of using vegetable oil as fuel occurred simultaneously with the beginning of the massive exploitation of fuels derived from petroleum. However, the thirties of the last century are considered the true beginning of scientific research related to this issue. In the years of the Second World War and after, vegetable oils are used as a substitute for diesel fuel, pure or mixed with it.

Reduction of the world's reserves of crude oil, increase of gas prices, as well as knowledge about the harmful effects of products of its combustion once again opens the door to research in this field in the early seventies. From that time until now methods for the elimination of problems related to the use of vegetable oils as fuels are developed, among which the most important methods is transesterification of vegetable oils lower alcohols. Due to its biological origin and similar properties with mineral diesel, the fuel is commercially called biodiesel. Today, the production and application of biodiesel in Europe and in the whole world are far advanced. It is used in city traffic, the operation of agricultural machinery, as well as for space heating in specific conditions. The European Union's commitment to the production of biodiesel fuel was concretized by Directive 2003/30/EC. The Directive predicts that the share of biofuels will grow at a rate of 0.75% starting at 2005. It also predicts that 5.75% of conventional fuel will be replaced by alternative fuels by 2010. Our country has great potential for the production of biodiesel. Biodiesel based on domestic raw materials can be cost-competitive with D2 fuel. However, the preconditions for the production of biodiesel to come to life are to add in the Energy Law the plan of production and use of biodiesel fuels and to stimulate the construction of the distribution network and thus provide a regular supply of consumers of biodiesel fuel. In addition, it is necessary to apply appropriate measures of government incentives (Jovanović et al., 2004). Of particular importance is to encourage the development of larger capacity plants, since it is thus possible to achieve a higher degree of effectiveness of the production process. Ethanol can be produced by chemical synthesis or by fermentation. Of the total ethanol production over 60% is produced by fermentation and is referred to as bioethanol. Ethanol can be produced by synthesis from the water and ethene in the presence of sulfuric acid as a catalyst. The fermentation process can be applied to all the raw material which has a sugar that can be metabolized by yeast, or polysaccharides, which can be decomposed to glucose. Although ethanol was primarily used for the production of alcoholic beverages, currently the largest part of production consumed as fuel (Kim and Dale, 2005).

Other materials, such wastewater of various technological processes have a great potential, regardless of the sugar concentration in the plant is lower than in the products of agriculture.

## The biosphere as a source of raw materials for industrial production

If we look at the need for sustainability and use of renewable sources involve in the process of securing raw materials it is needed in the first place to observe the construction industry. Development of the environmentally friendly technologies is of great importance since the construction industry consumes 60% of the raw materials extracted from the lithosphere (Wadel, 2009). On the other hand, the appropriate use of recycled and waste materials can significantly contribute to sustainable development. The achievement of the above objectives is only possible through finding environmentally friendly materials and construction. One of the directions of the solution is in the recycling and reuse of the given material, which directly affects the sustainable production and use of renewable sources. Of total extraction 24% goes to the building construction. In Europe, the building construction uses 4.8 tons of mineral resources per capita per year. Although the largest part of the burden of the environment comes from the material produced due to demolition of structures (Van den Dobbelsteen et al., 2002) and other materials have a very significant impact on the deterioration of the natural environment. Previous studies have shown that the construction industry has to respect sustainability and to always take into account the impact on the environment (Speth, 1990; Ehrlich and Ehrlich, 1990). In line with that, in the past two decades a growing interest in issues of global sustainability has led to the need to increase the sustainability of the used methods and techniques for the construction of buildings. For developing countries the emergence of this market represents an opportunity to connect sustainability on the one hand and better performance in the design, construction and operation of buildings on the other hand. This logic should be placed opposite to the global trends related to the steady growth in production, consumption and market (Papargyropoulou, 2012). Accordingly, it is necessary to find new ways to sustainably increase production and employment.

It is particularly important to emphasize the fact that the construction of buildings is one of the indispensable and fundamental human activities. The volume of construction has increased with the development of human civilization and today's construction, directly or indirectly, causes a

significant part of the environmental damage. Appropriate use of recycled and waste materials can significantly contribute to sustainable development. This is possible through the use of environmentally friendly materials and construction.

The materials are selected at the end of designing buildings or during the preparation of project documentation, which is the wrong methodological approach. The choice of materials used in the construction is the basis for both the quality of the obtained structures and to develop their own building materials industry and society as a whole. Through the current development of the society different materials are used in the construction of buildings. Builders have always tended to use materials that were present in the environment and readily available. In accordance with this, the materials used in the past in the construction have their application in the present. A large number of innovations in terms of technology, mechanical and other characteristics made that to materials and their use must be approached meticulously and with detailed analysis. In addition, the behaviour of materials in use, in modern conditions of micro and macro climate change, from the standpoint of environmental protection and ecology, requires their strict control and continuous testing.

## Conclusion

Appreciation of the concept of sustainability and sustainable development as an important criterion in the last few decades has changed the classic approach of evaluation of individual technologies. In the domain of these approaches of evaluation renewable resources and materials obtained by the process of recycling have found their place. Since an opportunity for the development of entrepreneurship in rural areas is located in the area of agriculture, tourism and small capacity of light industrial production, basing on renewable resources is an appropriate course of development. As previous studies found (Zekić et al., 2011, 2012) development of the rural sector in the future may not rely on the application of high technology and the solution to their problems must be found in the more accessible activities. On the other hand, the resources of rural regions are dispersed, which causes the specific local character of their exploitation. Expansion of activities of the population in rural areas and significant reduction of unemployment would affect the viability of family income. The development of technologies that do not require high qualification structure would result in a reduction of poverty and social exclusion. In addition, this can directly and indirectly affect on the protection of the environment and represents a prerequisite for the future development of

the rural economy as a whole. Increase of the income of the population could provide a basis for improving the economic and social infrastructure in rural Serbia.

In order to achieve the development of these areas it is necessary to make investments in technology and infrastructure renewal. It is also necessary to provide education and training and to create the conditions for a change of lifestyle in rural areas. The concept of integrated rural development, as part of a regional development policy, is an alternative to the classical industrialization and it is applicable in countries with large rural regions such as Serbia. If the concept of sustainable rural development is included in the state planning, it would create conditions for solving a whole range of problems and achieving the country's development in general.

## References


1. Anastas, P., Warner, J. (1998): *Green Chemistry: Theory and Practice*, Oxford, Oxford University Press, UK.

2. Bass, J. (2001): *Self - Powered (autonomous) Pellet Stove Demonstration*, Hi-Z Technology, Inc. Project 5099.

3. Dixon, S., Klein, T., Kiuru, L., Vona, C., Jones, R. (2005): *The growing role of biofuels in global transport: From myth to reality*, Energy and Climate.

4. Ehrlich, P, Ehrlich, A. (1990): *The population explosion*, London, UK: Hutchinson.

5. Elkington, J. (1994): *Towards the sustainable corporation: win – win – win business strategies for sustainable development*., Calif. Manag. Rev., 36 (2): 90 – 100.

6. Fischer, G, Schrattenholzer, L. (2001): *Global bioenergy potential through 2050*. Biomass and Bioenergy, 20:151–159.

7. Guinee, J. B., Gorree, M., Heijungs, R., Huppes, G., Kleijn, R., Koning, A., Oers, L., Wegener, S.A., Suh S., Udo de Haes H.A. (2002): *Handbook on life cycle assessment: operational guide to the ISO standards*, Kluwer Academic Publishers, Dordrecht.

8. Hitoshi, H, Yoko, W., Tomoyuki, K., Kanji, Z. (2001): *Bio-coal briquettes and planting trees as an experimental CDM in China*, Keio Economic Observatory Discussion Paper G-No. 136, WG4-30, Keio, p. 6.

9. Jovanović, M., Bošnjak, D., Zekić, V. (2004): *Ekonomska analiza proizvodnje biodizela*, Ekonomika poljoprivrede, Institut za ekonomiku poljoprivrede, Beograd, vol. 51, br. 3-4, str. 127-138.

10. Kim, S., Dale, B.E. (2005): *Environmental aspects of ethanol derived from no-tilled corn grain: nonrenewable energy consumption and greenhouse gas emmision*, Biomass and Bioenergy, p. 28.

11. Milutinović, S. (2004): *Urbanizacija i održivi razvoj*, Fakultet zaštite na radu, Niš, str. 47.

12. Mulić, R. (1995): *Strateški značaj biogoriva u poljoprivredi,* Zbornik radova: Biomasa, bioenergetska reprodukcija u poljoprivredi, IP "Mladost", Ekološki pokret Jugoslavije, Beograd, str. 41.

13. Oka, S., Jovanović, Lj. (1997): *Biomasa u energetici*, Biomasa – obnovljvi izvor energije, Zbornik radova, JDT, Beograd, str. 12.

14. Papargyropoulou, E., Padfield, R., Harrison, O., Preece, C. (2012): *The rise of sustainability services for the built environment in Malaysia*, Original Research Article, Sustainable Cities and Society, 5:44-51.

15. Smeets, E.M.W., Faaij, A.P.C., Lewandowski, I.M., Turkenburg, W.C. (2007): *A bottom-up assessment and review of global bio-energy potentials to 2050*, Progress in Energy and Combustion Science, 33(1):56–106.

16. Speth, J.G. (1990): *Can the world be saved?* Ecol. Econom, 1:289–302.

17. SRPS ISO 14040:2008 Upravljanje zaštitom životne sredine - Ocenjivanje životnog ciklusa - Principi i okvir, Institut za standardizaciju Srbije, Beograd, 2008.

18. SRPS ISO 14044:2009 Upravljanje zaštitom životne sredine - Ocenjivanje životnog ciklusa - Zahtevi i uputstva za primenu, Institut za standardizaciju Srbije, Beograd, 2009.

19. Tomanović, R., Stojanović, N. (1983): *Proizvodnja energije iz biomase*, Poljoprivreda kao korisnik i izvor energije, Zbornik radova, Ekonomika poljoprivrede, Beograd, str. 7- 14.

20. Van den Dobbelsteen AAJF, van der Linden AC, Klaase D. (2002): *Sustainability needs more than just smart technology*. In: Anson M, Ko JM, Lam ESS, editors. Proceedings of international conference on advances in building technology, vol. II. Oxford, UK: Elsevier Science, p. 1501–1508.

21. Wadel, G. (2009): *Sustainability in industrialized architecture: Modular lightweight construction applied to housing* (*La sostenibilidad en la construcción industrializada. La construcción modular ligera aplicada a la vivienda)*. Doctoral Thesis. Polytechnic University of Catalonia-Department of Architectural Constructions; Available online at: http://www.tdx.cat/ TDX-0122110-180946.

22. Walsh, E., Becker, A. (1996): *BIOCOST: A Software Program to Estimate the Cost of Producing Bioenergy Crops*. Proceedings of Bioenergy '96, Nashville, Oak Ridge National Laboratory, Tennessee, pp. 480 – 486.

23. Zekić, V., Jovanović, M. (2007): *Utvrđivanje kriterijuma za sagledavanje ekonomskih aspekata proizvodnje biogasa radi daljnje proizvodnje toplotne i/ili električne energije na AD Mitrosrem*, Revija agronomska saznanja, Novi Sad, broj 5, str. 33 – 36.

24. Zekić V., Tica N., Milić D., Ranogajec Joanjua, Radeka Miroslava (2011): *Tradicionalni građevinski materijali kao element ruralnog razvoja*, Agroekonomika, Poljoprivredni fakultet, Novi Sad, br. 51-52, str. 86-92.

25. Zekić V., Ranogajec Joanua (2012): *Production of the traditional building material as an element of rural development*, Thematic proceedings, International Scientific Conference „Sustainable Agriculture and Rural Development in Terms of The Republic of Serbia Strategic Goals Realization within The Danube Region - Preservation of rural values“, Institute of Agricultural Economics, Belgrade, 6-8. December 2012, Tara, Serbia, p. 713-729.

26. Zekić V., Ranogajec Jonjaua, Radeka Miroslava, Tica N., Bačkalić Z., Milić D. (2012): *Valuation of investment in processing plant for waste from ceramic brick and tile industry*, Technics Technologies Education Management-TTEM, 7(1):67-73.

# AN ANALYSIS OF THE EFFECT OF FEED COSTS ON BUSINESS RESULTS IN MILK PRODUCTION

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## Abstract

*Milk production on family farms in Serbia faces many problems. Fragmented production is making family farms much more alike farms whose production meets their own needs than farms with commercial production. The studied farms have Simmental cattle. We compared feed costs of both bulk and concentrate feed, their prices, effect on milk production and achieved results per cow per year. An important point that was studied was the economic efficiency of the farms, where the focus was put on feed costs, which constitute the largest share of the total cost of milk production.*

**Key words:** *family farms, milk production, business result*

## Introduction

The success of livestock production greatly depends on field crop production. Due to that fact, it is necessary firstly to optimize field crop production and make some structural adjustments toward getting more efficient feeds, in terms of quality and economics.

Making a comparative analysis, we studied the economic effect of feed costs on a farm business result, while having in mind different ways of procuring feeds. The production on the studied farms is conducted under similar conditions and in the same region (Eastern Serbia). The goal was to find critical points in the production of all three farms, propose some measures for improving production and eliminating negative effects, as well as to make suggestions for gaining more profits.

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The average number of cows on dairy farms in Serbia is 2.8, while in EU countries it is about 20 cows. Almost half of the growers have only one cow, and the fifth of them have five and more cows. Thirty per cent of the total milk production in the Republic of Serbia belongs to extra and first class milk according to EU standards, having % milk fat, % proteins, freezing point, somatic cell count and microorganism count (Lončar, Ristić, 2011).

## Methodology and data sources

Several methods were used in this research. All relevant pieces of information on organizing business, record keeping, and ways of getting inputs in field crop and milk production were obtained through the method of interviewing the farmer. After calculations, some indicators of business success were obtained.

The sources of information were the farmer's own records, data of the Agricultural Extension Office "Agroznanje" in Zaječar, as well as relevant Serbian literature.

## Results

### An analysis of production costs of bulk feed

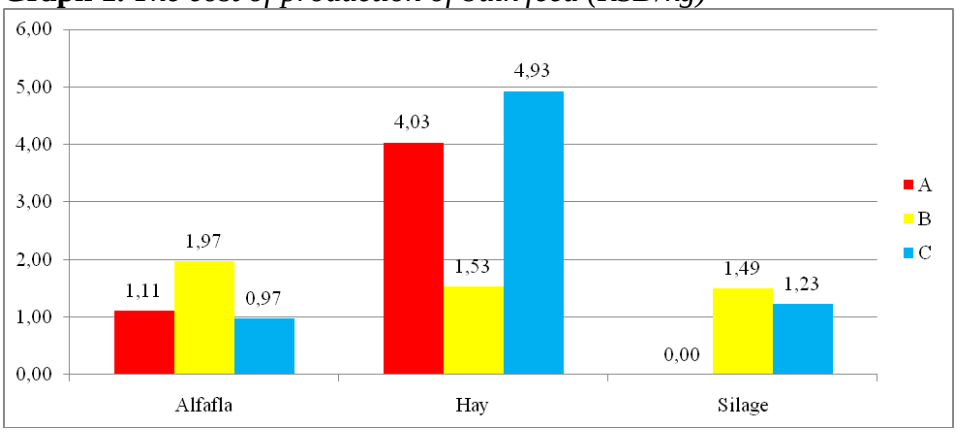
Bulk feed is in most cases made directly on farms. Graph 1 shows the production costs of alfalfa, hay and silage. Silage was not used as a feed only on the farm "A", whereas hay and alfalfa were used on all three farms.

The production cost of alfalfa was highest on the farm "B", amounting to 1.97 RSD/kg. The production was more expensive due to rental costs that were higher than on the other two farms and due to a lower yield per hectare as well.

The cost of hay per kilogram was highest on the farm "C", amounting to 4.93 RSD/kg, due to rental costs and seasonal labour burden of the production. The lowest cost of production of hay was recorded on the farm "B", amounting to 1.53 RSD/kg, mostly due to a higher yield, when compared to the other two farms.

In the long run, the use of silage ensures having stable dietary components in feed, which contributes to better quality of diets and higher milk production (Adamović, 2001). The farm "C" had lower costs of production of silage, due to a higher yield per hectare, although its total cost of production was higher by 11,861.21 RSD/ha.

**Graph 1.** *The cost of production of bulk feed (RSD/kg)*




**Source:** *Authors' calculation*

## An analysis of production costs of concentrate feed

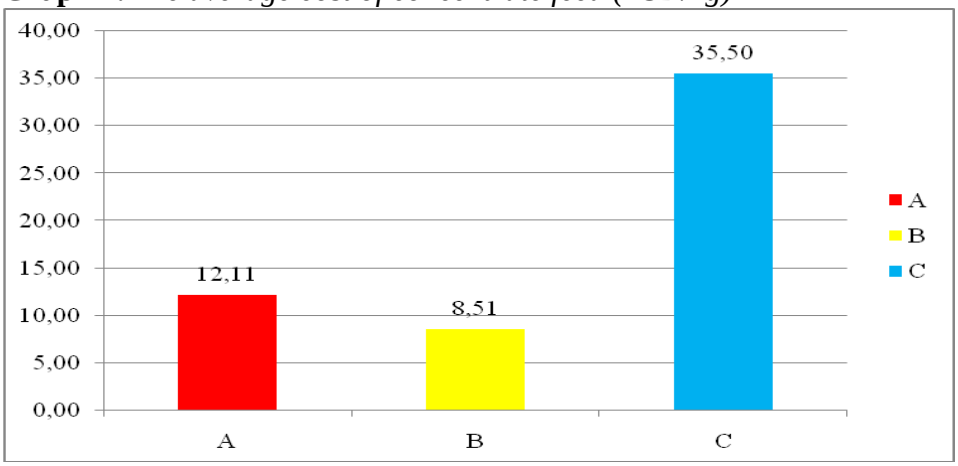
Concentrate feed accounts for a smaller part of diets when it comes to quantity, but a larger part when it comes to costs, therefore having effect on economic efficiency of production. All three farms used concentrate feed with different ratios of nutrients and had different ways of procuring the feed (Graph 2).

The farm "A" used wheat bran and brewers' grain. The both feeds were bought on the market, wheat bran for 22 RSD/kg and brewers' grain for 3.36 RSD/kg. Based on amounts and prices of this type of feed, we determined the average price for one kilogram of concentrate feed (12.11 RSD/kg).

The farm "B" made its own concentrate mix using ingredients produced on the farm. It bought sunflower meal, premix and soybean meal. That is the reason why this farm had the lowest cost of concentrate feed, which significantly influenced the business result. The average cost of production of concentrate feed amounted to 8.51 RSD/kg.The farm "C" had the highest cost of concentrate feed, amounting to 35.5 RSD/kg.

The reason for this was purchasing concentrates on the market. The farm used three types of concentrate feed: for dairy cows, dry cows and heifers.

**Graph 2.** *The average cost of concentrate feed (RSD/kg)*

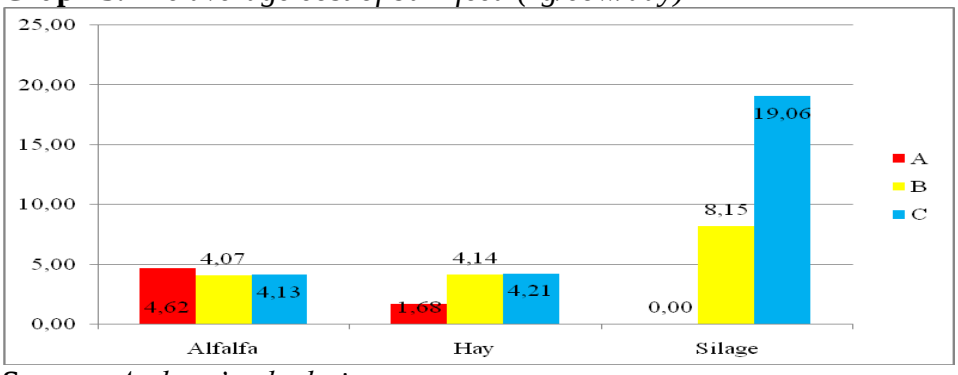



**Source:** *Authors' calculation*

**An analysis of costs of bulk and concentrate feed**

The cost of alfalfa was quite equable, ranging from 4.07 kg/cow/day on the farm "B" to 4.62 kg/cow/day on the farm "A". Furthermore, the farm "A" used the lowest amount of hay (1.68 kg/cow/day), due to summer cattle grazing. The other two farms used similar amounts of hay, amounting to about 4 kg/cow/day. The farm "C" used twice as double amount of silage (19.06 kg/cow/day on average) compared to the farm "B" (8.15 kg/cow/day) (Graph 3).

**Graph 3.** *The average cost of bulk feed (kg/cow/day)*



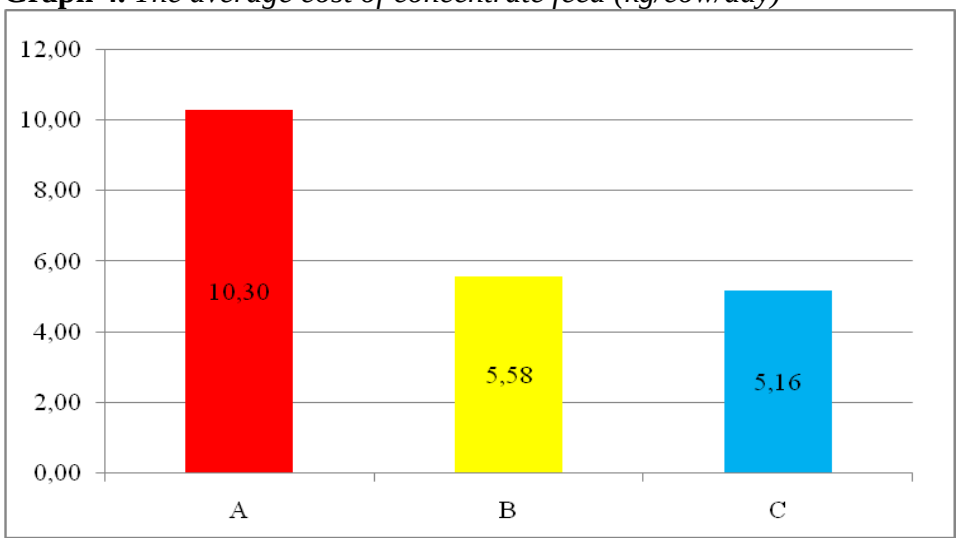

**Source:** *Authors' calculation*

The highest amount of concentrate feed was used on the farm "A", amounting to 10.30 kg/cow/day on average, being twice as higher than the amounts used on the farms "B" and "C" (5.58 kg/cow/day and 5.16 kg/cow/day, respectively) (Graph 4). We should not forget the fact that the structure and the component proportions of all three types of concentrate feed were different, as well as their nutrient value. The assumption is that the concentrate feed used on the farm "C" was best balanced and dosed, since it was made in a feed factory, and aimed for dairy cows, dry cows and heifers. That is the reason why the farm "C" had the highest cost of concentrate feed per cow per year, amounted to 67,209.30 RSD.

Taking into consideration the cost of production of concentrate feed made on the farm "B", we calculated that the annual cost of concentrate feed per cow amounted to 17,664.64 RSD, which is several times less than the cost of the farm "C". This cost component had a great effect on the farm business result.

The effects of concentrate feed on milk yield was least utilised by the farm "A". The annual cost of bran and brewers' grain per cow amounted to 45,643.08 RSD, which laid a significant burden on milk production on this farm that had the lowest average milk yield of all three studied farms.

**Graph 4.** *The average cost of concentrate feed (kg/cow/day)*




**Source:** *Authors' calculation*

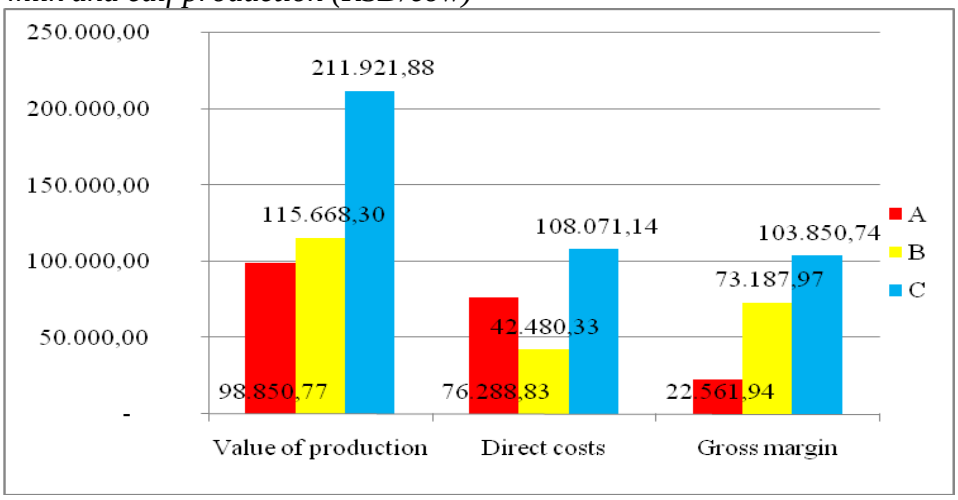
**An analysis of the cost of milk production and gross margins for milk and calf production**

The lowest cost of milk production was achieved by the farm "B", amounting to 12.47 RSD/l. The main reason for it was a low cost of feed, primarily concentrate feed, when compared to the other two farms. The costs of milk production of the farms "C" and "A" were 20.91 RSD/l and 21.83 RSD/l, respectively. Although the farm "C" had the highest feed costs (of both bulk and concentrate feed) per cow per year, it had a high milk yield. The farm "C" thus lowered the cost of milk production below the cost of the farm "A", which had the highest cost of production (21.83 RSD/l) due to the lowest milk yield.

The farm "C" achieved by far the highest value of production per cow per year, amounting to 211,921.88 RSD, mostly caused by high milk yield. The other two farms had almost twice as lower value of production (Graph 5).

The farm "B" had the lowest cost of production of 42,480.33 RSD/cow, thus having twice as lower direct costs than the farm "C" and having significantly lower direct costs than the farm "A". This ratio of direct costs and the value of production is a result of feed costs and amounts, as well as milk yield.

**Graph 5.** *The value of production, direct costs and gross margins for milk and calf production (RSD/cow)*




**Source:** *Authors' calculation*

A gross margin is a quick and efficient indicator for the profitability of a certain enterprise and it represents a result of subtracting direct costs of production from the total value of production, thus being a very efficient tool from the aspect of economics (Tomić et al., 2013).

The highest gross margin was recorded on the farm "C", amounting 103,850.74 RSD. However, when it comes the value of production, the share of this gross margin was not largest, compared to the other two farms. The gross margin of the farm "B" (73,187.97 RSD) accounted for 63.27% of the value of production, implying this farm achieved more economical production.

The smallest share of gross margin, and the lowest profit was obtained by the farm "A", accounting for 22.82% of the value of production, i.e. 22,561.94 RSD, what was one of the indicators for the least economical production of all the studied samples.

The gross margins of the farms "A" and "C" were approximately 28,179.52 RSD/calf and 28,755.14 RSD/calf, respectively. The gross margin of the farm "B" was slightly lower, amounting to 21,532.69 RSD/calf. However, when it comes to the background of these results, one should have in mind a different time period of raising calves. The calves of the farm "C" are sold at 10-15 days of age, while the calves of the farms "A" and "B" are sold at the age of three and two months, respectively. That implies more labour and higher costs of milk used for calves. Bearing in mind a real possibility of selling milk on the market, it would be better for both farms, from the aspect of productivity, to sell their calves as earlier as possible. Of course, we cannot neglect the fact that the farm "C" has a high quality genetic material and it also pre-contracts its calves.

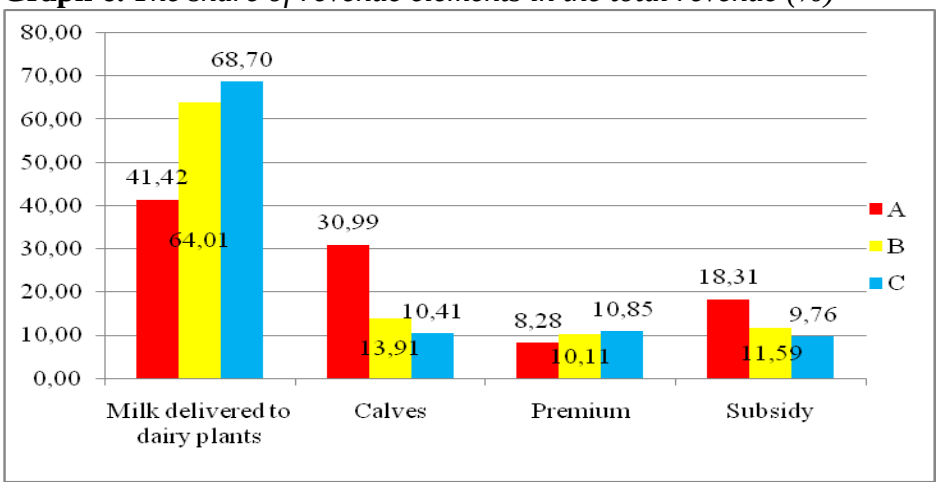
The share of the gross margins and direct costs of calf production of the farms "C" and "A" accounted for 93.93% and 57.51% of the total value of production, respectively.

## The analysis of the achieved business results

Graph 6 shows the share of revenue elements in the total revenue. The main parameter that determines the share of revenues from milk delivered to dairy plants and revenues from milk premiums in the total revenue is the average milk yield. The highest share of milk delivered to dairy plants

had the farm "C", amounting to 68.70%, and the lowest the farm "A", amounting to 41.42%. The same situation happened in case of milk premiums. When it comes to revenues from calves, the highest share had the farm "A" since it sold its calves for the highest price. The share of subsidies for dairy cows in the total revenue had characteristics of "fixed" revenue per cow, so the higher milk yield per cow is - the lower share of this revenue in the total revenue is.

**Graph 6.** *The share of revenue elements in the total revenue (%)*




**Source:** *Authors' calculation*

When it comes to the value of elements of the total revenue, one can conclude that the annual revenue per cow and revenue from premium per cow depended directly on milk selling price and milk yield. Therefore, the highest value was obtained by the farm "C", followed by the farm "B" and finally by the farm "A". When compared all three farms, the revenues from the calves and cow subsidies are directly proportional to the number and value of the calves sold, as well as the number of the realised subsidies per cow.

In the total cost of milk and calf production, feed costs constitute the largest share. The percentage of all feeds in the total cost of production was highest on the farm "A", then on the farms "C" and "B", amounting to 87.16%, 84.10% and 78.63%, respectively. However, if we compared the farms from the aspect of achieved feed costs per cow per year, then the farm "C" stood out with 97,114.90 RSD/cow, followed by the farm "A" with 68,704.21 RSD/cow and the farm "B" with 35,024.51 RSD/cow.

The reason for high costs on the farm "C" lies in the fact this farm used purchased concentrate feed for dairy cows (price 35.50 RSD/kg), while the farm "B" made its own concentrate mix (cost of production amounted to 8.51 RSD/kg). Thus the farm "B" used similar amounts of concentrate feed and spent 19,534.90 RSD/cow/year for concentrates, i.e. 56,193.25 RSD/cow less.

For the farm "A", the cost of purchasing concentrates amounted to 45,643.08 RSD of the total feed costs of 68,704.08, which only supports the previous statement. The average price of the concentrate amounted to 12.11 RSD/kg, which, bearing in mind the amount of used concentrate (10.13 kg/cow/day), made concentrate feed quite expensive in case of this farm.

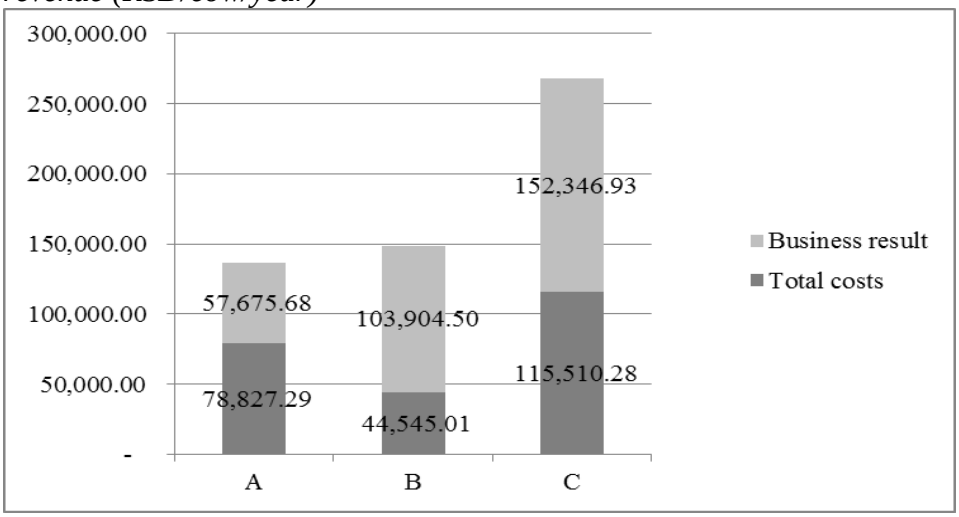
The cost of production of bulk feed was similar to all three farms, since the farms made their own bulk feed. However, when it comes to the total costs per cow, it was highest on the farm "C", due to the amount of silage used for dairy cows. The farm "A" had the lowest costs of bulk feed since it used only alfalfa and hay.

The costs of milk used for calves were directly proportional to duration of calf raising, i.e. the amount of milk calves used in that period and milk price.

Veterinary costs could be seen as a parameter of a level of production intensity of the studied farms. The lowest veterinary costs were achieved by the farm "A" since it uses summer grazing, which directly influences a lower rate of hoof diseases. The highest veterinary costs were achieved by the farm "C" that has a tie stall housing system.

Taking into consideration both quantity and pricing aspects of feed costs, milk yields, subsidies and premiums, we can see the farm "C" clearly distinguished from others, achieving the best business result of 152,346.93 RSD/cow/year, but also the highest costs per cow. Then there was the farm "B", having the best result in relative terms and the lowest costs in absolute terms. Its business result of 103,904.50 RSD/cow/year was almost twice as higher than the result of the farm "A", and its costs were lower by 34,282.28 RSD/cow/year (Graph 7).

**Graph 7.** *The share of the total cost and the business result in the total revenue (RSD/cow/year)*




**Source:** *Authors' calculation*

Having analysed the milk and calf production on the studied farms, we have come to a conclusion that the farm "B" had the most rational production and concentrate use. If we include the cost of production of concentrate feed from the farm "B" into the calculation of concentrate costs of the farms "C" and "A", while the amounts stay the same, we obtain with the following results:

- The total cost of production of the farm "C" has decreased by 58,415.42 RSD/cow.
- The total cost of production of the farm "A" has decreased by 17,545.83 RSD/cow.
- The business result of the farm "C" has increased by 58,056.02 RSD/cow and
- The business result of the farm "A" has increased by 17,242.68 RSD/cow.

## An analysis of the economic margin of milk production

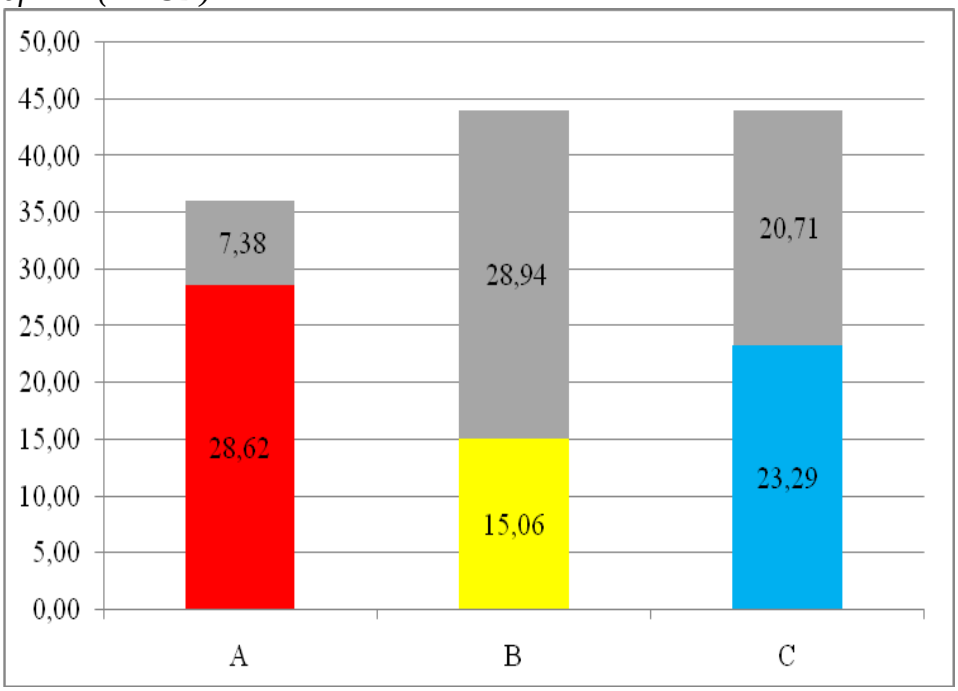
Knowing the factors that affect production efficiency can help in determining what their interrelations should be, in order to ensure that the expected production cover the cost of production.

The point of intersection of the sum of direct and indirect costs and the value of production is called the economic margin. This is the case where the value of production is higher than the total cost (Krstić et al., 2000).

The lowest margin (15.06 RSD), expressed as the selling price of one litre of milk, was achieved by the farm "B". This value was the furthest from the selling price. On the other hand, the margin price for the farm "A" was closest to the selling price, implying according to this indicator, that this farm can easily have a negative value of production in case of a decreased price of milk.

The amounts of 7.38 RSD/l, 28.94 RSD/l and 20.71 RSD/l achieved by the farms "A", "B" and "C" represent the difference between the selling price and margin price of milk, which is in fact a positive financial result per one litre of milk achieved in the studied production conditions (Graph 8).

**Graph 8.** *The economic margin expressed as the selling price of one litre of milk (in RSD)*

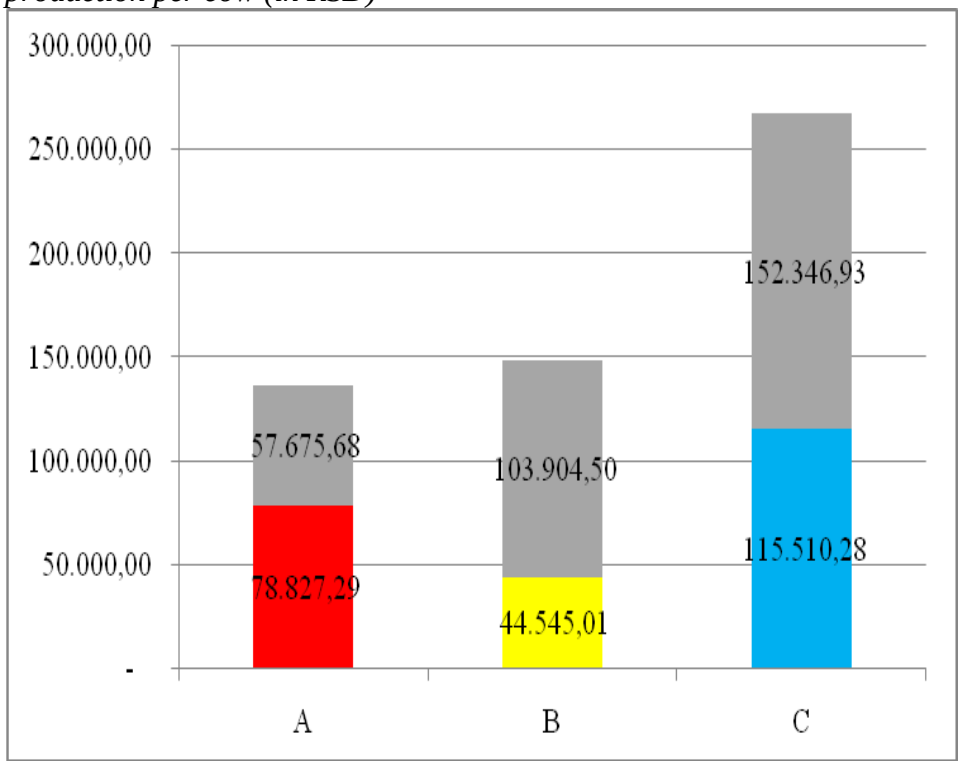



**Source:** *Authors' calculation*

The economic margin expressed by the annual cost of production per cow (in RSD) gives us a slightly different picture from the previous indicator. One can see that the farm "C" has the highest potential of depreciation from a possible decline in production value, having the highest result in absolute terms, amounting to 152,346.93 RSD/cow. Then comes the farm "B" having the result of 103,904.50 RSD/cow, and finally the farm "A" having the result of 57,675.68 RSD/cow. These values represent a positive financial result per cow/per year (Graph 9).

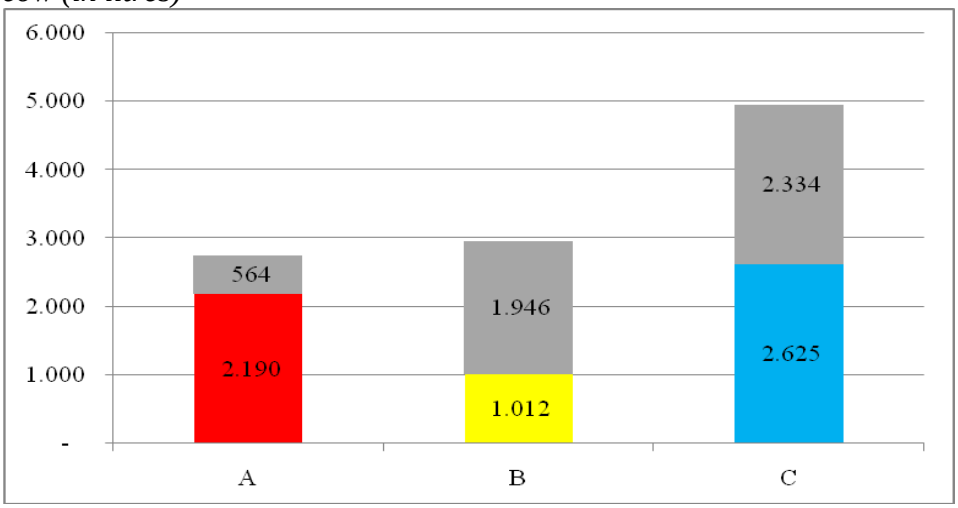
When it comes to milk yield, the farm "A" had 564 l higher yield than the economic margin, while the farms "B" and "C" had 1.946 l and 2.334 l higher milk yield than the economic margin, expressed as the annual milk yield per cow. These amounts of milk represent a positive financial result per cow per year, expressed in litres (Graph 10).

**Graph 9.** *The economic margin expressed as the annual cost of milk production per cow (in RSD)*




**Source:** *Authors' calculation*

**Graph 10.** *The economic margin expressed as the annual milk yield per cow (in litres)*




**Source:** *Author's calculation*

## An analysis of a farm business result

All three farms achieved economical production. The farm "A" achieved 1.27 RSD of the total revenue having invested 1 RSD, i.e. it gained 0.27 RSD of profit, which is the lowest result of all farms. The farm "C", however, achieved 1.84 RSD of the total revenue having invested 1 RSD, i.e. it gained 0.87 RSD of profit. Finally, the most economical production was achieved by the farm "B", which achieved 2.61 RSD having invested 1 RSD, i.e. it gained 1.61 RSD of profit.

The highest share of profits (61.68%) in the total value of production was achieved by the farm "B". A slightly lower share of profits was achieved by the farm "C" (45.68% of the total value of production), while the lowest result was achieved by the farm "A" having 21.33% of profits in the total value of production.

## Conclusion

Many factors affect a farm business result, among which the most significant is feed cost. Feed costs constitute approximately 80% and more of the total cost and significantly affect the business result of a farm.

The effect of feed costs on the business results of the chosen farms was studied, focusing mainly on concentrate feed since it constitute the largest part of the total cost of production. Regarding this, the following conclusions have been made:

- The most economical and profitable production was achieved by the farm "B".
- The most profitable production in absolute terms was achieved by the farm "C".
- The least economical and profitable production was achieved by the farm "A".

The main reason why the farm "B" had the most economical and profitable production lies in the fact it makes its own concentrate mix on the farm, spending much less than the other two farms that purchase concentrates on the market. Its cost of concentrates per cow was twice as lower than the cost of the farm "A" and almost four times lower than the cost of the farm "C". The farm "B" had similar milk yield to the farm "A", but twice as higher business result per cow.

The main reason for this is twice as lower annual costs of concentrates per cow, achieved by using twice as lower amount of concentrates. Furthermore, a significant effect on business results had milk quality and selling price. The farm "B" should go for increasing milk yield by introducing quality dairy cattle and, from a technological aspect, by using precisely balanced diets for different periods of lactation, as it was case with the farm "C". The milk yield of the farm "C" was slightly over the average in the Republic of Serbia, amounting to 2,458.50 l (Arsić et al., 2011). Simmental breed cows in Serbia produce about 4,045 kg of milk (Petrović, 2002). The most profitable production in absolute terms was achieved by the farm "C", mainly due to its milk yield that was within the global average, amounting to approximately 5,000 l/cow/year (Arsić et al., 2011). Besides the high total cost, 85% of which constituted by feed costs, this farm achieved the highest business result per cow, also due to milk yield, selling price of milk and milk quality. That is mostly because a genetic potential of a main herd, consisting of Simmental cattle exported from Germany. The farm could achieve an even better business result if made a quality concentrate mix on the farm.

The farm “A” achieved the least efficient and profitable production due to many reasons, such as: costly and not so efficient concentrates, a lack of maize silage as a very important bulk feed that affect milk yield of cows, a low selling price of milk because of its poor quality due to a lack of milking equipment, and the lowest milk yield of all three farms. A lower selling price of milk, formed based on milk quality and quantity, also had a significant effect on a considerably poorer business result of this farm. This farm should consider making its own high quality concentrate mix and silage, slowly introducing high-yielding breeds of dairy cows and buying milking equipment to improve milk quality.

It is necessary for farms to make timely steps to improve existed production and create sustainable production. They have to be ready to cope with fierce competition after the EU accession, when the milk from the EU member countries would be more competitive than the milk from domestic production.

Given the average milk yield in Serbia is 18% lower than the global average and 50% lower than European, it is clearly there are two urgent actions ahead: maximum rationalization of feed costs and introduction of high-yielding dairy cows into the production. All of this should be followed by stable government investments in agriculture.

## References


1. Adamović, M. (2001). *Proizvodnja silaže i senaže*, Društvo poljoprivrednih inženjera i tehničara, Institut PKB Agroekonomik i Institut za primenu nauke u poljoprivredi, Beograd, str. 10-11.

2. Arsić, S., Vuković, P., Kljajić, N. (2011). *Stanje i perspective proizvodnje mleka u Srbiji*, Radovi sa XXV savetovanja agronoma, veterinara i tehnologa, vol. 17, broj 3-4, Institut PKB Agroekonomik, str. 57-67.

3. Gogić, P. (2005). *Teorija troškova sa kalkulacijama*, Univerzitet u Beogradu, Poljoprivredni fakultet, Beograd – Zemun.

4. Krstić, B., Tomić, R., Sorak, G. (2000). *Organizacija i ekonomika stočarske proizvodnje*, Praktikum, Službeni glasnik, Beograd, str. 101-102.

5. Lončar, D., Ristić, B. (2011). *Analiza konkurencije i tržišne koncentracije u sektoru mlekarstva u Srbiji*. Ekonomika preduzeća, Savez ekonomista Srbije, vol. 59, br. 1-2, str. 125-142.

6. Ljiljanić, N. (2013). *Uticaj troškova ishrane na poslovni rezultat u proizvodnji mleka na porodičnim gazdinstvima,* Univerzitet u Beogradu, Poljoprivredni fakultet, Beograd, str. 72-92.

7. Petrović, M. (2002). *Stočarstvo*, Univerzitet u Beogradu, Poljoprivredni fakultet, Beograd, str. 144-145.

8. Tomić, V., Janković, S., Kuzevski, J., Ljiljanić, N., Radišic, R. (2013). *Maize Gross Margins in Different Environmental Conditions in 2011 and 2012*. Book of Proceedings, The Seminar Agriculture and Rural Development – Challenges of Transition and Integration Processes, Department of Agricultural Economics, Faculty of Agriculture, University of Belgrade, pp. 226-234.

# SHEEP FARMING-PASTURES-SUSTAINABILITY: AN ECONOMIC MODEL OF SHEEP FARM FOR RURAL AREAS IN SERBIA

*Zorica Sredojević[1], Nikola Popović[2]*

## Abstract

*Sheep production in Serbia is still extensive and poorly organized. Of the total number of sheep (1,635,218 head), about 80% is race pramenka as follows: Pirot, Svrljiska and Sjenicka. The remaining 20% consists of: cigaja (5%) and pramenka crossbreds with foreign races (15%). Based on the statistical data base records FAO and the Republic Statistical Office of Serbia, the work was performed economic analysis of the number of sheep and sheep products in Serbia, the European Union, Europe and the world for the period 2000-2012 years. In doing so, they give Indices of age, as well as the number of cattle and sheep share the product of Serbia Europe and the world and the EU share in world.*

*Starting from the basic natural conditions of mountainous areas of Serbia, as well as production-potential arable land, buildings, equipment, labor, etc. at their disposal a representative farms in the area, the main goal of the research work is aimed at determining the effectiveness of investments in the farm for breeding 200 head of breeding ewes and 8 rams. When starts with the fact that the necessary food during the summer provides the use of pasture area that are owned by the state. Sheep breeders have to pay compensation, so called tax-grazing. Producers provide hay for winter feeding of sheep, barley and oats with their own arable land. Such a model farm can contribute to better profitability of family farms operating in mountainous regions, and rural revitalization, sustainability areas and economic development of Serbia.*

**Key words:** *sheep farm, pasture, sustainability, rural areas of Serbia*

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## Introduction

Sheep are very adaptable to different conditions of keeping and feeding it to their cultivation of very intensive to extensive ways. In our situation is often the case that this kind of grown extensively in very poor housing conditions and nutrition. They can use pastures that are inaccessible to other animals, as well as nutrients that other species cannot use. Sometimes keeping the sheep was a much greater extent for wool production. Then the value of 1 kg of wool had a value of 10 kg of meat (Makević *et al*., 2004). Today the ratio is completely changed, and the sheep kept primarily for meat production, and wool or milk. We should not forget that keeping sheep manure was an important product. For sheep is further characterized as characterized in that it has a high fecundity, can be grown in a number of ways including several versions of nutrition. In fact, they endured poor housing conditions, care and diet. Certainly, improving the general conditions of keeping sheep is quickly reflected in increasing their fertility or weight gain.

Correlation with sheep farming areas to limited production capacity is one of the basic criteria preferences for sheep production on farms (Krstić *et al*., 1995). Over-represented pasture in the nutrition of sheep which makes this production more economical. Pastures are the most extensive of using agricultural land, because with them can only use green fodder for grazing ruminants (cattle, sheep, etc.) during the summer period (Gogić, 2004). Compared to hang out farm animals, sheep breeders provide security for the following reasons: they are very suitable for the use of pastures, they are very economical and profitable livestock species - give proportionately more income in relation to the inputs, allowing regular inflow of funds money etc. (Mekić *et al*, 2007). Due to the increasing demands of customers and to better competition in the market, it is necessary to improve domestic sheep. Improvement of production can only be achieved by improving the productivity of the various components in the long term (Sredojević & Mojsijev, 2013). Therefore, the main objective of this paper is to analyze the sheep and identifying the determinants of its economic efficiency, especially in rural mountainous areas of Serbia. In this area are mainly family farms, a major product of the meat, which makes up about 80% of the income of the average manufacturer. Due to the snow and harsh weather conditions, you need a closed system and food during the winter. Lambs are born in late winter to early spring. Grazing season begins in early spring and ends around the end of September to mid October.

## Material and Methods

For the study in this paper, we used data from a variety of materials of domestic and international publications, websites and databases of statistical records, survey of sheep farmers and others. Data for the number of sheep and sheep production products used in the statistical records of the Food and Agriculture Organization of the United Nation (FAO, EUROSTAT, 2014) and the Office of Statistics of the Republic of Serbia (SORS, 2014). It is for the period 2000-2012. On the based absolute amounts of the some years the number of sheep, produced meat and milk in the world, Europe, the European Union and in Serbia in doing so, they calculate indices of these amounts in relation to the base 2000$^{th}$ year, then the percentage established a learning Serbian in the manufacture of these products for some years in Europe, the European Union and in the world.

For the preparation of model input parameters for sheep farm used the data of the survey conducted on some farms in the municipality Sjenica, during the autumn of 2013$^{th}$ year. On the based area of pasture and arable of land, as well as a representative farm, selected 200 stem sheep. From the standpoint of producers (growers), made the economic justification of investment in the parent flock, provided they have the necessary other capacities. It is used investment and calculation methods were applied. All information and data are presented in tables with appropriate textual interpretation.

## Results and Discussion

***Capacity of sheep production in Serbia; share in Europe and the world-*** Our country has great potential for livestock development, especially for growing ruminants. Excellent conditions for cattle are in areas that are less developed and where there is no economic basis for major development projects. Rural areas have specific and complex economic, social and environmental in most countries encompass over 70% of the national territory and which is inhabited by 50% of the population (Sredojević *et al.*, 2010). Characteristics of most of the rural area in our country are sparse population, depopulation rather high age of the population, a significant representation of commuting and non-agricultural population of young, poor equipment transportation, utility facilities and living standards, the dominance of agriculture and insufficient diversification of other activities and the like.

The largest share of natural meadows and pastures are located in mountainous regions where the depopulation was a partial extinction of agricultural activities. Animal husbandry, particularly sheep, to the proper exploitation of agricultural land and prevent further degradation of natural meadows and pastures. Observed per capita average of arable land in Serbia is 0.56 ha, while in the neighboring countries are moving in the following amounts: Bulgaria 0.46 ha, 0.43 ha Romania, Bosnia and Herzegovina 0.40 ha, Croatia 0.33 ha, Montenegro 0.30 ha and 0.26 ha of Macedonia (SORS, 2014). On the basis of the data presented in Table 1, it can be seen that the sheep in Serbia in the last thirteen-year period exhibits oscillations with mild sensory decline and 15% fewer animals in the 2012$^{th}$ in relation to the 2000$^{th}$ year. On to a greater extent affect the long-term chaotic market conditions.

According to the same data source (FAO, Eurostat, 2014), the number of sheep in the European Union in the period analyzed is decreased and the throat 122,674,288 in 2000$^{th}$ year at 97,091,850 throat in 2012$^{th}$ year or 21%, while in Europe the decline was lower intensity for the 12%. On the other hand, during the same period, the number of sheep for some years has fluctuated since the fall of 2% to an increase of 10% in the 2012$^{th}$ compared to the base 2000 year (Table 1).

**Table 1.** *Number of sheep in Serbia, Europe, and the European Union and in the world in the period 2000-2012*

| Year | R. Serbia | Index | E. Union | Index | Europe | Index | World | Index |
|---|---|---|---|---|---|---|---|---|
| *2000* | *1,917,000* | *100* | *122,674,288* | *100* | *146,694,238* | *100* | *1,059,746,419* | *100* |
| 2001 | 1,782,670 | 93 | 112,473,763 | 92 | 136,175,168 | 93 | 1,038,368,239 | 98 |
| 2002 | 1,691,200 | 88 | 110,989,334 | 90 | 135,024,170 | 92 | 1,028,574,068 | 97 |
| 2003 | 1,756,090 | 92 | 110,527,863 | 90 | 135,493,681 | 92 | 1,037,780,362 | 98 |
| 2004 | 1,838,000 | 96 | 111,741,102 | 91 | 138,032,809 | 94 | 1,068,294,548 | 101 |
| 2005 | 1,837,000 | 96 | 110,368,117 | 90 | 137,276,432 | 93 | 1,099,787,676 | 104 |
| 2006 | 1,609,240 | 84 | 108,796,265 | 87 | 136,305,644 | 93 | 1,106,339,973 | 104 |
| 2007 | 1,606,160 | 84 | 107,062,052 | 87 | 135,525,338 | 92 | 1,108,498,319 | 105 |
| 2008 | 1,605,280 | 84 | 103,611,459 | 84 | 133,806,220 | 91 | 1,096,767,224 | 104 |
| 2009 | 1,503,990 | 78 | 101,279,747 | 82 | 131,655,907 | 90 | 1,076,680,844 | 102 |
| 2010 | 1,475,400 | 77 | 99,155,068 | 81 | 129,957,284 | 88 | 1,078,326,625 | 102 |
| 2011 | 1,460,300 | 76 | 96,788,620 | 79 | 127,306,839 | 87 | 1,043,712,633 | 98 |
| 2012 | 1,635,218 | 85 | 97,091,850 | 79 | 128,618,357 | 88 | 1,169,004,916 | 110 |

**Source:***http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Food_and_Agriculture_Organization_%28FAO%29* FAO, EUROSTAT

The production of sheep meat depends on a number of factors, primarily the race, housing conditions and diet. Based on the data presented in Table 2, it can be concluded that in the analyzed period 2000-2012. Serbia mutton production was about 23,000 t with a slight variation (decrease or increase) in any given year, about 6%.

**Table 2.** *The volume of production meat of sheep in Serbia, the European Union and Europe in the period 2000-2012* *(tons)*

| Year | R. Serbia | Index | E. Union | Index | Europe | Index | World | Index |
|---|---|---|---|---|---|---|---|---|
| 2000 | 23,000 | 100 | 1,200,186 | 100 | 1,412,784 | 100 | 7,788,863 | 100 |
| 2001 | 21,738 | 94 | 1,068,249 | 89 | 1,273,766 | 90 | 7,765,584 | 100 |
| 2002 | 19,360 | 84 | 1,090,135 | 91 | 1,293,583 | 92 | 7,767,971 | 100 |
| 2003 | 21,271 | 92 | 1,054,666 | 88 | 1,262,152 | 89 | 7,788,974 | 100 |
| 2004 | 24,000 | 104 | 1,063,243 | 88 | 1,288,659 | 91 | 7,835,629 | 101 |
| 2005 | 21,205 | 92 | 1,056,246 | 88 | 1,286,763 | 91 | 8,051,244 | 103 |
| 2006 | 20,402 | 89 | 1,035,504 | 86 | 1,269,761 | 90 | 8,238,397 | 106 |
| 2007 | 19,730 | 86 | 1,017,916 | 85 | 1,263,605 | 89 | 8,485,352 | 109 |
| 2008 | 23,003 | 100 | 983,073 | 82 | 1,234,901 | 87 | 8,408,228 | 108 |
| 2009 | 24,457 | 106 | 932,169 | 78 | 1,194,722 | 84 | 8,355,595 | 107 |
| 2010 | 22,726 | 99 | 889,853 | 74 | 1,154,316 | 82 | 8,241,718 | 106 |
| 2011 | 23,858 | 104 | 893,136 | 74 | 1,164,687 | 82 | 7,911,505 | 102 |
| 2012 | 22,373 | 97 | 878,379 | 74 | 1,150,961 | 81 | 8,470,267 | 114 |

**Source:***http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Food_and_Agriculture_Organization_%28FAO%29* FAO, EUROSTAT

At the same time, the European Union, the production of meat in sheep 2012$^{th}$ is also decreased, and even by 26% compared to 2000 year and in Europe by 19%. However, in the world in 2012, the production volume of sheep meat was 8,470,267 tons, which is 14% higher than in 2000 (7,788,863 tons). In terms of ownership structure of arable land in Serbia, more than ¾ of arable land is owned by households with up to 5 ha, while less than 1% of households have 20 or more acres. This structure in terms of size of estate has a large impact on the size of the average household, as well as the type and volume of production on it. Thus, the average size of farms in the EU is 17.7 ha, while in Serbia only 4.5 ha. However, should be noted that in some countries in the region, ownership structure is worse than in Serbia. For example, in Romania is about 94% possession of the surface to 5 ha in Bulgaria about 97% (FAO, Eurostat, 2014). Compared to meat production, the total production of milk sheep in Serbia the 2012$^{th}$ significantly decreased compared to 2000, as much as about 65% (Table 3).

**Table 3.** *The volume of production milk of sheep in Serbia, the European Union and Europe in the period 2000-2012* *(tons)*

| Year | R. Serbia | Index | E. Union | Index | Europe | Index | World | Index |
|---|---|---|---|---|---|---|---|---|
| 2000 | 34,023 | 100 | 2,696,824 | 100 | 2,880,886 | 100 | 8,103,580 | 100 |
| 2001 | 31,000 | 91 | 2,734,024 | 101 | 2,922,539 | 101 | 8,259,215 | 102 |
| 2002 | 27,574 | 81 | 2,816,455 | 104 | 3,007,960 | 104 | 8,301,184 | 102 |
| 2003 | 24,292 | 71 | 2,763,406 | 102 | 2,959,412 | 103 | 8,594,652 | 106 |
| 2004 | 25,000 | 73 | 2,748,097 | 102 | 2,951,297 | 102 | 8,760,579 | 108 |
| 2005 | 25,775 | 76 | 2,747,751 | 102 | 2,955,276 | 102 | 8,958,215 | 110 |
| 2006 | 15,300 | 45 | 2,882,517 | 107 | 3,098,878 | 108 | 9,275,144 | 114 |
| 2007 | 14,400 | 42 | 2,861,371 | 106 | 3,058,410 | 106 | 9,134,870 | 113 |
| 2008 | 14,300 | 42 | 2,910,839 | 108 | 3,108,632 | 108 | 8,994,632 | 111 |
| 2009 | 10,424 | 31 | 2,791,812 | 104 | 2,981,405 | 103 | 9,423,316 | 116 |
| 2010 | 9,658 | 28 | 2,911,212 | 108 | 3,126,066 | 108 | 9,890,478 | 122 |
| 2011 | 11,119 | 33 | 2,848,906 | 106 | 3,061,006 | 106 | 9,262,607 | 114 |
| 2012 | 11,601 | 34 | 2,789,815 | 103 | 3,015,062 | 105 | 10,122,522 | 125 |

**Source:***http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Food_and_Agriculture_Organization_%28FAO%29* FAO, EUROSTAT

Sheep production in Serbia is characterized by a weak racial composition, low productivity, poor quality products is extensive method of breeding and steady decline in the number of heads. Sheep and today in some areas, especially mountainous, is a major source of income for a large number of households and population. Degree utilization production capacity is an important indicator of the competitiveness of agricultural production. Empirical data and expert analysis in practice shows that in Serbia capacity underutilized. The exceptions are the tobacco industry, where the utilization of around 80%, beer and oil, with over 50%, while in all other industries, the utilization is below 50%. Thus, for example, the feed industry, capacity utilization is below 20%. Lack of capacity utilization is expensive pressing plant and the high cost of the final product and thereby reducing the profit of manufacturers and competitiveness in the market. In the European Union average of one active farmer produces food for 26 people, 46 for Germany, and 35 for France, Austria and Italy for 22, 16 for Bulgaria, while in Hungary 9, Romania 8, and Serbia total for 6. It talks about the low productivity of agriculture in Serbia in relation to the EU and some countries in the region. With respect to natural resources and comparative advantages of the region for livestock, especially in rural areas, Serbia is at a very low level in terms of the share of the number of sheep in the Europe and the world.

**Table 4.** *The share of Serbia in Europe and in the world and the EU in the world by number vote's of sheep, 2000-2012*

| Year | R. Serbia | Europe and share of Serbia | World and share of Serbia | EU and share in the world |
|---|---|---|---|---|
| 2000 | 1,917,000 | 146,694,238 | 1,059,746,419 | 122,674,288 |
| | *Share (%)* | *1.31* | *0.18* | *11.58* |
| 2001 | 1,782,670 | 136,175,168 | 1,038,368,239 | 112,473,763 |
| | *Share (%)* | *1.31* | *0.17* | *10.83* |
| 2002 | 1,691,200 | 135,024,170 | 1,028,574,068 | 110,989,334 |
| | *Share (%)* | *1.25* | *0.16* | *10.79* |
| 2003 | 1,756,090 | 135,493,681 | 1,037,780,362 | 110,527,863 |
| | *Share (%)* | *1.30* | *0.17* | *10.65* |
| 2004 | 1,838,000 | 138,032,809 | 1,068,294,548 | 111,741,102 |
| | *Share (%)* | *1.33* | *0.17* | *10.46* |
| 2005 | 1,837,000 | 137,276,432 | 1,099,787,676 | 110,368,117 |
| | *Share (%)* | *1.34* | *0.17* | *10.03* |
| 2006 | 1,609,240 | 136,305,644 | 1,106,339,973 | 108,796,265 |
| | *Share (%)* | *1.18* | *0.14* | *9.83* |
| 2007 | 1,606,160 | 135,525,338 | 1,108,498,319 | 107,062,052 |
| | *Share (%)* | *1.18* | *0.14* | *9.66* |
| 2008 | 1,605,280 | 133,806,220 | 1,096,767,224 | 103,611,459 |
| | *Share (%)* | *1.20* | *0.15* | *9.45* |
| 2009 | 1,503,990 | 131,655,907 | 1,076,680,844 | 101,279,747 |
| | *Share (%)* | *1.14* | *0.14* | *9.41* |
| 2010 | 1,475,400 | 129,957,284 | 1,078,326,625 | 99,155,068 |
| | *Share (%)* | *1.14* | *0.14* | *9.20* |
| 2011 | 1,460,300 | 127,306,839 | 1,043,712,633 | 96,788,620 |
| | *Share (%)* | *1.15* | *0.14* | *9.27* |
| 2012 | 1,635,218 | 128,618,357 | 1,169,004,916 | 97,091,850 |
| | *Share (%)* | *1.27* | *0.14* | *8.31* |

**Source:***http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Food_and_Agriculture_Organization_%28FAO%29* FAO, EUROSTAT

During the analyzed period, the share of Serbia in Europe has been reduced from 1.31% (2000), to 1.27% (2012), and in the world, with 0.18% (2000) at 0.14% (2012). In the European Union, the decrease was progressive, and in the year 2012. Share of the EU in the world decreased to 8.31% compared to 2000, when the proportion was 11.58% (Table 4).

**Table 5.** *The share of Serbia in Europe and in the world and the EU in the world in the production meat of sheep, 2000-2012* *(tons)*

| Year | R. Serbia | Europe and share of Serbia | World and share of Serbia | EU and share in the world |
|---|---|---|---|---|
| 2000 | 23,000 | 1,412,784 | 7,788,863 | 1,200,186 |
| | *Share (%)* | *1.63* | *0.30* | *15.41* |
| 2001 | 21,738 | 1,273,766 | 7,765,584 | 1,068,249 |
| | *Share (%)* | *1.71* | *0.28* | *13.76* |
| 2002 | 19,360 | 1,293,583 | 7,767,971 | 1,090,135 |
| | *Share (%)* | *1.50* | *0.25* | *14.03* |
| 2003 | 21,271 | 1,262,152 | 7,788,974 | 1,054,666 |
| | *Share (%)* | *1.68* | *0.27* | *13.54* |
| 2004 | 24,000 | 1,288,659 | 7,835,629 | 1,063,243 |
| | *Share (%)* | *1.86* | *0.31* | *13.57* |
| 2005 | 21,205 | 1,286,763 | 8,051,244 | 1,056,246 |
| | *Share (%)* | *1.65* | *0.26* | *13.12* |
| 2006 | 20,402 | 1,269,761 | 8,238,397 | 1,035,504 |
| | *Share (%)* | *1.61* | *0.25* | *12.57* |
| 2007 | 19,730 | 1,263,605 | 8,485,352 | 1,017,916 |
| | *Share (%)* | *1.56* | *0.23* | *12.00* |
| 2008 | 23,003 | 1,234,901 | 8,408,228 | 983,073 |
| | *Share (%)* | *1.86* | *0.27* | *11.69* |
| 2009 | 24,457 | 1,194,722 | 8,355,595 | 932,169 |
| | *Share (%)* | *2.05* | *0.29* | *11.16* |
| 2010 | 22,726 | 1,154,316 | 8,241,718 | 889,853 |
| | *Share (%)* | *1.97* | *0.28* | *10.80* |
| 2011 | 23,858 | 1,164,687 | 7,911,505 | 893,136 |
| | *Share (%)* | *2.09* | *0.30* | *11.30* |
| 2012 | 22,373 | 1,150,961 | 8,470,267 | 878,379 |
| | *Share (%)* | *1.94* | *0.26* | *10.37* |

**Source:***http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Food_and_Agriculture_Organization_%28FAO%29* FAO, EUROSTAT

The production of sheep meat, primarily lamb, occupies an increasingly important place in sheep production in the world. Based on the data given in Table 5, it can be seen that by this product, share of Serbia in Europe increased from 1.63% in the 2000$^{th}$ to 1.94% in the 2012$^{th}$. On the other hand, the share of Serbia in the production of sheep meat in the world has decreased during the analyzed period and from 0.30% (2000) to 26%

(2012), while the share of EU in the world decreased from 15.41% (2000) at 10.37% (2012).

**Table 6.** *The share of Serbia in Europe in the world and the EU in the world in production milk of sheep, 2000-2012* *(tons)*

| Year | R. Serbia | Europe and share of Serbia | World and share of Serbia | EU and share in the world |
|---|---|---|---|---|
| 2000 | 34,023 | 2,880,886 | 8,103,580 | 2,696,824 |
| | *Share (%)* | *1.18* | *0.40* | *33.28* |
| 2001 | 31,000 | 2,922,539 | 8,259,215 | 2,734,024 |
| | *Share (%)* | *1.10* | *0.38* | *33.10* |
| 2002 | 27,574 | 3,007,960 | 8,301,184 | 2,816,455 |
| | *Share (%)* | *0.92* | *0.33* | *33.93* |
| 2003 | 24,292 | 2,959,412 | 8,594,652 | 2,763,406 |
| | *Share (%)* | *0.82* | *0.28* | *32.15* |
| 2004 | 25,000 | 2,951,297 | 8,760,579 | 2,748,097 |
| | *Share (%)* | *0.85* | *0.28* | *31.37* |
| 2005 | 25,775 | 2,955,276 | 8,958,215 | 2,747,751 |
| | *Share (%)* | *0.87* | *0.29* | *30,67* |
| 2006 | 15,300 | 3,098,878 | 9,275,144 | 2,882,517 |
| | *Share (%)* | *0.49* | *0.16* | *31.08* |
| 2007 | 14,400 | 3,058,410 | 9,134,870 | 2,861,371 |
| | *Share (%)* | *0.47* | *0.16* | *31.33* |
| 2008 | 14,300 | 3,108,632 | 8,994,632 | 2,910,839 |
| | *Share (%)* | *0.46* | *0.16* | *32.36* |
| 2009 | 10,424 | 2,981,405 | 9,423,316 | 2,791,812 |
| | *Share (%)* | *0.35* | *0.11* | *29.63* |
| 2010 | 9,658 | 3,126,066 | 9,890,478 | 2,911,212 |
| | *Share (%)* | *0.31* | *0.10* | *29.43* |
| 2011 | 11,119 | 3,061,006 | 9,262,607 | 2,848,906 |
| | *Share (%)* | *0.36* | *0.12* | *30.76* |
| 2012 | 11,601 | 3,015,062 | 0,122,522 | 2,789,815 |
| | *Share (%)* | *0.38* | *0.11* | *27.56* |

**Source:***http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Food_and_Agriculture_Organization_%28FAO%29* FAO, EUROSTAT

The production of sheep milk in races represented in Serbia is very low and the average amount that is obtained milking sheep is 50-100 kg per year. In our country, in the highlands, sheep's milk is an important food. It is often processed into cheese, cream and other products.

During the period from 2000 to 2012, Serbia's participation in the production of sheep milk in the 2012$^{th}$ fell both in Europe and in the world, and nearly 30% compared to 2000 (Table 6). Also, the share of EU in the world in the same period declined from 33.28% (2000) at 27.56% (2012).

Although the Republic of Serbia has favorable natural conditions for the development of animal husbandry, it is still deficient in the production of meat, sheep milk and milk products. In the domestic and world market sheep products are increasingly popular, which a good opportunity that our country can and should use to export orientation of agricultural products.

***Sheep on pasture*** – This method can be very effective and often the most cost-effective way of keeping sheep. Namely, in the grazing area, as a rule used, which would otherwise be very difficult exploited in any way. The economic importance of pasture utilization could increase its intensive use, i.e., increase in the number of cattle that graze on pastures, which would necessarily accompanied by significant investments (Gogić, 2005). Number of sheep, which can be kept in a pasture or grazing lands depends first of which, the amount of food that can be expected on the surface. The second factor is related to the sheep, for their average body weight, and the average number of lambs per ewe. The minimum number of lambs is around 1.1 per sheep, while the average is about 1.3. Less commonly encountered flocks of lambs with an average number of 1.5 or more per sheep. Contribution of food is expressed in units of nutrients it is certainly the most important factor in determining the number of heads per surface. It is believed that the meadow per hectare may be kept on average between 5 and 20 of sheep, including offspring (Gutić *et al.*, 2006). Of course, the condition of the grass and the total yield per year can significantly vary. Utilization of feed in the pasture must be adapted to growing grass during the year Grazing sheep comes to recharge surface grazing, which certainly contributes to increase the yield of grass. Water supply to the suburbs used various sources and tanks. With them are set automatically drinkers or troughs with water level regulator in them.

Before organizing the sheep farms are planned: the number, herd structure, the direction of production, such as meat-wool type farms, for example, reproduction, meat and so on. Accordingly, plans are needed food for the winter period, for example hay, silage, grain crops for the provision of concentrate and grass surface mass of the vegetation period.

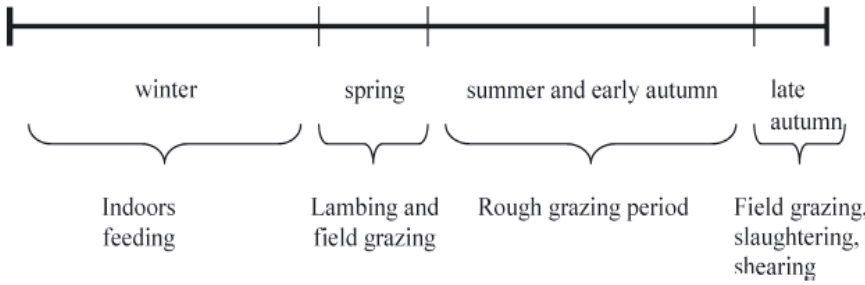
In our conditions, the winter feeding period lasts 5-6 months, a period of summer feeding 6-7 months. Based on these data, it is anticipated land territory for the production of certain nutrients and planned to return on 1 ha. Good pasture can provide 60-65% of the annual needs of sheep in food.

**Economic analysis of investment in farm sheep** - Eeconomic efficiency of sheep production on larger farms depends on the type of farm-reproductive, fattening and combined, investment in the establishment of farm equipment and food, then investment in breeding stock, technological process, provided that provided food, veterinary care, placement and price product. In Serbia, on the family farm average size of 4.5 ha on average have: a tractor, a cow, a beehive, three sheep, four pigs and 27 pieces of chicken (SORS, 2014). Family farms where grown sheep which are used through the drafting of model exploration in this paper, are in the territory of Sjenica and more broadly in the district of Zlatibor. The district covers an area of 6,142 $km^2$, accounting for 7% of the area of the Republic of Serbia, where he lives 313,396 inhabitants, which is 4% of the population of the Republic of Serbia. By geography district is located in the southwestern part of Serbia, and the characteristics and configuration of the ground, a hilly - mountainous area. Is limited Maljen and Povlen the north, the river Uvac the south, mountains Ovčar and Kablar the east and the river Drina to the west. District of Zlatibor is very hilly-mountainous area and has 438 settlements, 326 cadastral municipalities, of which 346 are among the hilly-mountainous region, and the total territory of 55.6% is agricultural land. County has significant potential for a forest known mountains are Zlatibor, Tara, Goldsmith, Golia and others. District consists of ten municipalities: Bajina Bašta, Kosjerić, Uzice, Požega, Čajetina, Arilje, Priboj, Nova Varoš, Prijepolje and Sjenica. It is located on the border of the Republic of Serbia, the Republic of Montenegro and the Serbian Republic. Agricultural production in the region is mixed and extensive. Landholding (5.48 ha) was significantly higher than the average of Serbia (4.5 ha). However, in the possession of the structure is little arable land as prevalent pastures and meadows.

Local agricultural production has been developed in accordance with the natural features of Zlatibor region, in terms of the features, though underdeveloped. Most are represented fruit-plums, apples and berries, then animal husbandry-cattle and sheep farming-potatoes, and grow some arable crops-barley, oats, etc. Sjenička or Pester sheep was named after

the village arbour on the Pester plateau, which is located in the southwestern part of Serbia, at an altitude of over 1000 meters. This is one of the major strains of sheep. Starting from the production potential of sheep in relation to the available surface area of natural grasslands (quality forage and pasture from these areas), then the market demand for a certain weight of lambs are graphically presented during the season when breeding sheep (Figure 1). Diet based on hay during winter and pasture in the summer.

**Figure 1.** *Seasonal subdivision sheep farming*




**Source:** Own presentation by author, *Sconhoft A. (2008), Sheep as capital goods and farmers as portfolio managers: a bioeconomic model of Scandinavian sheep farming, Agricultural Economics 38 pp. 193-200*

Dressing percentage was about 42%. Average milk production in lactating sheep Sjenicka 5-6 months range from 60-80 liters of 100 sheep, lambs was obtained 110-130 (Gutić *et. al.*, 2006). In this area the most have natural grasslands. Unfertilized natural meadows provide 1.1 to 2.8 t/ha of hay and pastures from 0.6 to 2.0 t/ha. Pester plateau is characterized by excellent natural predisposition for the development of animal husbandry. Number of livestock, especially sheep, in Sjenici increases during the period of exile livestock grazing, and reduce the winter before the introduction of livestock facilities. The main reason for the existence of these seasonal trends is the lack of fodder in winter and low capacity barn facilities. In sheep meal of the day, depending on the season and weather conditions, consisting of hay with artificial and natural meadows, pasture and concentrates. According to the model Gutića et al. (2006), given in Table 7, the predicted yield of hay with artificial meadows 15,000 kg/ha, the yield of hay from natural meadows 10,000 kg/ha, the yield of pasture 35,000 kg/ha, and the concentrate is used for procurement. The use of concentrates is mainly in the lambing time.

**Table 7.** *Arable land needed for food production for farms with different number of sheep*

| Nutrients | 100 sheep | | 200 sheep | | 300 sheep | |
|---|---|---|---|---|---|---|
| | Annual needs, kg | Necessary, ha | Annual needs, kg | Necessary, ha | Annual needs, kg | Necessary, ha |
| Hay from arable land, kg | 17,500 | 1.16 | 34,700 | *2.00* | 51,300 | 3.50 |
| Hay from nat, meadows kg | 17,500 | 1.75 | 34,700 | *2.50* | 51,300 | 4.30 |
| Pasture, kg | 90,000 | 5.09 | 190,000 | *10.50* | 290,000 | 14.20 |
| Concentrate, kg | 1,125 | - | 2,200 | - | 3,240 | - |
| TOTAL: | - | 8.00 | - | *15.00* | - | 22.00 |

**Source:** *Gutić et al. (2006), Ovčarstvo-tehnologija proizvodnje, Agronomski fakultet, Čačak, pp. 130*

The main conditions that determine the type of sheep production in the character foraging base, market conditions expressed Budget wool, meat and milk (Krstic *et al.*, 1995). Since in the present model with different number of sheep, a farm of 200 sheep that requires 15 ha, corresponding to an average farm size of the study area Sjenicko-Pester plateau. This farm is taken as the subject of further analysis. This analysis provides the Definition of sheep farms in order to improve the current situation in sheep and rural areas Sjenica. The research was conducted on family farms the municipality Sjenica, during April-October 2013$^{th}$ year. Five representative growers who have a different number of sheep from 130 to 240 are elected. Growers of sheep are using extensive way of keeping them with directional on producing meat-milk. Lambs in the first month of breast-feeding, and then recharge meadow hay and grain mixture of barley and oats. Hay and grain mixture are given as needed, and lambs are stop taking milk after 90 days. The basic for features of this model is presented based on data from the analyzed farms:

- Manufacturers in all farms are oriented to the production of meat from lamb; a significant share of total income is the production of milk, which is processed into high-quality sheep cheese.
- On farms are necessary facilities, equipment, machinery, and others.
- On the farm are grown bulls for its own replacement (repair herd) culled sheep and breeding material for placement on the market.
- Work processes are partially mechanized the production and storage of food and labor to engage in households.
- Breeders of sheep have its own areas for storing hay in sufficient quantity, to the diet program and an annual income of fodder expenditure by households.

- Sheep farming is based on the maximum use of natural resources.

Assessment of economic viability of investment in the parent flock of farm organization based on investment calculation, with the use of dynamic assessment methods (Gogić, 2009). This means das in all indicators for some years for the analyzed period and method of reducing the corresponding amount of interest, were converted to the same accounting torque, or the beginning of the use of productive sheep and rams. Economic parameters of the investment calculation for sheep farm:

*Investments*

*- Fixed assets*

*Sheep:* (200 sheep head x 55 kg) x 1.50 €/kg = 16,500 €

*Rams:* (8 sheep head x 65 kg) x 1.50 €/kg = 780 €

*Total: 17,280 €*

| | |
|---|---|
| *- Working capital* | *3,650 €* |
| *- Purchase sheep and other buildings* | *30,000* € |
| *Sum*: | 50*,930 €* |

*Annual cash receipts of products sold:*

| | |
|---|---|
| - Lambs (230 head x 30 kg) x 2.5 €/kg | 17,250 € |
| - thrown out breeding animals aged 9 months | 1,680 € |
| - ejected from breeding animals | 1,500 € |
| - Milk and wool | 1,170 € |
| *Total:* | *21,600 €* |

*The annual financial allocations for inputs purchased from the side:*

| | |
|---|---|
| - For food (20% is purchased) | 5,500 € |
| - water | 500 € |
| - Health Justine of sheep and lambs | 600 € |
| - Otheirs expenses (taxes for grazing etc.) | 700 € |
| *Total:* | *7,300 €* |
| *Net annual benefit:* | *14,300 €* |
| *The final value of the farm* | *17,650 €* |
| *Calculated interest rate:* | *8% per year* |
| *Period analysis of the economic feasibility of investing in farm* | *5 years* |

On the basis of set parameters, using dynamic method for evaluating investments are determined economic indicators.

*The net present value of the flocks of sheep:*

$$(14{,}300 \in \cdot \frac{1.08^5 - 1}{1.08^5(1.08-1)} + 17{,}650 \in \cdot \frac{1}{1.08^5}) - 50{,}930 \in$$

$$= 69{,}059 \in -50{,}930 \in = 18{,}129 \in$$

*Yield value of the analyzed flocks:*

$$(14{,}300 \in \cdot \frac{1.08^5 - 1}{1.08^5(1.08-1)} + 17{,}650 \in \cdot \frac{1}{1.08^5}) = 69{,}059 \in$$

*The average annual cost of cultivation and utilization of production animals are:*

$$7{,}300 \text{ €} \quad + 50{,}930 \in \frac{1.08^5 \ (1.08-1)}{1.08^5 - 1} = 20{,}033 \text{ €}$$

*Differences and relationship between average annual earnings and average annual cost of cultivation and utilization of production animals:*

21,600 € – 20,033 € = 1,567 € 21,600 € / 20,033 € = 1.08

*Pay back of return on investment*

$$(14{,}300 \in \cdot \frac{1.08^t - 1}{1.08^t(1.08-1)} - 50{,}930 \in = 0 \Rightarrow t = ? \text{ t = 4.2 years}$$

*Internal rate of return*

$$(14{,}300 \in \cdot \frac{1.0p^5 - 1}{1.0p^5(1.08-1)} + 17{,}650 \in \cdot \frac{1}{1.0p^5}) - 50{,}930 \in = 0 \Rightarrow p = ? \quad \text{p=20 \%}$$

Based on the initial parameters of the investment calculations investments in the farm for breeding 200 head of sheep and rams 8, in order to produce lambs, as the main and final product, calculate the financial assessment shows that investment, the superior organizational and economic conditions were appropriate, and cost-effective . In calculative interest rate of 8% would be achieved positive net present value of the farm and in the amount of 18,129 €. This means that the sum of the annual clean used during the first five-year period of breeding sheep, can recover investments made a substantial part of the funds to be set aside for accumulation and expanded reproduction. If we consider the yield value farm, it can be concluded that the upper limit of the total investment 69,059 €. Since this amount is greater than the amount of the planned investment in the farm, that is from 50.930 €, this investment is, the grower, economically acceptable.

Financial investments in those producing animals meet the relative criteria of economic efficiency, as the ratio between the average annual income and the average cost of procurement and use of animals is greater than one, i.e. 1.08>1 and the difference of these parameters is positive, i.e., 1,567 € 1>0. Internal rate of return planned investment is 20%. The planned investment would be returned for a period of 4.2 years. Since this period is much shorter than that of the period 4.2 years <5 years, and the internal rate of return is greater than the calculative, i.e. 20%> 8%, the investment in a listed farm is economically expedient. According to the average available surface in a rural area of Zlatibor District and average potential for food security at the household, an analysis of the economic feasibility of investment in farm production 200 breeding sheep and rams 8. Based on the indicators it was found that the model farms economically suitable for sheep breeders. Investments in parent flock are well below allowable limits, a refund is possible after only four years of breeding sheep. Interest rate is 20% above the assumed marginal interest rate of 8%, which confirms that this farm is very profitable, regardless of the source of funding. For further analysis of the sensitivity and the risk of investing in sheep production on the farm, require expert analysis and forecast the stability of market conditions, the possible sources of financing and other conditions.

## Conclusion

Sheep breeding in Serbia, in terms of productivity, is in poor condition, regardless of the available natural resources. The largest part of our sheep occupies pramenka (80%), while the other makes cigaja share (5%) and crossbreds Pramenka with foreign races (15%). According to statistics, the average fertility of the major strains of sheep (Pirot, Sjenički and Svrljiški) is 110%, 45 l milk yield per lactation sheep wool yield of 1.8 kg, and body mass of lambs 3.9 kg at birth, and 20 kg at age 90 days (before sale or slaughter). Sheep breeding is very profitable, because investment is low, and the products of which are highly valued and sought after in the market of. Needs sheep in nutrients depends on several factors: body weight and shape, stage of production, physiological status, activities, age and climatic factors. In order for sheep production to be successful and profitable, you need the appropriate area of pasture. The largest part of the annual installments of sheep grazing, with arable land to provide food for bulky winter-hay, straw, etc., and concentrated-barley, coats, etc. This feedback is the use of pastures and keeping sheep contribute to the reproduction of biological resources, the sustainable use

of pastures and rural development. According to the average available surface in a rural area of Zlatibor District and average potential for food security at the household, an analysis of the economic feasibility of investment in farm production 200 breeding sheep and 8 rams. On the base of economic indicators showed that the model farms are profitable for sheep breeders. Investments in parent flock are well below allowable limits, a refund is possible in the second year of breeding sheep. Interest rate is 28% above the assumed marginal interest rate of 8%, which confirms that this farm is very profitable, regardless of the source of funding. For further sensitivity analysis and risk investment in sheep production on the farm, it takes expert analysis and forecast the stability of market conditions, the possible sources of financing and other conditions.

**Note:** *The paper is part of the research projects number: 46009 - Promotion and development of hygienic and technological processes in the production of foods of animal origin in order to obtain high-quality and safe products competitive on the world market and the 179028 - Rural labor markets and rural economy of Serbia - the diversification of income and poverty reduction; funded by the Ministry of Education and Science of the Republic of Serbia, in period 2011-2014*

## References

1. Gogić, P. (2004): *Economic competitiveness of different ways of pasture utilization*. Journal of Agricultural Sciences, Vol. 49, No 2, Pages 258-267, Beograd.

2. Gogić, P. (2005): *Efektivnost investicija porodičnih gazdinstava u stočarsku proizvodnju zasnovanu na korišćenju pašnjaka*. Poglavlje u monografiji "Porodična gazdinstva Srbije u promenama", Poljoprivredni fakultet u Beogradu, str.142-150, Beograd.

3. Gogić P. (2009): *Teorija troškova sa kalkulacijama u proizvodnji i preradi poljoprivrednih proizvoda*, Poljoprivredni fakultet, Beograd.

4. Gutić M., Petrović M., Bogosavljević-Bošković S., Kurćubić V., Mandić L., Dosković V. (2006*): Ovčarstvo–tehnologija proizvodnje*, Agronomski fakultet, Čačak.

5. Krstić, B., Andrić, J., Bajčetić, B. (1995). *Modeli zemljoradničkih gazdinstava usmerenih na stočarsku proizvodnju,* Aleksandrija, Beograd.

6. Makević, M., Đorđević, N., Grubić, G., Jokić, Ž. (2004). *Ishrana domaćih životinja,* Poljoprivredni fakultet, Beograd.

7. Mekić C., Sredojević Z., Popović N. (2007): *SWOT analiza stočarske proizvodnje kao faktor ruralnog razvoja Republike Srpske*, Tematski zbornik-Multifunkcionalna poljoprivrede i ruralni razvoj u Republici Srpskoj, Poljoprivredni fakultet, Istočno Sarajevo, Institut za ekonomiku poljoprivrede, Beograd, Balkanska asocijacija za životnu sredinu (B.E.N.A.), Grčka, Istočno Sarajevo, Doboj, pp. 592-601.

8. Sconhoft A. (2008): *Sheep as capital goods and farmers as portfolio managers: a bioeconomic model of Scandinavian sheep farming,* Agricultural Economics 38, pp. 193-200.

9. Sredojević Z., Gajić B., Jeločnik M. (2010): *Economic Evaluation of the Interaction between Crops Production and Livestock Breeding Based on the Organic Production of Farms in Serbia*, Petroleum–Gas University of Ploiesti, BULETINUL Vol LXII, $N^0$ 3/2010, Economics sciences series, Romania, pp. 27-37, ISSN 1224-6832 www.upg-bulletin-se.ro/archive/2010

10. Sredojević Z., Mojsijev D. (2013): *Farm.Soft S.20.10-Agromix-softvare for recording agricultural farm business operations: an example of good practice in Serbia*, Thematic procedings-Internatuional Scientific Conference Sustainable agriculture and rural development in terms of the Republic of Serbia strategic goals realization within the Danube region–achieving regional competitiveness, Institute of Agricultural Economics, Belgrade, B.E.N.A. et al., pp.798-815, http://www.iep.bg.ac.rs/index.php?option=comcontentg&id=3&Itemid=22&lang=en

11. http://www.fao.org/docrep/018/i3107e/i3107e.PDF, FAO, S*tatistical Yearbook 2014*, World Food and Agriculture, Food and Agriculture Organization of the United Nations, Rome (Date of access, 23/03/2014).

12. http://webrzs.stat.gov.rs/WebSite/repository/documents/00/01/26/77/09Poljoprivreda.pdf, Republički zavod za statistiku, Republika Srbija (Date of access, 28/03/2014).

## III SECTION

# *THE REFORM OF THE EU COMMON AGRICULTURAL POLICY - A NEW DEVELOPMENT FRAMEWORK FOR THE PERIOD 2014-2020*

# JURIDICAL REGULATIONS ON STATE BORDERS AND SUSTAINABLE AGRICULTURE IN DANUBE'S AREA

*Alexa Gheorghe Grijac*[*]

## Abstract

*We present an analysis of the complex, multidisciplinary and interdisciplinary juridical regulations of the state border and S.A. from the perspective of the European Union and of Romania. Aim and objectives of the paper: Analysis of scientific works and publications in the juridical regulation on the state border and sustainable agriculture in the Danube's Area and presenting case study – Romania. Theoretical significance: The methodology used in the paper shows the interdisciplinary character of research, corresponds to modern trends of development of legal science, the conclusions and recommendations obtained can be used to improve the juridical regime of the state border and the sustainable agriculture from the European Union perspective and migration policy. The paper contains sustainable agriculture and rural development in the function of integral Romanian development and juridical approach on free movement of persons, goods, services and capital in Danube's Area.*

**Key words:** *sustainable agriculture, rural development, juridical regulation, state border, the European Union, the circulation of persons, migration.*

## Introduction

Throught its contents, this paper aims at being an attraction factor for the study of the countries of the Danube's Area from agricultural point of view and free circulation of the citizens who's main occupation is agriculture, giving that for many people these subjects are little known, and this ignorance often leads to indifference or careless actions. It can be said that the Danube's history interferes with Europe's agricultural history.

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The topic of this paper is generous, full of significances and of present interest, given the latest developments in the Danube's area. The processes of political and economic reform ongoing in the Danube's Area states clear genuine prospects of cooperation offered by the most important transportation and commercial European water-broadway, after the Stability Pact and the Danube deblocking in the Serbian sector of the big river. Since 1993, North Sea was connected with Black Sea through the Danube-Main-Rhine Channel and the Danube-Black Sea Channel.[1] The resources of the Danube's area countries, their agricultural and commercial potentiality, as well as their geographic positions emphasized always these territories as the more facile way of access to Europe from Asia, their history developing under the sign of cooperation and confrontation.

The world of XXI century has faced a series of challenges, such as the climate changes which affect most biological systems in the world, with impact upon social, agriculture, economic, political and military security and stability. Climate changes perturb normal lifecycles of natural flora, fauna and physical systems of the world. As unconventional threats we can list droughts, floods, desertification, which have major effects upon sustainable agriculture and food security. The environmental issues, such as pollutions, have grown in importance. To day, national and international organizations develop systems in order to take control over the challenges that have appeared, such as the Environmental Management System. The Program for Pollution Control, Evaluation and Rating (PROPER) is an instrument for improving agriculture's environmental performance through information dissemination.

Romania has faced a lot of conventional challenges in sustainable agriculture and rural development causing a big economic damage for 1983-2008 (2.425 mld. $) that affected 401,700 population especially because of drought and flooding. These natural disasters result from meteorological events, as well as from the power to produce such disasters and use them as climatic or geophysical weapons. This magnificient river evolved from the status of water-broadway under the control of Roman empire to the other one of free broad waterway under international jurisdiction since the end of the 19$^{th}$ century. The agreements of Paris, in 1947, and of Belgrade, in 1948, established the necessary balance between the need of free circulation on this river and "the

[1] George Cristian Maior, *The Danube, European Security and Cooperation in the 21$^{st}$ Century*, (2002) Editura Enciclopedică, Bucureşti, p. 16.

requirements to observe the independence and the sovereignty of each riparian state"[2]. After the Cold-War period there were the successive embargoes during the conflict in ex-Yugoslavia and the Romanian-Ukranian dispute regarding territorial waters in the Danube Delta. Parallel to these negative developments there were and positive other. The last is the development of cooperation among the riparian states in order to create a stable security environment in the Danubian space.

The topics in this paper are exclusively analyzed from the juridical, perspective; Contemporary issue, such as sustainable agriculture and state's frontier, sometimes controversial, but very important ones, related to the Danube's Area countries integration process. Each subject/subtitle of the paper focuses on following issues: sustainable agriculture and rural development in the function of integral Romanian development; juridical approach regarding navigation on the Danube; juridical approach on free movement of persons, goods, services, and capital in EO; Each subject is approached by an inter-disciplinary manner in order to take an accurate picture of agricultural and frontier realities on Danube's Area countries integration process.

## Juridical approach regarding Danube's Area and the state borders

In our view, it is necessary to share with you the core of Danube's Area (*Picture no. 1. Danube's Area -Danube River Basin)*: "As a riverine communication artery crossing 10 European states, making by Rhine-Main-Danube the connection between the Black Sea and the Mediterranean, the Danube River was a world significance.

The Black Sea has Two Masters: Turkey, which posses the access to the Straits and Romania on the territory of which there are the two navigable paths for the entry of maritime ships through the Danube, that is Sulina branch and the Danube-Black Sea Canal. The navigable mouths of the Danube provide connections with the Planetary Ocean for six European continental countries: Moldova, Serbia, Hungary, Slovakia, Czech Republic and Austria."[3]

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[2]Ibidem, p. 16.

[3] Constantin Iordache, *Some Arguments for the Augumentation of the Rioarian Naval Forces, (2002),* Coordinator: Maior George Cristian, (2002), Seminar „*Dunărea, Securitatea şi Cooperarea Europeană în secolul XXI*" *(Conference: The Danube, European Security and Cooperation in the 21st Century)*, Departamentul pentru Integrare Euroatlantică şi Politica de Apărare, Editura Enciclopedică, Bucureşti.

**Picture 1.** *Danube's Area (Danube River Basin)*


**Source:** *http://www.scrigroup.com/geografie/hidrologie/AFLUENTII-DUNARII45212.php*

According to "Convention on the navigation regime on the Danube" (1948) there is "the liberty of navigation" on the river.[4] The Convention affirms a non discriminatory treatment for every merchant vessels of all states "with regards to harbor and passage taxes, principles which are in accordance with the international law"[5] The Danube Commision established "particular measures aiming the safety of navigations, a common system of navigation markings, standardization of shipping documents, establishment of navigation rules, production of the fluvial maps, promulgation of recommendations for use of means of communications" and other rules[6]. Some stipulations of the Convention harm/injure Romania; for example, in art. 3 it is specified that riparian states must "to maintain in good condition for navigation the river sectors situated on their territory, which is not equitable, taking into account that our country has in its administration, over 40% of the navigable length of

[4] Ion Tănăsache, *The Danube-Navigation Artery and European Logistic Corridor*, in Conference "The Danube, European Security and Cooperation in the 21st Century", Bucure;ti, 2002, p. 93.
[5] Ibidem, p. 93.
[6] Ibidem.

the river (the lower sector, where the alluviuns are heavy) but transport capability of the fluvial fleet is only 22% (in 1994) from the total tonnage belonging to the riverine countries"[7]. Besides the Convention specifies that budget of the Danube Commission have to be made up of equal contributions of each state, which, again is disadvantageous to Romania"[8]

Austria, Bulgaria, Croatia, Germany, Hungary, Moldavia, România, Russia, Slovakia, Ukraine and Yugoslavia – members in the Danube Commission – had participated in Budapest, in April 2001, in the 59th Session of the Commission. Unfortunately, Germany, Croatia, Slovakia and Moldova are not members with full rights of this convention Co-opt the EU join this Convention will integrate and harmonize this Commission (organization) with the regime of the Rhine river. For a better cooperation among the river in states it is obviously necessary to attract each shipping company to contribute financially to the maintenance of the navigation system proper (according to) with the ships capabilities it operates with. It is necessary to determine who has the jurisdiction in case of navigation accidents (the Danube Commission or the International Court in The Hague). Romania has legal interests in Danube: firstly, revision of bilateral treaties; secondly, to perfect and update the international status of the Danube and others.

Strategic Action Plan (SAP) is developed through the Environmental Programme for the Danube River Basin (DRB). SAP supports the Convention on Cooperation for the Protection and Sustainable Use of the Danube River Basin (DRPC) (June 2000) to improving environmental management in the Danube Basin, and implement the Environmental Action Programme for Central and Eastern Europe. The regional strategies set out in the Action Plan are supporting national decision-making on water management, and on the restoration and protection of vulnerable and valuable areas in the DRB.

Common principles about the goals and actions of the Plan that countries agreed on: the precautionary principle, the use of Best Available Techniques (BAT) and Best Environmental Practice (BEP) for the control of pollution; the control of pollution at source; the polluter pays principle; and a commitment to regional cooperation and shared information among the partners implementing the Action Plan. Reduce the negative impacts

[7] Ibidem, pp. 93-94.
[8] Ibidem, p. 94.

of activities in the Danube River basin and on riverine ecosystems and the Black Sea is a great necessity. The targets in the plan are: elaboration of NAPs for implementation of the Strategic Action Plan; adoption of consistent water quality objectives and criteria for all Danube tributaries and the main river; completion of regulatory and permitting reform programme for water use and industrial enterprises; completion of a comprehensive system of information on the state of the riverine environment; development of technical and management capacity building programmes for all actors and sectors; introduction of phosphate - free detergents and ban on phosphate- containing detergents; identifying a mechanism and the necessary resources to support the development and production of the National Action Plans (NAPs).

The importance of the Danube River for the Lower Danube's states results from: firstly, the River has supported and support the supply of drinking water, agriculture, fishing and others; secondly, from an ecological point of view and so on.

In order to solve the environmental issues/dispute the countries of the Danube's Area cooperate within the International Commission for the Protection of the Danube River in Vienna (1994). The Summit on Environment and Sustainable Development in the Carpathian and Danube Region, in Bucharest (19-30 April 2001) adopted a declaration on the need for maintaining and rehabilitating the natural assets of the Region and for ensuring a sustainable development (implicit sustainable agriculture) of the Lower Danube's countries.

This is why it is necessary the cooperation among countries, with the common purpose of achievement a realistic development. The Danube's Area countries share the same values and democratic principles, but some of them belong to the EU, others are in process of negotiating their accession to the EU. A political process of cooperation among the Lower Danube's states is, in our view, a "political exercise of integration", useful for countries that are in process of negotiating their accession to the EU[9]. The Danube flows past ten countries: Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Bulgaria, Romania, Moldova, and the Ukraine and four capital cities: Vienna, Bratislava, Budapest, and Belgrade. The Delta has three main arms and continues to grow into the

[9] Alina Niculescu, Prospect of a New Political Cooperation Initiative in the Danube Area.

Black Sea at the rate of 25 to 30 m a year. The political tension in the Danube Area has dissolved, and with it much of the time-consuming border control that used to accompany any cruise along the river. Cities that once decayed under Communism are being reborn. The Lover Danube lies totally along or inside the Romanian Territory, from Baziaş to the flow of the river in the Black Sea. It is 1075 kilometers long, having an important hydroelectric potentiality. It ensures a minimum depth of 2.5 meters, for navigation of fluvial vessels, and 7.3 meters for the maritime ships able to enter the Sulina or Chilia branches, up to the city of Brăila.

„Large amounts of alluvia will exist between the Sulina and Chilia branch, phenomenon that will determine the movement of the mouth of Musura channel towards the northern dam of the Sulina branch. Actually, this phenomenon already happens, the delta of the Chilia bramch moving towards south and east with about 50-200 meters each year. This might result in the movement of the fluvial border of Ukraine towards the northern dam of the Sulina branch, making this country riverine to the Sulina branch"[10]. "To determine who has the jurisdiction in case of navigation accidents: the Danube Commission or the International Court in The Hague (see the sinking of motor vessel "Rostock"/1991 or the ramming of the passenger vessel "Mogoşoaia" by a Bulgarian c onvoy/1989)."[11] As a riverine communication artery crossing 10 European states, making by Rhine-Maine-Danube the connection between the Black Sea and the Mediterranean, the Danube River was a world significance. The Black Sea has two masters: Turkey, which posses the access to the Straits and Romania on the territory of which there are the two navigable paths for the entry of maritime ships through the Danube, that is Sulina branch and the Danube/Black Sea Canal. The navigable mouths of the Danube provide connections with the Planetary Ocean for six European continental countries: Moldova, Serbia, Hungary, Slovakia, Czech Republic and Austria.[12]

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[10] Ion Tănăsache, *The Danube-Navigation Artery and European Logistic Corridor*, in Conference "The Danube, European Security and Cooperation in the 21st Century", Bucure;ti, 2002, p. 95.

[11] Ibidem, p. 96.

[12] Constantin Iordache, *Some Arguments for the Augumentation of the Riparian Naval Forces*, Seminar „*Dunărea, Securitatea şi Cooperarea Europeană în secolul XXI*" *(Conference: The Danube, European Security and Cooperation in the 21st Century)*, Departamentul pentru Integrare Euroatlantică şi Politica de Apărare, Editura Enciclopedică, Bucureşti, p. 101.

**Picture 2.** *Danube Delta*


**Source:** *http://www.comune.ro/files/delta-1-700.gif*

## Sustainable agriculture and rural development in the function of integral Romanian development

The EU economy presents foreground features in agriculture and in frontier process sectors. The EU agriculture in modern and the most intensive in the world, and allowed enough food for the Europe's Member States as well as for export. In the Union there are multi or transnational companies. These companies play major role in agricultural land investment in Romania which sold cca 40% of his agricultural ground. From juridical point of view it is all right, but from the national security point of view, in our opinion, it is a big mistake. World's population grew always. In the beginning the increase in world's population had been slow enough. But since 1700 this increase had been faster because of Agricultural Revolution the people had more food to eat. Consequently the population had increased quickly because there was a big increase in amount of crops produced and in the meat of herds of domestic animals. There was more of food as a result the price of it fell.

Between 1700 and 1900, the Agricultural Revolution had brought better farming techniques. Methods of agriculture were improved. Farming had changed and new crops have appeared such as turnips. Among these new methods was the four field crop relation system (more land was farmed), better drainage methods also meant more land was farmed. Farmers also made more money by using selective breeding which allowed producing stronger, more meat animals and larger herds. These produced more manure used to fertilize the soil. Finally these methods and techniques, improved canals and roads ensured/assured the success of getting farmers' produce to market and made more money. Life for farm workers had always been harder than factory workers. Farmers' field had to be close together to make sense for using machinery to work them. Many of the little/smaller farmers could not afford the costs of using machinery. They had to sell their lands. Today Romanian farmers sell their grounds because of the same reason.

In Romania a favorable evolution of the sustainable agriculture is necessary, with the condition of recognizing agriculture as a key factor among the national economy, as a priority, a field integrated in the plans for sectors development. The Agriculture and the sustainable agriculture must play a fundamental role in Romania's development, in reducing the cleavage between Romania and the most advanced UE' member states and in joining their community. Therefore, developing a sustainable agriculture is a vital requirement for integrating agriculture in the strategy of a healthy and harmonious development of our country. The concept of "economic stability" of the estimate is little used in Romania. In instabile economic conditions (economic crisis), our country has to develop a sustainable agriculture and the agriculture has to play the first rol in national economic cal life. The process of sustainable agriculture development must be based on respecting the needs of present and future generations. The past and present way of managing the agricultural activities had destroyed the natural environment (area covered by forests has decreased enormons/huge and the soil has suffered degradation by half, or by 60% etc.). The need for integration agriculture with the objectives of economic and natural environment is the base of the concept of sustainable agriculture development.

Sustainable agriculture is the development of the agriculture "That satisfies the present needs without compromising the chances of future generations to satisfy their own needs" (Brundtland Report/1987). The definition is comparative with "Sustainable development" that was given

by the Norway prime minister Gro Harlem Brundtland (the chairman of the World Commission for Environment and Development) in the report "Our Future Together". There is a certain need of promoting a sustainable agriculture and a sustainable development on a long term, to care for the agricultural growth, as well as an environmental preservation on which depends the food security, the life quality, and the future of mankind.

Sustainable development and sustainable agriculture lie on economic and social development and on environmental protection at local, national, regional and global levels. In short, sustainable agriculture lies on four pillars: economic, social, ecologic component and technological one. The agriculture/farming plays an important part within the development of the society, and of course for developing a sustainable society, by promoting the environmental preservation. The development of a sustainable agriculture is a vital request for integrating the eco/agriculture in the strategy of a harmonious and healthy development of our country.

For ensuring a sustainable agriculture it is required the policies based on rational socio/economical/environmental criteria. The DRB supports the supply of drinking water, agriculture, power generation, navigation, and the end disposal of waste waters in 17 countries in the central Europe. This kind of intensive AGRICULTURAL use has brought problems of water quality, and reduced biodiversity in the basin as a consequence of the high nutrients loads, changes in river flow patterns and sediment transport regimes, contamination with hazardous substances, competition for available water and microbiological contamination.

Purpose of the SAP: regional integrated water management and riverine environmental management expressed in the Danube River Protection Convention; transition from central management to a decentralised and balanced strategy of regulation and market-based incentives. A series of actions to achieve these targets will be implemented through National Action Plans (NAPs) of the Danube basin countries. The NAP is to be made by participation of: Officials of national, regional and local governments; Municipal water companies and utilities; Industrial enterprises; Agricultural enterprises and the farming community; The general public and NGOs.

Common strategic directions: The approaches to be taken are set out in a series of strategic directions covering key sectors and policies, including: phased expansion of sewerage and municipal waste water treatment

capacity; reduction of discharges from industry; reduction of emissions from agriculture. The target in the Plan are: adoption of emission limits for fertiliser plants; evaluation of the critical load of nutrients from the Danube into the Black Sea; introduction of regulations for fertiliser storage, handling, and application; preparation of waste water and sewerage investment priorities for cities, agro-industrial towns and villages; introduction of environmentally sound agriculture policy reforms Demonstrations of Best Environmental Pactice for use of fertilisers, pesticides, and other agrochemicals in agriculture; completion of pilot and demonstration projects for manure handling, storage, disposal, and application; change to sustainable agriculture practices Restoration of the natural purification capacity of the Danube and its tributaries.

After 2007, Romania connected its freedom to the European Union from which our country received modest/little agricultural stimuli, insufficient for sustainable agriculture and sustainable development. We were wrong because we accepted not money, but laws, regulations, and we sold our ground, especially agricultural ground being a nice example for wrong docility. For our great sacrifice, for our docility we lost our agriculture and our industry. Other countries opposed against bad treatment when their national interests were threatened such as did Poland by its' opposition to some EU measures which were unfavorable.

## Juridical approach on migration free movement of persons, goods, services and capital in Danube's Area

There is a close relation between migration and labour force. The absence of jobs in one or another country determines the emigration of the persons able to work in agriculture. One of the categories of labour force involved in migratory movement is part of unqualified or semi-qualified labor force in agriculture. They (These) participate at the initiation of some micro/businesses in agro/tourism, the use of local agricultural resourses (serviceses in the rural environment) etc. The external migration of EU citizens (inclusive of Romanian citizens) has positive and negative effects in agricultural activity. It is necessary that some state's institution as well as civil society's organizations to act concerted in order to diminish the negative effects of external migration of Romanian citizens and the maximization of favorable agricultural effects. Nowadays, there are some conventions and protocols, but also national laws on person's migration.

There are certain relationship between agriculture and migration. The complexity of these relationship is very high, as these are correlated with many dimensions of security. Some States (governments) enhance border control, while others promote a policy of attracting and integrating immigrants in agro-tourism or in agriculture activity etc. In our view, the solution lies in national and EU policies for managing migration. EU Member States promote the integration of immigrants in search of work inclusive in agriculture field. Romania, an EU Member State, have a negative migration rate. Romanian citizens immigrants settled their permanent residence abroad in over 185 countries (the number of Romanian immigrants were: 97,000 in 1990; 15,000 in 2000; 14,000 in 2006; 10,000 in 2009 etc.). Therefore the number decreased constantly.

External migration has some consequences for the Romania's national interests. In our regard, these consequences can be emphasized by the analysis of reports between, migration and demography, migration and development, migration and security, migration and force labour occupying, migration and agriculture[13]. EU is based on common values states in the founding treaties of European Communities and in the Charter of fundamental rights of the EU: "to promote balanced and sustainable development and ensures free movement of persons, goods, services and the freedom of establishment"[14].

These values are distinguishing Europeans from the rest in the world because EU is founded on following values freedom, democracy, equality, rule of law, respect for human rights and human dignity.[15] European Union promotes a set of objectives such as peace and its values, an area of freedom, security and justice for Europeans (EU citizens). The European Union is a factor of security, stability, peace and prosperity, and improves EU citizens' lives. Therefore, EU has suppressed the border controls between EU Member States; this is way people, goods, capital and services are moving freely en entire UE's territory. Freedom is manifesting at each level of the EU being an essential value and allows every citizen in UE "to imagine, act, create and express themselves"[16] But

[13] Ibidem, p.122.
[14] *Charter of fundamental rights of the EU*, preamble, http://www.europarl.europa.eu/-charter/pdf/text_en.pdf.
[15] *Les valeurs de l'EU*, http://www.curiosphere.tv/actu/sithe10845/valeurUE.htm.
[16] Băhnăreanu Cristian, Dinu Mihai-Ştefan, *Common and National Interests Within EU Framework, Centre for Defense and Security Strategic Studies*, "Carol I" National Defence University Publishing House, Bucharest, 2012, p. 13.

freedom calls for responsibility because to be free means obvious to be firstly responsible (to be aware of rights and obligations on national and EU as well as of future generations. Lisbon Treaty defines not only objectives, and values of the European community (democracy, peace, justice, equality, respect for human rights, rule of law and sustainable development (and indeed sustainable agriculture).

The Treaty guarantees that the European Union will give/offer European's people an area of freedom, security and justice in every Europe's Member State, without internal borders, a sustainable development of EU based on economic growth, a competitive social market economy, a high level of environmental protection, to combat discrimination, to promote justice and social protection, economic, social and territorial cohesion and a real solidarity among Europe's Member States, to contribute to peace, security, the sustainable development of the EU and the world etc. European Union established a "space of freedom, security and justice" so that every European citizen to be protected by law and to have the same access to justice which claims increased coordination between institutes' actions.

Organizations such as Eurojust, Europal, and European police as well as Member State's judges and police officers must to strengthen the role and means of intervention. European Construction Process "has began on April 18", 1951 and went through some successive stages in order to promote a harmonious and balances economic activities and of a high level of the degree of employment. Today, the EU is favouring the development of Member States, and "facilitating the excellence of the service sector, encouraging agriculture and contributing to the creation of jobs for its citizens"[17] The European Union is "firmly engaged against climate changes, both at internal and at international level"[18].

The relation between the EU law and the Romanian (the EU Member States) law systems, is governed by two basic principles: the integration principle and the prevailing principle. "These principles lead to the resolution of the most important issues related to the EU law application as the immediate applicability, direct applicability and the priority of the EU regulations before the opposite internal regulations.

[17] Ibidem, p. 14.
[18] Ibidem, p. 16.

The EU acquis represents the main legislative set that a state invited to become EU member engages to respect. The acquis contains juridical norms adopted on the basis of EU constitutive treaties, mainly the Rome, Maastricht and Amsterdam Treaties, representing the totality of juridical norms regulating the activity of EU institutions, actions and policies."[19] Also, it is obvious "that law serves as an instrument to fulfil the European Union interests, the normative activity of the organization asserting as an efficient and decisive mean in the creation of all EU measures". Taking into account "the priority of European juridical norm in relation to the internal law, in matters being the object of EU regulation regarding EU policies determines in practice a strong impact over the traditional normative function of the internal juridical order". The EU is "an organization of sovereign states mutually guaranteeing security and defence by constitutive treaties, by strategic policies. Each state behaves according to its interests even if it assumes the participation to the crises and conflicts management, to the common security and collective defence"[20].

## Conclusions

The European Union represents a complex construction of values and manifests itself as a community based on human dignity, liberty, equality and solidary. The Union gives the best conditions for European citizens to live and work in liberty and security. The EU will promote its values not only in its vicinity, but in the world, at global level. The EU acquis contains an ensemble of rules, Union's constitutive treaties, directives, regulations, decisions, recommendations, notices and the European Parliament resolutions as well as the jurisprudence of EU Court of Justice. The EU law coexists with the internal law of each European Member State. Novelty and scientific originality: The scientific novelty of the paper is provided by the research of juridical regime of the state border migration, free movement of persons, goods, services and capital in Danube's Area and sustainable agriculture in a dynamic, holistic and integrative vision, from the perspective of, juridical investigation, historical, but also from security regard, without omitting aspects of political, economic, social or cultural, in order to avoid partial explanations and distort interpretations.

[19] Mirela Atanasiu, *The juridical norms – forms of manifestation of national and/or common interests*, (2012) Editors: Băhnăreanu Cristian, Dinu Mihai-Ştefan, *Common and National Interests Within EU Framework, Centre for Defense and Security Strategic Studies*, "Carol I" National Defence University Publishing House, Bucharest, o. 25.
[20] Ibidem, p. 31.

In 2010, the number of the persons coming from third states (Turks, Moroccans and Albanians) in EU – 27 was 20 million, or 4% of the European Union' population. The transfer of extra – EU flows (funds) of workers has decreased by 4% in 2009 compared to 2008[21]. To support economic recovery and to eradicate the unemployment rate of 10% the Union needs to address the gap between the supply of skills and labour demand and to ensure a better match between skills acquired through training and real labour agriculture needs. Migration and development are two interdependent phenomena that independently and conjectural had a decisive role for the agriculture development. They also influenced states, agriculture and institutions evolution. As a matter of fact, migratory forces influenced for centuries the nature of production system and development process. The opinions are divergent regarding the manner of understanding the existent correlation between migration and agriculture development.[22]

The Danube is connecting states having a total population of over 80 million people. By crossing ten countries and collecting its waters from other four, the Danube is the most important river basin in Europe. Now, for the first time in history, these countries share the same democratic values and want to affirm their European identity. The Blue Danube is the most important waterway of Europe. Why is the Danube important for the countries in its basin. The river supports the supply of drinking water, agriculture etc. for the optimal use and protection of the river, we consider that the cooperation among the countries from its basin is a "must"[23].

## References

1. Atanasiu Mirela (2012): *The juridical norms – forms of manifestation of national and/or common interest*, (eds.): Băhnăreanu Cristian, Dinu Mihai-Ştefan, *Common and National Interests Within EU Framework, Centre for Defense and Security Strategic Studies*, "Carol I" National Defence University Publishing House, Bucharest.

[21] Eurostat, Statistiques en bref 40/2010.

[22] Băhnăreanu Cristian, Dinu Mihai-Ştefan, *Common and National Interests Within EU Framework, Centre for Defense and Security Strategic Studies*, "Carol I" National Defence University Publishing House, Bucharest, 2012, p. 123.

[23] Alina Niculescu, „Prospect of a Newb Political Cooperation Initiative in the Danube Area", Cordinator Maior George Cristian, (2002), Seminar „*Dunărea, Securitatea şi Cooperarea Europeană în secolul XXI*" *(Conference: The Danube, European Security and Cooperation in the 21st Century)*, Departamentul pentru Integrare Euroatlantică şi Politica de Apărare, Editura Enciclopedică, Bucureşti, p. 97.

2. Băhnăreanu Cristian, Dinu Mihai-Ştefan (2012): *Common and National Interests Within EU Framework, Centre for Defense and Security Strategic Studies*, "Carol I" National Defence University Publishing House, Bucharest.

3. Grijac Gheorghe Alexa (2011): *Problemele Spaţiului Schengen,*. Bucureşti: Cibernetica MC.

4. Caraiani Gheorghe, Caraiani, Gheorghe, Grijac Gheorghe Alexa, Georgescu, Andrei Horia (2006): *Acquis-ul comunitar şi politica sectorială din domeniul transporturilor în Uniunea Europeană*, Editura Pinguin Book, Bucureşti.

5. Grijac Gheorghe Alexa (2006): *Migraţia, Vama şi Frontierele în perspectiva integrării României în Uniunea Europeană,* Editura Universitară, Bucureşti.

6. Grijac Gheorghe Alexa (2006): *Regimul juridic al frontierei de stat,* Editor.ro, Bucureşti.

7. Iordache Constantin (2002): *Some Arguments for the Augumentation of the Rioarian Naval Forces*, Coordinator: Maior George Cristian, Seminar „*Dunărea, Securitatea şi Cooperarea Europeană în secolul XXI*" *(Conference: The Danube, European Security and Cooperation in the 21st Century)*, Departamentul pentru Integrare Euroatlantică şi Politica de Apărare, Editura Enciclopedică, Bucureşti.

8. Maior George Cristian (2002): Seminar „*Dunărea, Securitatea şi Cooperarea Europeană în secolul XXI*" *(Conference: The Danube, European Security and Cooperation in the 21st Century)*, Departamentul pentru Integrare Euroatlantică şi Politica de Apărare, Editura Enciclopedică, Bucureşti.

9. Marcu Viorel, Diaconu Nicoleta, Purdă Nicolae, Drăghiciu Cătălina (2003): *Instrumente juridice fundamentale ale Uniunii Europene*, Lumina Lex, Bucureşti.

10. Niculescu Alina (2002): *„Prospect of a Newb Political Cooperation Initiative in the Danube Area"*, Cordinator Maior George Cristian,Seminar „*Dunărea, Securitatea şi Cooperarea Europeană în secolul XXI*" *(Conference: The Danube, European Security and Cooperation in the 21st Century)*, Departamentul pentru Integrare Euroatlantică şi Politica de Apărare, Editura Enciclopedică, Bucureşti.

11. Niculescu Alina, *Prospect of a New Political Cooperation Initiative in the Danube Area*.

12. Tănăsache Ion (2002): *The Danube-Navigation Artery and European Logistic Corridor*, in Conference "The Danube, European Security and Cooperation in the 21st Century", Bucureşti.

13. *Charter of fundamental rights of the EU*, preamble, http://www.europarl.europa.eu/charter/pdf/text_en.pdf.

14. *Les valeurs de l'EU*, http://www.curiosphere.tv/actu/sithe10845/-valeurUE.htm.

15. http://www.politiadefrontiera.ro/lege.php?id_cdrl=8

16. http://europa.eu/legislation_summaries/justice_freedom_security/free_movement_of_persons_asylum_immigration/index_en.htm

17. http://www.scrigroup.com/geografie/hidrologie/AFLUENTII-DUNARII45212.php

18. http://www.comune.ro/files/delta-1-700.gif

# CHALLENGES FOR CROSS-BORDER AND REGIONAL AGRICULTURE IN THE CONTEXT OF EUROPE 2020 STRATEGY

*Francesca–Magdalena Velciov (Rainof)*[1], *Razvan Murariu*[2]

## Abstract

*The agriculture market in European region faces a series of challenges involving the need for strategic decisions for long term future of agriculture and rural areas in the cross-border regions. To be effective in addressing these challenges, the regional policies must work within a framework of connected economic policies and sustainable public finances that contribute to accomplish the agricultural policies. In the context of globalization, it should be noted that the European strategy revealed a new perspective for agricultural market reform, the main development directions being focused on finding the most appropiate solutions to the new economic, social and environmental issues brought on by the international economic crisis, also contributing to the durable development of European agriculture. In what follows, we will briefly review the existing proposals at regional level for future development directions of the agricultural market in the cross-border regions.*

**Keywords:** *globalization, regional agriculture, Europe 2020 Strategy, European farmers*

## Introduction

The cross-border and regional policies of agricultural market represent a bridge between agriculture and society, between European strategy and its farmers. The main goals are to improve agricultural productivity and to increase the supply in order to provide stable and affordable food resources for consumers and to ensure a fair standard of living for farmers.

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The main regulatory and framework for agriculture and rural development in cross-border and regional areas aim to better respond the challenges of its time. Currently, the agricultural strategy is built around two pillars. First, the agriculture pillar that includes measures with a view to regulating the agricultural products market integration. Second, the rural development pillar comprises the social, economic and environmental issues. At present, the regional strategy is facing a complex series of both particular, like the development gap between rural areas across European region, and unpredictable challenges, like the negative impact of international economic crisis.

Althought it is well known that the globalization is the most expensive European policy, it has a significant impact not only on European agriculture, but also on the cross-border and regional environment and food industry. The negative effects of the financial and economic crisis overall economy highlighted the need for reassessing the regional and cross-border regions on rural development and agriculture. Furthermore, the cross-border and regional agriculture is now facing the challenges brought by its harmonizations with the goals of the Europe 2020 Strategy.

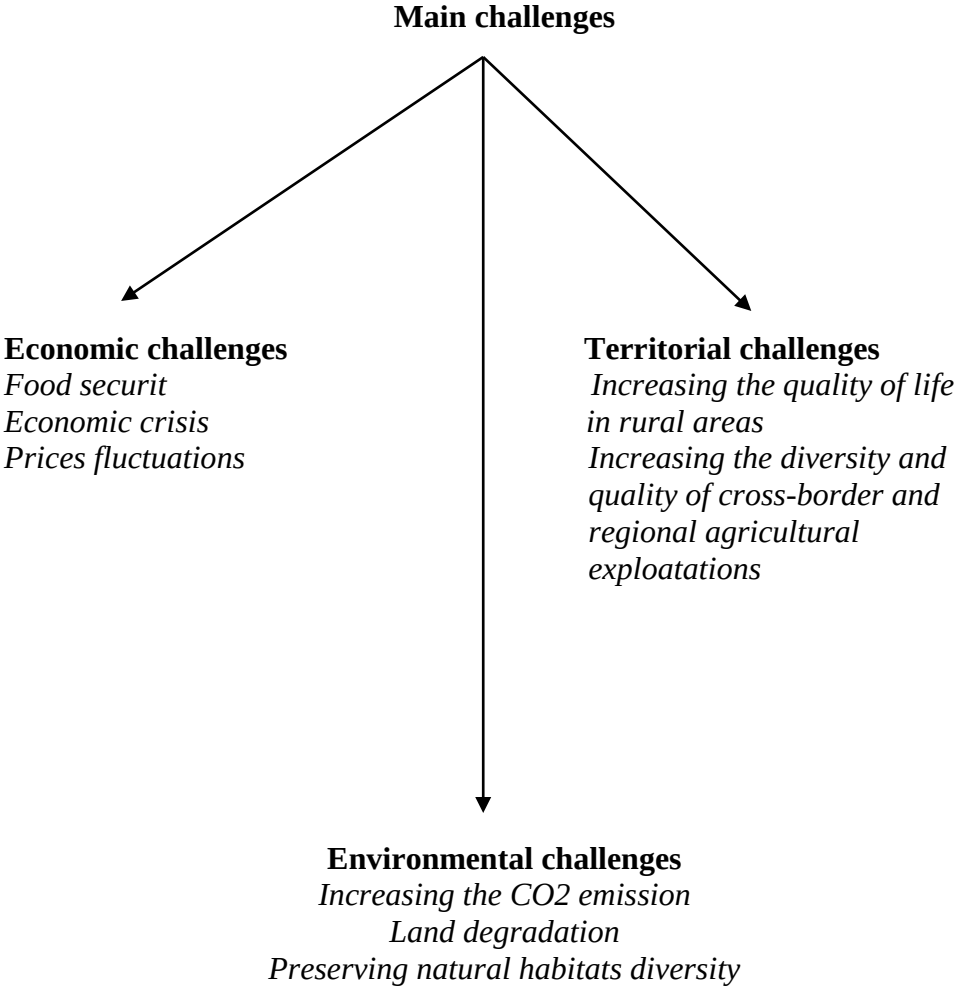
As a result, the regionalization of the agricultural market launched a comprehensive reform, in order to remordenize this policy and make it more market-oriented. Hence, in order to achieve this goal, the Europe 2020 Strategy provides a new perspective. Thus, by addressing to the new economic, social, environmental, climate-oriented and technological challenges of our society, the future market of the cross-border and regional agriculture in the context of globalization shall contribute further to development of an intelligent, reliable and durable economic growth, by paying a greater attention to the wealth and diversity of agriculture within the European states.

## The main challenges for cross-border and regional agriculture

The agriculture is an integral part of the economy and society, having a major role in terms of economic growth and social sustainabilty at cross-border and regional level. Like other economic areas, the agricultural sector was affected by the financial an economic crisis taking in consideration the rduction of financial lending, which had direct effects on producers in the region of reference states and also by increasing demand imbalances created as a result of the European market.

Recent analysis show that any significant reduction in agricultural activities would have adverse effects on economic growth, leading consequently to economic failures and job losses in the related field, especially in the agro-food productions chains, which rely on on primary agricultural sector to achieve high quality materials, to become more competitive and secure. Consequently, we have identified several areas that represent major "challenges" for the future of cross-border and regional agricultural market.

**Shema 1.** *The main challenges for cross-border and regional agriculture*




**Source:** *Authors' own illustration.*

## Economic challenges

The regional and cross-border agriculture is currently facing with a more competitive international market, as the world economy becomes more integrated and the trade system is increasingly liberalized.

According to some analysts this trend will continue in the upcoming years and will represent a major challenge for regional and cross-border farmers, but also an opportunity for them and for agro-food products exporters. Therefore, it's extremely important to increase productivity and competitiveness of regional and cross-border agriculture.

As the global food demand is projected to grow continously in the future, the regional agriculture should be able to meet this major requierment. Hence it's essential for regional agriculture to constantly maintain and improve the production capacity while respecting global commitments regarding international trade and policy coherence for agriculture development.

In this context, the new new direction of regional reform must take into consideration the fact that at present cross-border agriculture is facing inherent difficulties after economic crisis which has seriously affected agricultural producers and rural community space that are directly linked to broader macroconomic development which is affecting agricultural production costs.

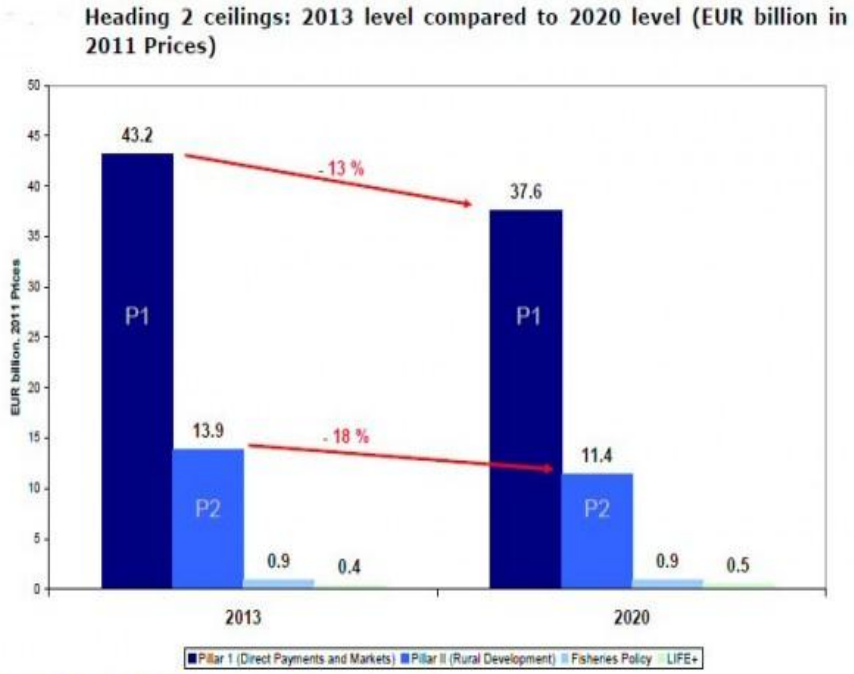
In the global context it is necessary that the regional policy continuesto support the income of European farners through direct payment systems providing a safety net for European producers in the framework of economic difficulties brought on by the international financial and economic crisis.

In 2013 the distribution of CAP expenditures showed a lower target allocation of funds to rural development than previous year. However it should be noted that once emerging from economic crisis, the European funds should be redirected to achieve this objective that can boost the sustainable economic growth and social inclusion, in line with the objective of Europe 2020 Strategy.

**CAP allocation between 2013 and 2020**

The Parliament secretariat's Note summarises the changes in PAC allocations between 2013 and 2020 in the following graphic which takes some of the issues raised in the previous section into account. The 2013 figures are adjusted by the amounts transferred to other MFF headings and take account of the compulsory modulation of expenditure from Pillar 1 to Pillar 2 in 2013. They show that committed expenditure to direct payments and market measures in 2020 is 13% less than in 2013, while committed expenditure to rural development measures is 18% less.

**Figure 1.** *The rural development allocation for 2013 compared to 2020 level*




**Source:** Elaboration by EP Policy Department B. Source of data: http://register.consilium.europa.eu/pdf/en/13/st08/st08288.en13.pdf. The rural development allocation for 2013 only includes compulsory modulation.

The calculation can also be done in other ways, as noted above. If the 'status quo' expenditure is based on the 2013 commitments x 7 years and compared to the total allocation for the 2014-2020 period, then Pillar 1 expenditure falls by 6.4% and Pillar 2 expenditure by 7.5%, which is a much narrower differential (the Pillar 1 numbers are €283.1 billion compared to €302.3 billion, and the Pillar 2 numbers are €89.9 billion compared to €97.2 billion).

The total commitment allocation for 2014-2020 could also be compared to the total commitment allocation for the 2007-2013 period (all in 2011 prices). However, the figures in the EP report (Table 10) do not adjust CAP spending for the whole of the 2007-2013 period for the transfer of some items out of the CAP budget and for the effect of compulsory modulation from Pillar 1 to Pillar 2. Therefore, the result of this comparison is not particularly helpful.

For what it is worth, based on the numbers in the EP report, the figures for this comparison show a 16% reduction in Pillar 2 but only a 6% reduction in Pillar 2 expenditure in the coming MFF period (the Pillar 1 numbers are €283.1 billion compared to €336.7 billion, and the Pillar 2 numbers are €89.9 billion compared to €95.5 billion). Failing to account for the effects of compulsory modulation and for the movement of some items out of the Pillar 1 budget explains the apparent reversal in the rates of reduction between the two Pillars.

Indeed, recalling once again that the baseline for Pillar 1 expenditure should build in the gradual decline in direct payment expenditure in constant prices, than the European Council made no discretionary reduction in the Pillar 1 ceiling. Holding direct payments constant in nominal terms at the 2013 level (and adding back the market measures expenditure) would have resulted in a 2020 budget of €37.9 billion in comparison to the agreed figure of €37.6 billion, both in 2011 prices. To repeat, the next MFF contains no discretionary reduction in CAP Pillar 1 expenditure, over and above what a continuation of current rules would imply. For comparison, the discretionary reduction in Pillar 2 is the full 18% shown in the figure above. This outcome can be interpreted as a real triumph for the strategy of legitimising Pillar 1 payments in this CAP reform.

## Europe 2020 Strategy

According to the Europe 2020 Strategy, a major objective is to protect the natural resources and to preserve the environment. In this context, some analysts stated that the CAP might decisively contribute to this approach, by introducing the measures to provide economic sustainability and long-term food security, while ensuring environmental protection of rural areas. Among the measures assigned to achieve this goal, the most important ones are those aimed at reducing production costs and consumption.

Another tool that may contribute to achieve this goal is to provide farmers support for using production technologies with low carbon reduction measures and for using crop rotation system. It is important to promote carbon reduction measures related to production efficiency, including energy efficiency improvements, such as bio-mass and energu sources based on innovative renewable technologies. With regard to the sustainable management of natural resources, because the agriculture is the first victim of climate change, in the form of growing occurrence of whether disasters, the European farmers must not only improve their production methods and reduce $CO_2$ emissions, but also adapt their working methods. Therefore in accordance with Europe 2020 Strategy goals, it is vital to encourage organic farming and funding support for those European farmers who intend to adopt green technologies in the production process.

This objective is explicitly stated by the CAP which according to the Strategic Guidelines for Rural Development for 2014-2020 emphasizes the environmental and country side protection, as a priority at European level. Moreover, the funds allocated to this priority aim at protecting natural resources and landscapes in rural areas of the EU particularly in the field of biodiversity, preservations of high natural systems and eco-systems. Environmental services and green agricultural practices, such as forest conservation, organic agriculture and crop rotation are supported by these funding programs.

## Territorial challenges

At present, an increasing number of rural areas are supported by non-agricultural factors, due to the diversification of their socio-economic structure. However, in a large part of the EU, agriculture remains an essential driving factor for rural development. The vitality and potential of many rural areas continue to be closely related to the presence of a competitive and dynamic agricultural sector, attractive for young farmers.

This situation is mainly characteristic of predominantly rural areas, where the primary sector comprises approximately 5% of the added value and 16% of the occupied workforce. It has also to be noted that agriculture plays an important role in rural areas by generating associated economic activities, related to agricultural products processing, tourism and trade. Also, in many European regions, agriculture forms the basis of local traditions and social identity.

Having regard to the three types of challenges outlined above, it was agreed at EU level that the CAP reform objectives should follow the directions mentioned below, in order to be brought into line with the objectives of the Europe 2020 Strategy:

- ✓ *to encourage the transfer of knowledge and innovation in agriculture, forestry and rural areas;*
- ✓ *to increase the competitiveness of all agricultural sectors and to increase the viability of agricultural exploitation to promote the organisation of food chains and risk management in agriculture;*
- ✓ *to restore, preserve and strengthen the ecosystems that depend on agriculture and forestry;*
- ✓ *to promote the efficient use of resources and to support the shift to low-carbon economic activities which could adapt to climate change in the agricultural, food and forestry sectors and*
- ✓ *to promote social inclusion, poverty reduction and economic development in the rural areas.*

**Table 1.** *Budgetary implication*

| **Budgetary implication of the CAP reform Strategic aims** | **Funding (billion EUR)** |
|---|---|
| First Pillar – Direct payments and market expenditure | 317.2 |
| Second Pillar – Rural Development | 101.2 |
| Total (first and second pillar) | 418.4 |
| Food safety | 2.5 |
| Funds for disadvantaged persons | 2.8 |
| European Fund for Globalization Adjustment | 3.9 |
| Research & Innovation in the field of food safety, bio-economy and sustainable agriculture | up to 2.8 |
| Total additional funds | no more than 17.1 |
| Total budget proposed for 2014-2020 | no more than 435.5 |

**Source:** *European Commission – The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future.*

In accordance with the Common Agricultural Policy reform proposal, in the post-2013 period, a significant part of the EU budget must continue to be allocated to agriculture, which is an economic sector of strategic importance. In order to carry out the main CAP activities, the proposal is to allocate EUR 317.2 billion for the first pillar and EUR 101.2 billion for the second pillar, in the period 2014-2020.

These funds will be supplemented by additional financing for research and innovation, food safety, and funds intended for disadvantaged persons; also, a fund of EUR 3.9 billion is to be provided for crisis situations in the agricultural sector and an amount of EUR 2.8 billion is to be allocated to the European Globalization Adjustment Fund, bringing the total budget to EUR 435.5 billion in the period 2014-2020.

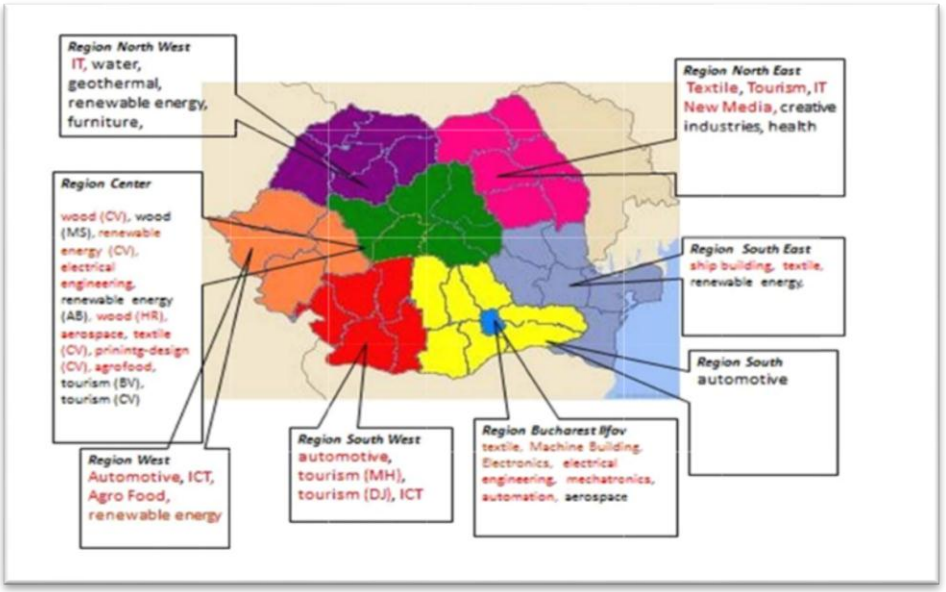
Pursuant to the new regulations, the distribution of the support for rural development will be based on objective criteria, with less developed areas continuing to benefit from higher co-financing rates, that will also be applied to certain measures such as those related to the transfer of knowledge, producer groups, cooperation and the Leader Axis. In what follows, we will outline the main instruments to be used within the CAP reform in order to face the abovementioned challenges and, at the same time, to better answer to the development priorities.

As it may be noted in the above-mentioned figure, in the next financial exercise most of Community revenues will be guided to direct aids, granting support both to young farmers, and to disadvantaged persons. This is explained by the fact that, as opposed to the previous years, when the CAP measures mainly reacted to endogenous challenges, from excess production crises to food safety-related crises, and proved to be useful for the EU both internally and internationally, in the post-crisis period, most challenges are caused by factors that are external to agriculture, which impose a more complex feedback.

In Romania, clusters can be found in the start up phase (14, in black) and in development (27, in red), 5 of these receiving the bronze medal following the evaluation developed by VDI/VDE Germany. The economic performance of clusters in Romania was analyzed in a study developed in 2012 by the Association of Clusters in Romania with regard to the 15 most active Romanian clusters.

The Romanian clusters had in 2012 an average turnover of 250 million EUR and total exports of 200 million EUR, with the total employed workforce being of approximately 5,000 employees per cluster, on average, for 17 enterprises. These contributed to 9% of the total exports, with the most competitive sector being that of the textile industry, where the companies in the cluster have contributed to around 12% of the total export for this sector of the economy (Cosnita, 2012).

**Figure 2.** *The economic performance of clusters in Romania*




**Source:** *Developed study in 2012 by the Association of Clusters in Romania*

**Table 2.** *Economic performance of clusters in Romania*

| Indicator | Value | Monetary Units | Average |
|---|---|---|---|
| Turnover | 15,006 | Million RON | 1,000 |
| Number of companies | 255 | Units | 17 |
| Export | 3,345 | Million EUR | 223 |
| Employees | 77,295 | Persons | 5,153 |

**Source:** *Association of Clusters in Romania - Clusters in Romania as vector of intelligent specialization.*

## Common Agricultural Policy

The common agricultural policy is the oldest of the European community policies. It was defined for the first time, in the Rome Treaty (1957) and was launched in 1961. The implementation of the common agricultural policy has lead to the modernization and the improvement of the efficiency of the communitary agriculture. The common agricultural policy was the largest beneficiary of the common commercial policy. The reduction and the subsequent elimination of the customs duty at the European Union level has lead to the free flow of agricultural products between member countries. Moreover, the common duty tariff represented an important protection measure for UE farmers.The common agricultural policy was very criticized internationally, especially by the United States of America representatives, this being the largest agricultural producer worldwide. The main principles of the common agricultural policy are:

- *The uniqueness of the market- at the EU level, there is a single agricultural market, in which there is a free flow of products, with a single set of prices;*
- *The community preference- on the EU market, the community agricultural products are preferred to imported products;*
- *Financial solidarity- imposes that each member state contributes to the community budget and implicitly to the European Fund of Orientation and Guarantees.*

The most important problem with which the common market of agricultural products is confronted at the moment is the development of equilibrium between demand and offer for the products in circulation. Through the modernization of agriculture and the increase of productivity in this domain, an explosion of the offer of agricultural products has been registered, while the demand has not evolved in the same manner. Moreover, the export of these products is difficult due to the high competitive nature of the world market, with the EU representatives in the domain considering that the reduction of the areas designated to agriculture and the quantitative limitation of products could solve in an efficient manner this problem. In the next period, within the common agricultural policy, the emphasize will be set on the direct aid mechanisms to farmers, which will result in the reduction of the cultivated agricultural surfaces and the reduction of the number of farmers, simultaneous with the increase in efficiency, the diversification and the increase in the quality of production.

## Key elements of CAP reform in the perspective of the 2020 Europe Strategy

In order to better emphasize the EU agricultural potential, the CAP must support farmer income in a fairer, simpler and better targeted way. For these purposes, only productive farmers will benefit from direct payments for income support. Also, direct payments must be distributed more fairly among farmers, regions and Member States. Price volatility represents a "threat" for the long-term competitiveness of the EU agricultural sector. In order to counterbalance this risk, the CAP proposes the so-called "safety-nets" for the agricultural sectors that are most exposed to crises and to encourage the establishment of insurance systems and mutual funds. In order to strengthen the environmental sustainability of the agricultural sector and to address the efforts of farmers, the CAP must redirect the direct payments system to economic practices that enable the optimal use of natural resources. These practices are environmentally-effective and simple to implement and they include: crop diversification, maintenance of permanent pastures, protection of green areas and of natural parks. In order to create a competitive agriculture, it is necessary to double the budget allocated to agronomic research and innovation, and to find solutions for putting its results into practice, by means of a new partnership for innovation.

Such funds will contribute to encourage the transfer of knowledge and technical assistance for farmers, as well as to the support of research projects that are relevant for the agricultural environment, ensuring a closer cooperation between the agricultural sector and the scientific community. In our opinion, in order to achieve the objectives of Europe 2020 Strategy, the CAP must ensure a more competitive and balanced food production system, by strengthening the farmers' position. Some analysts consider (Spoerer, 2010) that this goal may be achieved through a better support for producer organisations, inter-professional organisations and for the development of the "short networks" between producers and consumers (the decrease of the number of intermediaries). In order to encourage agro-environmental development, the CAP reform must take into account the specificity of each territory, encouraging national, regional and local agro-environmental initiatives. To this end, the protection of ecosystems, their restoration and climate action, as well as the optimal use of resources are priorities of the rural development policy.

At present, within the EU, two thirds of the farmers are over 55 years old. In order to support job creation and encourage young generations to get involved in the agricultural sector, the European Commission proposes the creation of a new "setting-up support", directed at farmers under 40 year old, during the first five years of their project. Also, in order to promote employment and entrepreneurship, the European Commission proposes a series of measures for boosting economic activity in the rural areas and for encouraging local development initiatives. For example, a "start-up set" will be created in order to support micro-enterprise projects, with a five-year financing of up to EUR 70,000. In some analyses (Lowe, P. & Buller, H., 2011) it is considered, in order to avoid useless administrative formalities, the simplification of several CAP mechanisms, namely the cross-compliance rules and the control systems, without entailing a loss of effectiveness. Moreover, the support granted to small farmers will also be simplified, with the establishment of a lump sum payment of EUR 500-1,000 per farmer per year. Land transfer from small farmers who cease their activity to other holdings that want to restructure their farms, will be encouraged.

**SWOT analysis of the contribution of CAP to the achievement of the Europe 2020 Strategy objective**

| **STRENGTHS** | **WEAKNESSES** |
|---|---|
| Policies to support the rural development, the increasing quality of life in rural areas and agricultural economy<br>The GAL approach, as stated by LEADER experience<br>Strategies and programs for diversification of the rural economy | CAP failed to sufficiently reduce the development gap and dispparities related to quality of life between rural areas |
| **THREATS** | **OPPORTUNITIES** |
| Lack of information infrastructure enabling the rural population to benefit from the full support of the CAP<br>Aging population in rural areas<br>Rural depopulation<br>Natural disaster threats that endanger EU agriculture | New approaches, technologies and innovations that may boost rural development<br>Policies that encourage the development of human capital in rural areas<br>The new structure of direct payments for farmers |

## Strategic development

Along with the regionalization strategy, there is also the objective of the development of a territorial economic concentration based on clusters (with a high degree of intelligent specialization for each region). Romania is however behind with regard to the cooperation, dissemination of information, and the development of efficienct coordination structures between companies, so that it can promote the business sector, innovation, technological transfer within the clusters and the possibility to develop brands. Furthermore, there is also a lack of business culture with regard to quality management and the quality infrastructure, which are specific to the sector, as well as the difficulty in the development and alignment of exporters to advanced certification standards requested by external markets, as well as the need of attracting investments and of streamlining the sector. Analyzing the cross-border agricultural markets, one has to notice the interesting benefits they have in store, as well as the support they offer to producers, as well as the efficient manner in which they identify the concrete needs of the sector.

For all the regions in Romania, the development in public-private partnership of a regional competitiveness strategy, with the participation of business associations and local public authorities is necessary in order to increase the competiteveness of the region in the international trade. The following supplementary arguments can be offered in this direction:

1. *The regions enter in direct competition in order to attract competitive factors and the promoting of their economic identity;*
2. *The export is an essential force for regional development in the context of globalisation and integration, context in which inter-regional competition increases;*
3. *The Regional Development Plan must be completed in order to tackle the problems and challenges faced by exporters;*
4. *Romania has a National Export Strategy, which must be well implemented and adapted at regional level;*
5. *Coordinating and establishing key objectives and resources at regional level through a strategic approach is an advanced practice among European Union member states, as well as a pre-condition for the increase of the absorption capacity of structural funds through projects that can be used by exporting companies.*

Taking into account the current regional disparities, the National Export Strategy integrates the strategic regional export approaches. Under the aspect of export intensity, the development regions are in the following situations:

- *more developed for exports in Bucharest-Ilfov, West, North-West and South regions;*
- *medium developed for exports in South East and Center regions;*
- *less developed for exports for South-West and North-East regions.*

In the regions of development which could get involved in the development of competitiveness strategic processes, there is no institutionalized structure, like a regional export council, in order to manage this type of process. The idea of the creation of export councils at regional level was first vehiculated as part of the framework of the Export Council, and the management of the National Export Strategy 2005-2009 and the integration in the European Union, when it became more obvious that coordination, strategy and common vision with regard to sustainable development of export at regional level is required. This vision should be aligned and integrated in the new National Export Strategy 2014-2020 and the Regional Development Plan. The introduction in the framework of the National Export Strategy of different essential elements regarding regional export strategies is all the more important taking into account the following aspects:

- *there are discrepancies, challenges and opportunities that are specific to each region, which can generate solutions and local regional initiatives, with the regions in Romania, being less competitive when compared with the other regions in the European Union, are eligible to receive structural funds for economic development;*
- *within the European Union, the development regions are competitiveness vectors;*
- *internal and external financing can be facilitated;*
- *regional forces can be targeted towards specific competitiveness objectives.*

From a regional perspective, the National Export Strategy and regional strategies will take into account the following guidelines:

- *increase of the internationalization of Romanian companies and the participation of the regions in the international trade;*
- *reduction of discrepancies in terms of export performance, both inter-regionally, as well as between countries intra-regionally;*
- *attraction of structural funds at regional level for sustainable development of exports;*

- *development of regional centers to support and promote export;*
- *reduction of current significant differences, from the point of view of economic performance, both inter-regionally, as well as among counties intra-regionally. Even the most developed regions have a high degree of concentration of economic and commercial activities in urban areas, with important parts of the country being excluded from international trade.*

The developed actions will also contribute to regional development in the following directions:

- *implementation of projects and programs of rural development targeted towards export (rural tourism, organic agriculture, IT&C, furniture, crafts, textiles, viticulture);*
- *programs for the stimulation of the creation of business alliances, including collective marketing associations at local level in the sectors with a significant multiplier potential, such as agricultural products and food processing;*
- *encouraging the decentralization of the export capacity from cities to rural areas, in order to create new skills and job opportunities;*
- *encouraging the creation of alliances between producers.*

Moreover, regional strategies contribute to job creation through:

- *support and strengthening of the key employing sector;*
- *creation of new jobs in new sectors (for example, the high-tech and services sectors, rural tourism, ecological farms), so that mass unemployment is avoided, taking into account that Romania has lost its competiteveness in the energy domain and other large traditional sectors, which generated many jobs;*
- *development of a policy and competitive framework that leads to foreign investments in these sectors.*

Last but not least, the strategies contribute to environment protection through the following aspects:

- *the sustainable use of natural resources and, at the same time, the prevention of pollution, and in case this is not possible, the reduction of emissions and of the impact on the environment, mainly from industrial activities;*
- *facilitating and stimulating the conformation of exporters to environmental standards;*
- *environment protection and biodiversity protection at the regional level.*

To sum up, the Regional Export Strategy targest objectives such as:

- *export support for associate producers, who export products using geographical indications and origin denominations;*
- *consultancy for the development of a support strategy for the formation and development of clusters and export networks in sectors with a potential of increase of exports;*
- *management of branding strategies at regional level;*
- *development of internal promotional and exhibition centers with a high degree of internationalization and specialization at the level of development regions, capable to promote the Romanian export offer so that it has an impact at international exhibitions.*
- *Development of regional structures in public-private partnership that are capable of ensuring the management of regional export strategies (Regional export councils) and the development of promotion centers at regional level;*
- *Support of the key sectors at regional level;*
- *Development of the export potential of the regions and their offering capacity for export on external markets.*

## The challenge of globalisation on the development of agricultural cross-border and regional markets

There are a series of benefits and dangers with regard to the influence of the globalisation phenomenon on the the development of the cross-border agricultural markets in the analyzed area. Among the benefits, one can mention the exchange of technology and new knowledge, introduction of new seeds and fertilizers, increase in production, standardization, genetically modified food products and the promotion of commercial crops. At the same time, there are a series of disadvantages, including the danger of destruction of soil fertility through excessive use of fertilizers, the gradual replacement of small farms (currently representing a majority in Romania) with large farms (this represents not only danger, but also an opportunity, in terms of potential increased efficiency) and the impossibility for small farms to access marketplaces. Furthermore, another potential dual perspective with regard to the impact of globalisation is represented by eco-agriculture, which is currently developed among small farms, versus industrialized agriculture, which is specific to large farms.

Other potential problems, including the production of food waste and the squandering of food, are debated between April 1-4 2014, when the Romanian Agriculture and Rural Development Ministry will hold in Bucharest the 29th Regional Conference for Europe (ERC) of the Food and Agriculture Organization (FAO) and the works of the 38th session of the European Committee for Agriculture of FAO (ECA). The information presented to member countries improved the understanding of the causes that lead to the loss of food products in the region. Preliminary results show that the main reason for the food waste production is represented by the consumers who buy food products with a long expiration period. This leads to an increase in unsold merchandise and thus to wasting of food that would otherwise be completely edible. Many awareness campaigns for the reduction of food waste have been launched in order to tackle specific local conditions, which contribute to food waste.[3]

## Conclusions

The alignment of CAP objectives to those of the Europe 2020 Strategy complies with the subsidiarity principle, in the context in which this policy represents an area of competences shared between the EU and the Member States. Through the action of synchronising with the EU development objectives in the perspective of the years 2020s, the new reformed CAP will enable the promotion of innovation, the increase of both economic and environmental competitiveness of the agricultural sector, the fight against climate change and the maintenance of employment and growth.

By maintaining the current two-pillar structure of the agricultural policy development instruments, Member States are given more discretion, in order to be able to better adapt Community solutions to their local particularities. Through all these elements, the future evolution of the CAP may essentially contribute to the preservation of a modern and competitive agriculture in the Europe, capable of coping with climate change and international competition and meeting the expectations of European citizens, at the same time.

Rural areas cannot be considered uniform territorial entities. Many of them currently enjoy a relatively favourable situation in the European Union, especially with respect to their physical proximity to the large urban centres, which is a direct advantage. Other European territories are still exposed to

[3] http://www.madr.ro/ro/ The Regional Conference for Europe Erc a FAO, 18th working session of European Commission for Agriculture/

the risk of facing an industrial recession related to certain circumstances that mainly result from the closing-down of a large enterprise. Some areas also face a series of geographically-related constraints that currently prevent them from accessing a fair share of the resources needed for the increase of competitiveness. Therefore, the development challenges are bigger when attempting to establish or maintain a solid basis of employment in remote or peripheral areas.

Employment development in rural areas is closely related to the development of the regional economy's production structure. Since in view of a sustainable rural development, agriculture no longer represents the sole economic development engine for rural regions, the rural development policy needs to strongly and directly target the increase of employment in case of non-farm or non-agricultural activities, still taking into account, however, the need to involve farmers in the multi-sectoral development strategies. In this context, both specialization, and diversification may be successful strategies.

As shown by the experience with the LEADER European programme, which supported the establishment of micro-enterprises and small and medium-sized enterprises, as well as the access to information and communication technology, the actors having the necessary knowledge, skills and ability are the essential and decisive factor for job creation and the support of a sustainable rural development.

The central CAP objective in the perspective of the 2020s must be the increase of the competitiveness, sustainability and stability of agricultural production in the European Union, in order to guarantee healthy and qualitative food for the citizens in the member countries, in order to protect the environment and to develop the rural areas. The CAP, especially through the Second Pillar, dedicated to rural development, has the needed instruments to contribute to the achievement of the objectives of the Europe 2020 Strategy, but the SWOT analysis of this policy shows there is still room from future improvement in some of its areas.

The current reform process of this policy, which is a flexible and permanently evolving one, may contribute to the remedy of the weaknesses of this Community policy, since it intends, as shown in the CAP towards 2020, to remodel the economic policy options meant to answer to the future challenges which EU agriculture and rural areas will face.

## References


1. Ackrill, R. (2000): *The Common Agricultural Policy*, Sheffield UK, Sheffield Academic Press.
2. Anghel, Ion E. (2002): *Foreign Direct Investment in Romania*, Expert Publishing House, Bucharest.
3. Bafoil, F. (2000): *Après le communisme*, Armand Colin, Paris.
4. Bonciu, F. (2001): *Foreign Investment in the world economy in Policies and Instruments of attracting Foreign Investment*, Bucharest.
5. Braghină, C. (1998): *Foreign Direct Investments in Post-Communist Romania, in Romanian-British Geographical Interchange*, Corint Publishing House.
6. De Bly, Harm I. (2003): *Geography – Regions and Concepts*, John Wiley and Sons.
7. *EAGF - Financial Report*, 2013.
8. *European Commission – The CAP policy toward 2020*, Bruxelles.
9. Fennel, R. (2007): *The Common Agricultural Policy: Continuity and Change*, London, UK, Oxford University Press
10. Kyed, K. & Kaergard, N. & Zobbe, H. (2012): *Multifunctionality and the European Common Agricultural Policy: A Theoretical Problem*, Zaragoza, Spain, European Association of Agricultural Economists.
11. Lowe, P. & Buller, H. (2011): *Setting the next agenda. New approaches to the CAP reform*, Journal of Rural Studies No.3/2011.
12. Spoerer, M. (2010: *„Fortress Europe" in long-term perspective: agricultural protection in the European Community*, 1957-2003, MPRA Paper 24120, Munchen, Germany, University Library of Munich.
13. Winter, M. & Fry, C. & Carruthers, S. P. (2008): *European agricultural policy and future of environemental welfare*, Amsterdam, Elsevier Press.

# POSTULATES OF PRICING POLICY IN SERBIA IN ACCESSION TO THE EUROPEAN UNION

*Koviljko Lovre, Marinko Kresoja*[1]

## Abstract

*Based on the compliance of aggregate supply and demand of agri-food products, the analysis of the statistical evidence can only provide a rough assessment. The comparison between the agri-food cost growth rate and agricultural production significantly indicates that, on average, in the time period 2000-2011, the average aggregate supply exceeded demand. The first indication points to the interdependence of food costs in relation to the total personal consumption costs and the relative agri-food retail prices. However, the second one results from the calculation of combined growth rate of agriculture and food industry. The comparative analysis of parity of economic position is a reliable indicator of physiognomy and implications of agricultural policy. The paper draws attention to the parity in the creation and distribution of national income or gross domestic product. It also emphasizes the importance of relative price movements of agricultural products and their impact on the agricultural growth, i.e. the aggregate supply reaction to price changes. Finally, the study accents the pricing policy and disadvantage reflections on the agricultural position and production increase.*

**Key words:** *Agri-food Products, Pricing Policy, Parity of Economic Position*

## Introduction

In every agricultural policy, including ours, the pricing policy, especially the price level policy, represents central issues, while solutions in this area largely determine the physiognomy of agricultural policy.

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There is no need to argue whether the price level policy of basic agricultural products, in the short or medium terms, can be set only on the basis of one criterion (the ratio of supply and demand in the case of agriculture in Serbia), which could be worked out so that it gives almost automatic price levels. In reality, especially with the growing level of uncertainty and the growing impact of international trade on the general development conditions, such automatism does not seem acceptable. Not only ours, but also experience of most developed countries, clearly shows that more flexible approach is almost inevitable where the price level of basic agricultural products is the resultant of a number of criteria, some of which are typically mutually conflicting. An extremely complex question of the price level criteria and resultant placement is also a central issue of pricing policy. It should be emphasized that there is or might be, no sufficiently exact method which derives the resultant of mutually conflicting criteria. This is the reason why the agricultural policies of many countries are satisfied only to define the criteria, from which it follows that the price level is determined by a political process, i.e. by a compromise between representatives of the conflicted interests. The compromise framework is usually rather wide, so the price levels mostly depend on the current power balance between the compromise participants. The most common consequence is that the price levels, in relative terms, fluctuate significantly, so there is an adverse reflection on the agricultural production growth. In conditions when the majority of developed countries try to limit the growth of agricultural production, the effect of price fluctuations is somewhat mitigated.

This extremely rough sketch is largely confirmed by our experience over last fifteen years when price relations have been deducted directly from the supply and demand, while there have been no attempts to define other criteria relevant to the pricing policy. Ultimately, based on the experiences of developed countries, the price level policy must be based on three criteria: 1) the price levels in the international market, 2) the labor productivity parity and economic position of agriculture and 3) the anticipated growth in demand and supply of agri-food products. Of course, the order of the criteria does not reflect the rank, but a logical sequence of priorities.

The above criteria determine the structure of this study with the primary purpose of sketching the outlines and elaborate the active and more efficient pricing policy mechanism of Serbia for basic agri-food products. The urgency of an effective pricing policy is caused by the negotiations

between Serbia and the European Union. In fact, the physiognomy of agricultural policy, as well as the development rate and economic position of agriculture in Serbia will mostly depend on the stipulated measures during these negotiations.

## Growth of supply and demand for agricultural and food products

Based on statistical evidence, the coordination of agricultural supply and demand of agricultural and food products can be evaluated only approximately. In spite of the lack of evidence in statistical materials, by comparison of the growth rate of expenses of the population for food and agricultural production, it is more than obvious that aggregate supply has exceeded demand to a certain extent in the last 12 years.[2] There are numerous indications that the supply of agricultural and food products exceeded demand in average in the period from 2000 to 2011. The first indication comes from interdependence of food expenses in relation to the total expenses of the population for personal spending and relative prices of agricultural and food products in retail trade. Having in mind the reliability of statistical evidences, interdependence is high, evaluated parameters are statistically significant, and autocorrelation of the residuals is considerably over the allowed limit (Figure 1 and 2).

It results from the cited interdependence that relative prices of agricultural and food products showed slow drop in prices, meaning that aggregate supply exceeded aggregate demand. Food expenses increase yearly per the rate of 0,72 % in average.[3] Such a slow imbalance of supply and demand with relative low income elasticity of demand relating to the level of economic development (0,3% in average)[4] and the low price elasticity

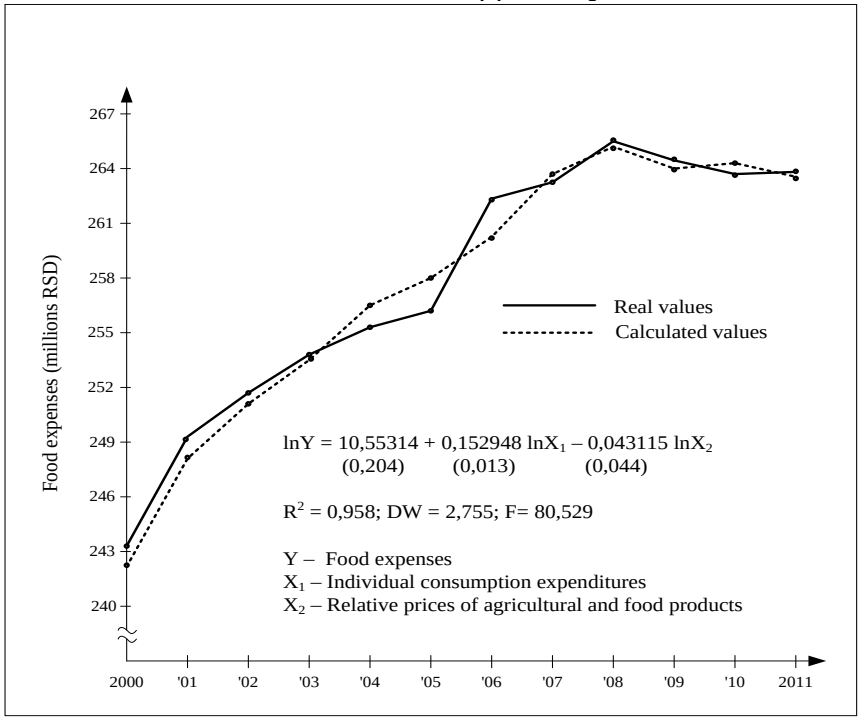
[2] Determination to analyze the period from 2000 to 2011 was based on changed political and macroeconomic circumstances in relation to the previous decade. First, the conclusion relates to the "opening" of the economy since 2000 relating to the completely closed economy until then. Changes of circumstances unavoidably meant the necessity of adaptation of agriculture, about which we will talk later.

[3] All growth rates in this part of the text are calculated from the linear trend. High year variations of analyzed aggregates do not allow the calculation from original data.

[4] It is important to note again that imperfectness of statistical data. From the series of data of the total expenses for personal spending and food expenses, the size of income elasticity of demand for agricultural and food products is calculated. However, part of food expenses in the total expense for personal consumption, according to the questionnaires of the population amounts to 41%. Having in mind the level of economic development, it is certainly a more real value. Based on registered values, share for food in the total expenses for personal consumption has stagnated since 2008, while the same on the questionnaire based value has increased.

of demand (-0,23%)[5] unavoidably meant that some surplus of supply had a disproportional price effect. It finally meant parity aggravation of the economic position of agriculture. Really, relative prices of agricultural and food products in the market of personal consumption decreased per annum average rate of -0,65%.

**Figure 1.** *Actual and calculated values of food expenses*




**Note:** *Constant prices, 2002*

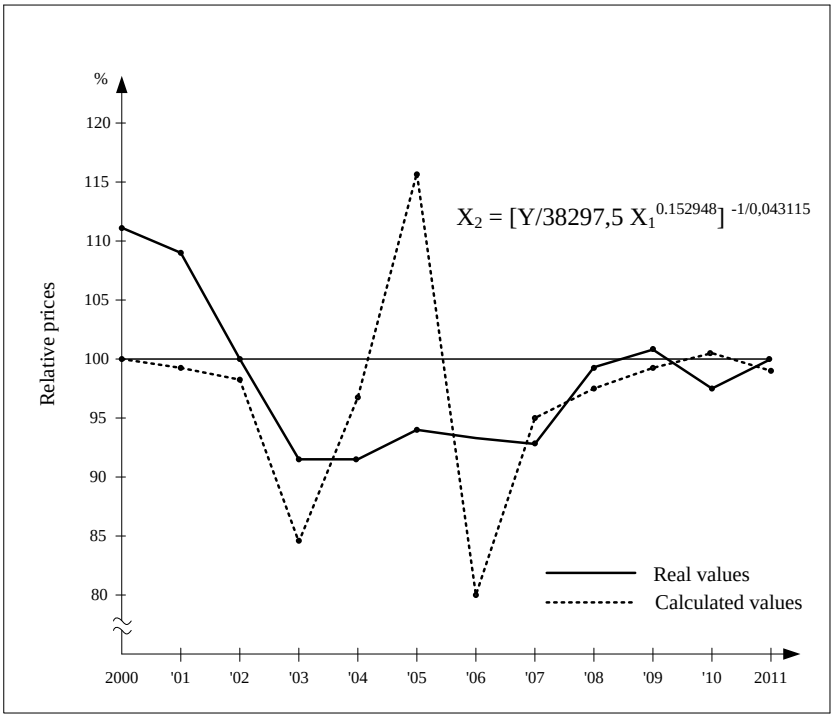
Second, a more reliable indication for the same conclusion comes from the estimate of combined growth rate of agriculture and food industry (food production).[6] To make reliable the combined supply growth rate of agriculture and food production in the market of personal consumption fairly well, it would be correct to rely on input-output relationships between agriculture and industry of food production. However, data

[5] The estimate of basic elasticity for food demand is done from interdependency of food expenses (constant prices in 2002) and the prices of retail agricultural and food products settled by general price index taking deflation into consideration: lnY=13,50745 – 0,22826lnX; R= –0,519 (Y – food expenses, X – relative prices of agricultural and food products).

[6] The estimate excludes drink and tobacco industries, although it would be methodologically more correct to include these industries into the estimate. However, the change of data registration system in the statistical service has caused the only possible estimate.

unavailability on weighted agriculture and food industry leaves only one possibility of estimating the approximating combined supply rate based on share of these sectors in the social product. It can be expected that share of agriculture in the total supply of agricultural and food products will decrease on "behalf" of food production, being the logic of development process on what almost the double growth of physical volume of food production refers in relation to the growth of the physical volume of agricultural production (1,81:0,93%). However, share of agriculture in the Gross Domestic Product stagnates, while share of food industry was reduced in the cited period. This moment we should have in mind when approximating the total food supply.[7]

**Figure 2.** *Actual and calculated relative prices of agricultural and food products in retail trade*

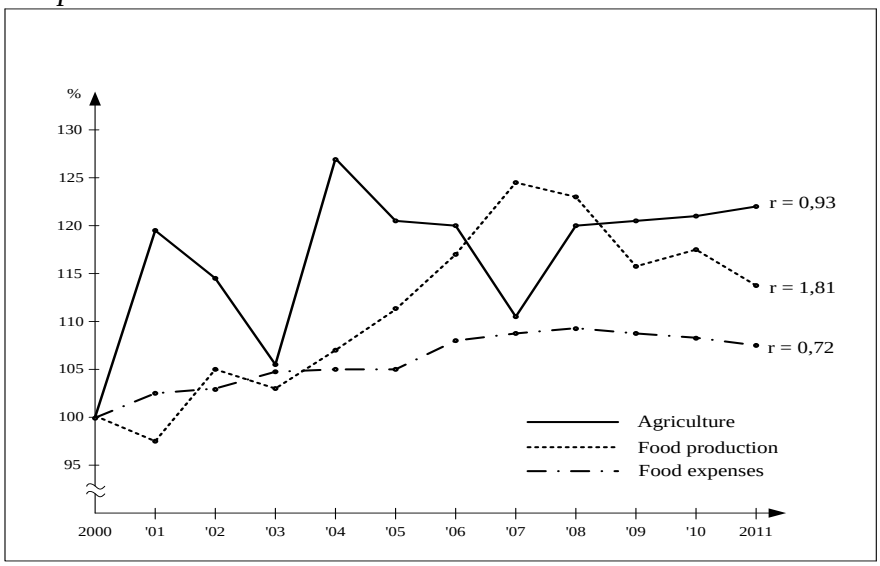



**Note:** *Consumption price index = 100,00*

[7] The second essential methodical problem, which in the estimate of combined rate of agriculture and food policy could not be surmounted relates to the indices of the physical production volume. The indices of agricultural production growth are shown based on net final production, while the indices of physical volume of food industry are reported the "gross" basis. It means that in case of food production, the total production is reduced neither for internal reproduction nor for reproduction input from agriculture. Therefore, the combined change rate of food supply should be taken with due dose of reserve, especially during establishing connection with final consumption.

The estimate of combined supply gives the average rate for the cited period of about 1,15%.[8] Demand growth for agricultural and food products amounted to 0,72%; it is an additional indication to draw conclusion about imbalance of aggregate supply and demand of agricultural and food products in the period from 2000 to 2011 (Figure 3).

**Figure 3.** *Growth indices: Agricultural production, food production and food expenses*



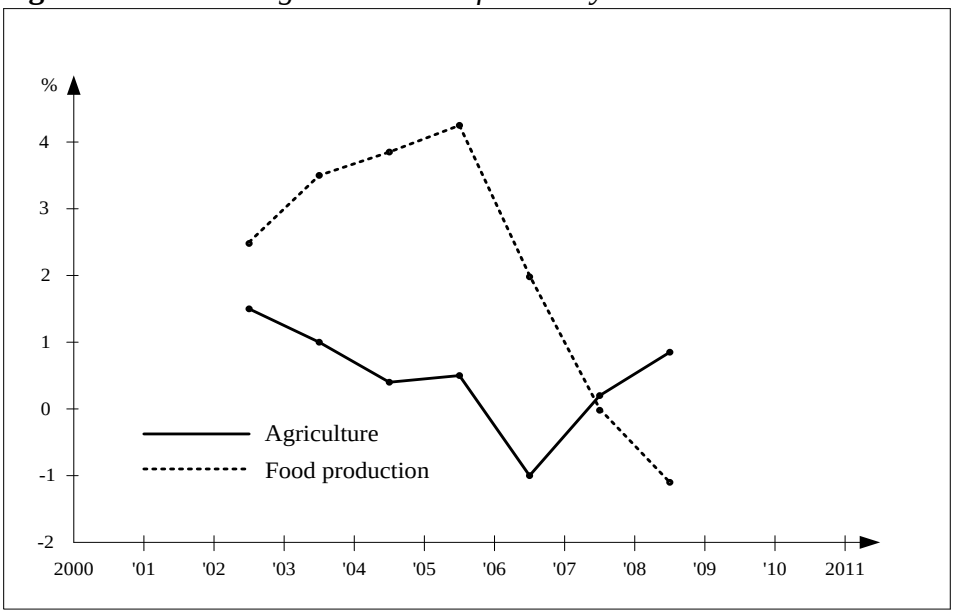

The estimate shows an unexpected high growth of food production in average in relation to the growth of agriculture of almost 2:1.[9] Such a result can be explained by two moments. First, in this period, the growth of agricultural products processing was essentially conditioned by repression of processing and finishing in households and handicrafts. It means that the index of food production growth was appreciably over the real supply growth of this industry in the market of personal consumption. Of course, the relationships of average values are only the starting point in the dynamic analysis of relations of agrarian supply and demand of agricultural and food products. The fact that characterizes the time we talk about and what specially worry us are the slowdown of agricultural

[8] From the estimate of the combined growth rate of food supply appears that the contribution of agriculture to the growth of supply is 69,8%, and the food industry of 30,2%. (The estimate was done based on the formulae: $r_p x + r_{pi}(1-x) = r_k$; $r_p$ – growth rate of agricultural production; $r_{pi}$ – the growth rate of food production; $r_k$ – the combined growth rate of supply of agricultural and food products).

[9] The relationship of interdependence is ln Y = 2,754 + 0,411lnX; R = 0,350 (Y – index offood production growth; X – index of agricutural production growth). The low level of interdependence additionally confirms the illogicality of statistical registering of production volume.

production growth and the absolute fall of food production since 2007. The slowdown is obvious from the trend of production volume and more obvious from six-year movable trends (Figure 4). In addition, illogicality of contrary directions in the growth of agriculture and food industry has been visible after 2004, where the instability of agricultural production surpasses the instability of food production, with relatively stable growth of food expenses, and it is an additional indication of above average of price effects. According to the logic of interdependence, the relationship of year indices of agriculture growth and food industry could be approximate to the growth of food expenses. Really, interdependence is, overall, high[10] with expressive deviations to the lower one in 2001 and 2004, and the upper in 2007. It means that in these years, there were underestimating, i.e. overestimating the growth of agriculture or food production, or both. Judging by these facts, it is about overestimation, i.e. underestimation of food industry growth because of "wavy" introduction and unsystematic registration of "new" products in the index account.

**Figure 4.** *Calculated growth indices from six-year movable trends*




[10]The estimate in the text derives from the relationship of production volume index: agriculture and food production, food on the one side, and the growth index of food expenses, on the other side. Interdependence is expressively emphasized: Y= 27,339 + 0,613X; R = 0,915;Y – relationship of the index of production volume of food production and agriculture; X – index of food expenses in constant prices), therefore, the estimate is enough reliable.

Regarding to the fact that the growth of food production could not be possibly reduced for the growth that was caused by repression of processing in households and handicrafts, it was not possible to estimate net supply of this branch. Second, growth indices of food industry, contrary to agriculture, were not registered on net basis, but they include reproduction consumption of the branch, which, as a rule, appreciably grows faster than net final supply. These both moments are not essential for the text that follows, but only as an indication on the approximate estimate of aggregate supply and demand of agricultural and food products. This relationship predominantly determines the parity of economic position of agriculture, on the one side, and exerts influence on the physiognomy and structure of measures and instruments of agricultural policy.

## The economic position of agriculture

In the work of this character, it does not make sense to emphasize what measure the parity of economic position of some economic sectors and branches exerts influence on not only the tempo of growth but it has direct regional and social reflections, whose "specific weight" unavoidably rises together with the level of development. With this, the parity of economic position is the basic point both current and development policy.

"Agriculture is a unique example of economic sector which legally develops in the conditions of the decline of human and material resources. Relative decline of resources implies, of course, the disparity of economic position of agriculture. Looking at that in a development-historical way, the disparity of economic position of agriculture is both the "trigger" and the generator of economic development, but the generating influence falls during development".[11]

The disparity of economic position of agriculture is an empirical fact, at least. This is the same with the tendency of narrowing initial disparity in the position of agriculture in the development period. However, although the functional connection between the level of development and disparity of the position of agriculture is not disputable, this relationship is not direct. The significant deviations appear under the influence of the whole range of

[11] Dunđerov, M., Trkulja, M., Gajić, M., Lovre, K., (1983): „Agrarna politika Jugoslavije i razvoj agroindustrijskog kompleksa", Ekonomski fakultet, Poljoprivredni fakultet, Subotica, Novi Sad, pp. 105.

influences, among which the prevailing are: proportion of initial disparity, composition of resource – in agriculture and in general, speed of economic growth, etc. Development in the conditions of relative fall of resources supposes the degree of adaptation far above average. The process of adaptation is extremely complex; it substantially limits the preciseness of measuring proportions and tendency of economic disparity. However, the comparative analysis of disparity of economic position can be used as a reliable indicator of physiognomy and implication of agricultural policy.

Parity of the position has two basic forms. First, parity in creation and the other, more important, parity in distribution of Gross Domestic Product or Gross National Product. However, these are the "final" relationships because the influence of relationships in reproduction consumption on the income level is omitted.[12] Namely, it is not difficult to suppose how much the statistical service is unable to register an endless abundance of processes characterizing adaptation or transformation of agriculture. Problems are huge and they begin with the definition of the "agricultural population" category, even more with registering the degree of activities of the agricultural population.[13] However, main difficulties are in registering the income of agriculture from "non-agricultural activities". Further difficulties appear in registering the position of agriculture in redistribution. Some essential features cannot be quantified, while the other, as a rule, cannot be registered with satisfying preciseness (for instance, net subventions in agriculture according to different bases). At last, the exceptional dual character of our agriculture makes the analysis difficult. In coexistence of the two sectors within agriculture differing not only in the degree of development but, more important, in economic behavior, comprehension of agriculture overall, has a very limited relevance. This is the reason for the relationships in this part of the analysis will be done roughly for the sector of agriculture overall.

Taking into consideration that the quality of records requires a necessary gradual procedure in measuring parity or relative economic position of agriculture, first there will be carried out the parity of the gross value added of agriculture.

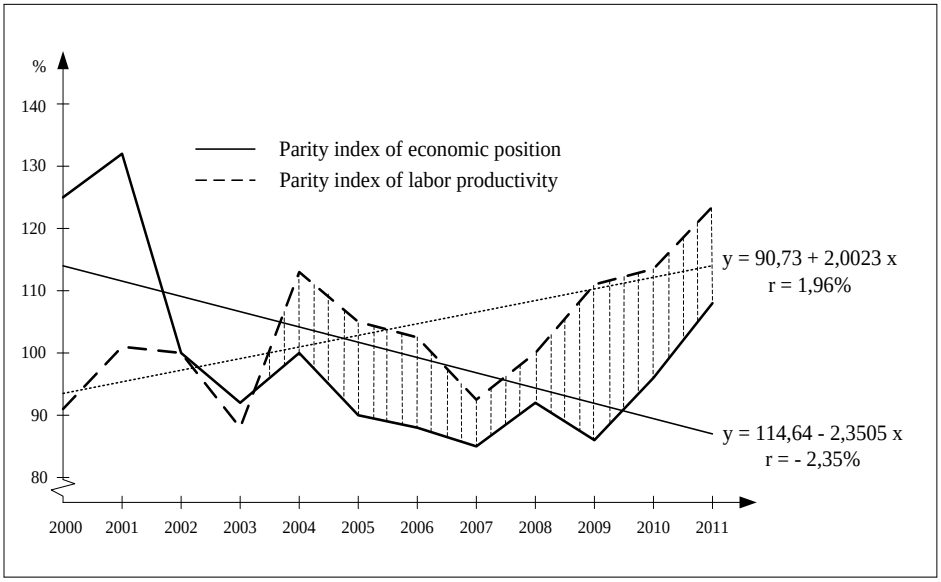
[12] To "lessen" somewhat the problems cited in the text, authors determined to the estimates of the parity of economic position and labor productivity based on the Gross Value Added. Finally, systematic problems in registering do not influence essentially on tendencies that is important in such analyses.

[13] To illustrate, it is enough to refer to the definitions and comprehensiveness of agricultural population in our censuses.

The parity of economic position is based on gross value added per active inhabitant in non-agricultural sector of agriculture in relation to the net value added per active inhabitant in the sector of agriculture – all at the current price. For the reasons already mentioned, the analysis is "located" in the period from 2000 to 2011, and the base relationship, for the same reasons, is "bound" for 2002.

The results of the estimates in Table 1 and also illustrated in Figure 5 definitely confirm the statements done based on the analysis of relationships of aggregate supply and demands of agricultural and food products. The imbalance of supply and demand had unavoidably the price effects reflected in tendentious aggravation of economic position of agriculture at the annual rate of -2,35% in average; therefore, the position of agriculture, in time average, was under the average level of non-agricultural sector. The exception is the starting years of the analysis; it is the period when the economy of Serbia "functioned" according to the model of closed economy. The graphic representation convincingly demonstrates the gradual aggravation of the position of agriculture with the degree of "opening" the economy. It proves that "closing" the economy unusually influences non-agriculture; primarily the industrial sector of the economy, i.e. agriculture is a more vital sector in irregular conditions of business.

**Figure 5.** *Economic position and labor productivity parity in creation of Gross Value Added*



Here, it is very important to „isolate" two basic influences on the parity of economic position. First, it is the influence of the parity of labor productivity, and second, it is about the influence of price parity. The parity of labor productivity derives from the same relationship as the economic position parity, but it is based on constant prices. The influence of prices derives, of course, from the relationships of economic position parity and the parity of labor productivity.

In the observed period, labor productivity in agriculture increased faster than in non-agricultural part of economic activities. The growth of labor productivity of agriculture was convincingly surpassed the same value in non-agricultural part of the economy - the growth rate of relative productivity of agriculture amounts to 1,96%. Therefore, it results that the influence of relative relationship of prices significantly reduces the influence of growth of relative labor productivity on the parity of the economic position of agriculture.[14]

Such an expressively negative influence on the economic position of agriculture is not logic; neither can it be considered regular relationship with production activities in the given frameworks of economic development. According to the logic of development processes, we should expect that the growth productivity rate in non-agricultural part of the economy increases faster than in agriculture and it would cause the converse influence of price relationships. The shown relationships are characteristic in a significant upper phase of development, when for reduction of share of the agricultural population, the rate of transfer of the population in agriculture rapidly grows.[15]

Parity of the position in distribution is far more important in the agriculture sector (Table 2, Figure 6).[16]

[14] Shaded parts in Figure 4 illustrate the changes of price influences from year to year, as well as the basic tendency.

[15] Experience says that a sudden disparity of agriculture comes after reduction of the share of agriculture population under approximately 12% mostly primarily due to the high population transfer rate.

[16] It would be interesting to analyze the position of agriculture in the secondary and tertiary distribution, as well as the analysis of internal parity determining the structure of agricultural production, but these themes are not within this paper.

**Table 1.** *Parity of economic position, labour productivity, and prices in creation Gross Value Added*

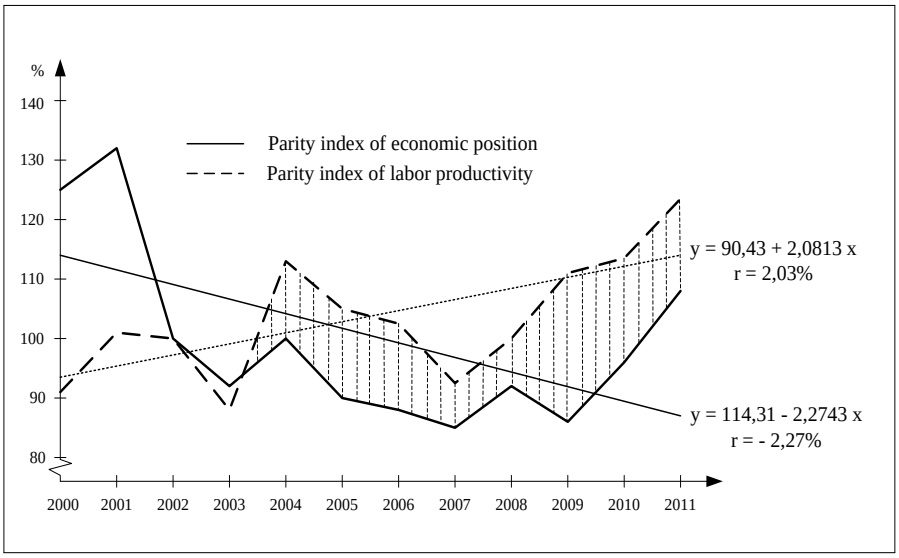
| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Economic position parity* | 97,87 | 102,56 | 77,68 | 70,95 | 77,86 | 70,10 | 68,06 | 65,24 | 70,80 | 66,42 | 74,59 | 84,14 |
| *Labour productivity parity* | 70,60 | 78,97 | 77,68 | 67,42 | 87,10 | 81,66 | 80,28 | 72,77 | 79,10 | 86,80 | 88,73 | 95,98 |
| *Parity of prices* | 138,63 | 129,87 | 100,00 | 105,25 | 89,39 | 85,84 | 84,77 | 89,66 | 89,51 | 76,52 | 84,07 | 87,66 |

**Table 2.** *Parity of economic position, labour productivity, and prices in distribution Gross Value Added*

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Economic position parity* | 97,06 | 101,98 | 77,34 | 70,61 | 77,54 | 69,83 | 68,13 | 65,30 | 70,76 | 66,43 | 74,53 | 84,15 |
| *Labour productivity parity* | 70,02 | 78,53 | 77,34 | 67,09 | 86,75 | 81,35 | 80,37 | 72,83 | 79,06 | 86,81 | 88,65 | 96,00 |
| *Parity of prices* | 138,63 | 129,87 | 100,00 | 105,25 | 89,39 | 85,84 | 84,77 | 89,66 | 89,51 | 76,52 | 84,07 | 87,66 |

The economic position parity of agriculture is estimated by the identical methodology as the parity in creation, so the estimate is based on the overall agricultural, i.e. non-agricultural populations. According to the logic of mutual relationships, the position of agriculture in distribution "follows" the position in creation, therefore, there is still the statement that the disparity of agriculture overall noticeably under the proportion that would correspond to the level of general development. Finally, the influence of relative labor productivity and relative prices remains more or less unchanged in relation to that illustrated in the analysis of the position parity in creating the gross value added.

**Figure 6.** *Economic position and labor productivity parity in distribution of Gross Value Added*




## Postulates of Pricing Policy

The previous analysis convincingly shows that economic position of agriculture has been continuously deteriorated, despite any relative productivity growth. This means that the "price scissors" have been reopened at the expense of agriculture, with a number of productions, regional and social reflections. Moreover, in conditions of transition of the entire economy, the agricultural population transfer is difficult, so the agrarian policy is faced with the central problem: what can be really done to mitigate the deterioration tendency of the relative economic position of agriculture? It should not be emphasized that the pricing policy, based only on the criterion of supply and demand with price impact correction in international trade, is extremely inefficient and, as shown, income biased. It is fundamentally important to consider the influence of the relative price movements of agricultural products on the increased volume of agricultural production and the aggregate supply reaction to the price changes. The aggregate price elasticity of agricultural supply is relatively low, both in the short and long term, as a result of the relative immobility of production factors. In terms of production, the degree of substitution among individual products does not allow significant customization that would considerably affect the total production volume.[17]

[17] The substitution of the basic agricultural products will be discussed later on.

In price elasticity calculations of agricultural supply, the most commonly used relation, whereby the production volume is related to the relative prices of the previous period, the production volume (supply) from the previous year and the trend factor. It is a commonly-exploited "distributed lags" model:[18]

The calculation is based on the functional relationship:

$$Y_t = \alpha_0\beta \cdot P_{t-1}^{\alpha_1\beta} \cdot Y_{t-1}^{(1-\beta)} \cdot T^{\alpha_2\beta} \cdot U_t$$

where the symbols denote the following:

$Y_t$ – index of physical volume of agricultural production;
$P_t$ – price index of agricultural producers, deflationary steady by the price index of industrial producers;
$T$ – time
$U$ – residual value.

The calculated coefficients: $\alpha_1\beta$, $(1-\beta)$ and $\alpha_2\beta$represent the elasticity in the short term. If the elasticities in the long term are to be calculated, then the short-term elasticities are divided with β. The result of the calculation is:

$Y_t = 6{,}042674 \cdot P_{t-1}^{0{,}099904} \cdot Y_{t-1}^{-0{,}441812} \cdot T^{0{,}097827}$ ;
(0,052840) (0,288262) (0,272251) (0,072601) - standard error of the estimation
$R^2 = 0{,}557;\ DW = 1{,}9345.$

Although the evaluated parameter of the price supply elasticity has a logical sign it is not statistically significant, but can be used for approximate estimation of agricultural price responsiveness.

Despite some inaccuracies in the quantification, it is not disputable that agricultural price elasticity is a positive variable in the short and long term, so that the decline in the relative price of agricultural products has resulted in the slowdown of production growth. The parameter $(1-\beta)$

[18] The model was developed by the research group of FAO. In our conditions, the model is a very convenient tool, as it requires minimum evidential basis.

has no theoretically correct sign, which means that the production volume dependence related to the same size ($Y_t : Y_{t-1}$) is not satisfactory pronounced. The calculation shows that the growth of production volume is explained by the combined impact of changes in the real prices of agricultural products and trend factors.

The pricing policy and its instruments have been gradually abandoned, so Serbia is today one of a few states that does not specify any price type for basic agricultural products. As a result, beside the slowdown in production growth and deterioration of the economic situation of agriculture, there are massive dumped imports and consequent inefficiency of material interventions in the of agri-food market. In addition, the "natural" internal price parities of agricultural products, as one of the central questions of long-term agricultural development and directing its production structure, are completely deformed. Disproportion in the internal parity withdraws a range of economic and social implications, which are finally manifested in a distinct deficit of certain agricultural products. The meat sector in Serbia is a typical example.

There is a wide range of endogenous and exogenous factors that affect the internal price parities of agricultural products. Among the endogenous factors, the relative productivity of certain products and the effect of production alterations (substitutions) have the predominant influence. Direct and indirect income per unit of invested labour is undoubtedly the most representative expression of relative productivity. In the long term, relative price changes are in inverse dependence of the relative movement of labour productivity, of course, with the supply volume aligned with demand. However, short-term changes in price parities do not happen without substitution effect, but the effect of these two factors are difficult to separate and measure individually.

Internal price parities of agricultural products are commonly presented in relation to the price of wheat. The reason is very simple: the price of wheat is the central product in the price system of agricultural products and crops with the widest range of production alterations. Therefore, it is the calculation of the gross impact of production alterations to the scope of certain agricultural products. Of course, the statistical reports are again a limiting factor, and the calculation is carried out only for the main crops.

The calculation procedure is similar to the price elasticity of aggregate supply. The production volume of a product is dependent in relation to: its own price in the previous year deflationary steady by the product price with the highest degree of product substitution, production volume in the last year and the trend factor. This dependence reflects the cumulative impact of productivity and substitution, as well as many other factors which cannot be quantified or their effects separated. By substituting dependent variables, the volume of production with the areas under a particular crop, the relation expresses the impact of substitution price elasticity in the short term. However, the impact of exogenous factors, mainly climatic, is still very distinct, so that the calculation results should be taken with a reserve. The calculation is performed for the four crops: wheat (wheat prices deflated by corn prices), sugar beet, sunflower and soybean (the prices are deflated by the wheat).

As expected, the results do not that completely reflect the actual price effects of the area substitution under arable crops (Table 3). The reason is in the divergent trends of relative prices. According to the calculations in any case, price elasticity of area substitution is not significant. The dominant part of the area changes can be explained by trend factor. The insignificant price impact on sugar beet and sunflower is unexpected to a certain extent, while the effect of substitution is normal for cereals, although it is not high. The pricing effect is also normal for substitution between wheat and soybeans.

**Table 3.** *The calculation of area price substitution for the 2000-2011 period*

$$(A_t = Q_0 + Q_1 A_{t-1} + Q_2 P_{t-1} + Q_3 t)$$

| | $Q_0$ | $Q_1$ | $Q_2$ | $Q_3$ | $R^2$ | F-test | D-W*** |
|---|---|---|---|---|---|---|---|
| Wheat: Maize | 12,9561 (0,056008)* | -0,013829 (-0,056732)** | 0,158084 (1,744239) | -0,174917 (-4,330337) | 0,870 | 15,586 | 3,138 |
| Sugar beet: Wheat | 10,04522 (0,181564)* | -0,00595 (-0,013994)** | 0,188211 (0,482293)** | 0,155422 (1,05159) | 0,273 | 0,876 | 1,702 |
| Sunflower: Wheat | 15,7369 (0,112207)* | -0,286462 (-0,911612)** | -0,035673 (-0,189908)** | -0,012354 (-0,188865)** | 0,149 | 0,408 | 1,805 |
| Soybean: Wheat | 11,65135 (0,061831)* | -0,109934 (-0,901441)** | 0,222645 (2,198823) | 0,24511 (7,239697) | 0,937 | 34,618 | 2,238 |

**Notes:**

** Standard error of the estimation. The other brackets show the values of t-statistics.*

*** The parameter is not significantly different from zero.*

**** Durbin-Watson statistics.*

## Conclusions

If the agricultural development of the past decade is presently observed, an extremely misleading impression can be made that there has been no particularly conflicted objectives of the agricultural policy of Serbia. Of course, the reality has been significantly different. Under the significant pressure of surplus supply and, to a lesser extent, the pressure of effective exchange rates and several unfavorable climatic years, the agricultural economic position is continuously and substantially eroded. All in all, with the development strategy that has still been prepared, the agriculture enters the next decade positioned unfavorably. In fact, the analysis shows the scale of parity violation of the agricultural economic position. The relative price decline is shown as the primary, almost exclusive cause of the deteriorated agricultural position. Despite the relatively low price-elasticity of aggregate supply, there is no doubt that the continuous deterioration of agricultural position would inevitably cause the slowdown of already low production growth. Accordingly, the conclusion that the economic position of agriculture should be significantly improved in future is certainly not controversial. The level of improvement surely depends on the desired rate of production growth. In simple terms, one of the main problems of the pricing policy is an urgent need for immediate improvement of the agricultural status if accelerated production growth impulses are considered essential. Of course, the increase in relative prices of particular products should be selective, according to the given indications.

Finally, there is an important note, referring to the gradual growth of relative prices. In this sense, the 2012 experience is more than instructive. The abrupt price growth of agricultural products has shown that the market cannot absorb such a pricing "coup". It has been immediately followed by relative price decline and dilatory production growth. The consequential agricultural position and production growth have been extremely unfavorable. The situation would have been much more favorable if the growth rate had got an absorbable pace. It is therefore important to emphasize that pricing policy must avoid sudden jumps, which inevitably lead to gradual falls. The ambition of this paper is not to elaborate in detail the criteria and methods for pricing policy development. Not underestimating either the importance or the complexity of these issues, they are of secondary importance and may be elaborated in detail in a relatively short period of time.

## References


1. Ball, E., Fanfani, R., Gutierrez, L. (2010): *The Economic Impact of Public Support to Agriculture: An International Perspective*, Springer, New York, Dordrecht, Heidelberg, London.

2. Brower, F., Fox, G., Jongeneel, R. (2012): *The Economics of Regulation in Agriculture: Compliance with Public and Private Standards*, CABI, Wallingford.

3. Dunđerov, M., Trkulja, M., Gajić, M., Lovre, K. (1983): *Agrarna politika Jugoslavije i razvoj agroindustrijskog kompleksa*, Ekonomski fakultet, Poljoprivredni fakultet, Subotica, Novi Sad.

4. Fuglie, O. K., Wang, L. S., Ball, V. E., eds. (2012): *Productivity Growth in Agriculture: An International Perspective*, CABI, Wallingford.

5. Lovre, K. (2013): *Policy of Support to Agricultural and Rural Development*, in Škorić, D., Tomić, D., Popović, V., eds.: „Agri-Food Sector in Serbia: State and Challenges", Serbian Academy of Sciences and Arts, Board for Village, Serbian Association of Agricultural Economists, Belgrade, pp. 233-258.

6. Lovre K., Kresoja M. (2013): *Distribution effects of agricultural policy of Republic Serbia*, objavljeno u: ed. Cvijanović D., Subić J., Vasile A. J.: „Sustainable agriculture and rural development in terms of the Republic of Serbia strategic goals realization within the Danube region – achieving regional competitiveness", Institut za ekonomiku poljoprivrede, Beograd, str. 1371-1387.

7. Lovre, K., Zekić, S. (2011): *Ekonomska analiza agrarnih programa*, Ekonomski fakultet, Subotica.

8. Piot-Lepetit, I., M'Barek. R., eds. (2011): *Methods to Analyse Agricultural Commodity Price Volatility*, Springer, New York, Dordrecht, Heidelberg, London.

9. Schmitz, A., et all. (2010): *Agricultural Policy, Agribusiness, and Rent-Seeking Behaviour*, University Toronto Press, Toronto.

# SUSTAINABLE FARM ANIMAL BREEDING, SELECTION AND REPRODUCTION – THE EXPECTATION 2014 - 2020

*Radica Djedović*[*], *Dragan Radojković*[**]

## Abstract

*Farm animal selection has a great impact on farm animal production as a whole, because the breeding response is cumulative and sustainable. Opportunities for animal breeding and reproduction stem from the global need for a sustainable increase in food quality, food quantity, and food production efficiency. Worldwide, animal product consumption is expected to grow by around 7% yearly over the next decade, and to keep rising for the next 15-20 years. The most important area of livestock production on which we need to put emphasis on are the genetics and genomics of farmed species, quantitative genetics, data collection and management, operational genetics, breeding program design and biotechnology. The application of selection and reproductive biotechnologies has a long lasting effect in farm animals breeding. Biotechnological methods in the field of reproduction include the measures of intended impact on physiological and reproductive processes in the direction of improving production and increasing fertility. Sex control, cloning, transgenesis and other biotechnological methods make it easier for breeders to produce more animals of desirable genetic potential and thus obtain higher yields and quality of the products.*

**Key words:** *selection, reproduction, biotechnology, farm animals*

## Introduction

Over the last decades in the European Union countries the significant changes took place in the field of improving farm animals for high and quality production in different livestock industries. This progress can be perceived primarily in the new selection methods, animal breeding and reproduction with especial emphasis on the use of MAS (marker-assisted

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selection) and genome selection, as well as in the increase of animal reproductive capability by means of new technologies among which the most important ones are the sex control and cloning (Vidović, 2009; Djedović and Radojković, 2013). This has enabled faster genetic, that is, production and economic progress. Introducing the new methods and technologies for the improvement and reproduction of domestic animals seems to be necessary taking into account the prediction that the consumption of animal products in the next decades will be increasing per rate of 7% annually (Liinamo *et al.*, 2003b). According to data from the beginning of the twenty first century the value of animal production (at the farm level) in the European Union-25 was €132 billion, amounting to 40% of the value of agricultural production (Liinamo *et al.*, 2003b).

A conservative estimate of the gain from animal breeding to the animal agricultural sector in Europe is almost €2 billion each year. The farm animal breeding and reproduction sector is knowledge intensive. Breeding organizations in Europe spend some €150 million yearly on research, development, and implementation, either conducted in-house or outsourced to universities and other research centers. The most important area of livestock production on which we need to put emphasis on are: the genetics and genomics of farmed species, quantitative genetics, data collection and management, operational genetics, breeding program design and biotechnology.

Biotechnology, generally speaking, is the application of biological knowledge for practical purposes. From the position of breeding and animal improvement the biotechnology is divided into two major categories which are often mutually entwined (*Vidović, 2009*): reproductive technologies functioning at the level of sperm cell, ovum and embryo; and molecular technology functioning at the level of individual genes, that is, at the level of DNA. Molecular technologies which are important for the animal breeding include: DNA „fingerprinting“, marker assisted selection and gene transfer.

In recent decades we have witnessed the intensive development of natural science and the application of scientific and research achievements for the purpose of managing physiological and reproductive processes in farm animals. The methods of directed or supported reproduction in farm animals are largely represented in all kinds of domestic animals throughout the world.

Biotechnological methods in the reproduction of farm animals represent the interventions by which, under the controlled conditions, the breeding of farm animals is being conducted, wherein we affect the spreading of desirable genetics and improvement of production traits. Biotehnological methods are being developed on the basis of research findings in various scientific fields (physiology, endocrinology and embryology) and with the use of up-to-date equipment (electronic microscopes, ultrasonographs endoscopes, deep freezing equipment, computer systems). Reproductive technologies comprise: artificial insemination, embryotransfer, sex control, cloning, inbreeding and preserving genetics.

Some of the biotechnological methods are used experimentally while others have been used for a considerable period of time in production at large, while the full application of certain methods such as obtaining of transgenesis can only be expected in the future. The objective of this paper is to indicate to the possibilities of sustainable breeding, selection and reproduction of farm animals by means of the achievements in biotechnology which are being increasingly used, such as sex control, cloning and obtaining of transgenic animals.

## Sex control and the use of sexed semen

Main reason for the use of sex control is the fact in certain kinds of production one sex is often more valuable than the other one. Sex control enables producers to produce more animals of desirable sex and less animals whose sex is not deemed desirable for certain direction of production. The beginnings of obtaining the sex determined offspring date back to 1989 when the surgical insemination was indispensable, therefore the further development of this biotechnology depended on the development of the sorting of spermatozoa with the aim to obtain the quantities of sexed semen sufficient for the use in artificial insemination (*Garner, 2008*). By further developement of the system of flow cytometer for separation of spermatozoa and thanks to innovative approach by different groups of scientists, progress in computer science, biophysics, cell biology, instrumentation and applied reproductive physiology, the foundation for commercializing the sex determined semen in cattle has been created. By mid 1990s, this procedure has advanced enough to result in 1997 by the first calf born by using the sexed semen in artificial insemination. Since then, more than hundreds of thousand descendents have been born through the use of sexed semen.

Today it is possible to determine the sex of embryo by physically taking a few cells and studying the chromosomes. Moreover, it is possible to sort out and separate spermatozoa which carry male or female chromosomes. Semen sex determination, that is, its sexing, is a relatively new biotechnological method which offers us the possibility of choosing the sex of descendents. The method which is being routinely used today is based on a difference in total quanity of DNA between spermatozoa with X and Y chromosomes. Flow cytometer, with its laser and detector can separate spermatozoa with 90% precision. The method offers numerous possibilities to farmers engaged in milk and meat production. Sex determined or sexed semen is more and more present both in the world market and our country.

Sex control provides advantage to certain crossing systems *(Vidović and Stupar, 2010)*. System of combination – rotational (terminal systems, composite) terminal systems and similar variants – also benefit from sex control. If sires who carry dam`s traits produce only daughters in these systems, and the sires who carry male traits produce only sons, all the descendants are of the "right" sex. There are no by-products in the forms of sons from "female" sires nor daughters from "male" sires. We need smaller number of dams for maternal yield in these systems because all their descendants, not only half of them, represent a potential offspring of desirable sex.

In dairy cattle breeding the system of one sex is recommended in order to increase the effectiveness of the cattle production, ie. selection effect. Efficiency of such system results from the fact that none of older animals are being kept for the next cycle of production. Only those animals whose index is better than that of heifers introduced into production and who have passed the testing are kept. Each introduced animal is young and in growing stage. In comparison with conventional system a much greater quantity of food is used for growth ie. for meat production, instead of using it for the maintenance of matured cows. Feeding is much more efficient. At the same time, farmers can pay greater attention to early puberty of heifers and their easier calving.

Research shows that the fertility obtained with sexed semen is lower about 75% in relation to the fertility which would be obtained by using the conventional non-sexed semen, what is in part the result of decreased number of spermatozoa in pajeta *(Seidel, 1999)*. Lower fetility can also be the result of damages which can happen on spermatozoa during sorting

out. Procedure with spermatozoa during separating is a very invasive one, they are placed under a high pressure and great speed and stopped abruptly afterwards causing the damage on spermatozoa by such physical force. Therefore, it is recommended to use sexed semen only in juvenile breeding females that show obvious signs of oestrus *(Foote, 2010)*. In cattle production, the heifers are the most fertile portion of the herd and the fact that they are not stressed by production is of crucial importance in the use of sexed semen.

The first signs of oestrus in heifers should be used for the insemination with sexed semen. If there are repeated inseminations the conventional semen should be used. In this way the use of the technology of sexed semen will be made possible, as well as the maintenance of a high level of profitability.

Repeated insemination is also recommended because one-time insemination can additionaly reduce the level of conception and fertility *(Senger i sar., 1988; Shannon i Vishwanath, 1995; DeJarnette i sar., 2011)*. Sexed semen should be used only on farms with proper organisation of reproductive activities and where the animals are in good health since in the opposite the fertility may be additionaly decreased. Moreover, only experienced inseminators who will handle the sexed semen in the right way should do it. Regardless its limitations, the use of sexed semen is very significant, because in this way we can obtain the individuals of the desired sex and supreme genetics.

*Đedović (2004)* points out that in the last ten years over 30,000 descendants were obtained by the use of sexed semen. Until today no anomalies have been found in those descendants. Calves obtained by the use of sexed semen in relation to those obtained from non-sexed semen did not show differences in pregnancy duration, birth mass, calving ease, calves vitality, abortion rate or percent of still born calves. Normally, female calves had shorter period of pregnancy, they were smaller and their calving was easier in comparison with male calves. When the heifers, obtained by sexed semen have grown up, they delivered normal calves upon being inseminated either by sexed or non-sexed semen.

Semen sexing is the field of research which should still be developed and improved and which should, as a final result provide the results that will facilitate its even simpler use to all the farmers who need such semen.

## Advantages and disadvantages of the use of sexed semen

Sexed semen is used for the production of the descendants of desired sex in some fields of animal production in order to use differences in the value of the male and daughters. No matter whether the purpose is to add genetic and economic value to heifers for milk production, or to produce genetically superior calves for fattening, the use of sexed semen may increase the profitability of herd.

There are more advantages for the use of sexed semen in dairy than in fattening industry but both industries can profit from the application. In dairy cattle sexed semen can be used for production of a greater number of daughters from genetically superior cows. For a considerable time now in diary cattle breeding the lack of quality female genetic material has been present. Use of sexed semen offers a great possibility to farmers to increase the efficacy of milk production by obtaining more female calves. It is particulary important in breeding some cattle breeds (Holstein, Jersey) where male calves are much less useful (*Korora, 2012*). Farmers can also improve the health of heifers since they will bear female calves of smaller mass and therefore we can assume that calving will also be easier. By easy calvings we obtain a greater number of live born calves and there are less health and reproductive related problems in first calved heifers.

Breeders in dairy cattle breeding can also use superior sexed semen for the production of bulls for progeny testing, from the elite cow population. In this case, the cost of progeny testing of descendants of those bulls is drastically reduced because the need for greater number of insemination which would provide a sufficient number of daughters is reduced as well. The disadvantage of this method is not in semen sexing but in the use of non-sexed bull sperm in order to recompense the expenses. Calves for fattening purposes can reduce the milk production and the yield of cow breeding stock what could reduce the profit of breeding stock as well. The method of using non-sexed semen is recommended for non-elite cows in the herd, in order not to reduce genetic and economic value of the elite ones.

Fattening cattle industry can also greatly benefit from the use of sexed sperm in the herd by using the increased number of male descendants for meat production in relation to female descendants. The use of sexed semen facilitates production of specialized, genetically superior heifers

from smaller part of the herd for overhaul purposes what makes it possible to use other cows for the production of male calves when they are inseminated by sexed semen obtained from the bulls with superior genetic traits for growth, feeding efficiency and halves quality. If the production requires one sex and heifers are slaughtered when a calf to replace her was born, sexed semen will enable only one delivery necessary to obtain female descendant so that a basic breeding stock should not be reduced after heifer has been slaughtered. The greatest advantage of the use of sexed semen is that it actually enables desirable and sufficient herd overhaul in every direction of production.

The main shortcoming of the use of sexed semen in cattle breeding is that connected with numerous other industries. The use of sexed sperm depends on the efficiency and cost, and economic and ecological conditions which influence the specified production. In the production conditions when the market prices are low, sexed semen can increase biological efficacy of the herd, but not herd cost efficiency in the short run as well. In addition, if bull reproductive potential is increased by non-sexed semen, the production of sexed semen can reduce the quality of produced semen by half, and therefore a possible fertility of that bull can also decrease as well. As is the case with each semen production in breeding programmes the sexed semen is valuable only if the sperm comes from genetically superior bull.

## Animal cloning

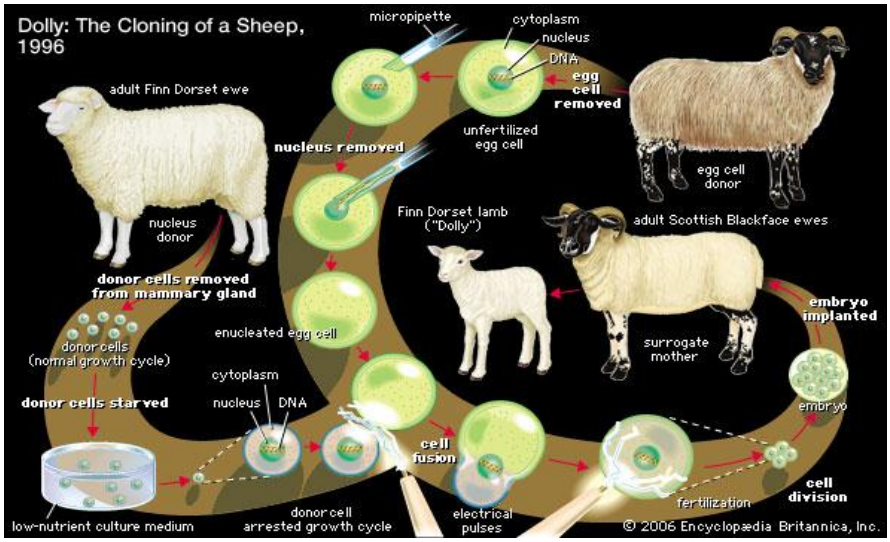
Animal cloning is the procedure of creating genetically identical individuals or greater number of such individuals. There are two kinds of animal cloning and they are: cloning by cutting the embryo and nucleus transplantation. Cloning by embryo cutting is performed in lab conditions and in various stages of embryo development. This method is natural and can be applied on a great number of species of domestic and wild animals. First results of this kind of cloning in domestic animals date from the beginning of 1980s (*Willadsen*,1979,1981; *Willadsen and Polge*, 1981). This method is influenced by shortcoming reflected in the fact that in this way it is, in most cases, possible to obtain only two identical embryos.

More common method used for animal cloning is the nucleus transplantation method (SCNT- Somatic-cell nuclear transfer). Foundations of this technique were laid in the 1950s. Differentiated

somatic cells are very difficult to divide in culture and it is almost impossible to obtain other cells from them. If the nucleus in somatic cell is completely preserved along with its capacity, such cell is capable to develop into genetically identical organism like that of the donor of nucleus (*Đedović, 2011*).

By the method of nucleus transplantation a great number of domestic animals has been cloned in the first place. A special advantage of this method lies in the fact that it can be used in endangered species which are on the verge of extinction. Some scientists mention the possibility of cloning and returning into life some dead species like mammoth, for example. The shortcoming of this method would be a great number of attempts that must be made in order to have a successfully cloned organism. By the method of nucleus transplantation an entire genetic material of donor is not transferred. Namely, a cloned organism obtains a portion of genetic material connected primarily with mitochondrial DNA from the female donor of ovum, therefore the obtained clone is not an "ideal" genetic copy of nucleus donor.

**Fig. 1.** *Cloning of Dolly the sheep*




**Source:** *Encyclopedia Britannica, Inc.*

Phenotypically speaking, the cloned individuals do not have to be identical. During their intrauterine development and upon their birth different factors can affect them, particularly if surrogate dams lived in different environments.

Such trials can serve to study the effect of factors of external environment and help safer assessment of their influence and to exclude those effects when it comes to the assessment of animal breeding value in livestock production. Besides the differences in phenotype, the difference in behavior of the clones was also perceived.

The use of cloning in livestock production is limited by a great number of factors such as the percent of success and procedure cost. Only 10% cloned embryos are delivered as live offspring by the method of somatic-cells nucleus transfer (*Wells at al*., 1999), while the price of this procedure is significantly higher in comparison with higly valuable animals obtained by the method of embryotransfer. If cloning becomes possible, modern commercial breeding stocks could be replaced by the lines of clones, or by population of identical individuals which were previously selected for their high qualities. Cloning of domestic animals today is performed in relatively small volume and with the goal to advance the technological procedure and to study production traits in individuals obtained by cloning procedure and to compare them with "conventional" animals.

Several studies were conducted with the aim to assess the effect of cloning on genetic advancement in populations of domestic animals, with emphasis on dairy cattle population. Nowadays the embryotransfer is used for obtaining male and female animals form elite cows inseminated by the elite bulls. By including the cloning into breeding programme a portion of female embryos could be used for cloning with about 10 clones obtained per each embryo. Obtained cloned embryos could be transferred into surrogate dams in different herds in order to confirm their production potential in different production systems. Such distribution of embryos could contribute to better understanding of the interaction of genotype-environmental factors and of excluding those interactions when assessing the animal breeding value. Such an applied breeding programme would contribute to the increase in the effect of generation selection from 5-20%.

In case the success of cloning and cost of this procedure would become acceptable the cloning could serve as the method for expanding superior genotypes into commercial breeding stocks. If an animal should display its superiority through its production it could become a candidate for cloning. Cloning could be performed in unlimited number by use of nucleus transplantation and such obtained embryos would be used in a great number of breeding stocks.

Potential advantages of including the cloning into selection programmes are numerous. In the first place, advantage of including cloning into selection programme is the initial genetic achievement which is immediately realized and where we replace average animals in commercial breeding stocks with superior clones. In addition, the uniformity of production traits increases by the use of clones. By the use of cloning we increase selection precision, that is, the effects of the factors of environment are more precisely confirmed and more safely excluded during the assessment of breeding value. Until now the additive genetic variance was most often used in traditional methods of selection and breeding. By means of cloning non-additive genetic variance can also be used what is a great achievement in selection.

Besides the advantages the cloning also has the potential disadvantages. By cloning only the top quality animals the number of lines within races and species may considerably decrease resulting in the decrease of genetic variability which is the major prerequisite for successful conducting of selection. Moreover, due to using less number of lines, there can occur, very soon, the increase of the inbreeding coefficient and manifestation of inbreeding depression and all problems related to that (decrease in production and reproductive performances, reduced adaptable capability, etc.). If the greatest portion of a farm animals population is based on smaller number of lines that have been cloned there is a danger for the line to become unresistant or less resistant to some pathogene or stressor what can result in epidemic or great fall in production. Previous research has shown that in a considerable number of animals created by nucleus transplantation cloning the abnormal newborns are delivered among which many die immediately after the birth. Moreover, the clones obtained in such a way are considerably more susceptible to various diseases. When we speak about the cloning by embryo division these problems are being avoided, however this way of cloning requires the time necessary to check lines genetic capacities before they can be placed on the market for commercial purposes.

The price of this procedure is going to be a big problem for wider use of cloning in the oncoming period as well. If we surpass this problem and start using cloning for commercial purposes its greatest impact will be felt in the way of breeding and the structure of basic and nucleus breeding stocks. By wider use of cloning, breeders engaged in breeding the commercial animals will become the breeders of female receptables of embryos while the embryos will be produced in another place. The

breeders will have to accept the fact that there will be less and less demand for conventionally produced animals while the demand for rare and superior animals will increase.

## Transgene animals

Transgene animals represent organisms in whose genetic basis we have introduced a certain number of genes (segment DNA) not characteristic for that animal species in order to induce permanent changes in genetic material which is then going to be transferred into the subsequent generations. Introducing specific genes of one species into the individual of other species is being conducted by help of specific lab technics. So far a great number of transgene animals such as pigs, goats, sheep, cattle, mice, have been obtained. The genes that are introduced into a hereditary basis of transgene individual most often are responsible for synthesis of specific polypeptides which have certain application in biotechnology, medicine, pharmacology, molecular genetics... For example, a transgene cow secreting milk containing proteins similar to those in human milk has been created, or a cow which produces more milk with less lactosis and cholesterole. Some predictions say that in the several next decades we will perform transplantation of organs obtained from transgenic animals. Also transgene animals are used for obtaining certain substances such as insulin, growth hormone and similar ones which can be used for therapeutic purposes. According to *Donnelly at al*. (1994) gene transfer, that is, creating of transgenic animals is being conducted in three ways:

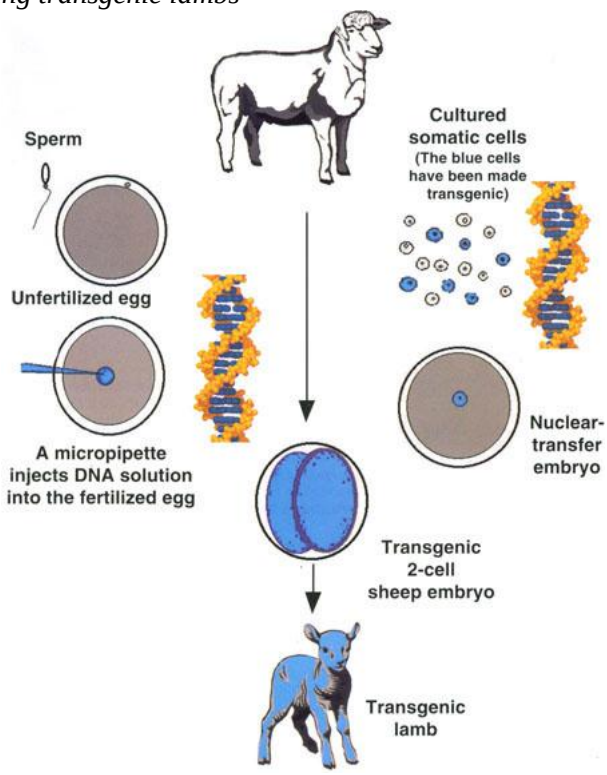
1. *DNA Microinjecting – physical input of alien DNA in newly formed nucleus of fertilized ovum, ie. alien DNA is input into one of two pronucleusus, one originating from the ovum and the other from spermatozoa. This ensures a great possibility that input gene or genes will not be introduced into the genome of the animal or that the expression of input genes will not happen. Upon introducing the DNA segment, the fertilized ovum is being transferred into surrogate dam. The advantage of this method is that it can be applied to the large number of animal species.*

2. *Gene transfer by means of stem cells – this method requires that DNA segments be previously put into the stem cells of embryos in in vitro conditions. Then the stem cells are inserted into the embryo in the phase of blastocyst and thus the chimera organism is created. This method is very important in biotechnology for studying genetic control of organism development.*

*3. Vectors for introducing genes – in this method of introducing genes we use vector for the insertion of the DNA molecule sequence. The vectors are mostly retroviral or bacterial plasmids. In this procedure we most often use the retroviruses and their possibility to contaminate the host cell, that is, to programme the host cell to produce the copies of viral hereditary material.*

Characteristics of all methods for obtaining transgenic animals are that only a small number of born animals carry inserted DNA segment what is being confirmed by testing the $F_1$ generation. Besides obtaining transgenic animals the gene transfer can be very interesting from the aspect of increasing the genetic variability in farm animals` populations. This can be particularly interesting when it comes to genes which influence resistancy and which can be found in primitive and autochthonous species while in modern, high productive species their frequency is reduced by selection, therefore their adaptable capability is substantially reduced.

**Fig. 2.** *Obtaining transgenic lambs*




**Source:** *Murray and Anderson: Genetic engineering and cloning may improve milk, livestock production, California Agriculture 54(4):57-65, 2000.*

## Conclusion

The application of selection and reproductive biotechnologies has a long lasting effect in farm animals breeding. Biotechnological methods in the field of reproduction include the measures of intended impact on physiological and reproductive processes in the direction of improving production and increasing fertility. Sex control, cloning, transgenesis and other biotechnological methods make it easier for breeders to produce more animals of desirable genetic potential and thus obtain higher yields and quality of the products. The farm animal breeding and reproduction sector is knowledge intensive. Breeding organizations in Europe spend some €150 million yearly on research, development, and implementation, either conducted in-house or outsourced to universities and other research centers.

All of these metods should be undertaken through competitive research programs emphasizing excellence, flexibility, and the willingness of governments and the commercial sector to co-fund projects. These programs should take into account the socio-economic context of food production from animals.

## References


1. Berry, D.P, Veerkam, R.F, Dillon, P. (2006): *Phenotypic profiles for body weight, body condition score, energy intake and energy balance across different parities and concentrate feeding levels*. Liv. Prod. Sci. 140: 1-12.

2. Bousquet, D. and Blondin, P. (2004): *Potential Uses of Cloning in Breeding Schemes: Dairy Catlle. Clonig and stem cells*. Vol 6, 190-197.

3. Campbell, K.H., McWhir, J., Ritchie, W.A., Wilmut, I. (1996): *Sheep cloned by nuclear transfer from a cultured cell line.* Nature 380 (6569): 64–6.

4. Cenariu, M., Pall, E., Cernea, C., Groza, I. (2012): *Evaluation of Bovine Embryo Biopsy Techniques according to Their Ability to Preserve Embryo Viability*. Journal of Biomedicine and Biotechnology,Volume 2012, 187-202.

5. DeJarnette, J.M., Leach M.A., Nebel R.L., Marshall C.E., McCleary C.R., Moreno J.F. (2011): *Effects of sex-sorting and sperm dosage on conception rates of Holstein heifers: Is comparable fertility of sex-sorted and conventional semen plausible?* J. Dairy Sci. 94 :3477–3483.

6. Djedović Radica (2004): *Ocena tipa teljenja i učestalost genetskih anomalija u testu po potomstvu bikova holštajn-hrizijske rase.* Doktorska disertacija, Poljoprivredni fakultet, Zemun.

7. Djedović Radica (2011): *Genetika domaćih i gajenih životinja*. Praktikum. Poljoproprivredni fakultet Zemun. Beograd.

8. Djedović Radica, Dragan Radojković (2013): *Farm animals selection aimed to improve livestock production competitiveness*. Thematic Proceedings of International Scientific Meeting "Sustainable agriculture and rural development in terms of the Republic of Serbia strategic goals realization within the Danube region" , december 5-7 th, Topola Serbia. p. 521-538.

9. Donnelly, S., McCarthy, C.R., Singleton, R. Jr. (1994): *The Brave new World of Animal Biotechnology*, Special Supplement, Hastings Center Report.

10. Farahvash, T., Golzar, A., Ahmadzadeh, A., Davoodi, J. (2008): *Some Factors Affecting Sex Ratio of Dairy Herds in East Azarbijan, Iran*. Asian Journal of Animal and Veterinary Advances, 3: 357-362.

11. Foote, R. H., (2010): *The history of artificial insemination: Selected notes and notables*. J. Anim. Sci, 80: 1-10.

12. Garner, D.L., Seidel G.E. (2008): *History of commercializing sexed semen for cattle*. Theriogenology, 69(7): 886-95.

13. Korora, J. (2012): *Seksiranje semena i odnos polova u populaciji mlečnih goveda Vojvodine.* Master rad, Poljoprivredni fakultet, Novi Sad.

14. Lassen, J., Gjerris, M., Sandøe, P. (2005): *After Dolly—Ethical limits to the use of biotechnology on farm animals.* Elsevier, 65, 992-1004.

15. Latham, K. E. (2005). *Early and delayed aspects of nuclear reprogramming during cloning*. Biology of the Cell. 97, 119–132

16. Liinamo, A.E., Neeteson-van Nieuwenhoven, A.M. (2003a). *The economic value of livestock production in the European Union.*

17. Liinamo, A.E., Neeteson-van Nieuwenhoven, A.M. (comp). (2003b). SEFABAR. *Sustainable Farm Animal Breeding And Reproduction*. Final Workshop Proceedings. EU-QLG7-CT-2000-01368. http://www.sefabar.org – publications (1.2. 2014).

18. Lopes, R.F.F, Forell, F., Oliveira, A.T.D., Rodrigues, J.L. (2001): *Splitting and biopsy for bovine embryo sexing under field conditions.* Theriogenology, Vol 56, p.1383–1392.

19. Milgram, M.A. (1999): *Cloning: For and Against*. Chicago, Illinois: Carus Publishing Company.

20. Nicholas F. W. And Smith C. (1983): *Increased rates of Genetic Changes in Dairy Cattle by Embryo transfer and Splitting*. Animal Production. 36, p. 341-353.

21. Roche, J.R., Lee, J.M., Berry, D.P. (2006a): *Climatic factors and secondary sex ratio in dairy cows.* J. Dairy Sci., 89: 3221-3227.

22. Russel, J.P. (2005): iGenetics, *A Molecular Approach*. San Francisco, California, Pearson Education.

23. Schneider, J.E. (2006). *Metabolic and hormonal control of the desire for food and sex.* Department of Biological Sciences, Lehigh University, 111 Research Drive, Bethlehem, PA 18015, USA.

24. Seidel, G. E., Schenk, J. L., Herickhoff, L. A., Doyle, S. P., Brink, Z., Green, R. D., Cran, D. G. (1999): *Insemination of heifers with sexed sperm*. Theriogenology, 52 (8): 1407-1420.

25. Senger, P.L., Becker, W.C., Davidge, S.T., Hillers, J.K., Reeves, J.J. (1988): *Influence of cornual insemination on conception rates in dairy cattle*. J. Anim Sci, 60: 3010–3016.

26. Shannon, P., Vishwanath, R. (1995): *The effect of optimal and suboptimal concentrations of sperm on the fertility of fresh and frozen bovine semen and a theoretical model to explain the fertility differences*. Anim Reprod Sci, 39: 1–10.

27. Van Vleck, L.D. (1982): *Potential genetics impact of artificial insemination, sex selection, embryotransfer, clonig and selfing in dairy catlle. In new Technologies in Animal Breeding.* Edited by Academic Press.

28. Vidović, V., Stupar, M. (2010): *Molekulska genetika*. Atelje. Novi Sad.

29. Walker, S. C. (2007): *Comparison of meat composition from offspring of cloned and conventionally produced boars.* Theriogenology 67 (1), 178–184.

30. Welch, G.R., Jonson, L.A. (1999): *Sex preselection: Laboratory validation of the sperm sex ratio of flow sorted X- and Y-sperm by sort reanalysis for DNA. Germplasm & Gamete Physiology Laboratory*. Agricultural Research Service. U.S. Department of Agriculture.

31. Wells, D.N., Misica, P.M.,Tervit, H.R. (1999): *Production of cloned calves following nuclear transfer with cultured adult mural granulosa celss*. Biol Reprod. 60, p. 996-1005.

32. Willadsen, S.M., (1979): *A method for culture of micromanipulated sheep embryos and its use to produce monozygotic twins*. Nature 277, p. 298–300.

33. Willadsen, S.M., (1981): *The development capacity of blastomeres from 4- and 8-cell sheep embryos*. J. Embryol. Exp. Morphol. 65, p. 165–172.

34. Willadsen, S.M., Polge, C., (1981): *Attempts to produce monozygotic quadruplets in cattle by blastomere separation.* Vet. Rec. 108, p. 211–213.

# NEW CAP REFORM AND SERBIAN AGRICULTURE*

*Stanislav Zekić, Bojan Matkovski***

## Abstract

*The Common Agricultural Policy of the European Union has significantly changed its physiognomy moving from the initial model based on the infinite price support and high external protection. The changes have moved towards reduction of production-related forms of support, emphasized support of farmers' incomes and creation of integrated rural development policy. In future, the support for agriculture will be based on decoupled direct aids, which will have the role of "greening" the European agriculture, while rural development policy will maintain its prominence. Since the EU membership is the unquestioned political direction for Serbia, the complementary agricultural policy and the agricultural competitiveness growth will be fundamental imperatives of national policy in the field of agriculture.*

**Key words:** *Common Agricultural Policy, Reform, Agriculture, Serbia.*

## Introductory notes

The Common Agricultural Policy (CAP) of the European Union has suffered significant changes during its existence. In the first three decades, the high price support was the basic mechanism of subsidizing European agriculture. From the beginning of the nineties, high costs of such a policy and many other factors were the main reason for the subsidizing change towards more or less focused income support and rural development measures.

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The direct payments that have been dominant for the last twenty years as coupled direct aids at first, have become decoupled direct aids in the last ten years. In the next budget period (2014-2020), the projected support will be mostly based on the new ("green") direct payments and measures for rural development support, while the price-market support will keep the marginal participation. The EU reforms in the system of agricultural support for Serbia, which has begun the process of pre-accession negotiations for EU membership, set a milestone for the national agricultural policy. However, the more important task will certainly be the preparation of the Serbian agriculture for the common EU market, which basically means increasing the competitiveness of agriculture.

## The Genesis of the Common Agricultural Policy

The creation of the CAP included agriculture in the "common market" that abolished restrictions and customs duties in trade between the six Member States and established the common external tariffs. It was based on the three basic principles, i.e. the common market, financial solidarity and orientation towards community formation. European Agricultural Guidance and Guarantee Fund - EAGGF was established as a finance source of export refunds, market interventions and structural measures, focused on price support policy as the main mechanism of protection. Subsidies were provided for exports to other countries, aimed at improving the competitiveness of the Community products in the international market. Additionally, the intervention prices were introduced providing the unlimited guaranteed price for farmers in periods of lower market prices. Such measures of agricultural policy highly isolated the Community agricultural market from the world.

Such a model of agricultural policy, based on price support, contributed significantly to the growth of agricultural production and soon surpluses appeared in some agricultural products. The problems of surplus and unfavorable agricultural structure initiated the so-called *Mansholt Plan* in 1968. Though without much success, it was the first serious attempt to formulate the structural policy of the Community. The physiognomy of CAP was not much changed during the seventies and eighties of the previous century, yet the knowledge of necessary agricultural support reform significantly matured. In fact, during this period the preconditions for the first serious reform of the CAP were made, which followed as MacSharry reform package in the early nineties.

The main objective of the above package of measures was restriction of production volume by combining the effects of price reductions and production constraints along with appropriate compensation for producers through direct payments. Target, intervention and threshold prices were reduced and manufacturers started to receive compensation that was not directly related to the production volume. Direct payments increased pressure on the budget expenditure, however, it was estimated that the economic costs of such measures would be lower, since the basic, allocative function of the prices would be more efficient in the market. In addition, lower prices would imply a lower level of export subsidies, which would decrease tensions between the EU and its trading partners.[1] One of the motives for MacSharry reforms was the need for the CAP to comply with international obligations in the field of agricultural policy, and enable the conclusion of negotiations that were conducted then within the framework of the Uruguay Round.[2]

In the area of crop production, the reform measures included: cereals, oilseeds and protein crops and in the field of livestock: cattle, sheep, milk and butter. Although one of the goals of the MacSharry reform was to reduce the budget pressure, its result was the growth of EAGGF costs. First of all, it was caused by the introduction of direct payments to producers. Modulation was not accepted as a measure of reduced direct payments to large manufacturers, while the method of compensation payment calculation favored regions with high-intensive production, so there was no reduction in social and regional disparities. However, the MacSharry reform expressed willingness to consider alternative policies and represented a true break with the traditional forms of agricultural policy, pointing to the new era of the CAP.

The Agenda 2000 reform package was adopted in 1999 and was mainly based on the preparation for the EU enlargement with countries from Central and Eastern Europe and the new international trade agreements of the World Trade Organization. It could be argued that the pursuit of the new CAP reform was "deepening" and "widening" of the 1992 reform

[1] Export subsidies were one of the main stumbling blocks in negotiations between the USA and the countries of the European Community in the framework of the Uruguay Round.

[2] Cost reduction projected by the reform enabled the reduction of export subsidies per unit, so these reform activities in the area of domestic agricultural support allowed the EU to reach agreements and completion of the Uruguay Round of multilateral negotiations on international trade.

objectives, i.e. the replacement of price support measures with measures of farmers income support through direct payments, as well as the establishment of a consistent rural policy. The Agenda 2000 described its objectives such as competitiveness, safety and quality of agricultural production, income stability of agricultural households, environmental protection, alternative employment opportunities and income generation.

In the area of crop production, the reform included cereals, oilseeds and protein crops, in the area of livestock - beef and products, e.g.: milk, butter and skimmed milk powder. The objectives of structural policy included in the above-mentioned reform, referred to the removal of the existing economic and social disparities between different regions in the EU and the setup of external conditions necessary for their uniform development. The increased importance of the environmental aspect was also a significant segment of the structural policy. A higher proportion of support was targeted at accompanying measures - protection of agro-environment, afforestation and early retirement. One of the main goals of the Agenda 2000 reform was the cost reduction of CAP due to the expected EU enlargement to the "East". Additionally, for the first time, the reform projected costs in the two sub-limits - market support - approximately 90% of the funds and rural development support - about 10%.

The CAP reform had begun in 2003 (the Fischler reform)[3] and ended in 2008, in accordance with the goals defined in the Agenda 2000 and was related mainly to the sustainable development of agriculture and rural development. The reform package was aimed at the common organization of the market for crop products, beef and milk, while oilseeds, sugar, wine, tobacco, chicken and mutton meat were left out of the agreement. The key elements of the reform were the following: 1) strengthening of market orientation and minimizing of market distortions, 2) strengthening of rural development and 3) market support review. The first element was manifested through the introduction of the Single Payment Scheme - SPS, not directly related to the decoupling[4] and established at the farm and

[3] This reform was followed by the 2004 reform in the segment of Mediterranean product.
[4] Production-related payments were retained in mountainous regions for livestock (cattle and sheep) in order to maintain agricultural production in marginal areas, yet the members could keep partial decoupling to some extent in the other segments when there was a legitimate reason, such as market disturbances or abandonment of production.

region levels[5]. Single payment schemes were related to certain requirements that farmers must have met in order to get this kind of support, so-called *cross-compliance*, e.g. application of environmental standards, food safety maintenance, concern about the health of plants and animals, good conditions of livestock, as well as keeping the land in good production and environmental conditions. Additionally, the aim of this kind of support was that farmers should become more market oriented and improve their entrepreneurial potential.

This reform finally introduced modulation, i.e. with some exceptions; direct support was reduced only for amount greater than 5,000 Euros yearly per farm. The strict financial discipline was emphasized in order to keep agricultural expenditures in the budget framework; therewith this was not related to rural development costs, as well as the SAPS for new members by 2013.

In the rural development policy framework for the period 2007-2013, the European Agrarian Fund for Rural Development (EAFRD) was established as a source of integrated support to rural development policy, based on the following four axes: 1) competition, 2) environment and resource management, 3) diversification of economic activities in rural areas and life quality improvement of rural population, and 4) leadership approach as the way to reach specific measures.

**Changes in the Common Agricultural Policy for the period 2014-2020**

The basis for new CAP solutions for the period after 2013 was appointed by the 2003 reform, while the preparation of the new CAP framework and guidelines for the period 2014-2020 was started in 2008, as the so-called *health check*. The process continued in 2010 through public discussions on CAP elements and objectives, in which several thousand different opinions by research organizations and independent researchers were reviewed, with the following four highlighted questions (*European Commission, 2010*):

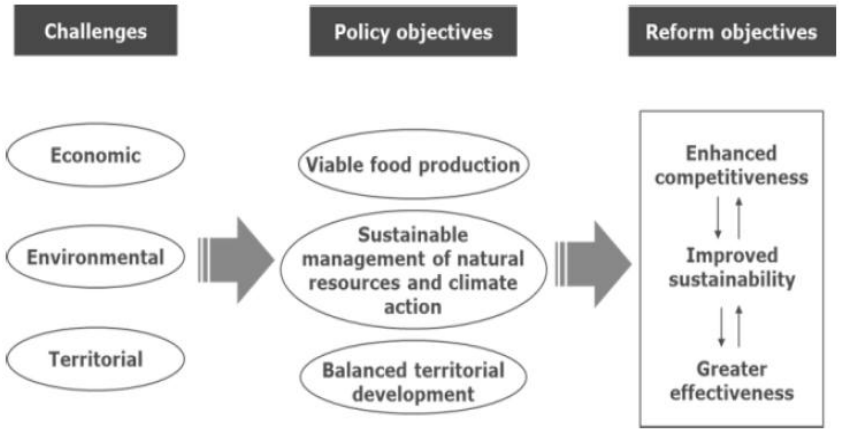
[5] Most forms of direct support for farmers were converted to this type of payment that was given on the basis of the referential amount earned in the reference period 2000-2002. In addition to this basic-historic approach, there also existed a regional flat rate approach, where the level of payment was calculated at the regional level, as well as a mixed model, which meant that the member states could apply different calculation models in some regions on their own territory. The new member states could also apply Simplified Area Payment Scheme - SAPS in the first years.

- *Why is the Common Agricultural Policy needed?*
- *What do EU citizens expect from agriculture?*
- *Why should the Common Agricultural Policy be reformed?*
- *What tools are necessary for the future Common Agricultural Policy?*

The public discussion led to the conclusion that the CAP was needed to ensure access to safe and stable offering of high quality food produced in an environment-friendly way, improve the quality of life in rural areas and guarantee the same conditions for farmers in all Member States. Agriculture was publicly expected to provide safe, high-quality, authentic, diverse and natural food at affordable prices, protect environment, ensure aid for developing countries and employment in rural areas, as well as connect producers and consumers better. Increased food demand, higher consumer expectations, need to strengthen the competitiveness of the EU agriculture, balanced resource allocation among farmers, small and large farms and the Member States, fair CAP towards small farms, areas with unfavorable production conditions and the new Member States were found to be some of the major reasons for the new reform of the CAP.

In 2013, after nearly three years of intense debate, the political agreement on the new orientation of the CAP was announced. It was certain that the adjustment mechanisms for the post-2013 period would be greatly influenced by consequences of the economic crisis and that more attention would be paid to the environment, natural resources and solution finding for the growing development disparities among European rural regions (*Bogdanov N., 2009*). The new policy should allow radical changes, such as fairer direct payments for those who care about the environment, stronger position of farmers in the food chain and more effective and transparent CAP. Direct payments would be distributed more fairly among member countries by abolishing payments on the basis of "historical rights" (*European Commission 2013*). In the period 2014-2020 the CAP will be reformed on the principle of *public money for public goods* which means that farmers are rewarded if they contribute to the environmental preservation. There is a new component of the first pillar introduced, a new instrument - greening, which is one of the main changes in the new CAP framework. This reform also amends further payments between the two CAP pillars, i.e. redistribute resources from the first to the second pillar (*Matthews A. 2013*).

**Picture 1.** *Goals of the CAP reform after 2013*




**Source:** *European Commission, 2013.*

In the budget period 2014-2020, numerous economic, environmental and territorial challenges of the implementation imposed on the CAP, are set as long- and short-term goals (*Picture 1*). Posed by the economic environment, the challenges are primarily related to food safety and globalization, declining rate of production growth, price volatility, increasing production costs because of high input costs and deteriorating position of producers in the food supply chain. Environmental challenges are associated with resource efficiency, soil and water quality, as well as habitat threats and biodiversity, while territorial challenges are related to rural areas facing democratic, economic and social events, with depopulation and business relocation included. In order to provide a framework for future policy of encouraging producers to cope with these challenges, the long-term CAP goals should relate to agricultural production sustainability, sustainable management of natural resources and climate change response, as well as even territorial development (*European Commission, 2013*).

In order to achieve the goals, it is necessary to adapt existing CAP instruments and focus them to the operational objectives for the establishment of more efficient instruments, targeted at competitiveness improvement of the agricultural sector and its sustainability in the long term. Competitiveness improvement is primarily related to changes in market mechanisms and elimination of production constraints. Abolition of the existing milk production quotas is expected in 2015 and of the

sugar quotas in 2017, while the system for approval of establishing new vineyards is expected no later than in 2018. Especially in certain sectors, professional organizations of farmers will be supported by specific regulations in the field of market competition (milk, beef, olive oil, cereals). Such organizations will be authorized to negotiate the sale on behalf of its members, which will increase competitiveness by reducing costs, easier access to credit and the products with higher added value. The second pillar also provides the additional support for young farmers to start their own farms. The CAP novelty is a new set of risk management tools, i.e. in the case of emergency, the committee will be able to allow producers to temporarily manage their market amounts and establish emergency reserves. Member States will be able to encourage farmers to participate in the risk prevention programmes within rural development.

The EU countries will combine several CAP instruments in order to improve sustainability. As one of the tools, *cross-compliance* will be simplified, but will still insist on increased responsibility of farmers in sustainable farm management in order to qualify for the direct support. From the year 2015 on, a new element in the first pillar will be introduced to the CAP framework - "greening". In addition to the basic direct payments, "direct green payments" will be granted to farms that implement practices aimed at protecting the environment and climate change. These additional payments may amount to 30% of the funds for that year, with three schemes of "greening": pasture conservation, crop diversification and conservation of ecologically significant areas. Crop diversification means that farmers with more than 10 ha of arable land must grow at least two different crops and at least three crops if the arable land exceeds 30 ha, while the main crop must not cover more than 75% and the two main crops together not more than 95% of the arable land. At least 30% of the rural development programme budget will have to be allocated to agri-environmental measures, support for organic farming or projects associated with environmentally friendly investment or innovation measures.

From the year 2013 on, a greater CAP efficiency and effectiveness will be achieved through better support planning, as well as its equitable redistribution among the EU Member States. In order to help young farmers to raise their farms, the additional payment is provided as an addition of 25% to the basic payment for the first five years. This measure is in the first pillar, and can be complementary to the measures within

rural development to help young farmers. A special type of support is anticipated for small farmers identified by each EU member independently, and the advantage of these manufacturers is that their support will be fully conditioned by their environmental care. Additionally, fund distribution between the Member States, regions, and even farmers will be more balanced.

In the second pillar framework, i.e. rural development support, it is anticipated that the member states or regions make long-term plans for rural development to define their goals. The Member States will have to define their own rural development priorities, based on at least four of the following six priorities (*European Commission, 2012*):

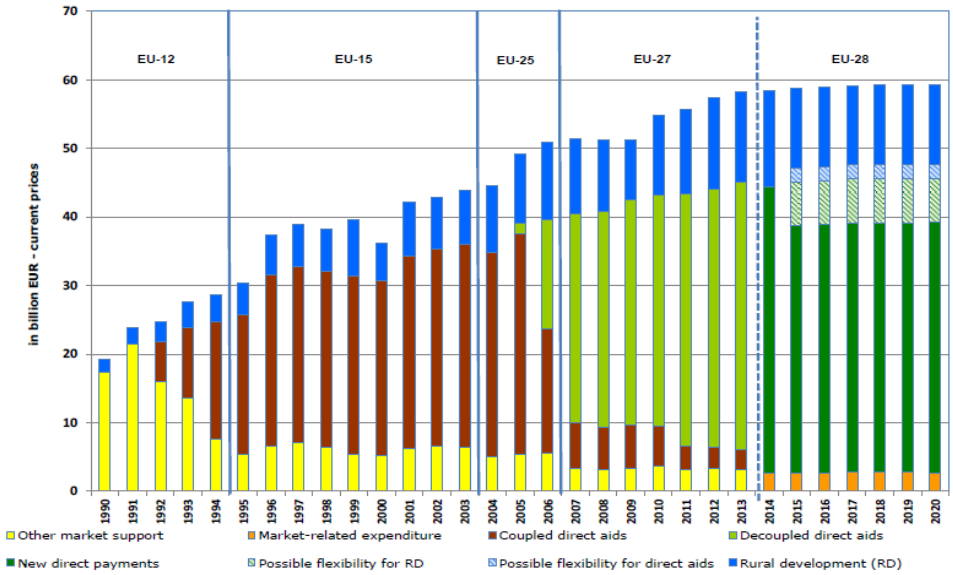
- *Fostering knowledge transfer and innovation in agriculture, forestry, and rural areas;*
- *Enhancing farm sustainability and competitiveness of all types of agriculture;*
- *Promoting food chain organization and risk management in agriculture;*
- *Restoring, preserving and enhancing ecosystems;*
- *Promoting resource efficiency and transition to a low-carbon economy;*
- *Promoting social inclusion, poverty reduction and economic development in rural areas.*

Total budgetary resources allocated for the financial framework of the CAP in the period 2014-2020 are little more than 408 billion Euros, expressed in current prices, with about 321 billion provided for direct payments and market-price support, and about 96 billion Euros for rural development (*European Commission, 2013*). Compared to the previous period, there is no significant change in the amount of market-price support in budget policy from 2014-2020 with approximately 5% of the funds provided from the first pillar, but these funds are to be used for market intervention in crisis situations. The remaining funds of the first support pillar are dedicated for basic direct payments and "green" direct payments. 70% of the national resources will be designated for basic payments, and they can be reduced in the amount of coupled support, the amount of payments for young farmers or small farmers.

The countries that apply a "basic-historic" model will have to try to balance the payment level by gradually reducing the funds for those producers who receive more than the national or regional average, while gradually increasing the amount to those who receive less than 90% of the national or regional average. The Member States will be able to redistribute up to 10% of national funds for the first 30 ha and thus encourage the further development of small farmers. Additionally, all Member States are required to dedicate up to 2% of their national funds for new entrant young farmers and their farm establishments.

Coupled support can make up to 10-15% of national funds, depending on the existing level of related payments, and they are designed to maintain the link between support and production. In order to take into account the current situation, production-related payments are linked to specific sectors in certain regions. Up to 5% of national funds may be dedicated for producers in areas that have some natural limitations. "Green payments," intended for manufacturers respecting certain agricultural practices beneficial for the climate and the environment, are required in the new budget framework and with the amount of 30% of the national funds. Each Member State decides independently on the direct payment allocation from 2014 on.

**Picture 2.** *Distribution of CAP cost per years (current price)*




**Source:** *European Commission, 2013.*

The new EU budget framework keeps the rural development funding at a similar level, but since some funds are dedicated for agro-environmental protection and support to the development of organic agriculture. The minimum payout percentage per segment (pillar) support is not determined, but each Union Member State is to define the measures for achieving the objectives. This means that the payments may be transferred between different support pillars up to 15% for the period 2014-2020 (*Picture 2*).

## Agriculture in the Process of Accession of Serbia to the European Union

As Serbia begins pre-accession negotiations for membership in the EU, agriculture needs special attention because of its economic importance. Adapting Serbian agricultural policy to CAP will involve changes of the level of agricultural protection and income support, construction of new and reform of existing institutions, adjustment of foreign trade barriers, as well as agricultural safety regulations, animal veterinary care, labeling according to the EU standards, etc. Because of this, the creators of Serbian agricultural policy must consider all the upcoming changes and make timely preparation of legislative, economic and institutional system of the country for successful integration into the EU.

As already stated, the CAP has greatly evolved from its original concept to its present form, yet Serbia is currently on its way to become a part of a dynamic and innovative system, and it is bound to accept the obligations arising from this process. Joining the EU is neither easy nor quick; therefore, in order to become a member of the system, it is necessary to undertake numerous activities that involve of not only government agencies, but also local and foreign experts, as well as all those who are competent to assist in the process.

The membership of Serbia in the EU will certainly have significant implications for the agricultural sector and the overall national economy. The experience of the "new" Member States confirms that the EU integration process leads to a significant increase in capital flows, even in the pre-accession period. The full membership of the EU implies the possibility of using common funds, which will be of great importance for Serbia, as a country with a relatively low level of development compared with the EU average.

When Serbian agri-food producers become a part of the common EU market, a strong competitive pressure from more efficient producers from highly developed European countries can be expected. Non-competitiveness of the agri-food sector in Serbia is the result of a number of factors, and the most important one is the low productivity of agriculture (*Zekić S., Gajić M., Matkovski B., 2013*). The low technological level of the agri-food sector in Serbia is a result of under-innovated production structure. Cultivars and racial composition of livestock are very outdated and need improvement, and among other things, this situation results from a lack of knowledge transfer in this area. The on-farm processing activities and higher added value production are still insufficient.

In order to improve Serbian agricultural production performance, it is necessary to encourage the agricultural production growth, primarily livestock, but also orchard, vineyards and vegetable productions, as well as the development of economically sustainable commercial family farms. More intensive production structure and sustainable ownership structure within the European agricultural model would significantly enhance the production potential in terms of partial agricultural productivity growth and thereby create a production base for the development of the food industry, which would increase the competitiveness of the industry and considerably improve the export potential of Serbian agricultural sector (*Zekić S., Gajić M., Kresoja M., 2012*).

The participation at the EU market requires reaching and adjusting the high and ever-growing demands imposed by the processing industry, pressured by retail food system. On the other hand, the agricultural production in Serbia is still in the process of transformation, so the structure of agriculture remains extremely unfavorable. It is characteristic for Serbia that small farms with semi-subsistence production are prevailing, so farmers cannot provide an adequate income and rational use of modern technical systems.[6] Therefore, the profitability of agricultural production is significantly lower when compared with the EU, which limits the recapitalization and therefore limits the modernization possibilities of agricultural production and minimizes the possibility of reducing costs.

[6] According to the 2012 Agricultural Census, the average of individual farm size in Serbia is 5.3 ha (http://webrzs.stat.gov.rs).

On its way to EU membership, Serbia is expected to make numerous changes in agricultural policy measures, since there is an evident lack of systematic approach to their programming and classification in the past, indicating that the agricultural policy of Serbia is still in the process of transition, searching for permanent concepts. New measures are introduced and dismissed rapidly, so there is no long-time framework that would indicate the direction of support, without frequent changes.

The period after 2000 has been characterized by very frequent and rapid changes in measures of budgetary support to agriculture leading to distinct problems in the agricultural policy of Serbia and continuous uncertainty for farmers, processors and suppliers of agricultural inputs (*Table 1*). Some measures have been more or less favorable for certain product groups, regions or farm types. In the form of changes in agricultural policy measures, the increased level of uncertainty for agricultural producers has reduced the level of agriculture investments.

**Table 1.** *Changes in agricultural policy measures of Serbia*

| 2000-2003 | 2004-2006 | 2007-2008 | 2009-2011 |
|---|---|---|---|
| • Price support for basic agricultural products;<br>• Material interventions on the market;<br>• Subventions for buying agricultural land. | • Reduction of price support;<br>• Input subventions;<br>• Credit subventions<br>• Introduction of the registry of agricultural producers;<br>• Support to adapting to international standards. | • Elimination of support to rural development;<br>• Elimination of measures of credit support;<br>• Support reduction to structural adaptation;<br>• Subventions to agriculture according to the principle of „area and herd payment“. | • Support restrictions by paying pension insurance;<br>• Break with subventions to non-commercial farms;<br>• Intensifying conditions for „area payment“;<br>• Support reduction to structural adaptation;<br>• Reduction of investment support;<br>• Attempt to leave „area payment“, and repeated introduction of price support. |

**Source:** *Lovre K., 2013.*

In terms of support structure there is a significant distinction between the Serbian and European levels, which is why the agricultural policy of Serbia will have to change. The adjustments require new institutions, greater transparency and availability to more beneficiaries, which leads to the necessity of the budget growth.

To prepare the agricultural sector for further liberalization, Serbia should increase budgetary allocations to agriculture. The analyzed experiences about the use of European support funds show that the main objective of candidate countries was to allocate the funds to projects that would raise the level of agricultural competitiveness, such as farm investments, processing and marketing of agricultural products.

The physiognomy of the CAP at the time of Serbian integration to the EU will have the dominant influence on further changes of the support system, since the extent of agricultural policy measures will greatly influence both the volume and the level of the realized farmers' income in the most important sectors of agricultural production. Serbia will have to create instruments to protect domestic production on the one hand and affect the increased competitiveness in the international market of agricultural and food products on the other (*Lovre K., 2013*).

## Concluding Remarks

Decades ago, the main mission of the EU agriculture, defined by the CAP, was the production of raw materials and increased share in the world market. Unlimited price support made the EU one of the largest food exporters in the world. These measures caused many negative effects, which, together with the new international challenges and the EU enlargement to the "East", enforced changes of the CAP model and redefined role of agriculture in European society. The reliance on the price support was not successful in reducing disparities between urban and rural areas, i.e. the standard of living of farmers was not held to the "parity" level, so this led to the reduction in their number. This policy also created trade conflicts with the "third" countries and significant impact on environmental degradation. For these reasons, agricultural support was at first transformed from price support to income support. The future model of agricultural subsidizing should emphasize agro - ecological goals, balanced distribution support, as well as further promotion of measures to improve rural development. It also allows the possibility of adjusting measures to regional specificities.

In the context of future EU membership, Serbia should try to secure a better position for its farmers during the pre- accession negotiations, but also do everything to increase the level of agricultural competitiveness in the future common EU market. This difficult task involves a series of measures and coordinated activities, from knowledge transfer to the changed structure of agricultural holdings, in order to improve the production performance of agriculture.

## References


1. Bogdanov N. (2009): *Efekti integracije Srbije u EU u oblasti poljoprivrede*, Fakultet za ekonomiju, privredu i administraciju – FEFA, Beograd.

2. European Commission (2013): *Overview of CAP reform 2014-2020*, (http://ec.europa.eu/agriculture/policy-perspectives/policy-briefs/05_en.pdf) (05.02.2014.)

3. European Commission (2012): *Ruralni razvoj EU nakon 2013. Vodič kroz predloge Europske komisije*, (https://webgate.ec.europa.eu/myenrd/app_templates/filedownload.cfm?id=C5C0B102-D148-4F32-DE82-C44A40BBA01) (05.02.2014.)

4. European Commission (2010): *The Common Agricultural Policy after 2013. Public debate*, Summary report, http://ec.europa.eu/agriculture/cap-post-2013/debate/report/executive-summary_en.pdf (25.01.2014.)

5. FAO, FAOstat. *World Agriculture Statistics Data Base* (http://faostat.fao.org).

6. Matthews A. (2013): *Greening CAP payments*, The Institute of International and European Affairs, Dublin.

7. Lovre K. (2013): *Policy of Support to Agriculture and Rural Development*, in: ed. Skoric D., Tomic D., Popovic V.: *"Agri-food Sector in Serbia – state and Challenges"* Monography; Serbian Association of Agricultural Economists, and Serbian Academy of Science and Art – Board for Village, Belgrade; pp. 233-258.

8. Popović R., Zekić S. (2010): *Evolution, State and Perspectives of Serbian Agriculture Within EU Integrations*, Advances in Agriculture & Botanics – International Journal of Bioflux Society, Vol. 2, No. 2, pp. 98-110.

9. Statistical Office of the Republic of Serbia. *Electronic Databases.* (http://webrzs.stat.gov.rs).

10. Tracy M. (1996): *Država i poljoprivreda u Zapadnoj Europi 1880-1988*, Mate, Zagreb.

11. Zekić S., Gajić M., Matkovski B. (2013): *Serbian agriculture in the regional and European integratons*, in: (Eds. Tomić D., Ševarlić M., Lovre K., Zekić S.) „Challenges for the Global Agricultural Trade Regime After Doha", Thematic Proceedings, Serbian Association of Agricultural Economists, Faculty of Economics in Subotica, University of Novi Sad, Belgrade, pp. 369-376**.**

12. Zekić S., Gajić M., Kresoja M. (2012): *Razvojne performanse agrarnog sektora Srbije u funkciji prevazilaženja ekonomsko-finansijske krize*, Anali Ekonomskog fakulteta u Subotici, Vol. 48, br. 27, Subotica, str. 97-109.

# IMPACT OF CAP 2014-2020 REFORM ON SERBIAN AGRIBUSINESS SECTOR

*Vlado Kovačević*[1], *Vladimir Zakić*[2]

## Abstract

*In this paper is analyzed influence of CAP toward 2020 reform on agribusiness sector in Serbia. New CAP is more in accordance with WTO, support will be oriented more on environment preservation, development of cooperatives, risk management instruments, decrease in state interventions, member states can chose how to allocate subsidies. EU CAP reform toward 2020 is very important and with great influence on Serbian agribusiness sector. First by declining in public support new CAP reform will positively affect all third countries by increasing competiveness of these countries. Second Serbia is EU' candidate and will benefit positively from institutional development and harmonization with new CAP will have obligation to harmonize law regulation in agricultural sector with CAP. Furthermore Serbian agricultural producers will have possibilities to use pre-accession funds prescribed in new CAP as planned from 2017.*

**Key words:** *Common agricultural policy, EU accession, Common market organization.*

## Introduction

In view of the EU's role as a major exporter and importer in and from Serbia, the CAP could arguably play a role not only in domestic but also in international agricultural markets, thus potentially affecting production and consumption levels in third countries (OECD, 2005). Since the MacSharry reforms of 1992, the CAP has undergone considerable changes steering EU agriculture towards greater market orientation.

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Impacts of CAP reform toward 2020. on Serbian agricultural can be transmitted (Matthews, 2011) by:

1) *EU domestic support,*
2) *EU export subsidies,*
3) *EU market access restrictions,*
4) *Change in Serbian institutional framework by harmonization of legislation with CAP,*
5) *Use of EU' pre-accession funds.*

Finally, even in the absence of directly measurable or identifiable price effects (OECD, 2005), countries' governments may take decisions that affect their populations following EU policy changes or expected changes in world markets – these could be defined as political economy impacts.

## CAP toward 2020 in brief

The CAP reform started with a public debate in 2010, followed by the issuing of the Commission's Communication on its vision of agriculture and the challenges and priorities for the future CAP and finally by legislative proposals for the first ever overhaul of the entire policy. The decision-making process differed from previous reforms, with the European Parliament for the first time acting as co-legislator with the Council. This CAP is historic in many respects; for the first time the entire CAP was reviewed all at once and the European Parliament acted as co-legislator with the Council (EU Commission, 2013).

The new policy is moving from product to producer support and now to a more land-based approach. This is in response to the challenges facing the agricultural sector in EU.

These have been identified as **economic** (including food security and globalization, a declining rate of productivity growth, price volatility, pressures on production costs due to high input prices and the deteriorating position of farmers in the food supply chain), **environmental** (relating to resource efficiency, soil and water quality and threats to habitats and biodiversity) and **territorial** (where rural areas are faced with demographic, economic and social developments including depopulation and relocation of businesses).

Past reforms have led to step changes in the CAP and this one is no exception. It represents another milestone in the CAP's history placing the **joint provision of public and private goods** at the core of policy. Farmers should be rewarded for the services they deliver to the wider public, such as landscapes, farmland biodiversity, climate stability even though they have no market value. Therefore, a new policy instrument of the first pillar (greening) is directed to the provision of environmental public goods, which constitutes a major change in the policy framework.

The new CAP design is also more **efficient, targeted and coherent**. It is based on a more holistic approach to policy support through the maintenance of the existing two pillar structure but in a more targeted, integrated and complementary way. Both pillars of the CAP are aimed at meeting all three CAP objectives more effectively, with better targeted instruments of the first pillar complemented by regionally tailor-made and voluntary measures of the second pillar (EU Commission, 2013).

The CAP toward 2020 has the two pillars, but increases the links between them, thus offering a more holistic and integrated approach to policy support. CAP toward 2020 introduces a new structure of direct payments, new eco-policy, subsidies etc. According to new CAP Member states (MS) can chose how to allocate subsidies.

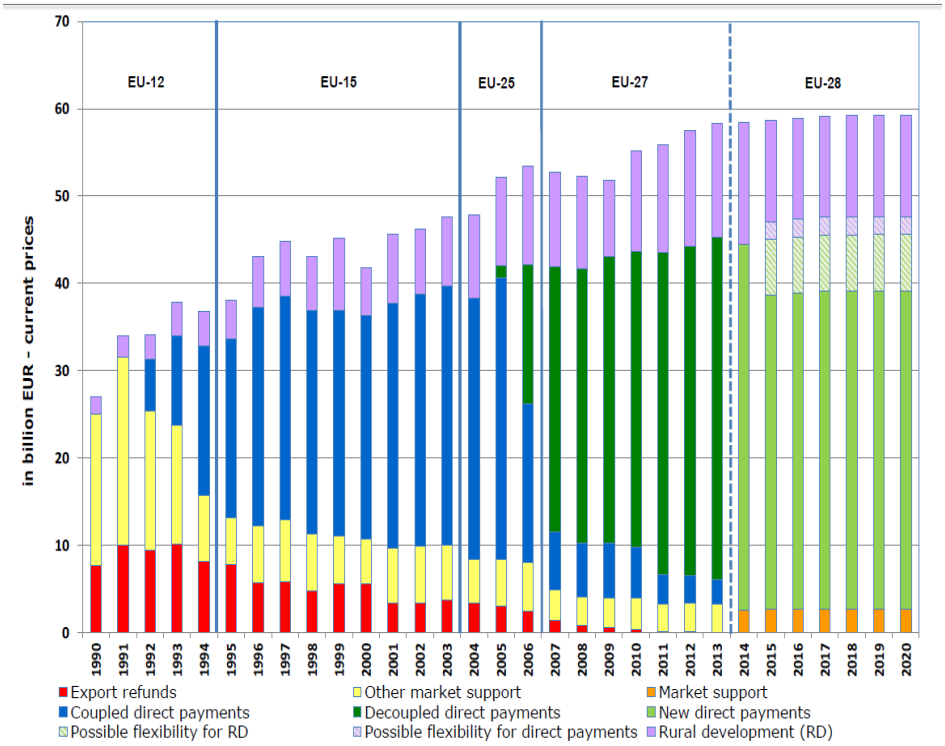
There is new **flexibility** for Member States (MS) in the budgeting and implementation of first Pillar instruments, acknowledging the wide diversity of agriculture, agronomic production potential and climatic, environmental as well as socio-economic conditions and needs across the EU. It also took place in the framework of the discussions on the overall EU budgetary framework for 2014-2020, the Multiannual Financial

This means a total amount of EUR 362.787 billion for 2014-2020, of which EUR 277.851 billion is foreseen for Direct Payments and market-related expenditure (Pillar 1) and EUR 84.936 billion for Rural Development (Pillar 2) in 2011 prices. Yet, within the current economic and financial climate, these amounts within the MFF show continued strong support for an ambitious agricultural policy which represents 37.8% of the entire ceiling for the period 2014-2020.

The amounts for the CAP agreed under the new EU multiannual financial framework for 2014-2020 are outlined in the table below. The amounts for both pillars of the CAP for 2014-2020 would be frozen at the level of

2013. In real terms CAP funding will decrease compared to the current period. Compared to the Commission proposal, the amount for pillar 1 was cut by 1.8% and for pillar 2 by 7.6% (in 2011 prices). This means a total amount of EUR 362.787 billion for 2014-2020, of which EUR 277.851 billion is foreseen for Direct Payments and market-related expenditure (Pillar 1) and EUR 84.936 billion for Rural Development (Pillar 2) in 2011 prices (EU Commission, 2013).

**Graph 1.** *Structure of subsidies 2014-2020*

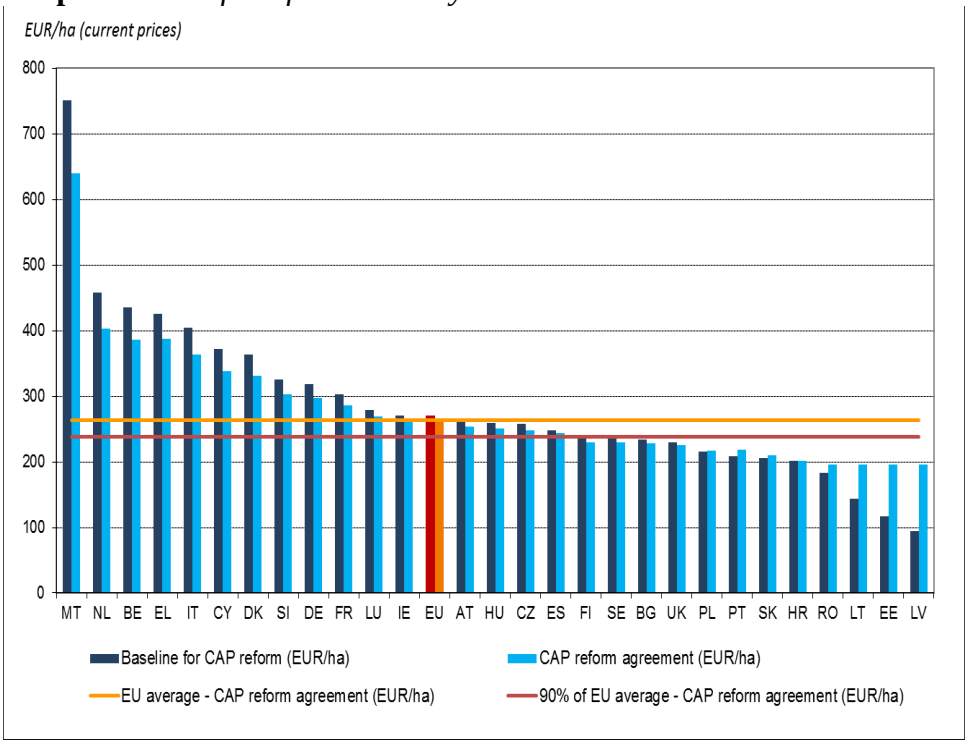



**Source:** *The Overview of CAP Reform 2014-2020 (2013): EU Commission, Available from: [http://ec.europa.eu/agriculture/cap-post-2013/](http://ec.europa.eu/agriculture/cap-post-2013/) (Accessed: 12.03.2013.)*

In short, new CAP has aim to attain higher levels of production of safe and quality food, while preserving the natural resources that agricultural productivity depends upon.

Direct payments are other changes. In previous CAP there was large difference in direct payments between MS. New CAP will put similar level of direct payments for all MS (Graph 2).

**Graph 2.** *CAP reform for Direct Payments*




**Source:** *The Overview of CAP Reform 2014-2020 (2013), EU Commission, available from: http://ec.europa.eu/agriculture/cap-post-2013/ (Accessed: 12.03.2013.)*

## Impact of CAP toward 2020 on agribusiness sector in Serbia

CAP toward 2020. will have two side effect on Serbia:

1) *As all third countries CAP is impacting trade by lowering subsidies in EU' MS, Serbia will benefit from reducing support Serbian agricultural products will gain on competitiveness. Lowering the trade barriers will have positive effect on Serbian agriculture (Berkum at al., 2012) etc.*

2) *Beside effect on third countries new CAP will have impact on Serbia as EU candidate (Oskam et al., 2010.) throughout institutional changes in Serbia (required harmonization with CAP). Secondly Serbia will have opportunity to use pre-accession support prescribed by CAP according to Draft strategy on agriculture and rural development of the R. Serbia 2014-2024.*

**CAP toward 2020 main changes in supports which are influencing trade and markets of agricultural products in Serbia**

In CAP toward 2020 main changes in supports which are influencing trade and markets of agricultural products are as following:

1) *Income Support Schemes is structured as following: single payment scheme (SPS), single area payment scheme (SAPS), complementary national direct payments (CNDPs), transitional national aid, coupled aids, specific support.*
2) *Main changes introduced by new CMO Regulation: ending of sugar quotas in 2017 (milk quotas to end in 2015 as per previous reforms), wine planting rights will be abolished in 2015 (a new system of vine planting authorizations will apply from 2016), adjustment of market intervention/aid schemes, exclusion of sorghum from public intervention, abolition of mandatory private storage aid for butter, deletion of certain aids for silkworms and for the use of skimmed milk and powder in animal feed and casein More responsive and efficient market measures, more flexible triggering conditions for optional private storage aid, automatic tendering for skimmed milk powder and butter above fixed quantities (butter increased to 50 000 tones), updated, more flexible exceptional measures, market disturbance and threat thereof can be addressed via exceptional measures, including export refunds (via urgency procedure in case of imperative grounds of urgency). Measures against loss of consumer confidence now cover all main sectors, emergency clause to "adopt necessary and justifiable emergency measures to resolve specific problems", commission power to authorize stabilizing collective measures by POs and IBOs. Availability of crisis reserve for specific measures (in particular market intervention, exceptional measures, export refunds).*

All of those policy changes will have double effect on Serbian agricultural sector, first liberalization and further reduction of supports will have positive effect on trade balance with EU by increasing Serbian competitiveness.

Secondly, it is expected from 2017 for Serbia to use pre-accession funds defined by new CAP, which will positively influenced Serbian agribusiness sector.

**CAP toward 2020 main changes in public interventions which are influencing trade and markets of agricultural products in Serbia**

EU public interventions products are purchased by the Member State and stored under their control, prior to re-sale when market conditions improve. Main intervention models under CAP toward 2020. is private storage aid (PSA), Eligible products: common wheat, barley, maize, paddy rice, butter, skimmed milk powder (SMP), beef (Article 11 CMO). Origin of eligible products: originate in the EU i.e. crops harvested in the EU, milk produced in the EU (Article 9 CMO). Intervention periods: cereals (1 November to 31 May), rice (1 April to 31 July), butter/SMP (1 March to 30 September). Fixed price quantities are for: common wheat (3 million tones, SMP 109,000 tones, butter 50,000 tones).

Eligible products for interventions: white sugar; olive oil; flax fiber; fresh or chilled meat of bovine animals aged 8 months or more; butter produced from cream obtained directly and exclusively from cow's milk; skimmed milk powder from cow's milk; cheese with a PDO/PGI; pig meat, sheep meat and goat meat. Origin of eligible products: EU origin, as per public intervention. Other general requirements: sound, fair and marketable quality and which do not exceed the maximum levels of radioactivity allowed.

Import and export licenses in brief: there is established validity period and security, export with refund or zero, current month + 4 months, 20 €/t for most products, export with dash: 60 days, 5 €/t, import: 45 days, 1 €/t outside TRQs.

Main types of state aid: investment on the farm/for processing and marketing, compensation for losses due to natural disasters, adverse weather conditions and plant/animal diseases, technical assistance, advertising, forestry (non commercial), the tool exists with following technicalities, difference between world market price and EU export price (FOB-FOB, except oats) set via tenders for grain, set via standing system (published refunds) for processed products. Public interventions are structured by two measures:

- *Guaranteed price.*
- *Public intervention stocks (safety net). Open from 1 November until 31 May Buying price for soft wheat is : 101,31 €/t up to 3 million tones. Over 3 millions tones tendering procedure sets the price.*

In the period of low prices subsidies of storage costs are meant to withdraw products surplus. Harmonization of law regulations on state intervention is of great importance for Serbian agribusiness sector. Currently Serbian Law on Commodity reserves has no any state intervention prescribed. Serbia will have to establish state intervention agency within Paying agency.

Conclusion can be drawn that new CAP has less state interventions which will have positive impact on Serbian agribusiness sector by increasing competitiveness of Serbian agricultural products.

Furthermore Storage cost subsidies is important measure in CAP 2020. Serbia has developed system of Public warehouses operating under Law on public warehouses for agricultural products. Public warehouses can serve for storing agricultural products for CAP' private storage subsidies in per-accession period. Currently Serbia has 16 public warehouses and needs to increase number of public warehouses.

## CAP toward 2020 influence on markets of agricultural products in Serbia

New CAP will have influence on commodity exchanges, stock exchanges and wholesale markets in Serbia. Draft law on Commodity Exchange has to be harmonized with EU regulation[3]. Clearinghouse, investor protection schemes (security funds), commodity exchange members, licensing process for exchange and exchange members will have to be in accordance with European Security Market Authorities (ESMA) requirements.

Previous CAP had negative impact on the commodity exchanges in new EU member states such as Hungary, Poland and others. Decries in the trade volume at the commodity exchanges in EU was consequence of the price protection and state intervention measures[4]. New CAP is reducing price supports and market interventions and will have positive impact on Serbian commodity exchanges.

[3] Spot market commodity exchanges is not subject to regulation EU legislation, it is left to the organization of each Member State

[4] State price support will decreasing price volatility and lowering the needs of exchange participiants for using commodity exchanges for hedging strategies.

One of the main features of the EU system of licensing and control of commodity markets is to integrate control functions (Allgood, C. at al., 2010) within an institution that controls the spot and futures trading in commodities trading in the capital market, the banking sector, the insurance industry and the like. Legislative and oversight role in the area of licensing and control of the capital market, which includes products to agricultural products, carries ESMA (Belozertsov, A. at al. 2011).

The 2012th year came into force the law in the professional community known as EMIR adopted similar provisions as the Dodd - Frank Act. Basic provisions of EMIR 's are: mandatory clearing and exchange and most OTC trading instruments, the application of specific techniques of risk management for trading instruments that are not subject to the clearing, reporting on trading, specific requirements for the establishment and operation of clearing houses and trading platform.

It is important to note that under the EMIR regulation, countries outside the EU have the possibility to send the request ESMA to assess compliance of domestic legislation that regulates commodity exchanges (Zakić at al. 2012), effective exchanges, OTC trading and goods and effects, and the like . If ESMA decides that the national legislation in the "sufficient" degree of compliance with the EMIR regulation allows EU companies and individuals to directly trade on exchanges and clearing houses used by that country. The need for harmonization of domestic listed and ESMA regulation is important in making the legislation related to the commodity exchange as well as the amendments to the capital market.

## CAP toward 2020 influence on risk management in Serbian agribusiness sector

The objective of past reforms to enhance the market orientation of EU agriculture is continued by adapting the policy instruments to further encourage farmers to base their production decisions on market signals. It is almost certain that, given the decline in public support, market-based risk management tools will play an increasing role. Futures and other derivatives will be increasingly used to hedge price risk. The EU can encourage their acceptance by providing training and education to farmers, by ensuring availability of market information, by having a suitable supervision regime in place, and potentially by promoting their use among risk-sharing co-operatives.

Insurance will also be increasingly used to mitigate yield risk. Growing insurance portfolios are expected to increase the effects of risk-pooling and reduce the cost of reinsurance. Index-based insurance tools will also contribute to more hazards being insurable. The public sector may support the use of insurance among farmers by providing re-insurance or minimally subsidizing the premium of crop yield insurance: enough to make it affordable, but not too much in order to avoid irresponsible behavior (e.g. planting unsuitable crops). It would also be beneficial for member states to increasingly require that farmers contract insurance to be eligible to compensation payments in case of crises or catastrophes. Rewarding farmers through payments for providing public goods is important to addressing the challenges of the future: promote sustainable agriculture, thus long-term food security, by supporting farming systems associated with high environmental standards of production. Designed to remunerate services rendered by the agricultural sector for which no price is paid on the market, these payments also contribute to cover risk. Additionally, the possibility of pricing externalities in the system should be further investigated (by using the polluter-pays principle, for instance by penalizing the producers or the types of produce associated with the most inefficient use of natural resources). Risk management support measures:

- *Crop, animal and plant insurance: contributions to premia for insurance schemes, covering farmers against losses caused by weather, animal / plant disease, pest infestation, environmental incident, mutual funds, contributions to compensation paid out of funds, to compensate farmers for losses caused by weather, animal / plant disease, pest infestation (when production losses > 30 % of average annual production).*
- *Income stabilization tool: contributions to administrative costs of setting up fund (not capital), contributions to compensation paid out of funds, to farmers experiencing drop of income of > 30 % of average annual income (causes not specified in EU rules); maximum 70 % of income loss to be covered.*

Conclusion can be drawn that new CAP will have positive impact on Serbian agribusiness sector by increasing competitiveness of Serbian agricultural products. Furthermore measures related to support of insurance in production and insurance of income in CAP 2020 Serbian producers will be able to use form 2017.

## CAP toward 2020 influence cooperatives in Serbia

Great emphasis is given within the new CAP to producers' organizations (PO) and producers group (PG). Producer cooperations are involved in: greater legal certainty for producer cooperation in all sectors, collective negotiation by POs for the supply of olive oil, beef and cereals and certain other arable crops, under certain conditions and safeguards, possibility for MS to introduce mandatory written delivery contracts for all sectors, with certain minimum contractual elements, subject to certain conditions and safeguards, continuation of sugar sector agreements and contracts after end of quotas in 2017.

New CAP will have significant positive impact on Serbian cooperatives. Serbia has small average agricultural households and cooperatives development is very important in order to achieve economic of scale in agricultural sector. Furthermore measures related to support new PO and PG in CAP 2020. Serbia will be able to use form 2017. It is important to enact new Law on cooperatives which will be in accordance with provision of Single CMO regulative.

## CAP toward 2020 influence on agricultural products quality standards in Serbia

Main characteristic of CAP towards 2020 is that is simplified, more flexible and in accordance with international standards. Reform of marketing standards rules: repealed 26 out of 36 specific marketing standards, introduced a General Marketing Standard for other products (GMS) and equivalence with UNECE standards, simplified and rationalized the checking operations.

CAP in organic farming main features: to multiply environmental/climate benefits - eligibility of individual and joint beneficiaries & higher transaction costs for the latter, to increase flexibility – duration of contracts linked to support for conversions may correspond to the conversion period & contracts for maintenance following commitments in the initial period can be shorter (than 5-7 years), maximum aid: € 600 (annual crops), € 900 (perennial crops), € 450 (other land uses), aid intensities is € 3000 per holding per year for participation in quality schemes and 70% of the eligible action for promotion (maximum duration: 5 years).

For Serbia standards development is important sector for two reasons, first often is not possible to export agricultural products without standard and second it is standard implementation value added instrument. Especially is important to introduce meat standards because Serbia is not using any standards for beef and pig meat. By implementing meat standards in Serbia will be possible to establish trade at commodity exchanges with these categories of meat as well the international trade will be improved. Furthermore measures related to support of quality schemes in CAP 2020. Serbia will be able to use support measures form 2017.

## CAP toward 2020 influence on Information and accountancy systems in Serbian agriculture

**EU Market information system for agricultural products** is based on the commitment of all member states of the EU to submit price reports for certain types of agricultural products on a weekly basis. The data used by the European Commission, which according to them is determined by government intervention in the market for agricultural products , as well as Eurostat publishes and analyzes the data and generate reports , which are also published.

Agricultural Market Information System of Serbia - STIPS is based on the collection rate by 18 agricultural stations in Serbia. The system is set up as an Internet portal, so that reporters enter reports directly to the website and thus does not waste time in the distribution of the report.

**The Farm Accountancy Data Network (FADN).** FADN is based on Commission Implementing Regulation (EU) No 730/2013 of 29 July 2013 on certain detailed implementing rules concerning the keeping of accounts for the purpose of determining the incomes of agricultural holdings. FADN collects representative information according to region, type of farming and economic size. The types of farming, classification according to economic size and regions are compatible with the Eurostat Farm Structure Survey (FSS), so it is possible to attribute to each farm in the FADN sample a weight according to the occurrence of similar farms/types in the FSS. This questionnaire aims to get a better view on the current situation regarding collection of micro-economic information in the agricultural sector, and the efforts needed to build a system fully compatible with the European Farm Accountancy Data Network

Serbia is in the faze of implementing FADN since 2012. Agribusiness sector will benefit for use of FADN data:

- *Policy making will be improved, Serbian policy makers will be able to compare domestic agriculture production and to use FADN data for policy making.*
- *Data requests and assistance to research Institutes, universities*
- *Benefits for Serbian farmers detailed benchmarks of farms, new knowledge improves farmers performance.*

## Conclusion

Impacts of CAP reform toward 2020. on Serbian agricultural can be transmitted by:

1) *EU domestic support,*
2) *EU export subsidies,*
3) *EU market access restrictions,*
4) *Change in Serbian institutional framework by harmonization of legislation with CAP,*
5) *Use of EU' pre-accession funds.*

EU CAP' reform toward 2020. is very important and with great influence on Serbian agribusiness sector. First by declining in public support new CAP reform will positively affect all third countries by increasing competiveness of these countries. Second Serbia is EU' candidate and will benefit positively from institutional development and harmonization with new CAP will have obligation to harmonize law regulation in agricultural sector with CAP.

Furthermore Serbian agricultural producers will have possibilities to use pre-accession funds prescribed in new CAP as planned from 2017. Trade policy and markets in agricultural sector, cooperatives, supports in agriculture, risk management instruments in agriculture will have great changes and it is of great importance for agricultural producers, processors and policy makers to learn o CAP and use new possibilities in order to develop agribusiness sector in Serbia. Main changes in supports are influencing positively trade and markets of agricultural products in Serbia. All of those policy changes will have double effect on Serbian agricultural sector, first liberalization and further reduction of supports will have positive effect on trade

balance with EU by increasing Serbian competitiveness. Changes in public interventions are influencing trade and markets of agricultural products in Serbia. Conclusion can be drawn that new CAP has less state interventions which will have positive impact on Serbian agribusiness sector by increasing competitiveness of Serbian agricultural products.

Previous CAP had negative impact on the commodity exchanges in new EU member states such as Hungary, Poland and others. Decries in the trade volume at the commodity exchanges in EU was consequence of the price protection and state intervention measures[5]. New CAP is reducing price supports and market interventions and will have positive impact on Serbian commodity exchanges. CAP toward 2020 influence cooperatives in Serbia. Specific measure is allowed under new CAP for supporting PO and PG in the first five year. New CAP will have significant positive impact on Serbian cooperatives. Serbia has small average agricultural households and cooperatives development is very important in order to achieve economic of scale in agricultural sector.

Impact related to agricultural products quality standards in Serbia is significant and positive. For Serbia standards development is important sector for two reasons, first often is not possible to export agricultural products without standard and second it is standard implementation value added instrument. Especially is important to introduce meat standards because Serbia is not using any standards for beef and pig meat. By implementing meat standards in Serbia will be possible to establish trade at commodity exchanges with these categories of meat as well the international trade will be improved. Serbia has great potential for organic production. Low cost labor, non-contaminated land etc. One of obstacles for further development of organic production is lack of organic pesticides. It will be important to amend Law on plant protection and approve EU organic pesticide list.

Serbia will have opportunity to harmonize law regulations on quality standards with EU and to register Geographical indications in EU. CAP toward 2020 influence on Information systems in Serbian agriculture. Serbia joining the EU will get this commitment, it is therefore necessary to introduce EU quality standards for certain types of products in accordance with EU rules and STIPS adapt to EU requirements.

[5] State price support will decreasing price volatility and lowering the needs of exchange participiants for using commodity exchanges for hedging strategies.

Implementation of FADN will positively impact Serbian agribusiness sector by supporting policy making process and improving accountancy practice of agricultural producers in Serbia. Furthermore all measure in CAP 2020. Serbia agribusiness sector will be able to use in pre-accession period. Overall impact of CAP toward 2020. on Serbian agribusiness sector will depend on the length of the accession period and will have higher impact if the Serbia will access EU in shorter period. If the accreditation of Serbian institution required for receiving EU' funds is fast, agribusiness sector will gain access to EU' pre-accession funds.

## References


1. Allgood, C. at al., (2010): *Introduction to Futures Hedging for Grain Producers*, University of Kentacky, Coleague of Agriculture, Lexington, Available from: www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000262553.pdf (Accessed: 22.7.2013.).

2. Belozertsov, A. at al. (2011): *Commodity exchange in Europe and Central Asia a means of management of price risk*, Working paper, No. 5, FAO/World Bank, Rome.

3. Berkum, C. and Bogdanov, N. (2012): *Serbia on the road to EU accession*, CABI, Oxfordshire.

4. *Council regulation no. 1370/2013* of 16 December 2013 determining measures on fixing certain aids and refunds related to the common organization of the markets in agricultural products. http://www2.ca.uky.edu/agc/pubs/aec/aec96/aec96.pdf (Accessed at 11 June 2013).

5. *Law on Public Warehouse for agricultural products (Official gazette of the R. Serbia, No. 41/09).*

6. Oskam et al. (2010): *EU policy for agriculture, food and rural areas*, Wageningen Academic Publishers, ISBN 987-90-8686-118-7, Wageningen.

7. *Regulation no. 1307/2013 of the European parliament and of the council* of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009.

8. *Regulation (EU) no. 648/2012 of the European Parliament and of the Council* of 4th July 2012 on OTC derivatives, central counterparties and trade repositories.

9. *Regulation no. 1306/2013 of the European parliament and of the Council* of 17 December 2013 on the financing, management and monitoring of the common agricultural policy and repealing Council Regulations (EEC) No 352/78, (EC) No 165/94, (EC) No 2799/98, (EC) No 814/2000, (EC) No 1290/2005 and (EC) No 485/2008.

10. *Regulation no. 1307/2013 of the European parliament and of the Council* of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009.

11. *Regulation no. 1308/2013 of the European parliament and of the Council* of 17 December 2013 establishing a common organization of markets in agricultural products.

12. Schaffint-Chatterjee C. (2010.): *Risk management in agriculture, Towards market solution in EU*, Deutche Bank Research, Frankfurt, Available at: www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000262553.pdf (Accessed: 22.7.2013.).

13. The OECD's report (2005): *"Agriculture and Development. The Case for Policy Coherence Agriculture and Development* (2005), Available from: http://www.oecd.org/document/23/0,3746,en_2649_33797_35664919_1_1_1_1,00.html (Accessed: 12.02.2013.).

14. *The Overview of CAP Reform 2014-2020 (2013): EU Comission*, Available from: http://ec.europa.eu/agriculture/cap-post-2013/ (Accessed: 12.03.2013.).

15. Zakić, V., Kovačević, V. (2012): *Importance of commodity derivatives for Serbian agricultural enterprises risk management*, Proceedings, Međunarodni naučni skup - Održiva poljoprivreda i ruralni razvoj u funkciji ostvarivanja strateških ciljeva Republike Srbije u okviru dunavskog regiona - očuvanje ruralnih vrednosti, IEP, Beograd, pp. 907-924.

# ANALYSIS OF EU COMMON AGRICULTURAL POLICY[1]

*Zoran Simonović[2], Dragan Momirović[3]*

## Abstract

*The authors are specific attention to the development of the Common Agricultural Policy of the European Union. The Common Agricultural Policy is viewed from the sixties of the twentieth century. It starts from Mansholt plan continues with expansions in 1973, 1981 and in 1986 years to finally come to the first reform of the CAP advocated by the then Commissioner for Agriculture MacSharry. The reform was carried out according to the proposal MacSharry only increase the cost of the CAP and has led to new reforms contained in the Agenda 2000th. During the 2003rd and the 2006th year has come again to reform the CAP. The very need for such frequent reforms, especially in the last twenty years lets us know that the importance of the CAP in the agricultural development of the European Union's big. It could be said that there was no CAP there would be no EU. Almost all agricultural activities in the EU are covered by the CAP. Subsidies are an essential tool for CAP. The Common Agricultural Policy could hardly function without import restrictions and export subsidies, various supplements and restrictions.*

**Keywords:** *CAP, EU, reforms, subsidies, agriculture.*

## Introduction

The Common Agricultural Policy is one of the oldest common policies. The specificity of the CAP is reflected in several facts. In the first place in the agriculture of the EU generates 1.5 % of the GDP of these countries, it means very little, while the CAP consumes more than 40% of the EU

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budget. This amount was previously higher - in 1984 the share was 74 %. According to financial projections that were made in the period since 2007 the 2013th it is planned to allocate to agriculture in total about 33% of the EU budget.[4] This data indicates that in the years to strive for gradual reduction of funds for this activity. Second, the Government experts almost identical opinion that the current CAP bad and should be changed. As the main negative factors CAP emphasizes its price, methodical character and unfairness. There are even so sharp tones that are directed towards CAP who think that it is expensive, wasteful and hostile to environmental protection. Based on the proposed financial perspective for the period since 2007 the 2013th The retained in approximately the same ratio of energy in relation to the IPT. It is unlikely, therefore, that the CAP radically change any time soon.[5]

## Development of a common agricultural policy

The Common Agricultural Policy has to be created and shaped more sixties formation mechanism "common market" for virtually every agricultural product individually. Emphasis was placed on the establishment of common price policy community, and resulting in the (Article 40 of the Rome Treaty) the European Agricultural Fund, which was the source of financing of the common agricultural policy (pricing).[6]

The European Union with its common policies contributes to greater cooperation between member states in all aspects of agricultural production. The creation of an economic union, therefore, is linked to the establishment of a developed concept of agricultural policy. Note again that the European Union began with a Mansholt Plan (Le Mansholt Plan) which is still in 1980 respectively in 1985 he was generally realized. The complexity of such problems of the agrarian program of the European Union, expressed in many segments of the agricultural policy of each country. Some of these issues are the following: the question of the general situation of agriculture in the country, the issue of improving the income of farmers, the issue of overcoming the unfavorable agrarian structure, the issue of surplus labor in agriculture, the issue of low labor productivity, the question of precise measures of social policy for farmers, and many others.

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[4] Prokopijević M. (2009): *„Evropska unija“*, Službeni glasnik, Beograd, 199.
[5] Dinan D. (2009): *„Sve bliža Unija“*, Službeni glasnik, Beograd, 339-340.
[6] Ловре К., Тркуља Ђ. (2003): *„Интегрална политика аграрног и руралног развоја Европске уније и импликације на аграрну политику земаља у транзицији“*, Анали економског факултета у Суботици, број 9, Суботица, 6.

Any of these issues, if it is set, it automatically requires a lengthy discussion of building a shared vision of where we are talking. Therefore, it is necessary to embark on the study of these problems and in consideration of all aspects of their eventual resolution. Generally CAP could be assessed as successful based on these objectives, but it is in fact caused serious economic, environmental and political problems.

Enlargement in 1973 The only further complicate the already difficult relations. The European Community entered two small countries (Denmark and Ireland) with large agricultural sectors and a large country (United Kingdom) with a small agricultural sector, but with a lot of big farmers. Just joining the UK has led to a new political twist because she followed an agricultural policy which was inconsistent with the CAP. Britain in the last two centuries has not been able to produce enough food for all its inhabitants, because it was a bit of arable land on the island. Britain is, therefore, imported food from their colonies. As the British Empire eventually declined the move to supply agricultural products from the Commonwealth and from cheap suppliers. Commonwealth countries have started to take care of the entry of Britain into the EU. It follows the roots of the British aversion and criticism that is directed at CAP.

Excessive production of agricultural products has caused a new debate on the reform of the CAP. The Council has introduced modest changes in the system of guaranteeing prices and introduced a special form of payment that was supposed to introduce "co-responsibility" dairy products, as they enable them to recover the costs of the intervention storage and subsidizing the sale of surplus produce.

When this payment for "co-responsibility" had achieved the Commission has proposed the introduction of quotas[7] in production. After a long and intensive negotiations at the highest level in March in 1984. The leaders of the European Union have agreed on a quota system for milk production.[8]

[7] Quotas were introduced for reasons to discourage production over the limit. To this end, they introduced taxes from 75% to 100% for exceeding the quota. Just to point out that the odds were in conflict with the idea of a common market on the free movement of factors of production.

[8] Petit M. (1989): *„Pressures on Europe's common agricultural policy“*, International food policy research Institute, Washington i Ecole Nationale superieure des scienses agronomiques appliquees, Dijon, 10.

Despite all the introduction of milk quotas and quotas for tobacco and sugar are not much help to reduce the consumption related to CAP. There is a possibility of a bankruptcy. Also the problem was forthcoming Mediterranean expansion, but also ever-present insistence of Margaret Thatcher on budget reform has further increased the pressure to take the radical surgery. At a summit in June Fonteneblu in 1984. The European Council decided to reduce the growth of spending for CAP, but at the same time the Council has decided to increase its own revenues of the European Union, thus removing the reason for far-reaching reform of the CAP, or the threat of running out of money.[9]

The issue of reform of the CAP again became topical in 1987 and in 1988 year due to budgetary pressures. The Commission has proposed a mix of measures to prevent overproduction, limiting consumption, diversification support farmers and promote rural development. Direct payments to farmers were introduced in 1988. The so-called. McSherry reform and it will become an increasingly important way of subsidizing agriculture.[10]

And this attempt at reform was only partially successful. The pressure to implement effective reforms and further strengthened, not only because of overtime costs CAP, but also because the CAP incited unfavorable international comments on the recently launched program on the single market. For all of this is further affected by the lack of progress in the Uruguay Round of the General Agreement on Tariffs and Trade (GATT). The misunderstanding arose as a result of disagreements over export subsidies, and also contributed to increase international pressure on the European Union to reform the CAP. The inclusion of agriculture in the Uruguay Round led to the Commission in a position to defend himself before the negotiations began in September in 1986 year. The Council insisted that the basic objectives and mechanisms of the CAP to those inside and those outside do not question.[11] Agriculture Commissioner MacSharry Irishman Ray (Ray MacSharry) was the main creator and driving force of the reform plan, which is called by his name, "McSherry plan." Member States in June in 1992 The agreed about the first reform of the CAP. The Common Agricultural Policy has changed fundamentally with the McSherry reform package. McSherry plan contains four major policy changes:

[9] Dinan D. (2009): *„Sve bliža unija“*, ibid, 347.
[10] Prokopijević M. (2009): *„Evropska unija“*, ibid, 212.
[11] *Bulletin of the European Communities*, No.3/1985, point 1.2.11, 2.1.22 и 2.2.12.

- *Reduced prices in certain sectors. As part of these reforms, reduced the prices of grains and oilseeds by 30 % over a period of three years. Prices for milk, beef and sheep have been reduced by 15%. The reduction was done to approximate prices were priced on the world market (and later price reductions introduced to fruits and vegetables).*
- *Direct support to farmers' incomes. The reform introduced a system of direct payments to farmers as compensation for price reductions in certain agricultural sectors.*
- *An important feature of these reforms is the introduction of so-called. "Scheme for non-use," which was supposed to commercial producers in certain sectors (mainly cereals) in certain regions paid to keep land idle rather than to grow crops that the EU must buy.*[12]
- *Follow-up measures have entailed the introduction of new programs to support rural development, organic agriculture, agricultural commodities replaces forests and the early retirement of farmers.*[13]

It is interesting to note that a generous compensation plan, on which the Council agreed to agriculture made the reformed CAP, is more expensive than unreformed. However, the cut in the guaranteed price and the omission of the country of manufacture, the reform has helped to reduce agricultural surpluses in the EU. Agricultural producers also did well because they had a reduction in income. Incentives extension together with a more pronounced concern for the environment and the concerns of consumers made on proposals for reform of the CAP in Agenda 2000, the Commission strategy to "strengthen and expand the Union in the first years of the twenty-first century." [14] Published in July in 1997. The Agenda 2000 included the revised objectives of the Common Agricultural Policy which revealed the impact of new social movements and economic trends in agricultural policy. Agenda 2000 was adopted in 1999 with the aim of further long-term development and continuing trade negotiations with the WTO. The Heads of State and Government of the EU agreed to new agricultural strategy makes a coherent policy that would constitute a framework for agriculture and regional development in the EU.

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[12] Sarker R., Jayasinghe S. (2007): *„Regional trade agreements and trade in agri-food products: evidence for the European Union from gravity modeling using disaggregated data“*, Agricultural Economics 37, 95.

[13] Hiks S. (2007): *„Politički sistem Evropske unije“*, Službeni glasnik, Beograd, 269.

[14] *Agenda 2000 for a stronger and wider Union*, COM(97) 2000 final VOL. I. Brussels: Commission of the European Communities, 15.07.1997, 98.

The agenda includes the period 2000th - 2006th and represents a strategy based on the principles McSherry reforms, but also includes the development of a comprehensive strategy to the wider needs of rural communities in Europe. Basic guidelines for this reform were:

- *To improve the global competitiveness of the European Union through lower prices,*
- *Guarantee the safety and quality of food to consumers*
  *To provide a stable income and a fair standard of living for the agricultural community,*
- *The methods of agricultural production to be favorable for the environment and respect the protection of animals,*
- *To integrate the objectives related to the environment in their instruments,*
  *To seek and create adequate income and employment for farmers and their families,*
- *A new division of functions between the Commission and the Member States relating to compensation in the form of direct payments or rural development measures.*

Basically Agenda 2000 proposed EU to continue McSherry reforms transforming agricultural subsidies from price support to direct payments. The Commission has proposed big cuts in guaranteed prices for a number of agricultural products. The farmers would get compensation for some sort of direct payment.

In addition to all the above presented Agenda 2000 he gave special importance to rural development and highlighting the responsibilities and opportunities for agriculture in order to boost environmental awareness. Accordingly Agenda 2000 proposed environmental protection within agriculture with that organic farming should be given a more significant role. The agenda has led to a simplification of the rules relating to new rural development and market regulation and management regulations to environmental standards, particularly in relation to field crops. Rural development became the second pillar of the CAP. Reform, said the intention to consider rural development in a broader context, i.e. including agriculture and forestry, as well as other professional interests in rural areas.

Treaty of Berlin established the sub-limits for the period since 2000 the 2006th year. Most of the funds (around 90 %) are intended to support the market, while about 10 % of EAGGEF anticipated costs to rural development. Sub-limits laid down in this agreement have been clearly defined, namely it was not envisaged that the funds are transferred from one section to another, or from one year to the next. The amounts are determined show an increase of € 36.6 billion in the 2000th year to 37.3 billion € in the 2006th year. Maximum costs are provided for the 2002nd € 39.6 billion a year, after this year, the amount of cost decreases. On the other hand, it is envisaged that the costs of growing two years immediately after 2006th due to the implementation of reforms in the sector of dairy products, and to determine the extent of direct payments. [15] Finally, we can conclude that the reform of the CAP of Agenda 2000 was very modest, because the system did not include the removal of price support of a large decline in agricultural income. Cuts prices on which it was agreed they were not large enough to provide the ability to manage agricultural policy in the post- enlargement EU. Also, this measure could not satisfy critics of agricultural protectionism of the EU at the WTO. Most importantly, food prices in the EU, despite the basic market conditions have remained high despite the fact that the offer still exceeds demand.[16]

## CAP Reform and the 2003rd

The reform of the CAP of the 2003rd was focused on the creation of a common agricultural policy that would be more market-oriented, and able to provide better quality and healthy food. As MacSharry reform that was adopted ten years ago, this reform is a response to pressures outside the EU, but it is negotiated in the WTO. At the same time, this reform reflects the need to adjust the CAP towards the EU Council decision of December 2002nd year to move forward with the expansion of the EU to the East. In particular, the reform of the 2003rd The attempts to provide resources to developing countries, with the costs of the CAP are in line with overall budgetary limits of the expansion of the European Union and applicable to the 2013th year. Thus, it is clear that the reform in accordance with the objectives of Agenda 2000 and should complete the process of reform in some areas and establish a stable policy framework in others.[17]

[15] http://ec.europa.eu/agenda2000/public_en.pdf
[16] Dinan D. (2009): *„Sve bliža unija“*, ibid, 355.
[17] Цвијановић Д., Симоновић З., Михаиловић Б., (2011): *„Тежишта и циљеви нове реформе ЗАП и политике ЕУ према новим члановима“*, Економика пољопривреде број 3, Београд, 364.

EU agriculture ministers on 26 June 2003rd, after the usual haggling adopted a radical reform of the Common Agricultural Policy.[18] Reform has completely changed the way the European Union is supporting the farm sector. New ZAP was directed towards consumers and taxpayers. Farmers in the EU are given the freedom to produce what, why there is market demand. This meant that in the future, the vast majority of subsidies paid independently from the volume of production. To avoid abandonment of production, Member States may choose to maintain a limited link between subsidies and production under well- defined conditions and within clear limits. This new "way to farm payments" will be linked to the respect of the environment, food safety and compliance with animal welfare standards. Severing the link between subsidies and production of the farmers in the European Union force to be more competitive and market-oriented production, while providing the necessary income stability. More money will be available to farmers who comply with environmental standards, quality, and programs for the protection of animals by reducing direct payments for bigger farms. The Council decided to further revise the prices of milk, rice, cereals, sharply wheat flour, animal feed and dry walnut. In order to comply with the maximum budget relating to the EU-25 to the 2013th The ministers agreed to introduce a mechanism for financial discipline. This reform was to strengthen the position of the EU in trade negotiations with the WTO. Different segments of the reform will enter into force in 2004th and 2005th year. The above method of payment farms will come into force in 2005th year. If a Member State is a necessary transition period due to the specific conditions of its agricultural sector, it can be applied single farm payment no later than 2007 year. Reform has five main elements, namely:

- *Continued implementation of Agenda 2000 on access (audit market policies, such as reducing the cost of intervention dairy products).*
- *Separation and direct support (introduction of single farm income payment based on previous payments).*
- *The introduction of mandatory reduction of direct payments in case of non compliance with the EU standards of environmental, food safety, animal health and their well-being.*

[18] European Commission, (2005): *„The Agricultural Situation in the European Union, 2003. report, European Communities“*, Brussels, Luxembourg, 25.

- *Strengthening and improving rural development. Strengthening of EU rural development policy, with more money, new measures to improve the environment, quality and animal welfare and help farmers to meet EU standards in production starting since 2005 year.*
- *Mechanisms for fiscal discipline to ensure that the cost of the CAP does not exceed the budget limit.*[19]

So to sum up, this agreement is separating subsidies from production, strengthen the cross-compliance policy, the pendulum shifted towards a more balanced distribution of payments, from larger to smaller producers and imposed price reductions in some hitherto unreformed sectors of agriculture (non-sugar sector). In its essence, the reform of the 2003rd represents a continuation of the reform McSherry in 1992 year. She changed the principles, but not the generosity of EU agricultural subsidies.

Like McSherry reforms Midterm Review was launched because there was a need of the EU to curb the influence of disturbing the common agricultural policy in order to facilitate the end of another round of multilateral trade negotiations, held under the auspices of the WTO. This round was particularly related to global development. For this reason, the EU is faced with additional pressures to alter CAP to farmers in developing countries would not have been brought in bad position. This new series of negotiations was launched in Doha, Qatar in November in 2001 year. It was officially called the Doha Development Round (Doha Development Round). Increased pressure in the WTO has provided a strong impetus for the reform of the CAP within the midterm review. The EU has argued that the midterm revision of which was finally agreed in June 2003rd The help came a shift in the negotiations in agriculture in the WTO and the Doha Development Round as a whole. Despite all this EU trading partner remained skeptical about wanting to see concrete proposals for the liberalization of agricultural trade in the WTO.[20] In August 2003 The U.S. and EU have made their joint initiative in agricultural issues at the WTO, which refers to the three pillars and to domestic support, export subsidies and market access. However, this initiative was insufficient to ensure the success of the ministerial meeting in Cancun in September 2003rd, which was a midterm review of the Doha Round. In November 2003rd years after

[19] http://ec.europa.eu/agriculture/capreform/index_en.htm
[20] Dinan D. (2009): *„Sve bliža unija“*, ibid, 357-358.

the failure of Cancun, the EU ministers and the European Commission have reaffirmed their commitment to Doha. In May 2004 the EU has indicated it would be willing to abolish export subsidies, in the July- august 2004 year that it is ready to establish a framework for establishing modalities in agriculture.[21]

The European Union has in its offer FIP with partners[22] from 28 October 2005th, offered a reduction of the total trade support by 70%, which is the planned reduction of this type of support under the reform efforts of the IPT in the Union, as well as restrictions on the "blue box" payments. Critics point out the fact that this is the amount of support that are not current, because the EU reform of the 2003rd the committed support of the separation of production and thus ensure that the label for 90 % of its support to farmers.[23] However, despite the pressures of enlargement and multilateral trade negotiations, the history of the CAP pointed out that the core group of member states to ensure that farmers, especially those in Western Europe, continue to receive large subsidies. The reform package is aimed at the common organization of the market for crop products, beef and milk. Oilseeds, sugar, wine, tobacco, chicken and mutton are excluded from the agreement reached.

The main problem of the CAP is that much of the money ends up in the hands of people who are not engaged in farming activities. In a study published by the OECD 2003rd The questioner who the users actually reformed CAP and led to the fact that a large part of the funds within the hands of those who provide input. In the first place to the landowners, who is not engaged in agriculture and businesses that produce chemicals that are essential to agricultural production. OECD calculates that about 45 cents of every euro on the basis of direct payments is in favor of landowners who are not engaged in agricultural activities, rather than the farmers themselves. Another important policy CAP market price support, the worse the result. Farmers receive only 48 cents of a euro, while 38 cents goes towards the costs of resource use and provision of inputs.[24]

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[21] Swinbank A. (2005): *„Developments in the Doha Round and WTO dispute settlement: some implications for EU agricultural policy"*, European Review of Agricultural Economics, 32(4):551-561.

[22] *Five Interesed Parties (FIPs)*, Аустралија, Бразил, Индија Јапан, САД, заједно са ЕУ чине Г-6, шест кључних актера преговора (six key players).

[23] Поповић В., Катић Б. (2007): *„Доха рунда преговора у СТО и интерна подршка пољопривреди Србије"*, Економски анали, 52(172), 97.

[24] Baldwin R., Wyplosz C., (2010): *„Ekonomija evropskih integracija"*, Data status, Beograd, 376-377.

## The reform of the CAP in 2006

The reform of the CAP in 2006 represents a radical change in sugar production. Ministers of Agriculture of the European Union on 20 February 2006 formally adopted a radical reform of the sugar sector. The reform, which came into force on 1 July, brought a change in the system that has remained largely unchanged for almost 40 years, in line with the rest of the reformed Common Agricultural Policy. The reform is allowed to provide long-term and sustainable future sugar production in the EU in order to improve competitiveness and market orientation of the sugar sector and to strengthen position within the EU in the current round of talks with the World Trade Organization. Key reforms related to the right to cut the tail of the 36% of the guaranteed minimum price of sugar, the giving of generous compensation for farmers and, most importantly, the restructuring fund aimed at encouraging non-competitive sugar producers to leave the production.[25]

From 1 January 2005 the ten member states will take effect the new agricultural policy in line with the reform agreed in June 2003rd year. The main element of the new policy is subsidizing farmers irrespective of their production, and in the interim period until 2007a. The Member States were able to retain the link between production and subsidies.

Nine European countries (Austria, Belgium, Denmark, Germany, Ireland, Luxembourg, Portugal, Sweden and the UK) have decided that from 1 January 2005. Then start implementing the new CAP is based on a single payment to farmers - Single Payment Scheme - SPS. The remaining five "old members" (Finland, France, Greece, the Netherlands and Spain) apply SPS since 2006, And Malta and Slovenia since 2007. Eight new members during the transitional period will apply a slightly different pattern of payments. Farmers in these states will receive grants which amount is defined per hectare (Single Area Payment Scheme - SAPS), and the pay of regional financial resources, but also the country's 2009th was transferred to the SPS.

The amount of subsidy is now directly linked to the measures that are being implemented:

[25] http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/194&format=HTML&aged=1&language=EN&guiLanguage=en

- *Environmental Protection,*
- *Food Safety,*
- *Implement health standards for plants and animals, the measures for the welfare of animals (so-called cross-compliance).*

In order to ensure compliance with the defined budget for the period up to 2013th, introduced stricter financial discipline. Reforming define three regulations of the European Commission.

- *The first decree is no. 1124/2008,[26] before her 796/2004/EC and defines detailed rules for cross-compliance, modulation and the management and supervision of the system. The provisions of cross -compliance are key to reform of the CAP as income of farmers within the SPS depends on their respect for public health, animal welfare, environmental protection and respect for other environmental measures.*
- *The second decree was (No. 1124/2008, before we 795/2004/EC) and sets forth detailed rules for the implementation of the single payment scheme (SPS) is defined Greater Regulation no. C1782/2003/EC laying down common rules for direct support schemes under the CAP and run support schemes for farmers. This allows you to go to system connectivity support for the production and farmers to ensure income and allows them to transition to a production that meets the demands of the market. Support is also within the instrument may be paid only if they comply with the provisions of cross-compliance. This system of support and co-ordinate with the WTO rules, i.e. they no longer count on the support that distort trade (the yellow box), but in the category of support that do not distort trade (the blue box).*
- *The third is regulation (no. 2237/2003EC[27] of 23 December 2003), And defines the detailed rules for the implementation of support schemes defined under Title IV. Increased Regulation no. 1782/2003EC. This provides continued support for specific products, for example. Premium for animals (sheep and calves), because in these sectors expect the greatest effects of changes in the support system, i.e. abolition of the connection between the support and the amount of production.*

[26] *Official Journal the European Union*, L 303, 7-9.
[27] *Official Journal the European Union*, L 339, 52-69.

In November 2007 the Directorate-General for Agriculture and Rural Development of the European Commission presented a reform plan CAP - called "health check" ("health check"). These are the proposals that have no legislative character, but serve as a preparation for the discussion ahead of legislative proposals that should be followed during the 2008th The goal of "health check" to improve the reform of the CAP began the 2003rd The endeavor to direct support system more efficient and simpler, modernized instruments market support CAP ( originally designed for six countries ) and find adequate answers to new challenges such as climate change and protection of bio-diversity. During 2007 and 2008th The Commission has developed the approach to audit of annual accounts 2008/2009, a "health check" is a preparatory action within this framework, without thereby prejudging the outcome of the audit.

## The Common Agricultural Policy after the 2010

It is anticipated that the Common Agricultural Policy is reformed to 2013th Commissioner Cioloş[28] launched on 12 April 2010 public debate on the future of the Common Agricultural Policy,[29] its objectives, principles and contribution to the strategy Europe 2020 Strategy. In addition to the question of how CAP can contribute to the development of the Europe 2020 Strategy, a public hearing gathered was focused on four main issues:

- *Why is the European Common Agricultural Policy?*
- *What are the objectives of the society for agriculture in all its diversity?*
- *Why is it necessary reform of the CAP and how can we meet the expectations of society?*
- *What tools are needed for the future reform of the CAP?*

Based on the results of public consultation and exchange with the Council and the European Parliament, the Commission on 18 November 2010. The announcement represented a "CAP towards 2020", which provides options for the future of the CAP and initiated discussions with other institutions and stakeholders. Display of bills scheduled for year 2011.[30]

[28] EU Commissioner for Agriculture and Rural Development Dacian Cioloş.
[29] http://ec.europa.eu/agriculture/cap-post-2013/debate/index_en.htm
[30] http://ec.europa.eu/agriculture/cap-post-2013/communication/index_en.htm

According to recent information that is of 26.06.2013 the Commission, the Council and the European Parliament (EP) reached a political agreement on the reform of the common agricultural policy . Subject to formal adoption by the Council and the EP as a first reading agreement when texts are translated into all the languages of the member states. On the basis of a Commission proposal from October 2011. Agreement relating to the four basic elements of the CAP:

*1) to direct the payment,*

*2) the one-off common market organization (EDA),*

*3) Rural Development and*

*4) Horizontal Regulation for financing, management and monitoring of CAP.*

The number of questions will be discussed separately in the negotiations on the Multiannual Financial Framework (MFF) for the period of 2014 the 2020th - Especially in terms of the transfer of funds between direct payments (Pillar 1) and rural development (Pillar 2), allocation of national envelope for direct payments and rural development, the rate of co-financing and questions about the upper limit and gradual decline.[31] Table 1 you can see the total budget and the funds that were intended for the CAP for the period 2010-2012.

**Table 1.** *Total budgetary resources and funds intended for the common agricultural policy (in million EUR per)*

| | **2010 Execution** | **2011 Budget** | **2012 The funding** |
|---|---|---|---|
| **EU budget** | 139 832.5 | 138 459.7 | 142 531.0 |
| **Agriculture and Rural Development** | **58 880.4** | **57 292.2** | **58 794.8** |

**Source:** *EC, Agriculture and Rural development DG, Financial Report & accounting 2010 (chapter 0501: EC, Budget DG, EC - OJ L68 (15.03.2011), EC - SEC(2011)498 (20.04.2011)*

In the months following important decisions will be taken at the EU level, related to the implementation of the new CAP. For Member States, what lies ahead is the development of new rural development program. You will have to make important decisions relating to the scheme of direct payments

[31] http://europa.eu/rapid/press-release_MEMO-13-621_en.htm

which will be implemented from January 2015. The challenge newest CAP will certainly represent an attempt to strike a balance between effectiveness and efficiency. In taking these decisions Member States have an obligation to make the most of the opportunities offered by the reform to identify future strategies for their agricultural sectors to ensure their competitiveness and sustainability in the longer term.[32]

## Conclusions

In the period preceding the emergence of the European Union agriculture was a sensitive issue for most governments in Europe. The situation in agriculture in most of Europe after the Second World War was bad. There was not enough food. There were no adequate mechanisms to ensure enough food for the entire population. For this reason, the main goal of ZAP was the growth of agricultural productivity and ensuring sufficient food production, ensuring quality of living standards of the rural population. CAP is at its inception was based on the production of which is related to price support, yet there was no mention of addressing the structural problems of agriculture. This policy has enabled the creation of surpluses of some agricultural products. This all led to the opinion that it should be made more comprehensive formulation of the EEC. In this direction he went and Mansholt Plan Act of 1968 year. Under this plan, the Commission proposed a radical change in the common agriculture. The very essence of Mansholt Plan reflected the limited price policy and market support and encouragement of nearly five million farmers to abandon unprofitable production. Throughout the period of the seventies there were some attempts to introduce new reforms. Some serious reform activities are made only in the mid eighties the adoption of the Green Paper, which gave a new relationship with the EEC agricultural policy.

The Common Agricultural Policy has changed fundamentally with the reform package. McSherry plan contained four major policy changes: First, there was a decrease in prices in certain sectors. Second, given the direct support of farmers' incomes. Third, an important feature of these reforms was the introduction of so-called. "Scheme for non-use," which was supposed to commercial producers in certain sectors (notably cereals sector) in certain regions of wages to keep land idle rather than to grow crops that the EU should be purchased and fourth point, which is related to the follow-up measures.

[32] http://ec.europa.eu/agriculture/policy-perspectives/policy-briefs/05_en.pdf

This included the introduction of new programs to support rural development, organic farming, replacement of farms and forests early retirement of farmers. Incentives extension together with a more pronounced concern for the environment and the concerns of consumers made on proposals for reform of the CAP in Agenda 2000, the Commission strategy to " strengthen and expand the Union in the first years of the twenty-first century. " Agenda 2000 was adopted in 1999 at the Berlin summit with the aim of further long-term development and continuing trade negotiations with the WTO. The Heads of State and Government of the EU agreed to new agricultural strategy makes a coherent policy that would constitute a framework for agriculture and regional development in the EU. Reform of the 2003rd years is consistent with previous reforms and refers mainly to sustainable agriculture and rural development. Reform has been featured in several major elements and they are: Continue the implementation of Agenda 2000 on access to, and separation of direct support, the introduction of mandatory reductions of direct payments in the event of non-compliance with EU standards of environmental, food safety, animal health and welfare, strengthening and improving rural development, strengthening of EU rural development policy, and help farmers to meet EU standards in production starting since 2005 year. And finally, introduces mechanisms for fiscal discipline to ensure that the cost of the CAP does not exceed the budget limit.

The reform of the CAP in 2006 represents a radical change in sugar production. Ministers of Agriculture of the European Union on 20 February 2006 formally adopted a radical reform of the sugar sector. The reform is allowed to provide long-term and sustainable future sugar production in the EU in order to improve competitiveness and market orientation of the sugar sector and to strengthen position within the EU in the current round of talks with the World Trade Organization. The formulated Common Agricultural Policy should be awake again reformed during the period from 2013th year. In this regard were initiated discussions on the future of the Common Agricultural Policy, its objectives, principles and contribution to the strategy Europe 2020 Strategy.

## References

1. *Agenda 2000 for a stronger and wider Union*, COM (97) 2000 final VOL. I. Brussels: Commission of the European Communities, 15.07.1997, 98.

2. *Bulletin of the European Communities, No.3/1985*, тачке 1.2.11, 2.1.22 и 2.2.12.

3. European Commission, (2005): „*The Agricultural Situation in the European Union, 2003. Report, European Communities*“, Brussels, Luxembourg, 25.

4. *Official Journal the European Union*, L 303, 7-9.

5. *Official Journal the European Union*, L 339, 52-69.

6. Baldwin R., Wyplosz C., (2010): *„Економија европских интеграција“*, Дата статус, Београд, 376-377.

7. Dinan, D. (2009): „Sve bliža Unija“, Službeni glasnik, Beograd, 339-340.

8. Ловре К., Тркуља Ђ. (2003): *„Интегрална политика аграрног и руралног развоја Европске уније и импликације на аграрну политику земаља у транзицији“*,Анали економског факултета у Суботици, број 9, Суботица, 6.

9. Petit M. (1989): *„Pressures on Europe's common agricultural policy“*, International food policy research Institute, Washington I Ecole Nationale superieure des sciences agronomiques appliquees, Dijon, 10.

10. Поповић В., Катић Б. (2007): *„Доха рунда преговора у СТО и интерна подршка пољопривреди Србије“*, Економски анали, 52(172), 97.

11. Prokopijević M. (2009): *„Evropska unija“*, Službeni glasnik, Beograd, 199.

12. Sarker, R., Jayasinghe S. (2007): *„Regional trade agreements and trade in Agri-food products: evidence of the European Union for gravity modeling using disaggregated data“*, Agricultural Economics 37, 95.

13. Swinbank A. (2005): *„Developments in the Doha Round and WTO dispute settlement: some implications for EU agricultural policy“*, European Review of Agricultural Economics, 32 (4): 551-561.

14. Hicks, S. (2007): *„Politički sistem Evropske unije“*, Službeni glasnik, Beograd, 269.

15. Цвијановић Д., Симоновић З., Михаиловић Б., (2011): *„Тежишта и циљеви нове реформе ЗАП и политике ЕУ према новим члановима“*, Економика пољопривреде број 3, Београд, 364.

16. http://ec.europa.eu/agriculture/capreform/index_en.htm (20.03.2014)

17. http://ec.europa.eu/agenda2000/public_en.pdf (20.03.2014)

18. http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/194&format=HTML&aged=1&language=EN&guiLanguage=en (21.03.2014)

19. http://ec.europa.eu/agriculture/cap-post-2013/debate/index_en.htm (21.03.2014)

20. http://ec.europa.eu/agriculture/cap-post-2013/communication/index_en.htm (21.03.2014)

21. http://europa.eu/rapid/press-release_MEMO-13-621_en.htm (21.03.2014)

22. http://ec.europa.eu/agriculture/policy-perspectives/policy-briefs/05_en.pdf (21.03.2014)

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### *- rural development and (un)limited resources -*

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