INSTITUTE OF AGRICULTURAL ECONOMICS, BELGRADE, SERBIA

IAE

International Scientific Conference

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

– regional specificities –

Thematic Proceedings

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International Scientific Conference

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- regional specificities -

THEMATIC PROCEEDINGS

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December, 10-11th 2015

Belgrade Chamber of Commerce - 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"

- regional specificities -

18. BALKAN SCIENTIFIC ASSOCIATION OF AGRARIAN ECONOMISTS, BELGRADE – SERBIA

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   Prof. *Wim Heijman*, Ph.D.

iv

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 - regional specificities"*, which was held in period 10-11th December 2015 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 *67 scientific-educational workers*, is the *Institute of Agricultural Economics Belgrade*, which collaborates in realization of this project with *6 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; Institute for Science Appliance in Agriculture, Belgrade; Institute of Medicinal Plants Research Dr Josif Pančić, Belgrade.*

Mentioned Project is implementing within the period 2011-2015, 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 - regional specificities*", 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 *Romania, Bulgaria, Russia, Poland, Germany and Macedonia*.

After all *38 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 *4 thematic sections*:

I) *NEW TECHNOLOGIES AND THE SUSTAINABLE USE OF NATURAL RESOURCES IN AGRICULTURE (section was represented by 4 papers);*

II) *PRODUCTION AND PLACEMENT OF AGRICULTURAL PRODUCTS WITH SPECIAL QUALITY CHARACTERISTICS (section was represented by 11 papers);*

III) *STRENGTHENING INSTITUTIONS AND REGIONAL COOPERATION IN FUNCTION OF AGRICULTURAL DEVELOPMENT (section was represented by 12 papers);*

IV) *SUSTAINABLE TOURISM IN FUNCTION OF RURAL DEVELOPMENT - REGIONAL SPECIFICITIES (section was represented by 7 papers).*

Belgrade,   **Editors:**

December, 2015   *Jonel Subić, Ph.D.*
                                                    Boris Kuzman, Ph.D.
                                                    Andrei Jean Vasile, Ph.D.

Table of Contents

II SECTION

PRODUCTION AND PLACEMENT OF AGRICULTURAL PRODUCTS WITH SPECIAL QUALITY CHARACTERISTICS

III SECTION

STRENGTHENING INSTITUTIONS AND REGIONAL COOPERATION IN FUNCTION OF AGRICULTURAL DEVELOPMENT

IV SECTION

SUSTAINABLE TOURISM IN FUNCTION OF RURAL DEVELOPMENT - REGIONAL SPECIFICITIES

PLENARY SECTION

PAPER BY INVITATION

INSTITUTIONAL SUPPORT FOR THE ECONOMIC ACTIVITY IN RURAL AREAS IN A FORM OF A POLICY IN POLAND

Adam Wasilewski[1], Marcin Gospodarowicz[2]

Abstract

The objective of the study was to assess institutional support for the development of non-agricultural economic activity in rural areas in Poland, by evaluating the efficiency of the policy of financial support from the European Union (EU) budget. The empirical studies were focused on identifying the economic effects of transferring public funds to the private sector. Those studies were carried out using methods such as descriptive and comparative analysis and the econometric method of the Stochastic Frontier Analysis (SFA). As empirical material, data from the Central Statistical Office (CSO) for the period 2004-2013 were used. The empirical studies show that the higher scale of support from the EU budget results in faster growth in the number of enterprises run by natural persons, micro-enterprises and the number of the employees. However, the technical efficiency of this support is low - with the transferred funds, only less than 37% of entities were established.

Key words: *institutional environment, policy efficiency, development of economic activity, rural areas*

Introduction

The policy is considered one of the elements of the institutional environment (North, 2005), which has a significant impact on market transactions taking place. In turn, the development of the sector of small and medium-sized enterprises is one of the priorities of the economic policy in both Poland and European Union (European Commision, 2013). The result of this approach is the creation of a wide range of financial

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instruments which should directly or indirectly support this development (Murzyn, 2010). However, each type of instruments available at the national level within the framework of the functioning operational programs contributes to the development of economic activity and the creation of entrepreneurial attitudes of the population in a slightly different way. This results mainly from the specific nature of the impact of public funds on the production of private goods in case of applying a specific instrument. In the majority of economic theories, the most recommended form is support through the creation of public goods (Stiglitz, 2004), such as technical and social infrastructure or support for the creation and transfer of knowledge.

Currently, one of the main trends dealing with the role of institutions is the New Institutional Economics. According to North (2005), institutions are both formal and informal rules of play for organisations. Among economic organisations he mentions, *inter alia*, companies, trade associations or cooperatives. Nevertheless, he also distinguishes a group of political organisations into which he includes: political parties, legislator and regulatory and enforcement bodies. The criterion of the existence and functioning of organisations is the objective which may be to maximise profit in case of economic organisations or to re-elect in case of political parties. The universal objective of organisations, regardless of their nature, is, however, to survive under conditions of scarcity leading to the competition. The policy covers the specific rules of play allowing to change the level of the implementation of the set up objectives. The identification of organisations associated with the given policy and changes with regard to the implementation of their objectives may be one of the ways to assess the policy efficiency in the context of the theory of the discussed trend.

This approach is, however, very general. Nevertheless, from a review of the literature it results that in the New Institutional Economics there is no precisely defined concept of the efficiency as it is in case of the efficiency understood by Pareto or Kaldor-Hicks (Stringham, 2001). The theorists of this trend, however, refer in their studies to the issue of efficiency. For example, North (2005) states that "...companies, political parties, and even higher education institutions in the face of competitive organisations must seek to improve the efficiency". According to the author, the suppressed competition restricts the organisation's motivation to invest in new knowledge and, consequently, does not induce sudden institutional changes. In turn, the strong competition accelerates institutional changes.

In these considerations, the author concludes that the reason for improving the efficiency is generally the competition, and a measure serving this purpose is an improvement in the level of knowledge. Therefore, a question arises what kind of implications it has for assessing the efficiency of the policy supporting the development of small and medium-sized enterprises, in particular by means of direct subsidies.

Taking on an assumption on the existence of relationships indicated by North, we may say that the assessment of the policy efficiency should take into account the competition of the environment in which the given organisation operates, i.e. enterprise. If the competition is negligible, support for the enterprise development by subsidising knowledge transfer may bring negligible results, as enterprises will have no motivation to use it. The opposite effect will be in the highly competitive environment. In turn, direct transfers of funds to selected enterprises may result in the elimination of competitive enterprises, and in the long term, reduce the tendencies to invest in new knowledge, due to the lack of sufficient competition (Bunderson, Reagans, 2011). However, in certain circumstances, such transfers may be beneficial. This situation will take place when under the negligible competition they will contribute to the formation of new enterprises, which will motivate existing enterprises to improve their efficiency. The scale of this support and the conditions under which it is granted should be, however, defined in such a way so as not to eliminate existing enterprises from the market.

The assessment of the specific policy, including support for the development of the sector of small and medium-sized enterprises, may also be carried out in terms of the decentralisation of power, which is also one of the issues raised in the New Institutional Economics. The representative of this trend, Weingast, states, by adopting Hayek's assumptions on the significant importance of diversified information (Weingast, 2005) that authorities of the lower administration level have the better information about local conditions or preferences than the central government. For this reason, political decisions made at lower levels are better adapted to local needs. Admittedly, the author considers these relationships on the example of federalism and refers political decisions to the issue of the production of public goods, but his observations may be applied also to the assessment of the policy supporting the development of small and medium-sized enterprises in Poland. Some instruments of this policy such as, e.g. infrastructure development are a typical example of support by producing public goods.

It also seems that support for the production of private goods, as a result of the policy pursued, will correspond to local needs to a larger extent.

Thus, if the adaptation of the policy to local needs is adopted as a criterion of efficiency of this policy, this policy may be assessed based on the degree of decentralisation of decisions on the support distribution criteria. This approach can also be justified by the fact that decisions made at the local level may, to a larger extent, eliminate solutions applied as part of the distribution of support, which will distort competition. It is also confirmed by Weingast, according to whom the central government has a tendency to create the policy according to the rule "one size fits all". As a result of this, the pursued policy is not flexible enough to be adapted to diversified local conditions (Bailey, 1999). This situation applies largely to support granted to entrepreneurs under various operational programs. Although most of these programs are implemented by *voivodeship* self-governments, the distribution criteria, and at least the major part of them, are determined at the central level. However, according to Weingast (2005) there are the areas in which the policy decentralisation fails. An example of a situation in which local authorities are not able to cope with the consequences of their decisions, are the externalities related to environmental pollution. It is therefore reasonable to make the degree of decentralisation of the given policy conditional upon the consequences of its implementation and upon its enforceability.

Nevertheless, the assessment of the policy efficiency by defining the degree of its decentralisation in the context of adapting to the possibilities of emerging of specific externalities requires making several assumptions. The better adaptation of the policy to local needs may take place under the conditions of:
- the absence of corruption,
- the absence of the phenomenon of rent-seeking by local authorities,
- the absence of motivation to support interest groups.

According to Weingast (2005), such phenomena cannot be ruled out. The decentralisation of decision-making with regard to the given policy leads, according to the author, to an increase in the capacity and motivation to support private rather than public activity. This, in turn, forces to take account of the above phenomena in case of assessing the policy efficiency in the context of decentralisation. However, the considerations of the aforementioned author include one more aspect of the process in question,

which to some extent results from the phenomenon of rent-seeking by local authorities. The policy decentralisation contributes to the emergence of the territorial competition. The condition of competition among territorial units is, naturally, the mobility of labour resources (Tiebout, 1956). Nevertheless, the increase in the competitiveness of the unit as a result of the policy pursued may also be an indicator of its efficiency. The increase in the competitiveness of the unit results, in this case, from the attitude of local authorities geared towards rent-seeking. However, the policy for improving the competitive position excludes the phenomenon of corruption and activity for narrow interest groups. Disregarding the rights of a wider group of inhabitants, under the conditions of high mobility of the human capital, may result in its outflow. In Poland, the human factor is admittedly not much mobile, but the cases of territorial competition are encountered. An example could be the use of a possibility of determining tax rates on properties or means of transport by commune self-governments. Similar consequences could result from the use of subsidies for the development of economic activity in sectors of particular importance to local authorities. Nevertheless, these solutions are not widespread yet.

One more issue related to support by means of subsidies results from the property rights theory. This theory includes a statement that if the transfer of property rights is allowed, the efficiency of the output allocation is of secondary importance. Property rights will be granted to those units which value them most. So, if using the policy, we make the allocation to the less efficient units, the market will revise the decisions made, this way or that.

The above statement stems from the Coase theorem (1960), according to which, if property rights are transferable and transaction costs are not too high, then the exact definition of the property right is not valid because the parties may transfer this right as a result of which it will reach its highest value. Thus, Coase introduces the condition of making an adjustment to the output allocation, which the transaction costs is. This, in turn, leads to a situation where the resource reallocation to the most efficient owner will take place only if the increase in the value of owned property rights is greater than the transaction cost. Otherwise, the rights still remain at the competence of the unit with the lower efficiency. When assessing the allocation efficiency by means of the policy, it would be necessary to assess the above relationships in the first instance. Should the condition enabling the reallocation of the resource property right be

met and these resources would still remain at the competence of the unit to which they were allocated using the given policy, this would mean that they were granted to the most efficient unit.

From the above considerations it results, in general, that any forms of intervention, to which we may also include direct financial support for small and medium-sized enterprises within the framework of the European Union policy, slow down the process of the efficient resource allocation. However, they may be an important factor of the economic growth, just as they were in China. According to Murrell (2005), such a role is played by the model of dual economy as the application of various forms of intervention strengthens the efficiency "on the margin". In the context of the New Institutional Economics, this means a temporary approval for a set of informal rights giving a possibility of the submarginal production. However, this provides social protection of these units, which, as a result of the reforms, i.e. the transition to the purely market economy, would lose most (Lau et al., 2000).

Admittedly, the result is the slowdown of the above-mentioned reallocation, but thanks to this, in the opinion of the neoinstitutionalists, we gain time allowing to prepare the mechanisms securing the market transactions. Taking into account the economic aspect of dual economy, it may be concluded that some solutions may also be applied in Poland. The use of such mechanisms is justified by the Constitution of the Republic of Poland, which defines the economic system of the country as the "social market economy". Assessing the policy efficiency according to the criteria of the dual approach would, however, require determining the extent to which the given instrument of that policy supports the units which would suffer the greatest losses in case of its absence. This, in turn, implies a need to determine the criteria for the classification of units into the so-called "group of losers".

To the issue of the assessment of the specific policy, the public choice theory also applies. Unfortunately, according to Clark and Lee (2013), who are the representatives of this trend, now in the economic studies we may notice a tendency to emphasise market failure and to conclude on this basis that this failure is a sufficient justification to take corrective action by the government. Widely ignored is the issue of public choice. According to the above-mentioned authors, the reasons for market failure also result in government failure.

The policy pursued by the government may therefore lead to the improved economic performance, but it may also be harmful to the economy. In this aspect, the assessment of the policy, and even suggestions regarding pursuing a particular policy should take into account, on one hand, a possibility of revising market failure and, on the other, negative effects to which the process of its implementation may be exposed as a result of government failure to implement its process, or, in a broader sense, of state failure. Such formulation of the problem of the possible impact of the state on the market is, however, a kind of negation of the approach applied by behavioral economics (Clark and Lee, 2013). The economists of this trend assume that from a certain moment people start behaving irrationally (Ariely, 2008), due to which they cannot effectively pursue their interests in relations with the market without support on the part of the state. The public choice theory assumes that if we accept a thesis on the irrationality of market entities, before choosing a specific policy, it should be confronted with a thesis on the irrationality of entities of this policy.

The basic premise of the policy supporting the development of economic activity in rural areas should be, however, its efficiency. Nevertheless, taking into account various theories of approach to the issue of efficiency, carrying out a full, comprehensive assessment of the specific policy is very complex in methodological terms. This assessment is additionally impeded by the differences in theoretical approaches to the issue of involving the public sector in the development of private economic activity.

Therefore, the effect of the application of various approaches may be obtaining conflicting results. Thus, the assessment of the efficiency of the policy supporting the development of non-agricultural economic activity in rural areas is generally a partial assessment. Such an approach has also been applied in this study. The adopted objective of the study was to assess the policy by assessing the efficiency of financial support from the EU budget, as its main instrument. It should be noted here that, in relation to the total level of support for the development of entrepreneurship, i.e. of direct and indirect nature, the local efficiency has been assessed. To this end, the mesoeconomic analysis has been applied, which allowed to determine the relationships between the inputs incurred and outputs achieved at the commune level.

Methodical approach

For the studies of the local efficiency of financial support for non-agricultural economic activity, the data from the CSO Local Data Bank for 1.529 rural communities have been used. From the population of rural communities, those communes were removed whose own income *per capita* in the working-age population differed from the average by more than 3-fold value of the standard deviation. Then, the remaining population of rural communities was divided into quartiles in terms of the level of support from the EU budget transferred to the commune in the years 2007-2013, under all operational programs *per capita* in the working-age population. A comparative analysis has been carried out in the next stage, for selected groups, trends with regard to the creation of new enterprises run by natural persons and micro-enterprises as well as changes in the number of the employed and unemployed. In addition, the studies have been extended by an analysis of correlation and simple regression between the absolute value of obtained support and economic variables associated with economic activity. However, those analyses were static.

To assess the external efficiency, also the method of the Stochastic Frontier Approach has been used (SFA). The analysis of the stochastic function (production or cost) Stochastic Frontier Analysis (SFA) and non-parametric analysis – Data Envelopment Analysis (DEA) are the most commonly used empirical approaches to the measurement of efficiency. Both methods estimate the limit of efficiency and calculate the technical efficiency of the unit with respect to it. The SFA approach requires the adoption of specific assumptions regarding the functional form of the production or cost function. The main advantage and superiority of the SFA concept in comparison with the DEA is the fact that it takes into account the observational errors and allows to establish confidence intervals of coefficients and sources of inefficiency. Deviations from the limit curve may gave various reasons (incorrect observations, impact of variables not included in the model, such as happiness, weather conditions, etc.) which are so-called noise. Therefore, the stochastic approach to estimating limit models takes into account the existence of statistical noise, which is represented by an additional random variable. The model of the stochastic limit of the function has been proposed by Aigner et al. (1977) and Meeusen and van den Broeck (1977). The model for the ith subject is expressed as:

$$\ln(y_i) = f(x_i, \beta) + v_i - u_i$$

where:

    y_i is an observed ceiling of the result of the ith entity;

    f is a functional form (production or cost function);

    x_i is a vector of inputs used by the entity;

    β – vector of parameters which must be assessed;

    v_i is the rest of the equation, independent by assumption and having the same distribution (iid) where $N(0, \sigma_v^2)$;

    u_i is a non-negative random element that describes the level of inefficiency,

The technical efficiency of the ith entity is described by means of the formula $TE_i = \exp(-u_i)$ and takes values between 0 and 1, where 1 means a unit fully efficient in technical terms. In view of the fact that it is only possible to observe the difference between two random elements $w_i = v_i - u_i$, u_i is estimated using the expected conditional value assuming known w_i: $E[u_i|w_i]$. With regard to the functional form of the efficiency limit, in the literature the most commonly used approach is the Cobb-Douglas approach:

$$\ln y_i = \beta_0 + \sum_{j=1}^{k} \beta_j * \ln x_i + v_i - u_i$$

or its extended and more flexible version in the form of a translogarithmic function:

$$\ln y_i = \beta_0 + \sum_{j=1}^{k} \beta_j * \ln x_{j,i} + \sum_{j=1}^{k}\sum_{h=1}^{k} \beta_j * x_{j,i} * x_{h,i} + v_i - u_i$$

The tests of hypotheses of zero parameters of the production function limit and the selection of the functional form of efficiency models are based on the general statistics of the likelihood ratio test.

Efficiency of financial support under the pursued policy

In the chapter dedicated to the methodology, it has been stressed that the subject of the study was 1,529 rural communities. In the years 2007-2013, those communes received about PLN 13.1 billion under various projects through the Regional Operational Programs, Operational Program Human Capital, Innovative Economy and other programs. Most of the funds were, however, transferred through the Regional Operational Programs.

For the measures of those programs, which included both direct support for the development of economic activity as well as indirect support through infrastructure projects, nearly 63% of the total funds from the EU budget were spent (Fig. 1), allocated for the analysed rural areas.

Figure 1. *The structure of the funds from the EU budget transferred to the analysed group of rural communities in connection with completed projects (status as of 31.12.2013)*
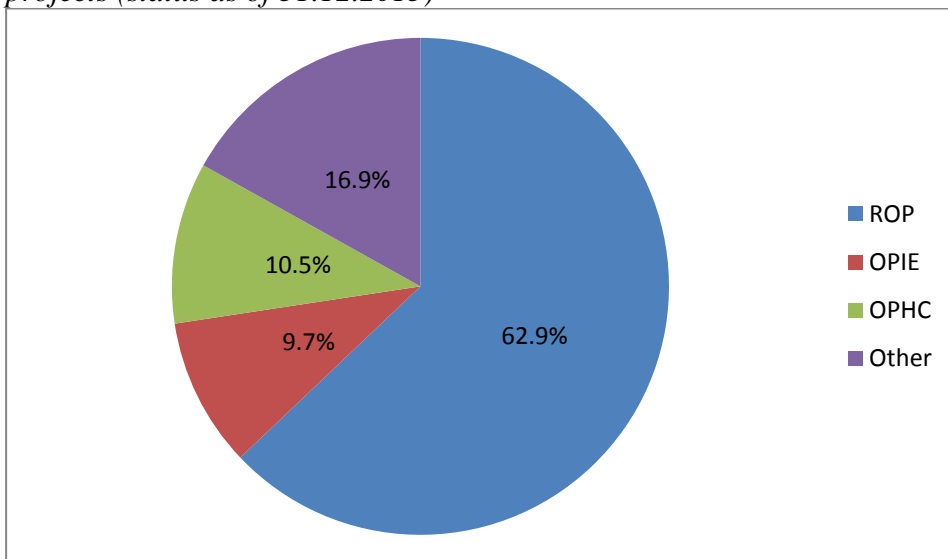
From the studies carried out it results that, on average, each commune received nearly PLN 1.9 thousand *per capita* in the working-age population. The mean value was, however, less than PLN 1.1 thousand which means that the vast majority of the communes received support below the average for those areas. 25% of the analysed communes received support at the level of less than PLN 492 *per capita* in the working-age population and other 25% of communes – more than PLN 2.2 thousand i.e. slightly more than the average. Thus, there was a very high variability in terms of obtained financial assistance. This confirms the value of the calculated coefficient of variation, which reached 251%.

In 2004, i.e. at the time of Poland's accession to the EU, more than 545 thousand economic entities of the private sector operated in the analysed area. The number of those entities has increased regularly until 2013, the

year in which it reached a value of almost 712 thousand. Some collapse in the upward trend occurred only in 2009, which was largely determined by the financial crisis in Europe. Nevertheless, the growth rate for the number of enterprises in rural areas in the years 2007-2013 was similar to the growth rate in the year 2004-2006. However, it should be stressed that in the period 2004-2006 instruments used to support the development of economic activity in rural area were also different. For this reason, comparing specific economic changes in these two periods, in principle, would not add much to the analysis of the local efficiency of the EU policy instruments. Due to this, the occurring economic changes were analysed according to the scale of support. To this end, the communes were divided into quartiles, whose limits were presented in the previous paragraph.

Slightly different were the changes in the indicator specifying sort of the saturation of the analysed areas with economic activity. By analysing the number of economic entities run by natural persons per 1 thousand of inhabitants of working age (Fig. 2), it must be stated that the collapse in the upward trend occurred not only in 2009. The decline in the value of that indicator was, in fact, reported also in 2011 and 2012. However, the reasons were different. In 2009, that collapse resulted from the financial crisis, while in 2011 and 2012 – from a relatively larger increase in the number of people of working age. In other words, the increase in the number of entities fell behind the increase in labour force resources. Such situation occurred regardless of the scale of support (Fig. 2). A similar collapse in the trend occurred both in the groups of communes with a low relative level of support (quartile 1 and 2), and in the groups of communes with a high level of support (quartile 3 and 4). However, the entire period of 2007-2013 saw an increase in the relative number of enterprises, regardless of the level of support.

Moreover, from the studies carried out it results that relatively more resources from the EU budget were received by rural communes with better developed economic activity. In 2007, the number of enterprises per 1 thousand people of working age was, in fact, much higher in the communes belonging to quartile 3 and 4, i.e. with a higher level of EU support *per capita* in the working-age population, than in the communes belonging to quartile 1 and 2 (Fig. 2). Similar trends occurred also in case of the indicator specifying the number of microenterprises per 1 thousand people of working age. Quite an interesting phenomenon was also noted in case of the communes in 1 and 2 quartile. From the moment of

launching various instruments of financial support, non-agricultural economic activity run by natural persons developed least in the communes where potential beneficiaries made the least use of those instruments. On this basis, we may even formulate a hypothesis that at a very low level of the development of entrepreneurship in rural areas, a clear increase in the scale of public aid may significantly accelerate its development. However, the verification of this hypothesis requires more in-depth studies.

Figure 2. *Number of economic entities run by natural persons per 1 thousand people of working age, in the groups of communes diversified in terms of the amount of EU support per capita in the working-age population*
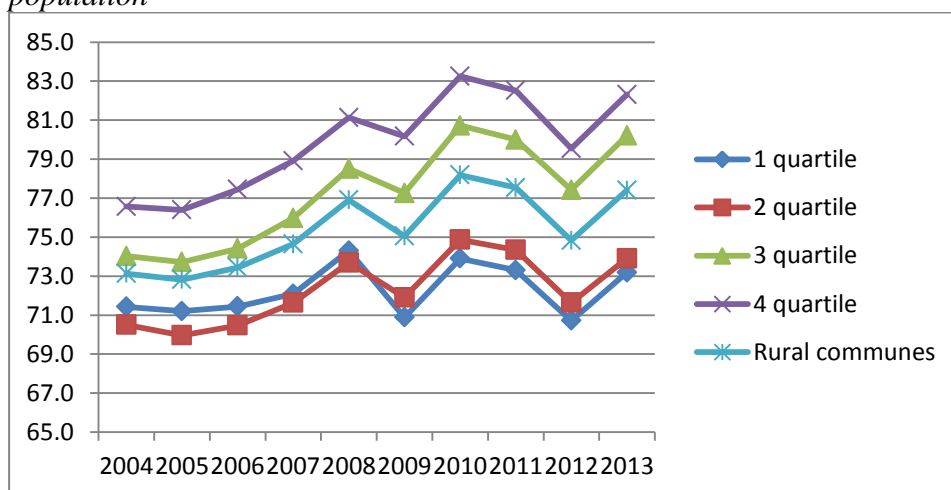
Source: *Own calculations based on the CSO data.*

By analysing the increase in the absolute number of entities in the groups of communes diversified in terms of the scale of financial support (Fig. 3), thus excluding the negative impact of the increase in the number of people of working age, it may be concluded that the relative amount of financial transfers from the EU budget played an essential role in taking economic activity by natural persons. In the years 2007-2013, i.e. in the period of applying financial instruments adopted for the studies, the greater increase in the number of entities was reported in the groups of communes with a higher level of support. Particularly visible is the difference between the first and the fourth quartile, in which an increase in the number of these entities, throughout the period of the impact of support, was by as many as 6 percentage points higher. It should be

stressed here that a higher level of the increase in the number of economic entities was achieved in the groups of communes, in which the initial state of the number of entities was also higher. In the context of the increase in the number of economic entities run by natural persons, financial support from the EU may be defined as a quite efficient instrument.

Figure 3. *The increase in the absolute number of economic entities run by natural persons in the years 2007-2013, in the groups of communes diversified in terms of the amount of EU support per capita in the working-age population*
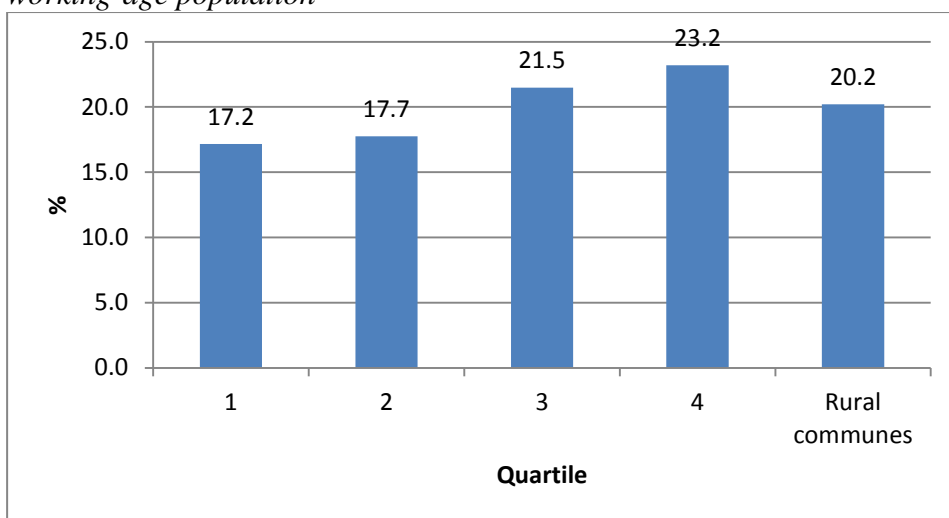
Source: *Own calculations based on the CSO data.*

One of the objectives of the EU policy was to increase employment and to reduce unemployment. In assessing the efficiency of financial support, we should then take into account the changes induced in rural areas in the above areas. The trends of changes in the field of employment were quite similar to those in the field of the development of economic activity in the analysed areas. In the years 2007-2012, we observed the decrease in the share of the employed in the total number of people of working age. In absolute terms, employment in rural areas, however, increased by 10.7% (Fig. 4). The increase in the number of the employed was observed in all groups of communes, regardless of the scale of support. However, it was higher in the communes with a higher levels of EU support.

The studies show that the difference between the extreme, in terms of the relative level of support, groups of communes amounted to as many as 11 percentage points. This means that public funds quite strongly stimulated

employment of new workers although were not sufficient to create the conditions in which the growing labour resources would be fully managed. It should also be stressed that the fastest growth of employment was reported in the communes, in which it was higher. In this context, it may be concluded that the diversity of rural areas in terms of management of possessed labour resources is growing. The applied criteria of the distribution of public financial support are conducive to sort of the economic polarisation of rural areas.

Figure 4. *Changes in the number of the employed in the years 2007-2012, in the groups of communes diversified in terms of the amount of EU support per capita in the working-age population.*
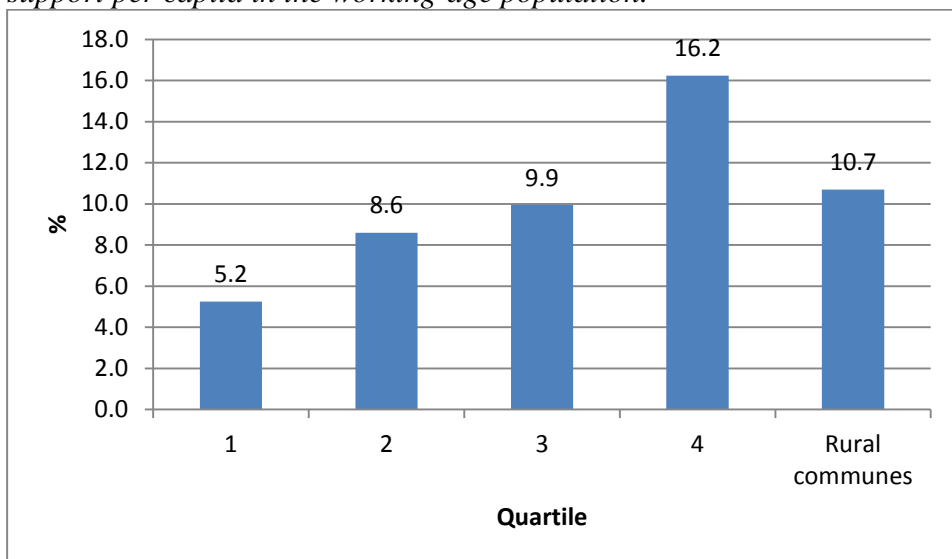
Source: *Own calculations based on the CSO data.*

From the Stochastic Frontier Analysis (SFA) carried out, in which transfers to rural communes under the ROP, OPIE and OPHC were used as inputs and outputs were newly established enterprises run by natural persons, it results that the technical efficiency of support was quite low (Table 1). With the transferred funds, only less than 37% of entities were established, which, in theory, could have been established with that scale of transfers. An improvement in the technical efficiency could be contributed by a significant increase in the scale of transferred support. The efficiency of scale is, in fact, slightly more than 63%. Nevertheless, financial support from the EU budget has a significant positive impact on the formation of new entities. The efficiency of its use in this direction,

however, is quite diversified in terms of communes. The coefficient of the variability of technical efficiency is in fact almost 68%. The obtained results of estimating technical efficiency should be treated as an indication of the insufficient use of the potential associated with EU aid funds in creating entrepreneurship in rural areas.

Table 1. *Descriptive statistics of technical efficiency measures and scale of support from the EU budget*

Variable	Mean	Standard deviation	Max	Min	Median	1 quartile	3 quartile
Technical efficiency measure	0,367	0,249	0,996	0,081	0,268	0,190	0,445
Scale efficiency measure	0,631	0,175	1,000	0,280	0,604	0,504	0,752

Source: *Own elaboration based on the data from the CSO Local Data Bank.*

Conclusions

From the studies of the literature of the subject it results, generally that the efficiency of the policy depends, to a large extent, on the type of the instruments chosen for its implementation. Positively assessed are, first of all, the instruments that serve to strengthen the legal system, thus resulting in reducing bureaucracy generating the transaction costs. In theoretical considerations, the well-functioning system also promotes the efficient resource allocation by creating specific regimes of establishing, transfer and enforcement of property rights. In addition, the efficient resource allocation may be carried out under conditions in which the legislative solutions make economic activity independent of the implementation of political objectives. The use of public funds under the pursued policy should be, in turn, oriented towards manufacturing public goods. The above theoretical recommendations are in the literature of the subject referring virtually to any policy.

Allocating resources through the policy is negatively assessed especially due to the fact that these funds are acquired, according to the theorists, mainly by rent-seeking units and not by efficient units. However, according to the representatives of certain economic trends, the allocation of funds through the policy may also have positive consequences. Such a view is propagated especially by the supporters of dual economy. In their opinion, any forms of interventionism, and subsidising economic activity

is considered as such, slow down the resource allocation process to the most efficient entities. However, in this way they provide the weakest units with the time to adapt to the market requirements.

On the basis of the empirical studies on the impact of the policy on the economic processes through analysing EU funds, which may be classified as the instruments directly or indirectly supporting the development of entrepreneurship in rural areas in the years 2007-2013, it is, however, difficult to determine the time of their reallocation to the most efficient units. In the current period, however, they bring measurable and positive economic effects. From the analyses carried out it results that the higher scale of support from the EU budget results in the faster growth in the number of enterprises run by natural persons, micro-enterprises and the number of the employees.

From the Stochastic Frontier Analysis (SFA) carried out, in which transfers to rural communes under various operational programmes financed from the EU funds were used as inputs and outputs were newly established enterprises run by natural persons, it results that the technical efficiency of support was quite low. With the transferred funds, only less than 37% of entities were established, which, in theory, could have been established with that scale of transfers. An improvement in the technical efficiency could be contributed to by a significant increase in the scale of transferred support.

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EVOLUTION OF LAND STRUCTURES EXPLOITATION IN ROMANIA – CHANGING THE PARADIGMS

Andrei Jean Vasile[1], Alecu Alexandra[2]

Abstract

The evolution of the land exploitation structures reviles not only the effects, of the inland agricultural policy measures during the political regimes, but also the efforts in agricultural production optimization. The paper presents an analysis of the land structures exploitation evolution in Romania from the perspective of the agricultural paradigm changes during the transition to free market economy.

Key words: *agriculture, transition, farm land, holding, agricultural policy*

Introduction

Agriculture was and still continues to represent for Romanian economy an economic branch located in a changing paradigm and looking for a place in the national economy, but having profound implications and broad significances, not only in terms of economic potential national, often clamor and hard capitalized, but also divergent influences that it has on the rural economy, under capitalized and under the pressure of a poor and less fortunate population.

Thus as is found in some studies (Ciutacu et al., 2015), there are differences between the agricultural economies, including the EU-28, the effect of policies on financial allocations designed to achieve support for holdings, whose main result is emphasizing gaps in their provision of capital and less convergent growth in the European agricultural model. On the other hand, the issue of consolidation of holdings and agricultural areas was the object of numerous research studies. Linz and Stepan

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(1996) made an inventory of problems of democratic transition and consolidation in Southern Europe and post-communist Europe, highlighting the main challenges that post-communist states need to exceed in order to create a functional and competitive agriculture.

Van Lier (2000) discuss the necessity of land use planning and land consolidation in the future in Europe, starting from the necessity of using classical instruments in order to achieve efficiencies and improve agricultural productivity, in terms of potential capitalization.

Rembold and Riddell (2002) raise the issue of farm land rationalization and land consolidation from a much larger and complex perspective as the strategies for multifunctional use of rural space and the need to implement national programs for holdings consolidation. Andrei and George (2015) highlights the need to optimize production structures in terms of utilized agricultural area and crop rotation achieved as tools in increasing the recovery of agricultural potential.

Regardless of the expression of opinions outlined in this aspect, it is shaped the more than obvious need to strengthen the agricultural area holdings, as the essential source for increasing the recovery of agricultural potential and productivity levels in the industry. The existance of significant differences in the European area of agricultural productivity is generated by different degrees of aggregation of agricultural property.

The unlock of the potential of agriculture involves creating agrarian production structure able to combine and use as close to optimum specific resources available in this economic branch. Strengthening land ownership and agricultural holdings are two of the deepest problems of Romanian agriculture during the realization of the market economy. From this perspective, understanding the role and place of agricultural holdings in the national economy is an essential element in order to increase the capitalization of national agricultural potential.

Agricultural holdings are, perhaps, the most important component in the process of revaluation of high agricultural potential. In the agricultural holding resources are mobilized technical, human and financial resources required by realizing the potential of the agricultural production increased, but mostly is brought to the fore the potential of rural communities, in terms of their dependence on agricultural activities.

Evolution of agricultural holdings is closely dependent on the political system and public agricultural policy measures adopted in many cases by some external measurements of these two components previously mentioned. Structural dependency on agricultural production measures and policy decisions imposed a tendency to centralize production decision effectively contributing to a dissolution of the fence the involvement of local stakeholders in identifying the best production solutions.

Evolution of agricultural production structures in the last six decades was and is challenged by uncertainties and comprehensive paradigm changes. If in the beginning, in the early years of communist dictatorship, strengthening land ownership was brutally made by forcing land owners to give the land to the community service, using the Soviet model, after the fall of communism, we witnessed an active dissolution of land ownership in Romania, and a wide polarization thereof. Based on these considerations, the paper is structured into two general analysis or production structures until 1989 and after 1990.

The structure of agricultural production in the communist period

The main objective in the establishment and especially the strengthening of socialist agriculture, since the beginning of the communist regime in Romania, was the dissolution to extinction of property farms including the small individual, both on earth and technical capital available accumulated in peasant households, and means of work and setting up collective farms as the main tool of agricultural production. Destruction of agricultural property peasant and construction of the new agriculture socialist generated both social instability and resistance to new structures of production, seen by the regime as a harmonization of interests of the two social classes - peasants, addicts to land and workers - in building new socialist economy.

The new socialist agricultural production structures were established by merging individual agricultural properties and forcing to delete the old structures of agricultural production in order to create a bourgeois with an intense industrial character of agriculture. Thus, for a period of more than 40 years, the main forms of organization of agricultural potential national recovery and exploitation were the three main units of Agricultural (Constantinescu N.N., p.190):
- CAP cooperative agricultural units;
- State agricultural enterprises;
- Stations for agricultural mechanization.

The organization of new socialist agricultural production structures imposed a comprehensive mobilization of many administrative resources, human, financial and capital whose effectiveness is sometimes questionable. The chart below presents the evolution of the main forms of existing farms in Romania during 1960-1989.

Figure 1. *The agricultural units evolution in Romania, 1960-1989*

- units -	1960	1970	1980	1985	1986	1987	1988	1989
■ Stations for agricultural mechanization(SMA)	243	293	714	573	573	573	573	573
■ State Farm Companies (IAS)	560	370	407	419	419	420	420	411
■ Total cooperative agricultural units from which	5398	4626	4643	4363	4352	4327	4258	3776
■ CAP	5398	4626	4011	3745	3745	3720	3652	3172

(chart displays: $y = 655.14x$, $R^2 = 12.2$)
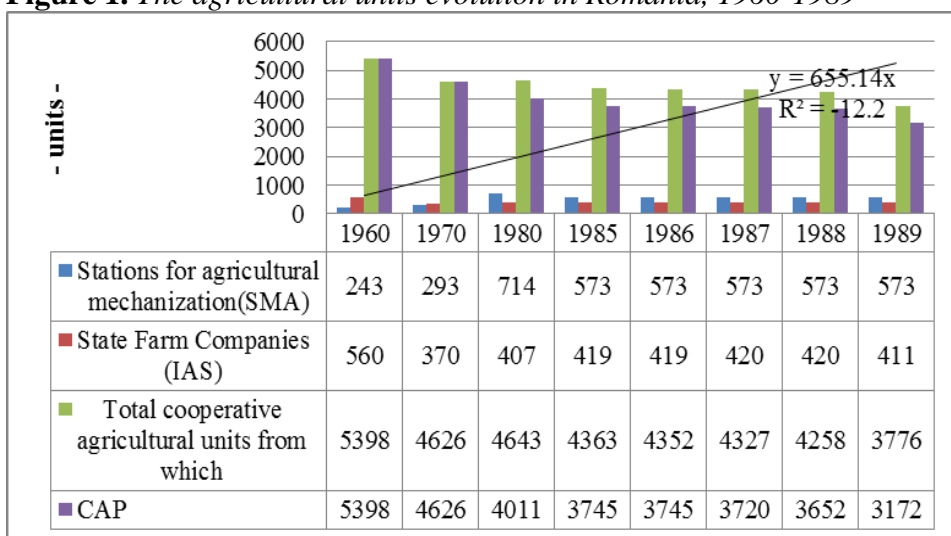
Source: *authors based on: Anuarului Statistic al României, 1990, INS*

As can be seen in Fig 1 the agricultural cooperative units were the main tools in achieving socilaiste agriculture. It should be noted from the outset that the CAP had a majority within them. During the period 1960-1980 ahricultural cooperative units were synonymous with Cap respectively 5398 units in 1960 and 4626 units in 1980. After 1980 we can notice a slight decrease in the number of CAP, while state farm companies remain relatively constant, around 420 units until 1989. It can also be noted that the number for agricultural mechanization after year 1985 remains steady at 573 units.

From a general analysis of the data in figure above it can be noted that throughout the period analyzed, satation for agricultural mechanization increased by 135.8%, or 330 units, the agricultural cooperative units recorded a decrease of 30.05 %, reducing their number with 1662 units, accentuated by dramatic decrease of CAP with 2226 units, or 41.24%. The smallest drop was registered in State Farm companies, only 26.61%, or 149 units. In these circumstances it can be concluded that, from a structural perspective to exploit the agricultural national potential during

the communist period was succeeded in building a complementarity between agricultural structures. The aggregation of agricultural area under the 2 forms of exploitation centralized: cooperative agricultural enterprises, which include CAP, respectively, state farms, to allow a higher valorisation of the national agricultural potential. Creating resorts for agricultural mechanization, as support structure for the first two, is an element with a favorable impact on improving the degree of recovery and are usually technically well-equipped structures with specialists. Their evolution over the period 1960-1989 demonstrate the importance given to promote technical arguments in the national agricultural potential.

Thus in order to understand the role of holdings structures in the national economy, in figure 2 is represented the evolution of the farm size in some European countries during 1950-1990.

Figure 2. *Evolution of the farm size in some European countries, 1950-1990*

$$y = 2.3758x$$
$$R^2 = -1.123$$
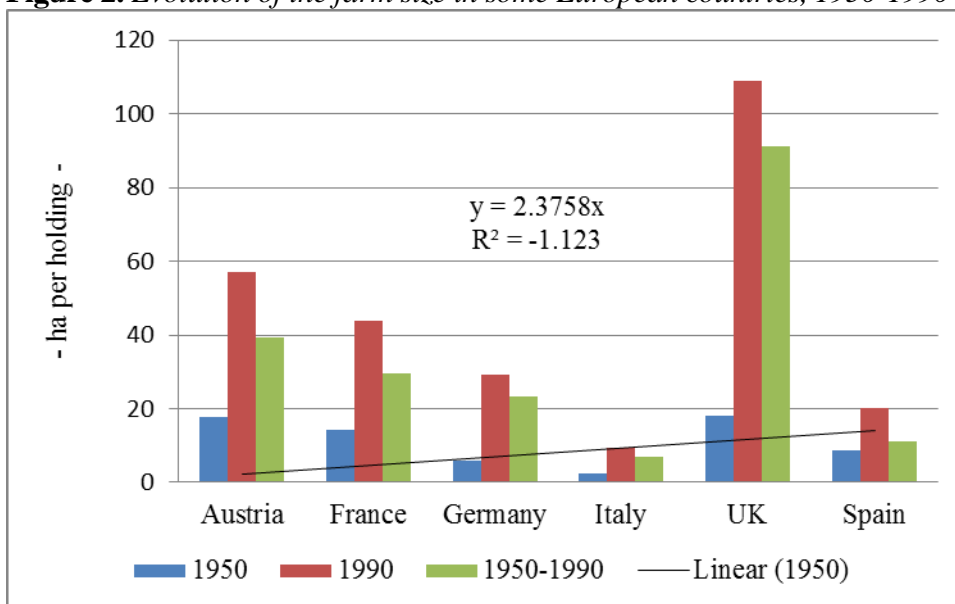
Source: *author's based on (Bold si Urs, 2003; p.110)*

Between 1950-1990 it can be seen, as in the case of the six European economies investigated, a consolidation of agricultural property, noting that these countries strengthen agricultural holdings was carried out only through measures and financial instruments and not brutally like Romania's case.

Thus, if in 1950 the farm size in Austria was 17.8 ha / holding and forty years later it reached 57 ha / holding (an increase of 39.2 ha / holding), in France it increased from 14.2 ha / holding to 43.8 ha / holding (+29.6 ha / holding), Germany from 6 ha / holding to 29.3 ha / holding in 1990 (+ 23.3ha / holding), Italy from 2.3 ha / holding 9.4 ha / holding in the same 1990 (+7.1 ha / holding) the UK from 18 ha / holding in 1950 to 109 ha / holding 1990 (91 ha / holding) and Spain to 8.8 ha / holding in 1950 to 20.1 ha / holding in 1990, an increase of 11.3 ha / holding.

To be closer to the socio-political realities of the region, it is presented in Table 1 the compared structure in interwar Yugoslavia and interwar Romania.

Table 1. *The compared structure in interwar Yugoslavia and interwar Romania*

Ha	Yugoslavia (1931)		Romania (1930-1935)	
	% of holdings	% in UAA	% of holdings	% in UAA
<1	33.8	6.5	18.6	1.6
1-2			33.6	11.1
2-3	34	21.5		
3-5			22.8	15.3
5-10	20.5	27	17.1	20
10-20	8.8	22.3	5.5	12
20-50	2.5	13	1.7	7.8
50-100	0.3	3.2	0.3	4.5
>100	0.1	6.4	0.4	27.7

Source: *authors based on (Murgescu, 2010; p.295)*

From Table 1 it can be noted that in the period 1930-1935 the most significant share of arable land (27.7%) in Romania is 0.4% represented by farms, while small farms with an area > 1 ha represented 18.6% of farms and 1.6 % of arable land. The situation is slightly disproportionate in the case of Yugoslavia where small and very small farms as in the case of Romania hold over 50% of holdings. It may be noted that both in the interwar period and in the contemporary period the phenomenon of polarizationed farms is contemporary. The structure of land ownership is a constant and intractable issue in cases of countries such as Romania and Yugoslavia. Identification of methods of consolidation was a difficult step to achieve and painful to implement.

Land holdings structure has significant effects on productivity levels. Productivity in agriculture is closely related to the level of aggregation and agricultural areas, because according to them are applied methods of mechanization, crop rotation and other specific methods. Table 2 shows the evolution of agricultural productivity in some European countries, for 1948 / 52-1988 / 92 periods.

Table 2. *Agricultural productivity in some European countries, 1948 / 52-1988 / 92*

Country	1948/52	1958/62	1968/72	1978/82	1988/92
Austria	15.2	35.0	56.2	94.7	117.9
Belgium	29.1	56.9	96.4	172.9	243.6
Bulgaria	12.5	22.3	49.2	89.5	177.3
Czech Rep.	21.8	35.5	52.7	73.2	91.3
Denmark	58.3	90.4	146.4	225.8	346.7
France	22.3	40.8	64.8	120.2	187.3
Germany	31.8	59.7	106.7	183.9	240.6
Greece	4.5	7.0	8.6	15.0	22.3
Italy	9.2	18.4	31.2	58.1	83.2
Ireland	20.9	31.3	38.6	64.9	94.8
Yugoslavia	18.6	33.9	40.3	75.4	88.4
UK	36.6	62.1	85.1	111.7	139.7
Poland	19.6	28.7	35.6	40.0	45.3
Portugal	6.6	8.8	18.6	25.5	44.5
Romania	8.6	12.5	23.2	52.9	59.2
Hungary	12.3	21.6	35.9	71.3	90.7
USSR	21.3	38.3	55.8	58.8	63.4

Source: *authors based on (Bairoch, 1999; p.148) and (Murgescu, 2010; p.366)*

As can be seen from Table 2 agricultural productivity shows significant increases in all states submitted. Regarding the agricultural productivity in Romania it can be said that, despite its significant increase from 8.6 million calories produced annually by a male agricultural worker during 1948-1952, it reached 59.2 million calories produced annually by male agricultural worker during 1988-1992.

The significant increase in agricultural productivity is the direct effect of specific national policies for reducing dependencies and increasing agri-food imports and food security. Most of the states listed in the table above were members of CEE, and under the effect of CAP, semnificative increases can be noticed in agricultural production. On the other hand, CAER states intensify agricultural prouduction.

To close the section and provide a general picture of the situation at the end of the communist period, in table 3 is presented Romania's economic level in the European context, for the last year of the communist regime, 1989.

Table 3. *Romania's economic level in the European context in 1989*

Country	Added value in manufacturing (USD/person)	Grain yield (kg/ha)	Average daily consumption of calories (kcal)	Average daily consumption of animal protein (gr)
Austria	3793	5407	3496	64.8
Bulgaria	NA	3991	3683	52.2
Czechoslovakia	NA	4951	3609	63.3
Denmark	3935	5646	3622	66.2
France	3655	6101	3449	76.1
Germany	6690	5715	3464	63.8
Italy	2297	3816	3508	57.3
Yugoslavia	1277	3550	3620	40.4
Polond	836	3136	3464	56.1
Portugal	839	1695	3414	49.9
UK	4048	5792	3181	53.9
Romania	778	3109	3252	38.3
Span	1857	2669	3567	59.1
Hungary	NA	4772	3668	55.5
USSR	NA	1925	3380	56.1

NA: data not available
Source: *authors based on: (Murgescu, 2010) and (Grigorescu, 1993)*

From Table 3 it can be noted that Romania's economic level in the European context is quite unfavorable. Thus, if the value added in manufacturing, Romania recorded the lowest level of 778USD / person, compared to 839USD / person in Portugal and 836 USD / person for Poland or 1277 USD / person in the case of Yugoslavia. Even in the case of others the situation is

favorable for Romania, although it can be noted some convergence of the average daily consumption of calories (kcal) which ranks our country above countries such as the UK and close to the USSR.

Farm structures during the transition period

Achieving market economy in Romania involved a long and anevois transition process, which required a large paradigm shift of the national economy. Agriculture, like other branches of national economy must be widely reformed in order to answer the demands of a competitive market economy. As a paradox, agricultural reform has meant destructuring proprietary land structures especially from the perspective of agricultural land aggregation.

The agricultural reform that started in 1990 meant mostly agricultural land restitution process by the former owners expropriated by the communist regime, but without taking into account whether they have the necessary technical and financial capital to restart the agricultural production circuit. In this contex, we can say unequivocally that the Romanian agriculture has returned in a state of economic primitivism, where small farm owners were forced to return to archaic methods of working the land.

Thus in the early 90s, in Romania were founded legal regulations that contributed to the formation of new economic entities and the transition to a new legal regime of financial property. Thus due to the Law 18/1991 it has began the allotment of land to the rural population, but imposing limits in terms of arable land that could be returned. The transition from communism to a market economy has made the Romanian farmer the owner of agricultural land that had to be exploited. Not having the necessary resources, because by law it was only given agricultural land, and none of the related machinery, farmer was unable to fully understand the role of agricultural holdings.

As stated in some specialized studies (Mauriel, 1994), between farmers and the workers formerly employed by the agricultural cooperatives it has been produced a major break because the socialist property modified relations with land and labor, forcing the workers to lose sense of responsibility (Mauriel, 1994).

In these conditions, the valorification of Romanian agricultural potential was strongly dependent on the evolution of land ownership structures, affected by the accentuated division of land ownership.

Table 4 presents the main legal regulations that have contributed to land ownership in Romania, and thus to create agricultural holdings under the various forms that exist today.

Table 4. *Legal regulations that have contributed to land ownership in Romania*

Typology	Legal categories	Legal framework[3]	Private sector	State sector
Individual	Individual farms	Law no.18/1991 on the land with numerous changes, additions Law no. 1/2000 for reconstitution of propriety rights on agricultural and forestry land	x	-
	Family assotioations	Association law (Low no.36/1991)	x	-
Legal entity	Legal assotiations	Association Law (Law no.36/1991)	x	-
	Agricultural companies	Company Law (Law no.31/1990)	x	x

Source: *authors based on: World Bank (2005).*

Evolution of land fund in Romania

With the land reform started in 1990 in Romania, as well as in most ex-Communist states, there were major changes regarding ownership of agricultural land.

Evolution of land fund distribution by type of propriety was drastaically influenced by reforms that have targeted agricultural sector. Thus, Table 5 shows the evolution of land fund in Romania, during 1989-2000.

Table 5. *The evolution of land fund in Romania, during 1989-2000*

Year	Total agricultural area	Village, county, municipality			%of agricultural area		
		Public propriety	Private propriety	Total	Public	Private	Total state land
1989	14759	4134	0	4134	28,0	0,0	28,0
1990	14769	4244	0	4244	28,7	0,0	28,7
1991	14898	2662	1912	4574	17,9	12,8	30,7
1992	14790	2560	1834	4394	17,3	12,4	29,7
1993	14793	2615	1842	4457	17,7	12,5	30,1
1994	14798	2618	1338	3956	17,7	9,0	26,7
1995	14798	2618	1338	3956	17,7	9,0	26,7
2000	14857	632	3229	3861	4,3	21,7	26,0
Δ1989-2000 (1998=100)	0.7%	-84.7%	68.9%	-6.6%	-84.6%	69.5%	-7.1%
Average	14807.75	2760.375	1436.625	4197	18.6625	9.675	28.325
Median	14795.5	2618	1586	4189	17.7	10.7	28.35

Analyzing the evolution of land fund distribution in Romania during 1989-2000, it can be noticed the change of holdings ownership and that the rural population was allotmented lands in property of the state. The transfer of land ownership from the state property of the individual produced a large readjustment of agricultural production structures.

As it can be seen from the data presented in tabel 5 in 1989-1990 in Romania the agricultural land was completely owned by the state, which account for a share of total agricultural area of 28% in 1989, 28.7% respectively in 1990.

Since 1991, agricultural land began to be transferred to privately-owned, as a result of the land law. Thus in the same year the share of private agricultural land increased, reaching 12.8%, while 17.9% holds public land property of the agricultural area.

Between 1995-200 it can be found a full transfer of land ownership to private ownership, so at the end of the reviewed period, is represented 21.7% of the privately owned agricultural area instead of public ownership that was only 4.3% of the agricultural area.

However, it may be noted that the state continues to hold more than 25% of the land for the entire period, while noting a decrease from 28% share of state land in the agricultural area in 1989 to 26% share in the total agricultural area in 2000 . Figure 3 presents the dynamics of state land privatization in 1991-2001.

Figure 3. *The dynamics of state land privatization in 1991-2001*

Source graph showing bars for 1991-1995, 1996-2001, 1991-2001 with linear trendline:
$$y = 241.21x$$
$$R^2 = -0.181$$
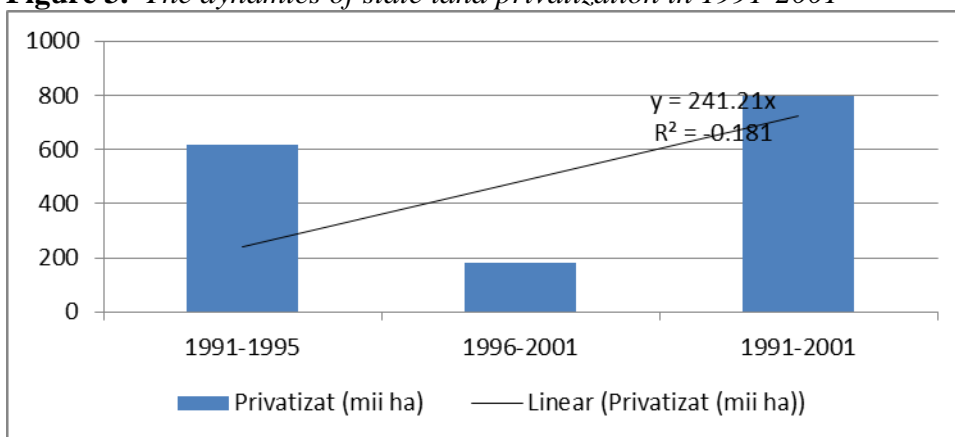
Source: *authors based on: World Bank (2005).*

In Figure 3 you can see that in 1991-1995 was recorded privatization of 77.35% of the privatized land for the entire period analyzed, ie 618 000 ha of the 799,000 ha. After 1996 there may be a slowdown in transfer of land returned to former proprieties owners dropping to 181 thousand ha, mostly because the process is completed.

Restoring land ownership was a constant problem for Romanian agriculture and intractable under an existing legislative framework setbacks that caused significant problems in the implementation. To highlight the dynamic transfer of land ownership in Romania, Figure 4 presents the evolution of the land surface of the reconstituted for 1999-2005.

Figure 4. *the evolution of the land surface of the reconstituted ones in Romania during 1999-2005*
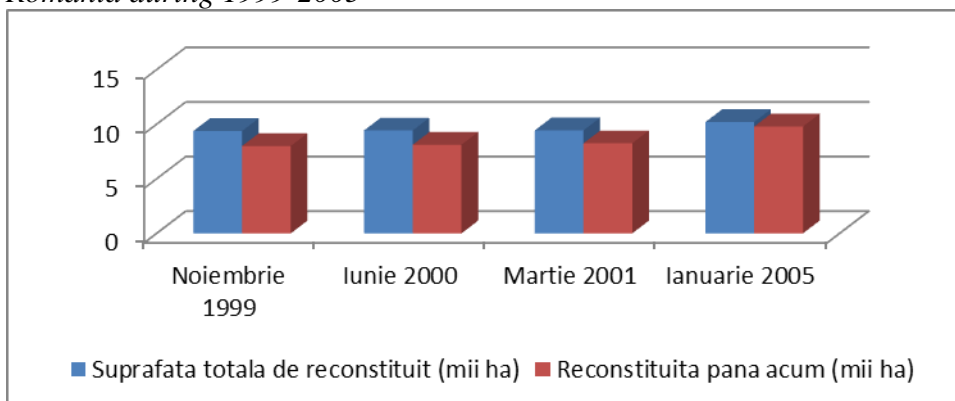
Source: *authors based on: World Bank (2005).*

Figure 4 reveals that in 1999-2005 total area that has to be reconstructed increases gradually since 1999, from 9.367 million ha, up to 10.194 million ha in 2005. Along with this, there is an increase in the total surface reconstructed directly proportional with the area that needs to be reconstituted, its level reaching in 2005 to 9782 thousand ha, increasing from 7.998 thousand ha, reconstructed in 1999. The process of reconstituting the former owners of agricultural land is satisfied in 1999 in proportion of 85.38%, a percentage that increases to 95.96% in 2005.

However, It should be noted that in addition to the transfer of land ownership in private ownership are observed strengthening land ownership by using the second levers available, namely the sale and purchase of land. Thus, in the period 1999-2004 the total value of the sale and purchase of land, and between urban, is growing. The direct effect is seen that the price per hectare for land plot grows from 58 million lei/ ha in 1999 to 139,800,000 lei / ha in 2004 (an increase of 241.03%), and for land located outside town grows from 6 million lei / ha in 1999 to 10,4 million lei / ha in 2004, thereby reaching the total value of 13.913 billion lei.

Table 6. *The sale and purchase of land 1999-2004*

	1999	2000	2001	2002	2003	2004 October
Town area						
Total value (billion lei)	1.555	1.87	2.439	5.395	7.942	9.6
Price (millioan lei/ha)	58	56	64	93	123	139.8
Outside the build-up area						
Total value (billion lei)	281	452	764	2.209	3.04	4.313
Price (millioan lei/ha)	6	7	8	8,7	8,9	10,4

Source: *authors based on: World Bank (2005).*

Although land sales and purchases increased significantly between 1999-2004, both on land located in towns and for the unincorporated areas is found that the biggest increase of the surface is registered when sold outside towns, namely the agricultural area. Thus, as is highlighted in figure 5, for the same period analyzed, area sold increases with 369 391 ha, from 43 977 ha to 413 368 ha in 2004, or 10.63%. Regarding lands in towns is increasing with only 41 782 ha from 26904 ha in 1999 to 68686 ha in 2004.

Figure 5. *The evolution of sales and purchases of lands, in Romania, 1999-2004*
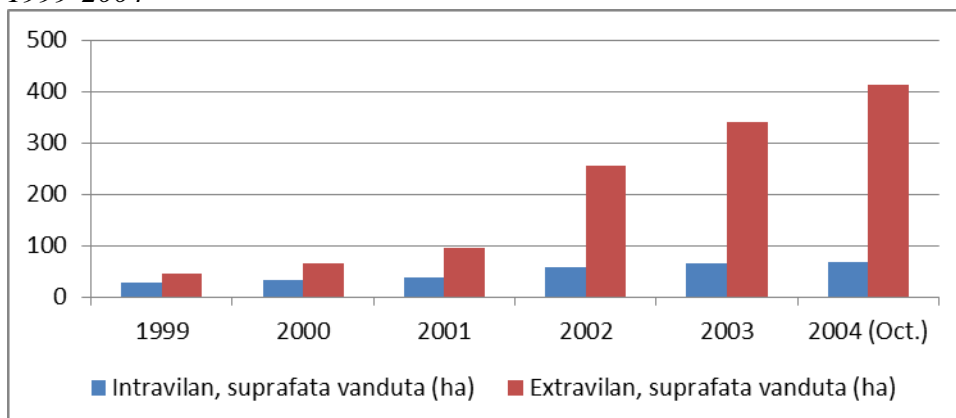
Source: *authors based on: World Bank (2005).*

Romanian farms in the context of the need for land consolidation

The evolution of Romanian agricultural holdings reflect equally the need to strengthen national land ownership in the context of achieving a competitive agriculture, which is still quite difficult to achieve given the sharp break of the property. Having a sharp polarization Farms highlights two Romanian agriculture - one rural subsistence land ownership dominated by small and very broken and the other one, large landed property, aggregated and organized legal high performance. In Figure 6 it is shown the evolution of individual farms in Romania, 2002-2010.

Figure 6. *The evolution of individual farms in Romania, 2002-2010.*

	under 0.1-1	1 - 5	5 - 10	10 - 50	50 - 100	over1 00	Total
2002	2166	1846.1	215.7	44.5	2.8	2.2	4277.3
2010	1871	1518.3	219	69.5	5.4	3.6	3686.7
Diference 2002-2010	-295	-327.8	3.3	25	2.6	1.4	-590.6
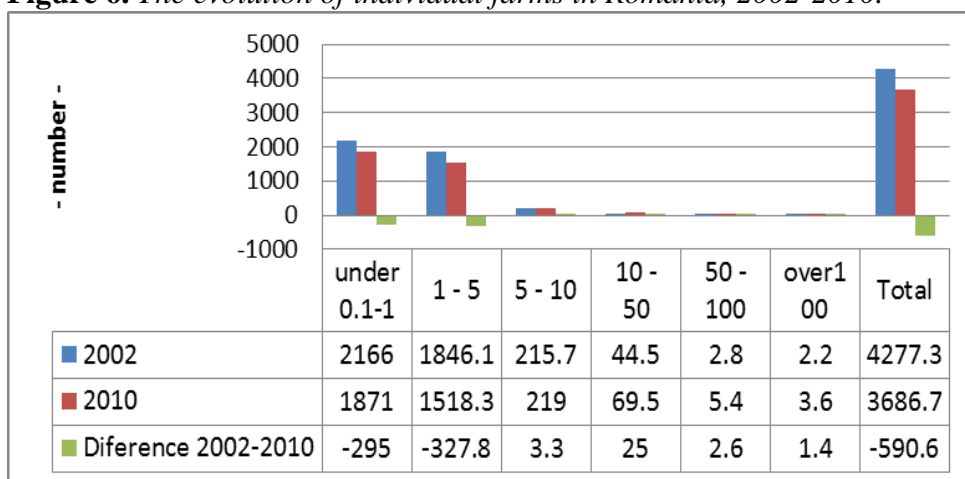
Source: *authors based on INS, 2013*

From Figure 6 it can be seen that during the analyzed period, the total number of agricultural holdings is reduced by 590.6 units, due to the reduction of very small holdings and small farms respectively in the same period under 01.-1 ha reduced by 295 units, while farms with 1.5 ha area are reduced by 327.8 units. What is more, it can be noticed the consolidation of farms with 5-10 ha area which increased by 25 units. Regarding the evolution of UAA, it follows the same trend.

Analyzing individual farms in Romania in UAA (Utilized Agricultural Area) between 2002 and 2010, it can be concluded that, overall, the proportion of individual holdings of UAA in 2010 is lower by 1%, which parallels what has led to a decrease the number of individual holdings to 590,6 thousand. Figure 7 shows the distribution UAA individual farms in Romania, 2002-2010.

Figure 7. *The distribution UAA individual farms in Romania, 2002-2010.*
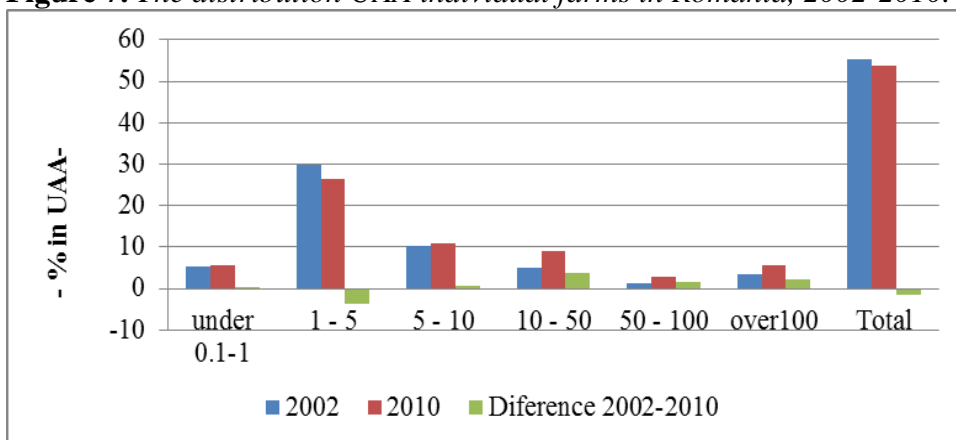
Source: *authors based on: (INS, 2013) and (INS, 2014)*

Analyzing figure 7, we see that farms with large areas, from 5 ha to over 100 ha, individual agricultural exploitations in UAA percentage increase in 2010 compared to 2002, in some cases even 3.9% for surfaces between 10 and 50 hectares, from 5.1% of SAU in 2002, at 9% of SAU in 2010. For individual holdings, with areas between 1-5 ha, it can be seen a significant reduction in this percentage UAA which decreases by 3.6% in 2010 compared to 2002. Analyzing the total number of farms that had used agricultural areas and / or owned livestock, according to their legal status (Table 7) note that they fell in the year 2010 to 3,859,043 holdings from 3,931,350 holdings in 2007.

Conclusion

Strengthening agricultural areas of the farms was a constant problem in Romania over recent historical periods. Trying to achieve a sustainable consolidation of agricultural areas was most often either a low intensity or for a short period of time. The evolution of land ownership structure has been determined equally by the spirit of the Romanian farmer, which once became land owner identified himself with the property.

Addressing a topic such as the Romanian land ownership transformation during the transition from socialism to a market economy is still topical, strengthening land ownership in Romania is not over despite the measures taken.

The transition to market economy and the paradigm shift in national agriculture generated a broad process of reorientation of the structures of agricultural production, especially land ownership. Land ownership is still bipolarized, in Romania existing farms that can not benefit from financial allocations through the mechanism CAP.

Analysis of the evolution of land structures exploitation in Romania from the changing paradigm perspective, highlights the organic dependence of Romanian farmer to the land ownership, most often unable to adjust the structure of production to market requirements.

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ENVIRONMENTAL MANAGEMENT IN BULGARIAN AGRICULTURE – EVOLUTION, EFFICIENCY, LESSONS FOR SERBIA

Hrabrin Bachev[1], Dimitre Nikolov[2]

Abstract

This paper gives an insight on the evolution of system of agro-eco-management in Bulgaria, assesses its efficiency and major challenges, and withdraws lessons for Serbia. It incorporates an interdisciplinary approach, and analyzes diverse private, market, and public modes of environmental governance during post-communist transition and European Union integration in Bulgaria. After that it assesses the efficiency and major challenges of eco-management, and suggests recommendations from the Bulgarian experiences for Serbia and other countries with similar development and environmental challenges.

Key words: *eco-management, market, private, public, EU integration*

Introduction

Issues associated with the effective environmental management in agriculture are among the most topical in public, business and academic debates around the globe (Baba *et al.*; Bachev; Dobbs and Pretty; Dugos and Dupaz; EC; Hagedorn; MEA; Mitchell; NEASS; Nikolov et al.; Peerlingsa and Polman; Reed; Scozzari and Mansouri; UN). In Bulgaria there has been a significant modernization of market, private and public modes of eco-governance in the last 25 years. However, research on socio-economic aspects of agri-eco-management is still at the beginning stage and far behind the contemporary needs of society.

This paper gives insight on the evolution of the system of agro-eco-management during the post-communist transition and the EU integration,

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assesses its efficiency and challenges, and withdraws lessons for Serbia and other countries with similar development and eco-challenges. Agri-environmental management is studied as management of eco-preservation and improvement activities of individual agents associated with agricultural production. It requires effective social order (governance) regulating, coordinating, stimulating and controlling behavior and relations of diverse agrarian and non-agrarian agents (Bachev).

Agent's behavior is governed by a number of distinct modes and mechanisms including: institutions, market, private, collective, public and hybrid forms. Efficiency of dominating modes of eco-management is assessed in terms of their potential to: protect eco-rights and investments, induce eco-friendly behavior, facilitate eco-exchange and cooperation, increase eco-information and innovation, detect eco-problems and risks, reconcile conflicts and coordinate actions, assure socially desirable level of eco-conservation, mitigate eco-risks, and minimize the overall (conservation, recovery, enhancement, third-party, transaction) costs of individual agents and society.

Depending on the objectives, levels, and periods of analysis, and available data different type of indicators are used to assess: comparative potential, complementarities and controversies of individual modes; state and dynamics of eco-behavior of agents; extent and dynamics of eco-pressure of agriculture; impact on and/or state of natural environment and its individual components. The overall costs and effects have been taken into account including private, social, direct, indirect, technological, transaction etc.

Evolution of eco-management in Bulgarian agriculture

During most of the transition period (1989-2000) the rights on agrarian resources and the diverse eco-rights were not defined or were badly defined and enforced (Table 1). During the prolong process of privatization the management of critical agrarian resources was carried in ineffective and "temporary" structures with no interests in sustainable development. Moreover, outdated and sectoral system of public policing, regulations and control dominated until recently. There was neither modern system for monitoring the state of environment nor awareness of the "concept of sustainability" in public and private agents alike.

Before the EU accession country's laws, standards and institutions were harmonized with the Community Acquis introducing modern framework for

eco-governance - new rights and restrictions, integrated territory, water and biodiversity management, preservation of traditional varieties and breeds, animal welfare, "polluter pay principle", and corresponding control, monitoring, and assessment institutions. The EU accession has introduced and enforced a "new order" - strict regulations and control; tough quality and environmental standards; environmentally friendly zoning; financial support for eco-conservation and market instability, etc.

Table 1. *Evolution of environmental management in Bulgarian agriculture*

Institutions	Private modes	Market modes	Public modes
Post-communist transition (1989-2000)			
Not well defined eco- and resource rights, bad enforcement; No sustainabi-lity concept	Provisional lease in contracts on natural resources; Unregistered farms; Firms; Cooperatives	Trade with informal brands, origins, and ecosystem services; Free (monopoly) agricultural water pricing	State and cooperative farms; Organization under privatization, liquidation and reorganization; Outdated system of eco-regulations, monitoring, information, and enforcement
Pre-accession to EU (2001-2006)			
Better defined and badly enforced rights on agrarian and eco-resources, & contracts	Unregistered farms; Firms; Cooperatives; Water User Associations; Vertically integrated modes	Trade with formal brands, origins, organic products, and ecosystem services; Free (monopoly)agricultural water pricing	Special Accession Program for Agrarian and Rural Development; Cross-compliance; Environmental regulations, standards, and agencies; Regulations for organic farming; Agricultural Advisory Service
EU membership (since January 1, 2007)			
Well-defined rights, and better enforcement; EU Community Acquis; Collective institutions	Unregistered farms; Firms; Cooperatives; Water User Associations; Vertically integrated modes; NGOs; Codes of behavior; Eco-labels	Trade with formal brands, origins, organic products, and ecosystem services; Free (monopoly) agricultural water pricing; Insurance against natural disasters	EU eco-regulations and standards; Operational Programs; Programs for eco-management; Agrarian and Rural Development Plans; Direct payments; Advisory Service; Eco-monitoring and assessment; Protected zones; Compensations for natural disasters; Mandatory eco-training; Garbage taxation; Firms for Natural Parks, Support to trans-border initiatives

Source: *Authors*

Outside EU demand, monitoring, pressure, and sanctions lead to a better enforcement. Internal collective actions for good governance also have got momentum leading to some improvement of public management.

However, the new "rules of the game" are not always clearly understood by the public and private organizations. Enforcement of eco-standards is often difficult since the detection and penalizing costs are high. Furthermore, institutional modernization has been associated with new conflicts between diverse private, collective and social interests.

During much of the transition now a good portion of farming activities has been carried in subsistence, small scale, inefficient and unsustainable structures (Table 2). Most livestock holdings have been also miniature "unprofessional" farms breading the majority of all animals (Table 2).

Farms adjustments have been associated with a significant decrease in number of unregistered, cooperative and livestock holdings without an adequate transfer of the resources and eco- management to other structures. Dominating modes have had little incentives and capability for long-term investment to enhance productivity and eco-performance with a great informal sector playing a big role even nowadays.

Smaller size, owner operating and extensive nature of the majority of farms let avoid certain problems from the past (e.g. over-intensification, lost natural landscape, biodiversity, nitrate and pesticide contamination, livestock and manure concentration, uncontrolled erosion etc.). It has also revived some traditional and more sustainable technologies, varieties, and products, and averts some livestock epidemics.

The private mode has introduced incentives and possibilities for integral eco-management, investing in eco-system services, origins, labels, and integration with agro-tourism, processing, and marketing. Private management is associated with improved environmental stewardship on owned and marketed resources, but less concern to manure and garbage management, over-exploitation of leased and common resources, and contamination of soils, waters and air. The process of farms adaptation has been also associated with some intensification of production reviving or deepening some of the eco-problems.

However, evolution of various farmers' and eco-associations has been hampered by the big number and diversified interests of agents, and weak

positions of farmers – e.g. newly established Water Users Associations have not led to expected irrigation boom neither overcome existing monopolies. There are few examples for effective agrarian organizations mostly with small-membership and strong common interests (e.g. tobacco, silk-warm, bee-honey etc. producers). Recently eco-organizations have been quite successful in eco-monitoring, campaigns against GM crops and removal of restrictions in protected areas, garbage cleaning, etc.

Table 2. *Number, size and importance of different farms in Bulgaria*

	Public	**Unregistered**	**Cooperatives**	**Firms**	**Total**
Number of farms					
1989	2101	1600000	na	na	1602101
1995	1002	1772000	2623	2200	1777000
2000	232	755300	3125	2275	760700
2010		350900	900	6100	357900
Share in number (%)					
1989	0.13	99.9			100
1995		99.7	0.1	0.1	100
2000		99.3	0.4	0.3	100
2010		98.0	0.25	1.7	100
Share in farmland (%)					
1989	89.9	10.1			100
1995	7.2	43.1	37.8	11.9	100
2000	1.7	19.4	60.6	18.4	100
2010		33.5	23.9	42.5	100
Average size (ha)					
1989	2423.1	0.4			3.6
1995	338.3	1.3	800	300	2.8
2000	357.7	0.9	709.9	296.7	4.7
2010		2.9	807	211.6	8.5

Source: *National Statistical Institute*

Market-driven organic farming has emerged in the country and registered a significant growth – the number of organic operators increased 70 folds since 2003 (MAF). There has been enormous augmentation of organic areas and number of livestock but they are still a tiny portion of the total Utilized Agricultural Area and the livestock population (Table 4).

Transition to certified organic production is a major form of eco-management in the eco-active farms (Figure 1). Other private and market modes are less used predominately by the Physical Persons. Nevertheless, there are widespread applications of informal forms such as farms with "ecologically pure production", "built reputation for pure products", etc.

Table 3. *Number and size of livestock holdings in Bulgaria*

Type of holdings	Share		Share		Share		Average heads
	farms	heads	farms	heads	farms	heads	
Dairy cows	*1-2*		*3-9*		*20 and >*		
2003	87.3	56.3	11	23.3	0.6	13.5	1.9
2010	79.6	30.1	14.6	20.0	2.3	36,3	3.3
Buffalo cows							
2003	85.3	47.5	11.4	20.6	1.2	23	2.3
2010	63.5	11.4	21.6	11.5	6.9	60,7	7.3
Ewes	*1-9*		*10-49*		*100 and >*		
2003	56.7	89.3	26	9.6	9.5	0,4	5.9
2010	29.8	82.8	22.6	13.2	33.2	1,7	10
She-goats							
2003	98.2	86.8	1.2	5.8	0.1	3	2.6
2010	96.2	67.3	3.3	20.2	0.01	5	3.1
Breeding pigs	*1-2*		*3-9*		*200 and >*		
2003	87.1	34.5	10.2	14.0	0.2	35.1	3.0
2010	78.8	12.8	14.9	8.8	0.5	57.4	7.8

Source: *Ministry of Agriculture and Food*

Table 4. *Evolution of organic production in Bulgaria*

Indicators	2003	2005	2007	2008	2010	2011	2012
Farming area, ha	650	2432	11808	16663	25647	26622	40378
% in UAA	0.01	0.05	0.23	0.33	0.51	0.52	0.79
Wild herbs, ha	-	-	397835	489083	546195	543655	472700
Cattle	na	395	395	470	364	976	1173
% in all cattle		0.11	0.07	0.14	0.07	0.17	0.22
Sheep	na	294	1690	2471	6698	6648	9175
% in all sheep		0.02	0.11	0.21	0.49	0.46	0.67
Goats	na	32	1058	1624	2773	3397	2831
% in all goats		0.01	0.28	0.45	0.78	0.99	0.96
Bees colonies	na	23508	35747	44861	46429	58855	85346

Source: *Ministry of Agriculture and Food*

Additionally, a portion of the surveyed farms has own initiative or participates in another private, collective or state eco-initiatives – e.g. 28,2% of Physical Persons, 18,2% of Sole Traders, and 17,6% of others implement own eco-initiative. Some 9,3% of Physical Persons have "a signed private eco-contract", while 6,4% of Physical Persons, 5,9% of Companies and Corporations, and 4,5% of Sole Traders have "a signed eco-contact with the state". A part of the farms participate in eco-initiatives of other farms and

organizations - for 8,1% of Physical Persons this is "informal initiative of other farms"; for 17,6% of Companies and Corporations, and 4,5% of Sole Traders, and 3,9% of Physical Persons that is "eco-initiative of the state"; and for 5,6% of Companies and Corporations, and for 1,5% of Physical Persons this is "eco-initiative of the supplier".

Figure 1. *Share of eco-active farms applying different forms of eco-management, percent*
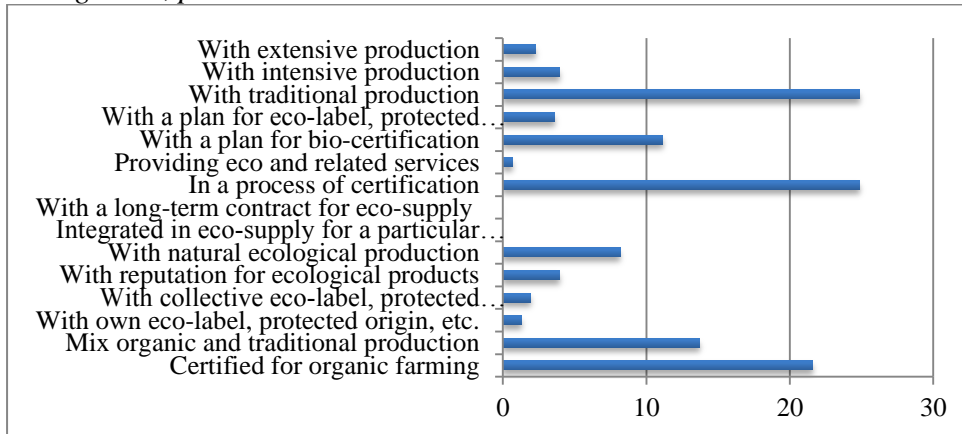
Source: *Survey with agricultural producers, 2014*

During the transition period the public (national and international) intervention in eco-management was not significant, comprehensive, sustainable, or in some cases even related. Eco-policies were fragmented and reactive to the urgent problems (e.g. natural disasters) with different agencies responsible for the individual aspects of management.

In the past years a number of programs are developed to deal with the specific eco-challenges such as preservation of biodiversity and environment; limitation of Sulphur Dioxide, VOC, Ammonia emissions; waste management; water sector development; combating climate change; organic agriculture; management of lands and fights against desertification. National monitoring system of environment has been set up, and mandatory eco-assessment of public programs also introduced.

Nevertheless, inefficient priority setting, management and enforcement (bad coordination, gaps, incompetence, ineffective enforcement, corruption, etc.), and administrative capability prevail. Agrarian education and Agricultural Advisory Service are not effectively reorganized and provide modern training on rural development and eco-, climate change, and water-

management issues. Integral approach of soil, water and biodiversity management in planning, funding, management, monitoring, controlling and assessment has not been completely applied, and stakeholders involved in the decision-making at all levels, and modern "eco-system services", "life-cycle", "water accounts", "eco-foot-prints" approaches incorporated into the program management. Neither mechanism for effective communication of data to all stakeholders assured. Agrarian and environment research has not been is modernized and severely underfunded up to now.

There has been enormous progress in the public support since 2007 EU CAP providing significant funding for the Area-based payments, National top-ups; agro-environmental payments and specific measures like organic farming, management of agricultural lands with high value and handicaps, traditional livestock, protection of soils and water, preservation of landscape; farm modernization and diversification; infrastructural development; training. Increased eco-support including new "green payments" is in place since 2014.

The new rules (e.g. "cross-compliance") and pubic subsidies have improved farms income and eco-performance, involved abandoned lands, and brought about amelioration of eco-situation. However, implementation of the public support measures has been slow and far behind targets. Due to the restrictive criteria, lack of titles, complicated and costly procedures, and massive mismanagement, it is not been effectively utilized and benefit unevenly different farms. For instance, less than 7% of the beneficiaries get the lion share (80%) of the Direct Payments while public assistance further enlarges existing disparities between different farms, sub-sectors, and regions of the country.

Efficiency of environmental management in agriculture

A by-product from the new market and private management has been a considerable disintensification of agriculture, ease of eco-pressure and pollution comparing to the pre-reform level (Bachev). The market adjustment has been associated with a sharp decline in all crop (but sunflower) and livestock (but goat) productions, a big portion of the agricultural has been lands left uncultivated, average yields shrunk to 40-80%, livestock, and used machineries, chemicals and waters have decreased significantly (Figure 2). At the same time some traditional crop varieties and livestock breeds have been recovered. All that sharply reduced the eco-pressure of agriculture – e.g. in the last years soils have been in good

ecological state in terms of organic content, and heavy metals and metalloids contamination (EEA).

Figure 2. *Irrigation and chemical application in Bulgarian agriculture*
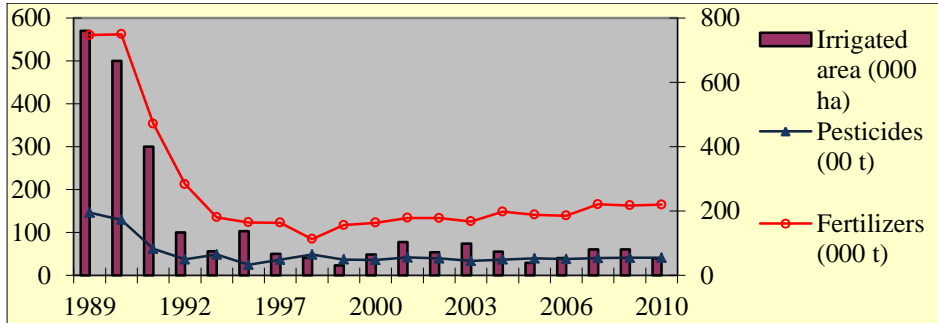
A negative rate of fertilizer compensation of N, P, K intakes dominate and a huge amount of nutrition have been irreversibly removed annually from the soils (EEA). Monoculture or simple rotation has been practiced by large operators, and unbalanced input of nutrient is typical.

There has been considerable increase in farmland affected by acidification (Figure 3) as 4.5% of the acidified lands are with level harmful for the crops (EEA). The fraction of salinized land doubled but it is still merely 1.1% of the total. Illegal garbage yards in rural areas have increased reaching 4000 with an actual number far bigger than the officially reported.

Figure 3. *Share of degradated agricultural lands in Bulgaria (percent)*
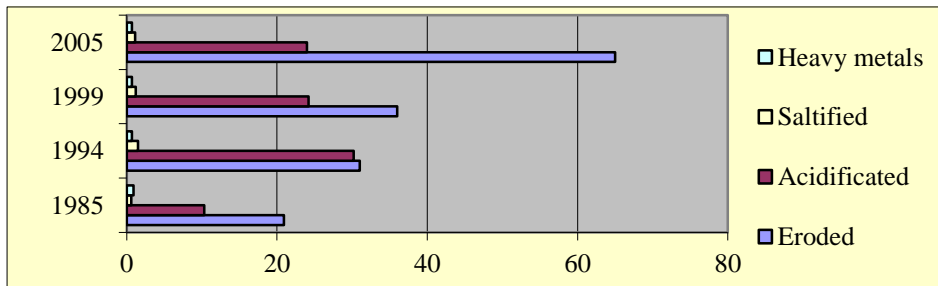
Due to the ineffective management 34% of the arable lands have been subjected to wind erosion and 64% to water erosion.

There is 21 folds decline in water used in agriculture (Table 5) as merely 2-5% of the network used and primitive techniques employed. That reduced water stress in the country but had a harmful effect on crop yields and structure while irrigation has not been effectively used to correct inappropriate distribution of rainfalls, and mitigate effects of climate change on farming.

Table 5. *Evolution and agricultural use of water resources in Bulgaria*

Indicators	1988-1992	1993-1997	1998-2002	2003-2007
Agricultural water withdrawal ($10^9/m^3$/year)	3,058	0,141	0,144	0,143
Share in total water withdrawal (%)	21.78	-	1.66	-
Share of total actual renewable water resources withdrawn by agriculture (%)	14.36	0.66	0.68	0.67
Area equipped for irrigation (1000 ha)	1263	789	622	104,6
Share of cultivated area equipped for irrigation (%)	29.17	17.55	17.36	3.18
Area equipped actually irrigated (%)	na	5.42	4.96	51.29

Source: *FAO, AQUASTAT*

There has been amelioration of quality of surface and ground waters - currently only 0.7% of the samples exceed the Ecological Limit Value for nitrate. However, many water eco-systems are at risk caused by the increasing application of chemicals. Monitoring of waters for irrigation also show that in 45% of the samples nitrates concentration exceeds contamination limit 2-20 folds (EEA). Currently, the Nitrate Vulnerable Zones cover 68% of the total Utilized Agricultural Areas.

Only 0.1% of the livestock farms possess safe manure-pile sites, 81% use primitive dunghills, and thousands have no facilities at all (MAF). Serious eco-challenge has been also posed by the inadequate storage and disposal of expired and prohibited pesticides.

The amount of protected areas in the country almost doubled since 1990 (NSI). Nevertheless, the widespread lack of proper eco-management has affected negatively biodiversity in some agro- and related ecosystems - large-scale enterprises paying little attention to biodiversity protection, considerable farmlands uncultivated, some agro-ecosystems lost "agro" character, semi-natural grasslands converted to cultivation, municipal pastures degraded by over- or under-grazing, reckless collection of wild plants and animals destructed all natural habitats, etc. Similarly, the Index of Birds in Agricultural Lands has been negative and variety of bird species

decreased by 10% in last years (EEA). In the past decades all 37 typical animal breeds have been endangered, 6 irreversibly extinct, 12 almost extinct, 16 endangered, and 3 potentially endangered (MEW).

There has been enormous (68%) reduction of the overall Green-house Gas emissions from agriculture since 1988 as the sectors decline is higher than the national one (Figure 4).

Now agriculture is the second biggest emitter of GHGs contributing between 7-10% of the total.

Figure 4. *Greenhouse gas emissions from Bulgarian agriculture*
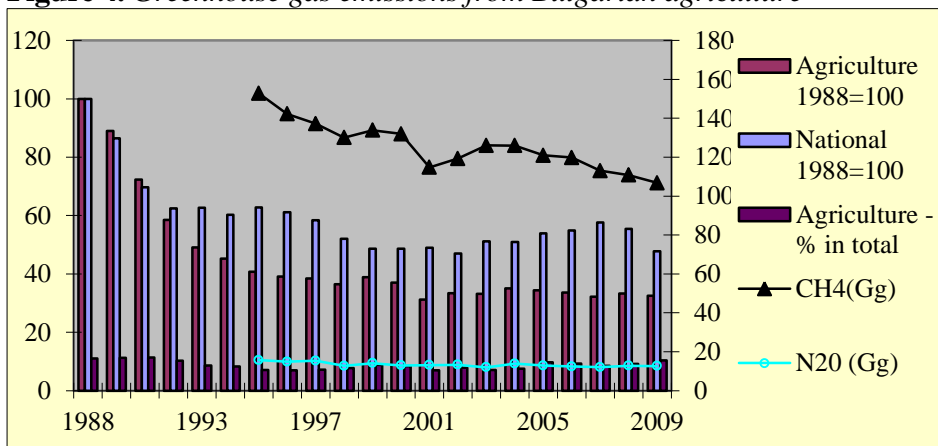
Source: *Executive Environment Agency*

Our large-scale survey has found that for a big part of the "eco-active" farms the eco-management is associated with a "high" increase in the long-term investments, production costs, registration, tests, and certification costs, and specialized costs for nature conservation (Figure 5).

Also for the majority of farms, the eco-management is associated with "average" growth in specialized costs for protection of natural environment, overall production costs, long-term investments, costs for studying official regulations and standards, overall management costs, costs for acquiring information, training, and consultations, costs for marketing of products and services, costs for participation in programs for public support, costs for private negotiations and contracts, costs for registrations tests, and certifications, costs for cooperation with others, and costs for resolutions of disputes and conflicts.

Figure 5. *Extent of augmentation of costs of agricultural farms associated with environmental protection activity in Bulgaria (percent)*
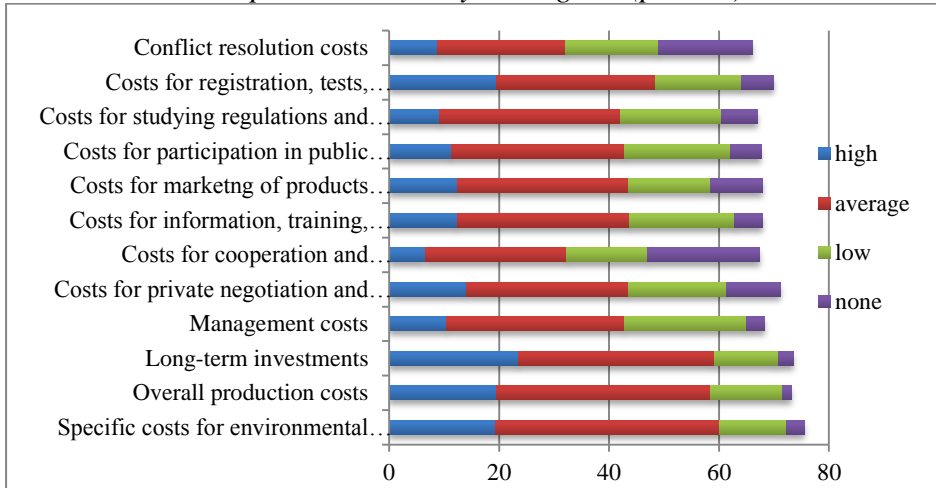
Figure 6. *Share of farms, in which environmental protection activity is associated with increase in ecological efficiency in Bulgaria (percent)*
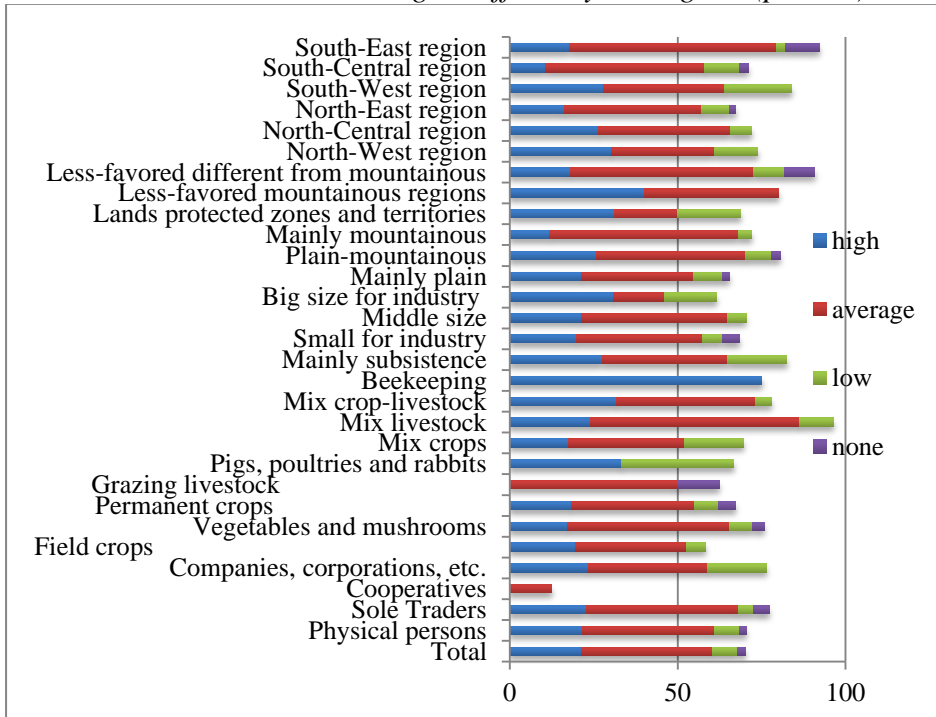
For the predominate portion of farms, natural environment protection activity is associated with the augmentation of farm economic efficiency, as for around one fifth of them that is to a "great" extent, for 37,8% in "average" extent, and for 9,1% of holdings in "insignificant" extent.

For the majority of farms, environment protection activity is associated with the augmentation of ecological efficiency of the farm, (Figure 6). The eco-activity leads to increasing in farm ecological efficiency for a relatively biggest portion of holdings specialized in beekeeping, pigs, poultry and rabbits, mix crops-livestock production, large-scale holdings, and farms located in less-favored mountainous regions, with lands in protected zones and territories, and in North-East and South-West regions.

To the greatest extent the eco-activity of a big part of farms is stimulated by: "personal conviction and satisfaction of farmers from eco-activity", "participation in public support programs", "received direct public subsidies", "professional eco-training of farmer and hired labor", "market competition", "access to farm and eco-advices", "possibilities to increase profit", "eco-benefits for the farm in longer-term", and "European Union policies" (Figure 7).

The biggest ("average" or "strong") impact on eco-active farms have been caused by the Measures 111, 114 и 143 "Professional training and advices", Measure 214 "Agro-environmental payments", "Direct Area-based subsidies by the EU", Measure 112 "Setting up of young farmers", Measure 141 "Semi-subsistence farming", Measure 121 "Modernization of agricultural holdings", "National tops ups for products, livestock, etc.", and Measure 211 "Natural handicap payments to farmers in mountain areas" (Figure 8).

The impact of the remaining instruments of the CAP on the greatest part of the surveyed beneficiaries is "low" or "none". What is more, a part of the farms evaluate the impact of the public support instruments on their holdings as "negative".

The later concerns more than 10% of the beneficiaries from the Measure 223 "First afforestation of non-agricultural land", Measure 226 "Restoring forestry potential and introducing prevention actions", and Measure 313 "Encouragement of tourism activities".

Figure 7. *Extent in which eco-activities of farms is stimulated by various factors in Bulgaria (percent)*
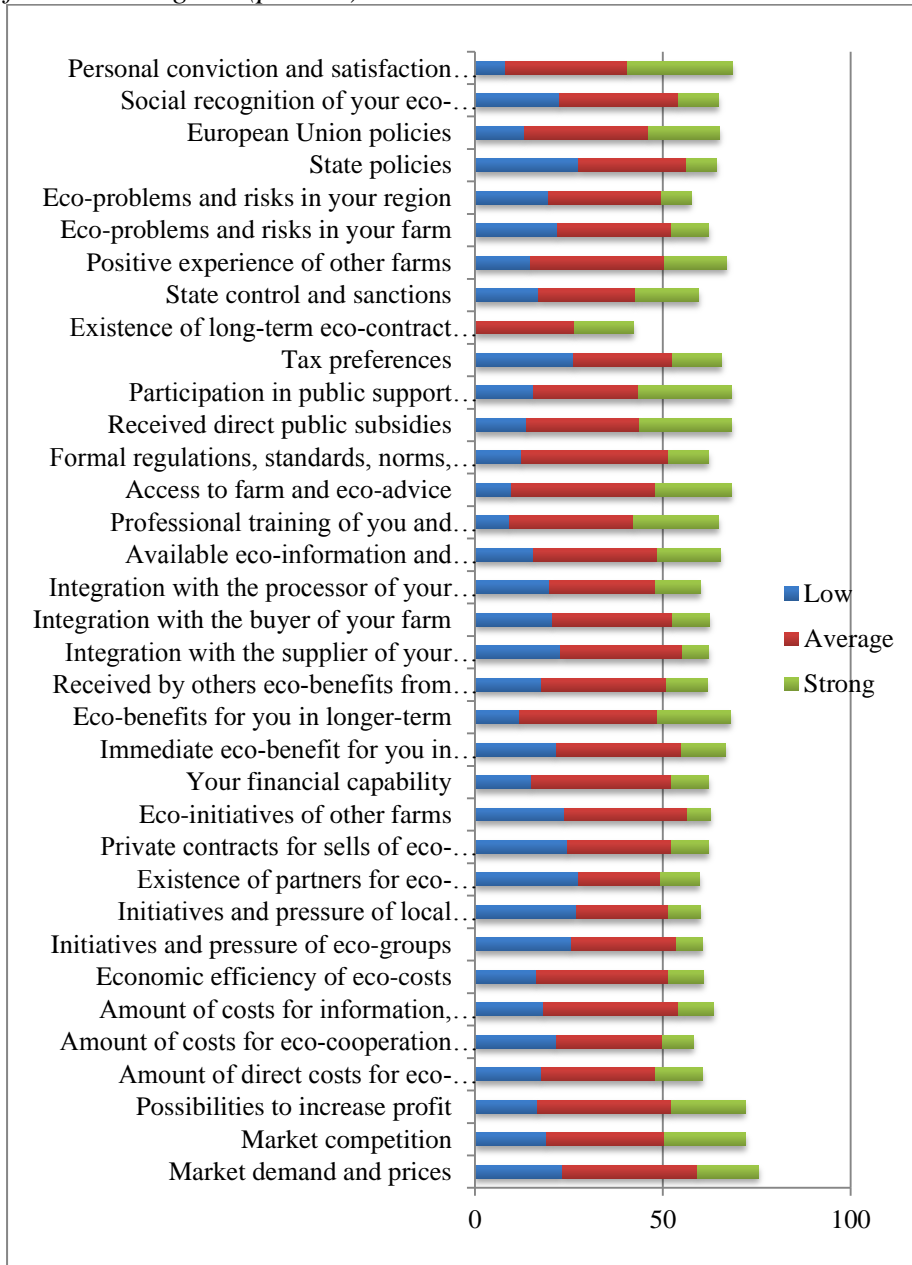
Source: *Survey with agricultural producers, May 2014*

Figure 8. *Scale of impact on supported farms of different instruments of EU CAP in Bulgaria (percent)*
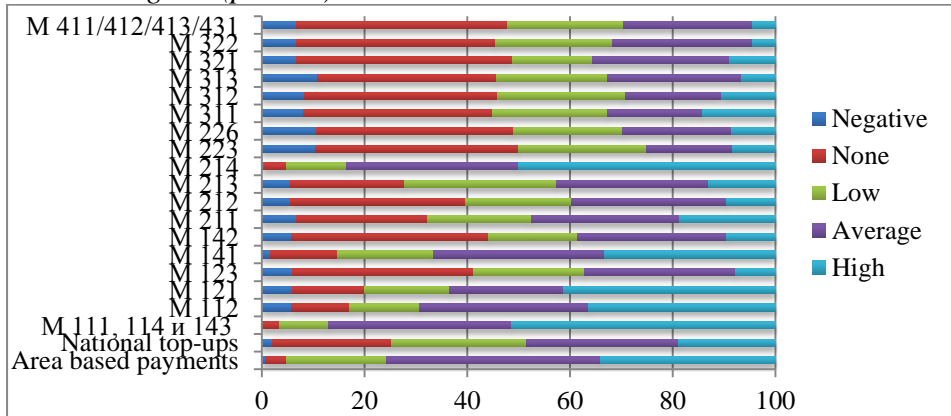
Source: *Survey with agricultural producers, May 2014*

Conclusion and lessons for Serbia

The post-communist transition and the EU integration have brought about significant changes in the environmental management in the Bulgarian agriculture. The newly evolved market, private and public governance has led to a significant improvement of the eco-management and the eco-impacts of agriculture introducing modern eco-standards and public support, enhancing environmental stewardship, disintensifying production, recovering landscape and traditional productions, and diversifying quality, eco-products and services. The agrarian transition and integration has been also associated with some new challenges such as unsustainable exploitation of the natural resources, lost biodiversity, land degradation, water and air contamination etc.

Implementation of the "common" EU policies has been having unlike results in the specific "Bulgarian" conditions. Up to date it enlarges the income, technological, and eco-discrepancy between different types of farms, sub-sectors of agriculture, and regions of the country. In a longer-term the eco-hazard(s) caused by agriculture will likely expand unless effective public and private measures are taken to mitigate the existing eco-problems and risks. Therefore, special measures are to be taken to improve eco-information and assessments; modernize the system of property rights, public regulations and enforcement; perfect the management of public organizations, programs and services; and extend the public support to and partnerships with the dominating farming (including small-scale and subsistence) structures, etc.

The positive and negative Bulgarian and international experiences are to be further studied and popularized, while some lessons could be effectively used to modernize the system of agro-eco-management in Serbia. The major recommendations could be summarized as following:

First, it is to integrate better eco (including neglected water, eco-system services, climate change etc.) policy in the agrarian and development policies. A long-term public support, stability and certainty in the eco-policy have to be assured in order to induce effective private and collective eco-actions. **Second**, it has to be applied an integral approach of soil, water and biodiversity management in planning, funding, management, monitoring, controlling and assessment of public programs at all levels, and real stakeholders' involvement in decision-making is to be guaranteed. Modern "eco-system services", "life-cycle", "eco-accounts", etc. approaches are to be incorporated in programs design at all level.

Third, it is to improve coordination and efficiency of public and private agents involved in the eco-management, and overcome existing division of responsibilities, poor coordination, conflicting interests, and inconsistency, controversies, gaps and inefficiency of actions. **Forth,** it is to further define, regulate and privatize property, user, management, trading, discharge etc. rights and assets related to eco-resources, eco-system services, renewable energy supply, (N, GHG) emissions, waste discharge, etc. For instance, introduction and enforcement of new agrarian intellectual property rights on protected zones, "Designations of Origin", "Geographical Indications", "Traditional Specialty Guaranteed", eco-labels and innovations, etc. can further enhance the sustainable development of the sector.

Five, it has to be employed a range of adequate instruments including appropriate pricing, quotas, public funding and insurance, taxing, interlinking in order to improve eco-resources use efficiency and risk-sharing, and preventing over-intensification and pressure on natural resources, and supporting farms "multifunctionality" and adaptation to changing environment. **Six,** the national and international assistance instruments are to be adapted to the specific local conditions and support all type of farms and perspective structures (including joint-ventures), farm modernization and adaptation, eco-innovations, etc. Adapted eco-measures and standards are to be better implemented.
Seven, it is to be broadly employed hybrid (public-private, public-collective) modes given coordination, incentives, and control advantages over "pure"

public forms. Public enforcement of most eco-standards is difficult (e.g. vast informal sectors, remote areas etc.) and higher support is to be given to voluntary (professional, community, NGOs etc.) initiatives though informing, training, assisting, funding, risk-sharing, assisting agents' cooperation etc. Real participation of the farmers and stakeholders in priority setting, management, and assessment of public programs at all levels is to be institutionalized. **Eight**, it is to secure adequate eco-data collection, monitoring, and independent assessment on soil, water and air contamination, waste management, social costs, eco- (water, energy) foot-prints, benefits from farming, effect on eco-conservation, renewable energy production, impacts of climate change, existing eco-risks, etc. Adequate mechanisms for timely and effective communication of eco-information to decision-makers, stakeholders and society are to be assured.

Nine, it is to further improve eco-education and training of farmers, administrators, and public at large. Agricultural education, information and advisory are to reach all agents via effective methods suited to their specific needs, continues training, sharing experiences, including topical eco-management issues. Effective cooperation with other (public, private, international) organizations in all these areas is to be supported. **Ten,** it is to improve constantly the overall public governance - property rights, laws and contracts enforcement, fight against mismanagement and corruption, etc. as well as remove all restrictions for private and collective initiatives. **Eleven,** public and international support to multidisciplinary and interdisciplinary research on all aspects of eco-management is to be augmented, including of factors, forms and impacts of eco-governance.

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CHANGES AND TRENDS OF VEGETABLES MARKET IN ROMANIA

Raluca Andreea Ion[1], Iuliana Dobre[2]

Abstract

Vegetables are important food in daily diet, because of their content in vitamins and minerals. Vegetables' market is dynamic in those regarding demand, supply and prices, therefore, the current study aim to investigate the conjuncture of the market. The objectives of the paper are to identify the main trends of vegetables market. Statistical data provided by the Romanian National Institute of Statistics has been analysed. The findings show that both demand and supply increased. Imports decreased in the last years, as well as its contribution to total supply. Differences between quantities purchased on the market and quantities consumed can be observed, for all species of vegetables. It shows that self-consumption remains a feature of vegetables market in Romania, as it was in the previous period.

Key words: *vegetables, demand, supply, market trends, self-consumption*

Introduction

This study tries to address the following question: What are the main changes and trends of vegetables' market in Romania? Findings will help farmers, processors and retailers in their efforts of invest money in certain branches and to better understand the factors that changed consumption and production of vegetables.

Vegetables market is characterized by a specific behaviour different from other food markets. This behaviour results from its many features, among which the most important are: atomicity of supply and demand, uniformity of products, seasonality, specific areas dedicated to vegetables production and a

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weak system of collecting, high degree of perishability, continuity of demand compared to seasonality of supply, vegetables production requires a very high consumption of factors of production, especially labour, assortment of vegetables on the market is varied, and production of vegetables has different destinations: for fresh consumption, processing and export which requires organizing distribution channels to consumers. Knowing the features of vegetables market guides manufacturers and other businesses on the effective activities, less uncertain.

Worldwide, the importance of vegetables' consumption is recognized. World Health Organization has undertaken and continues to undertake research on nutritional status and their relationship to health. In this regard, it is recommended agro ecological products to consumers, with a high load of nutrients and bioactive. Vegetables are, from this point of view, the products covered in the daily and rational diet. They have very favourable effects on the human body:
- Moisturizing body because of the high water; fresh vegetables have 72 -95 per cent water;
- Increasing the body's immunity capacity;
- Fat reduction.

Comparing them with other foods it is found that many species of vegetables are unsurpassed in terms of content in protein substances. The leguminous vegetables contain large amounts of protein substances (7 per cent peas, beans 2.9 per cent, 2-8 per cent mushrooms, garlic, parsley leaves, cauliflower, and spinach). Vegetable proteins contained in human nutrition bring about 5-10% of the total required quantity.

Vegetables contribute to human energy balance and carbohydrates (beans 5.8 per cent, peas 18 per cent, carrot 6.9 per cent, celery 5 per cent, beetroot 6.8 per cent, and parsnip 14 per cent). Onion varieties grown in our country contain 7.8 to 11.6 per cent sugar, 10 per cent carbohydrates zucchini, melon 7-8 per cent, cauliflower and cabbage from 4.2 to 5 per cent, spinach 2.9 per cent etc. But the greatest importance lies in the content of vegetables rich in vitamins and minerals, hovering, in this regard, along with fruit, among the most valuable food for humans.

Vegetables contain large amounts of vitamin C. Vitamin C is readily degraded at high temperatures and prolonged storage. Cauliflower, spinach, green beans and loss reached 40-50 per cent at a temperature of 20-24ºC over a period of 24 hours only 5-10 per cent at 8-10ºC. While preserving the long

(4-6 months), the vegetables lose 30-70% of vitamin C. Therefore, it is recommended to consume vegetables mostly fresh. What is important to remember is that all other foods consumed by humans fail to provide only 10-15 per cent of the body needs vitamin C. This situation, coupled with the fact that vegetables are the only source of vitamin P (citrine), made them indispensable food.

In vegetables, there are vitamins important in the prevention of diseases and maintaining the human body's metabolic balance. They contain large amounts of vitamin A found in carrots, tomatoes, lettuce, spinach, pepper, beetroot (coloured vegetables contain a greater amount of vitamin A) and meet in a proportion of 60-80 per cent the body needs for carotene (provitamin A).

Previous studies on vegetables' market are available, but they contain statistical data analysis for about eight-ten years. The main findings show that vegetables market does not cover domestic consumption; the main reasons come from the specific supply and demand of agricultural products and large losses in this sector. Regarding the first aspect, given that vegetables market is characterized by seasonality of supply on the one hand, and continuity of consumption, on the other hand, imports complete the supply.

Imports of vegetables represent 10 per cent of total demand. Imports of vegetables were 17 times higher than exports in 2007, Romania importing 398,060 tons of vegetables and exporting 23,667 tonnes only. Regarding losses of vegetables, they were 328,197 tonnes in 2006, representing 10 per cent of production. Losses of vegetables are recorded in the field, during transport, due to its realization on roads in poor condition and storage, due to the lack of shelter, ensuring microclimate conditions they need.

The context of the period 2006-2007 changed, the vegetables market being very dynamic. The main changes happened in retail system. The value of goods sold through retail was raised from 158191.5 billion lei in 2008 to 184880.7 billion lei in 2012, meaning 116.9 per cent increase (National Institute of Statistic, Romania, 2014). Retail trade focused, statistical data showing a reduction in the number of stores from 134,878 in 2008 to 129,875 in 2012 (National Institute of Statistic, Romania, 2014). The number of small shops with sizes up to 120 square meters, decreased, while the number of large stores increased, even doubled in size the stores of 10,000

m² and over. So now, with the development of retail trade, diversified sales opportunities are identified for farmers in the production of vegetables.

A new fresh study is needed, to update information about vegetables' market. In this article, a documentary study was carried out, aiming to identify the changes and trends of supply, demand and prices on vegetables' market. In what follows, demand, supply and prices of vegetables are examined, based on statistical data analysis.

Material and Methods

Demand, the most important element of the market is, according to the dictionary of marketing (Frone, 1999), the quantity of goods and services that buyers are willing to buy from the market, to satisfy consumer needs.

Market demand may be studied in two ways (Manole, 2003): cross-sectional, collecting data regarding demand in a specific moment of market developments, and longitudinal (in time), when several times series are considered, to estimate the demand trend. In this study, longitudinal method is used, to identify the changes and trends of demand and supply in time. For this research, statistical data collected by the National Statistics Institute have been analysed.

Supply is the quantity of a good that can be sold to existing price conditions. The offer is studied as volume and structure, and, for vegetables, it is made up of domestic production and imports. Supply of vegetables is influenced by the cultivated area as quantitative factor, and average yields per hectare as qualitative factor.

The information used for market research is collected from databases and publications of the National Institute of Statistics of Romania: balances, which were collected data on resources, with its components (domestic production and imports) and uses with its components (export, domestic availability for consumption, intermediate consumption, losses, stocks and availability for human consumption); Statistical Bulletin of Prices, Supply balances, Coordinates of living in Romania: income and consumption.

Data on prices, purchase and consumption of vegetables have been collected. Also, previous studies (Turek, 2008) have been consulted.

Results and Discussions

The vegetables' balance sheet is presented in Table 1, for the period 2012-2013. In 2013, the resources of vegetables increased, compared to 2012, considering the increase in production. Imports account for 10.8 per cent of supply, on Romania market, in 2013.

Table 1. *Balance sheet for vegetables and products from vegetables, 2012-2013*

Specification	2012 (tons)	2013 (tons)	2013/2012 (%)
A. RESOURCES	3422075	3729798	109
1. Domestic production	2980728	3326204	111
2. Import	441347	403594	91
B. UTILIZATIONS	3422075	3729798	109
3. Export	57949	67604	116
4. Internal availabilities for consumption	3364126	3662194	109
5. Intermediary consumption	142242	158559	111
5.1. Seeds consumption	3283	3131	95
5.2. Fodder consumption	138959	155428	112
5.3. Industrial processing	-	-	-
5.4. Industrial transformation	-	-	-
6. Total losses	276795	300902	109
7. Stock variation	-91522	164647	*
8. Availabilities for human consumption	3036611	3038086	100

Source: *Bilanturi alimentare, 2013. Romanian National Institute of Statistics, p.24*

The average annual vegetable consumption is 151 kg / capita in 2012, and 152 kg / capita in 2013. An increase in vegetable consumption per capita can be noticed, which can be explained economically in various ways.

On the one hand, things can be addressed in terms of the increase in resources or if we speak of domestic production of vegetables which increased by 1.09 times in 2013 compared to 2012, or the importation. The latter show a decrease, which enhances the role of Romanian vegetable sector and its transfer of income to the economy.

On the other hand, an increase in consumption may suggest reducing purchasing power for other goods, which is not a positive element. Anyway, as shows the use of resources as quantitative structure, total availability for human consumption of vegetables represents 88.7% of in 2012, or 81.45% in 2013. There is a decrease in available funds, generated by the increased export. Overall, the trade balance is positive for vegetables.

Cumulated with initial stock, import and domestic production volume, Romania resources of fresh vegetables rose in 2012-2013, mostly due to domestic production (Table 2). Moreover, the distribution structure can be seen in Chart 1.

Table 2. *Total resources of vegetables and products from vegetables (thousand tons)*

Specification	2012	2013
Resources	4375	4591
Initial stock	953	861
Production	2981	3326
Import	441	404

Chart 1 *Structure of vegetables resources, 2013*
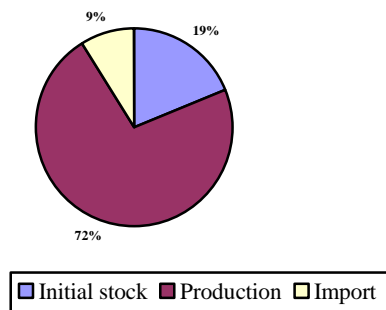
Source: *Bilanturi alimentare, 2013. Romanian National Institute of Statistics, p.6*

Referring to the trade balance, statistics (Bilanturi alimentare, 2013, p.6) show export growth over the imports of vegetables. As regards the vegetables species, commercial balance is different. Tomatoes, expressed as fresh vegetables, and as a ratio between the years 2013-2012, import exceeds export, with a shortfall of 19 per cent (Table 3). Resources of tomatoes,

consisting of domestic production and imports, have increased from 889,004 tonnes in 2012 to 917,842 tonnes in 2013. The most significant influence on the increase in resources of tomatoes has domestic production, which provides 76.8 per cent of necessary in 2012 and 81.6 per cent in 2013. Imports of vegetables represent, therefore, 23.2 per cent of supply of vegetables in 2012, and 18.4 per cent in 2013.

Also, there were no intermediate consumption, in 2012 the inventories are negative (-64,401 tons) and positive in 2013, which influenced the overall supply of tomatoes. The total supply of fresh vegetables, mostly intended for human consumption (77.1 per cent, including export, or 77.8 per cent, only domestic availabilities in 2013).

Table 3. *Balance sheet for tomatoes, 2012-2013*

Specification	2012 (tons)	2013 (tons)	2013/2012 (%)
A. RESOURCES	889004	917842	103
1. Domestic production	683282	749128	109
2. Import	205722	168714	82
B. UTILIZATIONS	889004	917842	103
3. Export	11170	7109	63
4. Internal availabilities for consumption	877834	910733	103
5. Intermediary consumption	-	-	-
5.1. Seeds consumption	-	-	-
5.2. Fodder consumption	-	-	-
5.3. Industrial processing	-	-	-
5.4. Industrial transformation	-	-	-
6. Total losses	172216	186540	108
7. Stock variation	-64401	16083	-
8. Availabilities for human consumption	770019	708110	92

Source: *Bilanturi alimentare, 2013. Romanian National Institute of Statistics, p.25*

The balance sheet for preserved tomatoes includes the supply and use of resources. The components related to resources refer to agriculture (production) and imports. Uses refer to the destination, namely exports and domestic consumption.

Statistical data have allowed a comprehensive analysis of indicators for the period between 2007-2013. In terms of resources, quantitative assessments show variations between years and between the volume of supplies from internal and external sources (Table 4). Significantly, the production is destined for domestic consumption (99.2 per cent in 2012-2013).

Table 4. *Balance sheet for preserved tomatoes (reference period 1st April previous year to 31 th March current year), thousand tons*

Specification	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013
A. RESOURCES	346.8	256.1	259.8	359.8	299.4	325.6
1. Acquisitions from agriculture	173.4	124.8	107.7	158.1	169	155.7
2. Imports	173.4	131.3	152.1	200.7	130.4	169.9
B. UTILIZATIONS	346.8	256.1	259.8	359.8	299.4	325.6
3. Exports	0.8	1.2	3.7	1.7	11.6	2.5
4. Internal utilization	346	254.9	256.1	358.1	287.8	323.1
-human consumption	346	254.9	256.1	358.1	287.8	323.1

Chart 2 *Dymanics of external trade for preserved tomatoes*
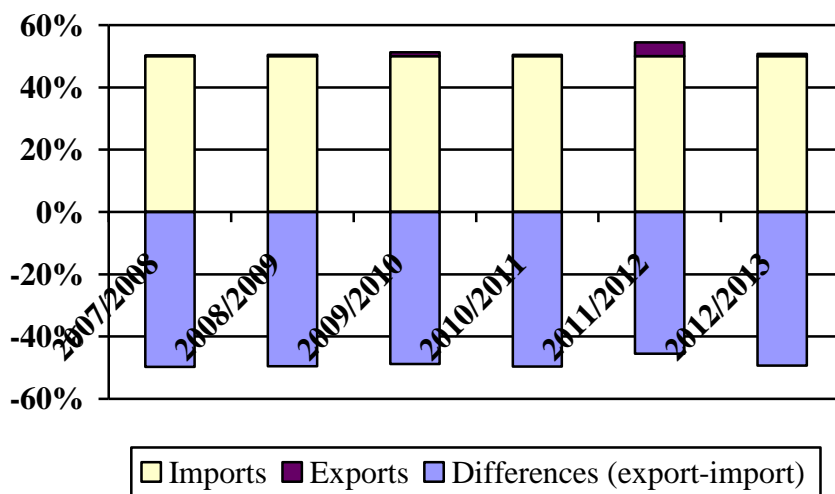
Source: *Bilanţuri de aprovizionare, Romanian National Institute of Statistics, 2013, p.20*

For dry onion, supply increased in 2012-2013. Among the total resources, domestic production was 87.0 per cent in 2012 and 88.6 per cent in 2013. The shares of 13.0 per cent and 11.4 per cent were insured by quantities of production imported (Table 5).

For the period under review, exports increased by 2.1 times. As in other vegetables case, the main destination production of onions is consumption of population, which is provided at a rate of 93.0 per cent in 2013.

The import is higher than export, which shows that the trade balance is deficient for dry onion.

Table 5. *Balance sheet for dry onion, 2012-2013*

Specification	2012 (tons)	2013 (tons)	2013/2012 (%)
A. RESOURCES	396904	441930	111
1. Domestic production	345340	391837	113
2. Import	51564	50093	97
B. UTILIZATIONS	396904	441930	111
3. Export	1820	3796	2,1 times
4. Internal availabilities for consumption	395084	438134	111
5. Intermediary consumption	441	477	108
5.1. Seeds consumption	441	477	108
5.2. Fodder consumption	-	-	-
5.3. Industrial processing	-	-	-
5.4. Industrial transformation	-	-	-
6. Total losses	12231	13616	113
7. Stock variation	-20418	12946	-
8. Availabilities for human consumption	402830	411095	102

Source: *Bilanturi alimentare, 2013. Romanian National Institute of Statistics, p.26*

As regards potatoes, from the perspective of how to use the total availability, for the period 2012-2013, distributions concern: domestic consumption (excluding exports), intermediate consumption (seed, feed, industrial processing) and losses.

What results is the demand for household consumption, accounting for 24.0 per cent of total uses in 2012 and 22.9 per cent in 2013.

This percentage reduction is related to the increased volume in intermediate consumption and total losses (Table 6).

Table 6. *Balance sheet for potatoes, 2012-2013*

Specification	2012 (tons)	2013 (tons)	2013/2012 (%)
A. RESOURCES	8614000	8999000	104
1. Domestic production	2465000	3290000	133
2. Import	324000	311000	96
B. UTILIZATIONS	5825000	5398000	93
3. Export	8614000	8999000	104
4. Internal availabilities for consumption	3192000	3303000	103
5. Intermediary consumption	891000	998000	112
5.1. Seeds consumption	694000	730000	105
5.2. Fodder consumption	155000	210000	135
5.3. Industrial processing	42000	58000	138
5.4. Industrial transformation	-	-	-
6. Total losses	200000	246000	123
7. Stock variation	2101000	2059000	98

Source: *Bilanturi alimentare, 2013. Romanian National Institute of Statistics, p.4-5*

The evolution of total potatoes production was 385 thousand tons in 2013 compared to 2012. Volume growth was driven by domestic output and the gap between initial stocks that, although decreasing, influenced the domestic supply and the volume of imports, which fell (Table 7).

Table 7. *Total resources of potatoes (thousand tons)*

Specification	2012	2013
Resources	8614	8999
Initial stock	5825	5398
Production	2465	3290
Import	324	311

Source: *Bilanturi alimentare, 2013. Romanian National Institute of Statistics, p.4*

Because of its importance, the consumption of vegetables is analysed in detail. Vegetables are important sources of vitamins and minerals for human body. World Health Organisation recommends a consumption of 400 grams of vegetables and fruits per day per person, which means 150 kilograms per year (World Health Organisation, 2003). Domestic consumption of vegetables for the period 2007-2013 is shown in Table 8. From the above analysis, it is noted

that vegetables' production is the main source for consumption in Romanian. Domestic consumption of vegetables was oscillating higher amounts were recorded in the years 2009-2010, while household consumption was different for these products, the largest being the period 2011-2012. Graphically, consumption of vegetables of population is shown in Figure 3.

Table 8. *Internal consumption of vegetables, including mellows (period of reference 1 st July previous year to 30 th June current year), thousand tones*

Specification	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013
Internal consumption, of which:	3557.1	4199.8	4266.1	4261.5	4517.4	3956.3
- seeds consumption	3.3	4	3.8	3.7	3.6	3.3
- fodder consumption	342.8	420.2	429.2	425	459.4	388.9
- human consumption	2960.9	3439.1	3523.5	3526.2	3708.7	3287.3
- losses	250.1	336.5	309.6	306.6	345.7	276.8

Chart 3 *Dymanincs of total consumption, 2007-2013*
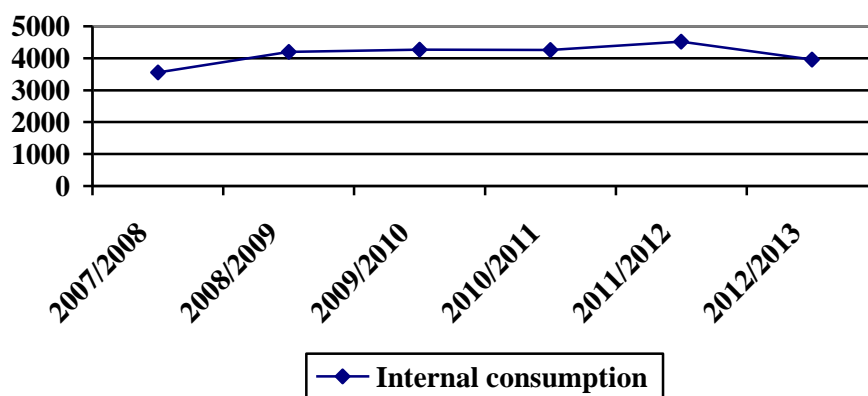
Source: *Bilanturi alimentare, 2013. Romanian National Institute of Statistics, p.19*

Average consumption of vegetables and preserved vegetables in kilograms per person has increased. Statistics for the period 2012, 2013 and 2014 show that a person has consumed more vegetables 0.042 kg in 2013 than in 2014 and more 0.109 kg in 2014 compared to 2013. However, consumption

remains low for what is recommended by experts to provide the protein and moisture content of the body. Compared to the recommended consumption of vegetables, in Romania consumption is much lower.

Table 9. *Average consumption of vegetables and preserved vegetables, in the period 2012-2014 (kg/month/person)*

Specification	2012	2013	2014
Vegetables and preserved vegetables total, of which:	7.575	7.617	7.726
Tomatoes	1.001	1.011	1.007
Carrots and other roots	0.791	0.806	0.857
Peppers	0.420	0.395	0.405
Potatoes	3.480	3.314	3.314
Onion	0.834	0.847	0.853
Green and yellow beans	0.118	0.144	0.149
Cabbage and cauliflower	0.740	0.798	0.830
Broth	0.333	0.333	0.337
Vegetables canes	0.179	0.176	0.163

Chart 4 *Vegetables consumption (kg/year/person) in the period 2012-2014*
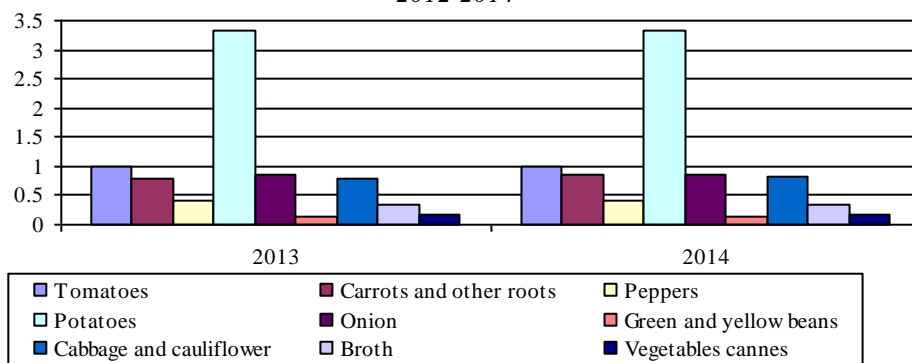
Source: *Coordonate ale nivelului de trai în România. Veniturile şi consumul populaţiei, 2013, 2014, Romanian National Institute of Statistics, p.184; p.182*

The quantities of vegetables and preserved vegetables brought from the market vary per species. It can be noticed an increase overall domestic demand for vegetables and canned vegetables at all products. On the other hand, the quantities purchased are lower than quantities consumed, meaning tendency towards self-catered of households, given the Romanian traditionalism, highly praised. Moreover, farmers' self-consumption from their own production is typical to Romanian agricultural economy. Many farms provide themselves up to 75 per cent of vegetable products for fresh

consumption or to conserve. There are situations where self-consumption fully covers requirements for certain vegetable species. Previous research (Preda, 2001) done around Bucharest showed that seasonal products are insured by farms (summer tomatoes, peppers, root vegetables, onions, garlic), some being processed in the family for the winter. In a household with an area of 2500 mp and a diversified structure of vegetable species, a sufficient quantity of products is obtain which, at least during the summer season, ensures daily demand for family consumption.

Table 9. *Average quantities of vegetables and preserved vegetables purchased from the market, in the period 2012-2014 (kg/month/person)*

Specification	2013	2014
Vegetables and preserved vegetables total, of which:	4.362	4.563
Tomatoes	0.762	0.77
Carrots and other roots	0.511	0.56
Peppers	0.339	0.361
Potatoes	2.205	2.184
Onion	0.493	0.508
Green and yellow beans	0.059	0.062
Cabbage and cauliflower	0.997	1.003
Broth	0.097	0.108
Vegetables canes	0.030	0.025

Chart 5 *Vegetables purchase (kg/person/year), in the period 2013-2014*
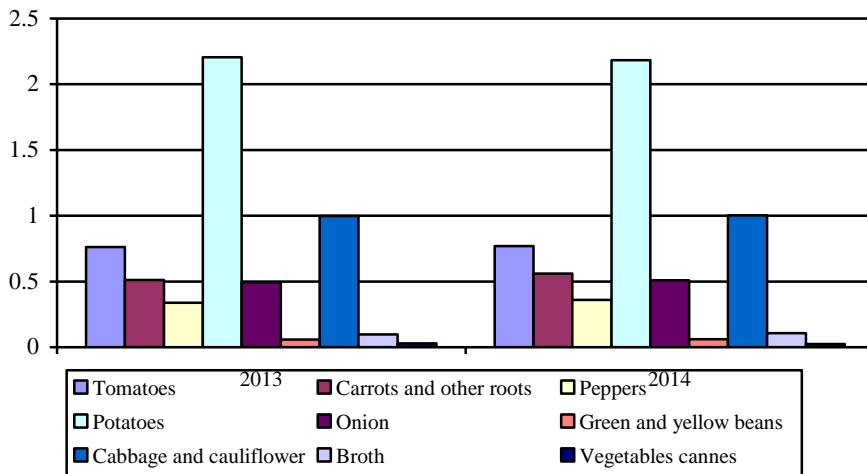
Source: *Coordonate ale nivelului de trai în România. Veniturile şi consumul populaţiei, 2013, 2014, Romanian National Institute of Statistics, p.173; p.176*

As regards prices of vegetables, it is determined by the market as a result of supply and demand. Increasing the supply of vegetables induce decreasing in the price of these products. Also, demand for vegetable consumption is limited by normal physiological needs.

Demand is relatively constant throughout the year compared to supply, which is seasonal. Therefore, the price is different, per months and seasons. In summer and autumn, the price is low and out of season, it grows. Table 10 presents the average prices for the main vegetable markets and fairs in the county municipality of the development regions in Romania in December 2014. At potatoes, onions and carrots, the highest prices are in the South and in the centre of the country.

The apple prices were the highest in the West, with particular reference to Timisoara, according to statistics. The wide variation in prices between regions and within them is natural, given the prevailing production structures.

Table 10. *Prices for some vegetables in the main cities of Romania, December 2014 (lei/kg)*

City (region of development)	Potatoes	Onion	Carrots
Alba Iulia (Centru)	1.75	3.00	2.75
Brăila (S-E)	0.93	1.43	1.20
Bucureşti (Buc-Ifov)	1.27	2.07	2.50
Calaraşi (S Muntenia)	1.35	2.00	2.50
Cluj Napoca (N-V)	1.25	2.00	2.00
Craiova (SV Oltenia)	1.09	2.00	1.69
Piatra Neamţ (N-E)	0.96	1.75	1.48
Timişoara (Vest)	1.25	2.00	2.00

Source: *Buletin Statistic de Preturi 2014, Romanian National Institute of Statistics, p.42-43*

Conclusions

In conclusion, vegetables market in Romania is dynamic. Both demand and supply increased. Imports decreased in the last years, as absolute and relative figures and its contribution to total supply. Differences between quantities purchased on the market and quantities consumed can be observed, for all species of vegetables. It shows that self-consumption remains a feature of vegetables market in Romania, as it was in the previous period. The great importance of vegetables to ensure rational nutrition can be noticed,

especially the product contain in vitamins. By eating an assortment of vegetables, between 250-300 grams, which is the daily ration, the necessary vitamins for the human body are assured. The important role of vegetables in the diet is shown in "healthy food pyramid" where it ranks second after bread, cereal, rice, pasta. Future direction of vegetables markets should be directed towards encouraging the consumption and export, for which large quantities of domestic production are needed.

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I SECTION

NEW TECHNOLOGIES AND THE SUSTAINABLE USE OF NATURAL RESOURCES IN AGRICULTURE

THE USE OF RENEWABLE ENERGY SOURCES IN ROMANIAN AGRICULTURE

Dorel Dusmanescu[1]

Abstract

As economic sector, the agricultural sector is an important energy consumer. In present, the energy sources derived from fossil fuels need to be replaced with other sources, with an less level of pollutant emissions and who are renewable. Romania has a good technical potential concerning the renewable sources of energy, but that potential is not efficiently rated in the present. The paper present a review about the possibilities to use the renewable energy sources in Romanian agriculture.

Keywords: *renewable energy sources, wind energy, photovoltaic energy, biomass, biodiesel*

Introduction

The role of energy in modern society is fundamental, without which this could not exist in its current form. The energy sources, based on fossil fuels (coal, oil and gas) are those that have given considerable boost to the economic and technological development of society. Unfortunately, use of these energy sources, based on fossil fuels, had and adverse effects on the society and the economy.

A first undesirable effect is given by the increased pollution induced by burning these fossil fuels in various technical and technological processes. From the coal power plants to the engines that acts various machines and vehicles, all generate large amounts of carbon dioxide and other combustion products (soot, ash, various other gases such as nitrogen oxides, sulfur oxides, etc.) having a polluting effect on the environment. This effect has become more intense due to industrial development accelerated in the twentieth century, development which involved the burning of large amounts of fossil fuels, but also due to cutting of large

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areas of forests, forests that provide a natural recycling of the carbon dioxide produced in excess. As a consequence have appeared the acid rain, smog and "greenhouse effect" globally.

Identifying the industrial pollution and, mainly, the combustion of fossil fules, as the main cause of the increase in ambient temperature led to the adoption of measures locally and globally to reduce the pollution and the pollution generated effects. The measures proposed at international level concern, on the one hand, the introduction of new technologies to ensure withholding of pollutants, and on the other hand, reducing the amount of fossil fuels burned and replacing them with other energy sources, less or no polluting.

Another negative effect on the economies of the world is given by the finite nature of the fossil fuels and by the fact that their geographical distribution is not uniform. As a consequence of this, and of the fact that modern society can not exist without energy, all countries have become more or less dependent on energy sources based on fossil fuels, so the exhausting over time can lead to global economic collapse if no action is taken for gradual replacement of these energy sources with renewable energy sources, which can not be exhausted in time.

In conclusion, the introduction of renewable energy in the economic activities is a necessity. Agriculture, like any sector of activity, requires energy sources to ensure the functioning of used processes. This article is an analysis of the energy demand in Romania's agriculture and, based on the potential of renewable energy sources in Romania, aims at identifying ways of ensuring that energy needs for agricultural sector from these sources.

Energy consumption in romanian agriculture

Like any sector, Romania's agriculture requires an energy consumption who is based currently on the direct or indirect use of fossil fuels.

Energy consumption in Romanian agriculture is composed of:
- consumption of liquid petroleum fuels, particularly diesel, for actuating the agricultural machineries (tractors, combines, etc.) and the vehicles used to ensure transport of various products and materials;

- natural gas consumption for heating of the work spaces (offices, warehouses, greenhouses, etc.);
- consumption of electricity used to actuating the processing equipments (conveyors, mills etc.), the office equipment, or for heating of the auxiliary spaces etc .;
- biomass energy consumption, mainly for the heating of work spaces.

In the following is presented the evolution of energy consumption in Romanian agriculture, classified by energy sources.

Figure 1. *Evolution of final consumption of gasoline type fuels, between 1992-2013*
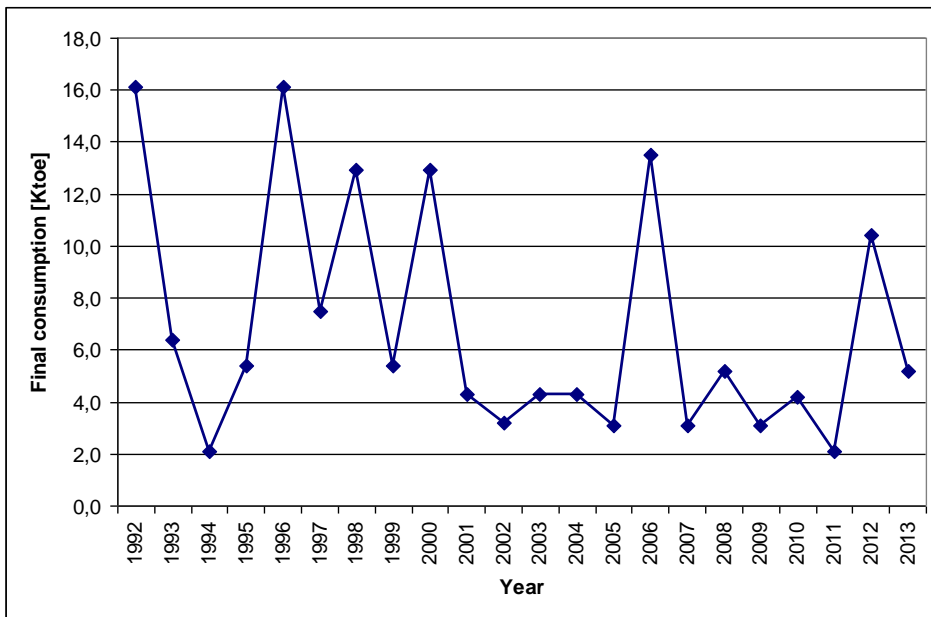
Source: *processed by author.*

As can be observed, the final consumption of gasoline in the agricultural sector present important variations, throughout the analyzed period, and the maximum value of this consumption is relatively low.

This is because the gasoline fuel type is used in Romanian agriculture only for auxiliary transport activities. Variations in final consumption of gasoline can be explained by the fact that for these activities may be used transportation vehicles with diesel instead of gasoline.

Figure 2. *Evolution of final consumption of diesel type fuels, between 1992-2013*
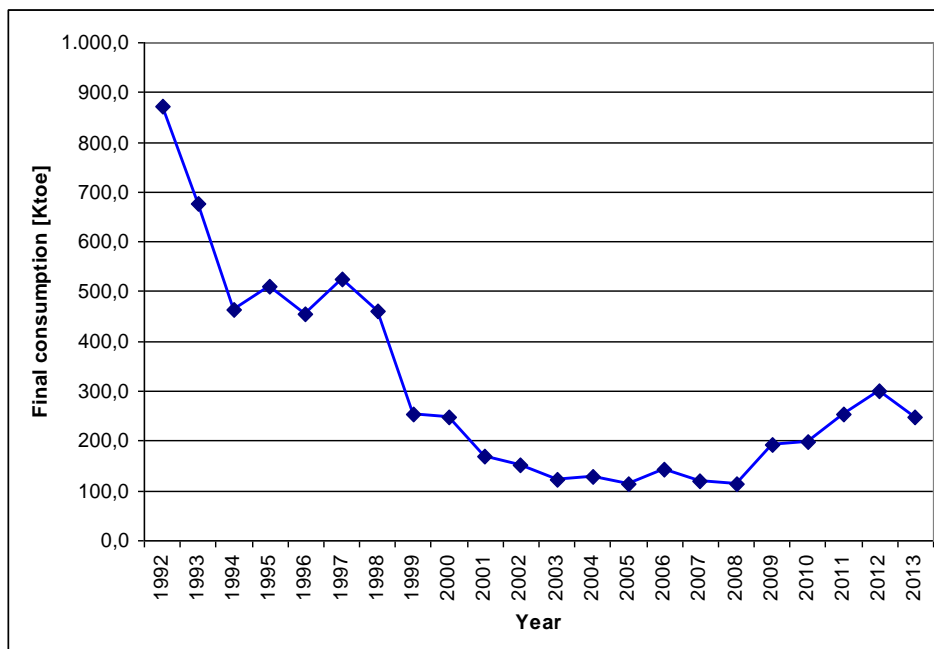
Source: *processed by author.*

Diesel type fuel is the main fuel used for driving motors agricultural machinery. As can be seen in Figure 2, diesel fuel consumption in agriculture has experienced a drastic drop compared to 1990.

Although, since 2008, consumption of diesel fuel has increased, it has not reached the level of 1990, reflecting the evolution that has had the Romanian agricultural sector during the analyzed period.

Replacing diesel with vegetable oil or biodiesel suppose a full coverage of needs from domestic production. Apart from this requirement, will be need to take into account the problems raised by the use of vegetable oils and biodiesel in the operation of the engines (corrosion of pipes and gaskets, rubber buildup in pipes and filters etc.) having as consequent the increase the costs of using these motors (the filters should be replaced more often, the rubber pipes must be replaced with metal pipes or pipes resistant to the corrosion of biodiesel etc.). Other expenses occur because of the fact that the vegetable oil should be filtered and conditioned, and process of obtaining biodiesel requires an consumption of energy and other material and human resources.

Figure 3. *Evolution of final consumption of natural gas, between 1990-2013*
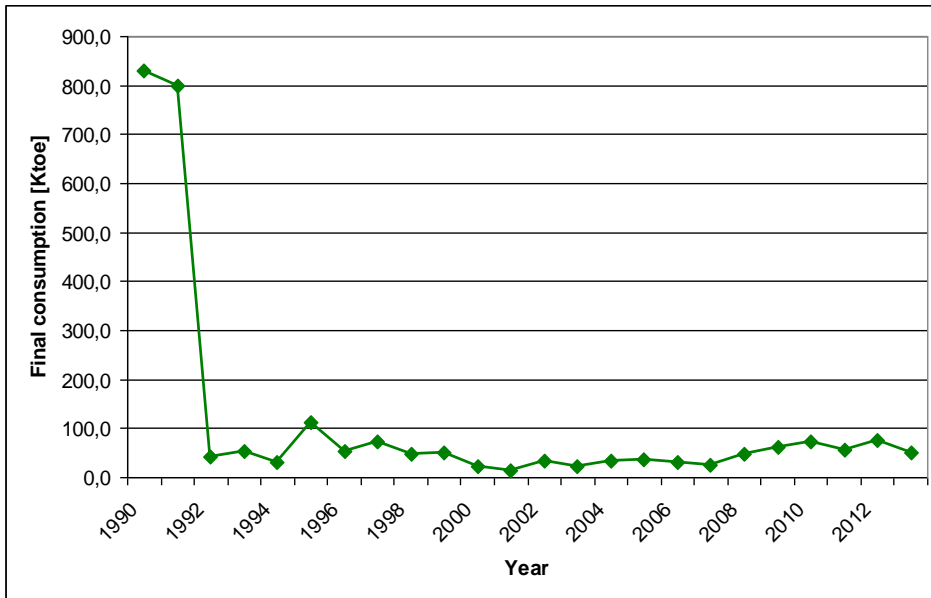
Source: *processed by author.*

Natural gas consumption in agriculture experienced a brutal drop in 1992 compared to 1990, and remained at low levels until now.

The small annual oscillations had no significant values, which show that in agriculture, the activities that have used natural gas there never have recovered. The actual consumption is most likely the consumption due to heating the offices and possibly of some small halls or greenhouses.

Considering this, is apparent that natural gases will be more easily replaced with wood mass for burning or with electricity. Of course the solutions adopted are punctual and can not be adopted a unique solution for the entire agricultural sector.

The specific disadvantages of heaters who use wood / pellets are currently lowered due to the existence of automated central heating systems that can ensure a steady supply with wood in the firebox, and ash removal at large intervals of time.

This eliminates the need for human supervision during operation, the operation becoming very simple.

Figure 4. *Evolution of final consumption of electric energy, between 1990-2013*
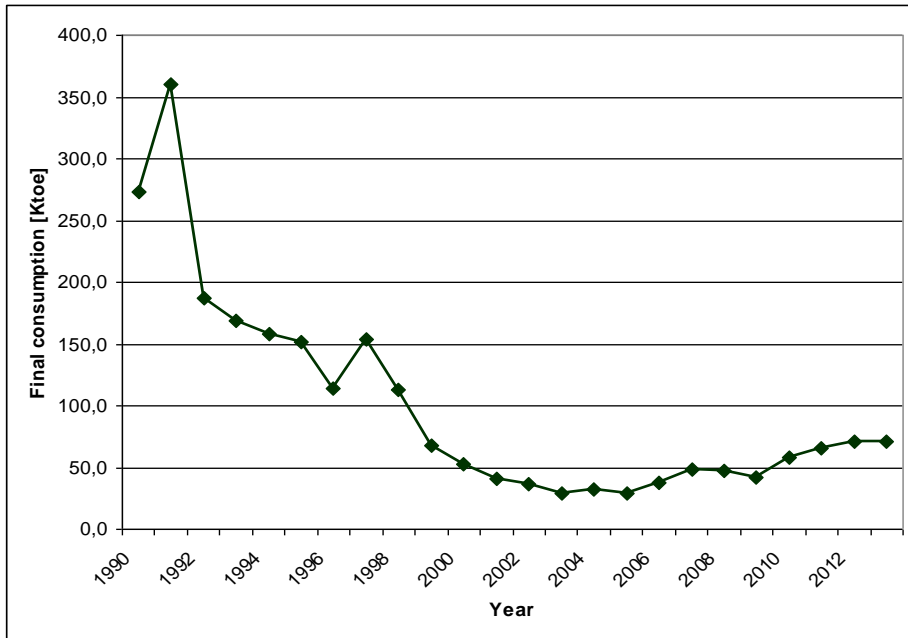
Electricity consumption he met also a drop compared to 1990 but more subdued. After 2007 consumption increased slightly but never reached the level of 1990.

Electricity as the energy source can not be replaced with something else. The source of generation of this form of energy will change, introducing small wind turbines and especially photovoltaic panels.

Wind turbines can be effectively used only in areas where there are prevailing winds, knocking almost all year round. Such areas are rare, and at a height so that the adoption of this solution is difficult.

The solution that can be easily adopted in agriculture is represented by photovoltaic panels. They can be mounted on the roof of the administrative buildings, the roof halls for animals growth, for processing industrial crops, on the roof of mills, and on difficult terrain or exhausted in the form of solar farms. It also can perform various electrically operated mobile systems that would provide various services in the field (pumping water for irrigation etc.).

Figure 5. *Evolution of final consumption of solid fuel, between 1990-2013*
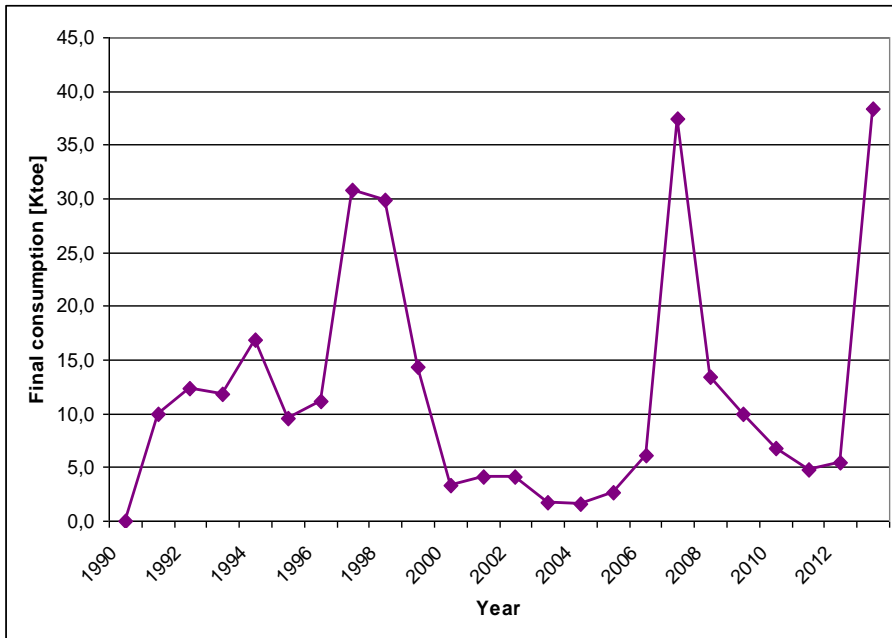
Source: *processed by author.*

As can be seen in Figure 5, the consumption of solid fuel in Romanian agriculture has experienced sudden variations in the analyzed period. But these variations occur around some low values of energy consumption (compared to other sources analyzed), so there exist availability for extending this consumption by replacing natural gas consumption with solid fuel. Of course, the solid fuel taken into consideration is represented by the woody biomass for combustion, consisting of residue from primary wood processing and from the production of timber (bark, branches, sawdust, wood chips, etc.) and the biomass obtained from crops for energy, in Romania are possible energetic willow crops and paulownia. It was not considered the use of firewood for applications in agriculture.

Possibilities to use renewable energy sources in Romanian agriculture

Due to the multitude of different activities that are performed in technological and non-technological processes from Romanian agriculture can not speak about a complete replacement of energy sources based on fossil fuels, and the issues should be treated differently.

76

Consumption of liquid fuel for agricultural machinery

A great consumption of energy in Romanian agriculture, is the fuel for agricultural machinery and motor vehicles, especially diesel fuel. These agricultural machines have generally motors with medium power and a rugged construction that ensure reliability and proper maintenance, in the conditions from the field.

Because of the fact that use diesel engines, these agricultural machines are the easiest to be converted to use biodiesel fuels type, because these engines are designed to ensure low maintenance and repairs directly to the venue of current activities. This can be an important advantage because the use of biodiesel fuel type requires a more frequent maintenance of engines (cleaning of filters, cleaning of the pumps, sloppy / replaced Rigid and / or flexible pipes etc.).

The advantage of switching to biodiesel in agriculture is the fact that fuel source can be represented by a part of the production harvested, locally processed to obtain biodiesel fuel type.

Biodiesel is a biofuel made from vegetable oils through technological processing requirements. As vegetable oils can be used a wide variety of oils, obtained from a variety of plants. In Romania, the most efficient biodiesel crops are sunflower, soy and rape. Because the sunflower oil is used extensively in food and soy is used in human food and the feeding of domestic animals, can be used for practical purposes, for biodiesel production only the rape oil and possibly a fraction of soy production.

To assess the ability of Romanian agriculture to ensure biodiesel fuel type was analyzed the rapeseed production and as a reserve, production of sunflower from which retains a part of the amount available, amount remaining after removal the necessary for ensuring human consumption.

The yield of oil extracted from the seeds of sunflower and rapeseed is considered at the value of 40% which is an average value. For the processing to biodiesel is accepted a conversion efficiency of 90% of the oil quantity processed.

In the following table are presented the productions of crops that can be processed to biodiesel, with the possible biodiesel productions.

Table 1. *Biodiesel potential production*

Assortment	Specific Consumption [kg/capita]	Necessary for human consumption [tonnes]	Oil production [tonnes]	Surplus of oil [tonnes]	Biodiesel [tonnes]
Rape oil	-	0	423.628	381.284	381.284
Sunflower oil	12.3	244.296	875.723	631.427	284.142
TOTAL					665.426

Source: *processed by author.*

Under the conditions specified, the technical potential of Romania for biodiesel is of 665.426 tonnes. This quantity is equivalent to the following quantities of fuels, presented in Table 2.

Table 2. *Energetic equivalence between biodiesel – other fuels*

Assortment	Quantity [thousand tonns]
Biodiesel	**665**
Gasoline	562
Diesel	592
Wood	1772
Stalks	1563
wood pellets	1397
P type fuel (petrol lampant)	618
Light liquid fuel	665

Source: *processed by author.*

In terms of energy, biodiesel potential of Romania is about 24.620.762 GJ, amount of energy who is equivalent to 588.000 toe.

As it can be observed, the necessary of diesel type fuel in agriculture, approximated to 370 thousand toe / year can be covered if it is processed to biodiesel all production of rape, without the necessity to process in biodiesel a portion of the production of sunflower sun.

Electricity consumption

Another important energy consumption is represented by the electricity consumption. The electricity is used mainly for driving various devices and equipment used in agriculture and the energy supplier is represented from physical viewpoint, by the national energy system.

Figure 6. *Theoretic solar potential of Romania for global horizontal irradiation*
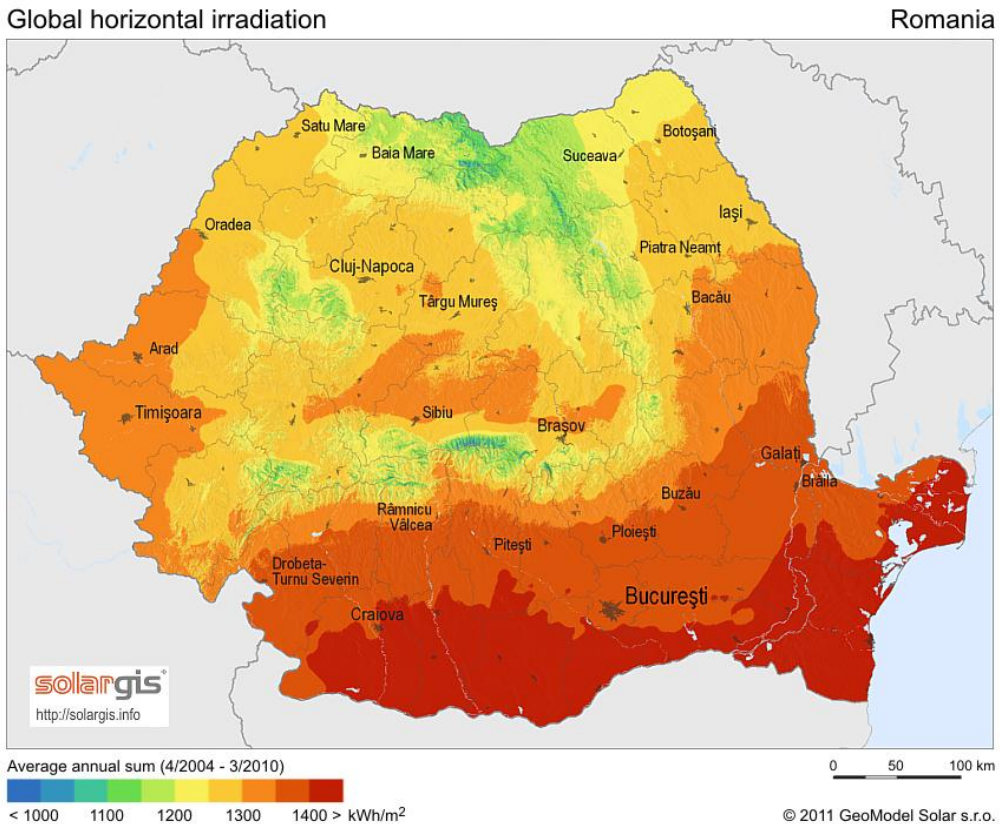
Source: *SolarGIS © 2013 GeoModel Solar s.r.o.*

Renewable electricity sources, in Romania, are the sources of hydropower, wind turbines and photovoltaic panels. Wind turbines are installed grouped in wind farms, and send the electricity production generated in the national energy system, so that this form of energy use in agriculture is done indirectly. The same observation can be made for electricity generated hydroelectric.

Instead, electricity generated using photovoltaic panels can be obtained locally and can ensure the functioning of medium and small power consumers. Romania's photovoltaic potential is relatively good, especially in areas with high agricultural potential, like plains and hills. According to estimates made in [10] the Romania's technical photovoltaic potential is about 13,870 thousand toe / year. Taking into account that in 2013 electricity consumption in agriculture was 70.2 thousand toe, it is clear

that there is potential enough to provide the necessary electricity in agriculture, by photovoltaic generation, even at a double consumption.

The major disadvantage of this energy source is given by the diurnal variation of production, but, in agriculture, many activities are only conducted in daylight so that they will not be disturbed by the use of photovoltaic panels as a source of electricity.

Photovoltaic panels have the advantage that they allow the achievement of mobile generators, which run at various locations and are thus independent in terms of energy.

Another aspect is given by the fact that when there is no active consumers, the excess of energy can be sent to the national power system (in the case of solar farms) or can be stored in batteries, in the case of small power installations.

Obviously, it is clear that the above values are only approximate. Effective photovoltaic electricity production depends on both the number and type of photovoltaic panels used and by the climatic conditions of the region and the season. It follows that, in the south of Romania, the photovoltaic panels may be a source feasible energy that can offer and surplus energy that can be capitalized, while the mountainous areas or those situated further north will require an additional electricity supplement provided the national energy system.

Natural gas consumption

Natural gas represents a smaller share in total energy consumption in agriculture, they ensuring mainly the heating of work spaces.

It is easy to see that, in this case, one can replace natural gases with woody biomass for combustion, consisting of: residues and sawdust resulted in processing of wood, residues resulted in the harvesting and primary processing of wood from the forest (branches, wood chips, sawdust, bark, etc.), agricultural residues (stalks, cobs, etc.) and wood mass from energy crops (willow energetic, paulownia etc.).

Obviously, will be necessary changes to the combustion installations, will be provided measures for collecting and removing the ashes results in the

burning process and to ensure woody biomass supply and to ensure the storage of biomass in optimal conditions.

All these issues require extra storage spaces and an workload much greater than if in the case of natural gas supply.

The advantage is given by the fact that, largely or even entirely, the biomass demand can be provided from own sources, possibly by exploiting agricultural residues that were not capitalized.

In the year 2014 the amount of wood harvested is 16,972,050 cubic meters. Corresponding to this quantity will obtain a quantity of twigs, bark and wood chips / sawdust from primary exploitation by 1,642,138 cubic meters.

Considering that all the harvested wood will be processed in timber, this will have as result an additional quantity of sawdust of 2,376,087 cubic meters.

The final quantity of the wood biomass is 4,018,225 cubic meters, or 2,410,935,000 kg, which provides an energy quantity of approx. 979 000 toe. It was considered the density of the wood analyzed by 600 kg / m³ and a calorific value of 17 MJ / kg.

It can observe that the biomass produced in agriculture / forestry can replace the energy consumption supplied by the natural gas and the solid fuel in agriculture.

Conclusions

Energy consumption in Romanian agriculture is provided from multiple sources, and is performed by multiple processes, so that each case should be considered separately.

Analyzing the possibilities of covering energy requirements in agriculture from renewable sources resulted that this is possible, even if will occur some supplementary costs for this (modifying engines, maintenance more expensive due to the change of tracks at intervals smaller and additional consumption to produce bio fuels, etc.).

The largest energy consumption is given by the diesel fuel for agricultural vehicles and for transport of the harvested production. For replacing diesel with bio fuels can be used directly vegetable oils where engines allow, or can be used biodiesel, obtained by processing vegetable oils. Choosing the final solution depends by the existing engines on the agricultural machinery and by the maintenance costs involved.

For electricity can be installed wind turbines or photovoltaic panels, covering the needs of agriculture from their own production. Obviously, arise problems due to the variability of the two sources of electricity. This means that either the powered processes will take place in the hours when installations operate or are maintained the connections to the national power grid, using differential metering.

Regarding the natural gases, the volume of consumption is low, and their role can be taken up by woody biomass.

In perspective, the study of this issue will focus on analysis of some technological processes from agriculture to identify more precisely the energy demand in agriculture in order to identify the possible technological solutions.

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QUALITY ASSESSMENT OF ACID SOILS IN SERBIA WITH RESPECT TO THE CONTENT AND MOBILITY OF MICROELEMENTS

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Abstract

This paper evaluates the quality of acid soils in Central Serbia with respect to the content, mobility and availability of certain microelements (Fe, Mn and Zn). Also, the effect of major agrochemical characteristics of the tested soils on the mobility and availability of these microelements in the soils is analyzed. Quite complex transformations of mineral and organic materials affecting the availability of microelements (Fe, Mn and Zn) occur in these soils. Due to highly unfavorable chemical processes, acid soils in Central Serbia contain physiologically poorly active iron that has low availability, thus resulting in iron deficiency. Manganese in these soils shows marked mobility, particularly at a pH below 5.5, which leads to significant increase its availability in soil. Zn content in the exchangeable fraction of acid soils is negligible (0.1%). These soils exhibit a considerable cation exchange capacity (over 25 meq/100 g), thus causing a significant reduction in Zn availability.

Key words: *Acidity, soil, mobility, content of microelements*

Introduction

Acid soils limit crop production on 30-40% of the world's arable soils and up to 70% of the world's arable land. It has been estimated that over 50% of the world's potentially arable soils are acidic (Haug, 1983). In the Republic of Serbia, acid soils are widely distributed, accounting for over 60% of total arable land (Stevanović et al., 1995). These are mostly lowland or hillside pseudogleys or their leached (decalcified) variants, acid vertisols, podzolic eutric cambisols, and gray or leached gray soils in mountainous regions (Đalović et al., 2010). These soils are rather poor in

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bases, medium to strongly acidic, with very poor structure and with low contents of organic matter and certain biogenic elements, phosphorus in particular. Therefore, they are poorly suitable or unsuitable for the cultivation of most crops (Jelić et al., 2007; 2013b). The low productivity of acid soils results not only from unfavorable chemical properties but also from unfavorable microbiological and, very often, physical properties, such as physiological depth, texture, structure, porosity, and water and air regimes (Dugalić, 1998, Jelić et al., 2015).

Microelements (Fe, Mn and Zn) in naturally acid soils originate from the lithosphere composed of rocks and minerals i.e. the mineral portion of soil (Milivojevic et al., 2014). Part of these elements can also come from anthropogenic (pollution) sources (Adriano, 1986; Kabata-Pendias and Pendias, 1989). These microelements are constituent parts of the crystal lattice of a large number of primary minerals in eruptive rocks into which they are embedded during their crystallization and through isomorphous substitution (Krstić et al., 2008). Moreover, Fe, Mn and Zn are also present in the structures of secondary minerals or clay minerals. Their contents are largely determined by the elemental and mineral composition of rocks broken down to form the parent material from which soils develop, as well as by pedogenetic processes that affect the substrate (Adriano, 1986; Kabarta-Pendias and Pendias, 1989).

The availability of Fe, Mn and Zn to plants depends on their origin in the soil (geochemical or anthropogenic origin) and their properties. The soil metals derived from geochemical sources are found in poorly available or unavailable forms (Milivojevic et al., 2012; 2013). Therefore, their soil concentrations are dependent on the parent material and different pedogenetic processes that are primarily induced by the pH and oxidation-reduction potential of the soil. For instance, soils formed on basic and carbonate rocks are richer in zinc than soils on granite and gneiss (acid silicate rocks). Also, carbonate and clay soils typically contain more manganese compared to sandy soils (Dugalić and Gajić, 2012). As for Fe, oxidation and alkaline conditions, as a rule, cause Fe deposition, whereas acidic and reduction conditions induce Fe hydrolysis (Kabata-Pendias and Pendias, 1989). In contrast, the elements coming to soil through different anthropogenic sources are generally found in the forms (in the soil solution, exchangeable and specifically adsorbed forms) that enable their higher availability to plants. Major anthropogenic sources of these microelements include atmospheric deposition, uncontrolled use of organic and mineral fertilizers and pesticides, use of undertested waste sludges or other soil

enhancers (Kabata Pendias and Pendias, 1992). Atmospheric deposition mostly results from the burning of fossil fuels (coal and oil) during electric and thermal power generation, processing of ores of Fe and non-ferrous metals, and from activities at chemical industry sites. A negative effect is also produced by traffic exhaust emissions. All these anthropogenic sources have an adverse effect not only on the soil, but also on the other parts of the biosphere (water, air and plants).

This study presents the quality of acid soils in Central Serbia as dependent on the content, mobility and availability of iron, manganese and zinc, and the dynamics of the microelements depending on the agrochemical characteristics of these soils.

Distribution of acid soils in Central Serbia

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 is considered a true mosaic of soil types, subtypes, variants and forms, due to the high complexity of geological and lithologic substrates, the great diversity of its relief and specific climate characteristics of certain regions. The Vojvodina region is mostly covered by fertile black soil, the 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). In addition to alluvial soils predominating mostly in the Morava River valley (Pomoravlje Region), soils are also formed on calcareous dolomite rocks in the uplands of Central Serbia (south of the Sava and the Danube) where black and brown soils are the dominant soil types.

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 fertilizers, effect of acid rains and absence of organic fertilizers (Đekić et al., 2014). In

consequence, the chemical, biological and physical 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, podzolized 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 acid, poorly structured, poor in organic matter and poorly suitable or 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) and the soils 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 and Đalović, 2008; Milivojevic 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 under cropland, gardens and permanent orchards. 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 which are characterized 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 has been 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 (Milivojević i sar., 2012; 2014). The area between Belgrade and Aranđelovac is covered by acidic 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 are ilimerized 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 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.

Contents, mobility and availability of iron, manganese and zinc in acid soils of Central Serbia

The complex problem facing crop production on acid soils centers on their poor physical, chemical and biological properties. As regards chemical properties, a low soil pH leads to increased solubility of certain microelements, manganese and zinc in particular and iron in part (Milivojević et al., 2011a; 2011b; Jelić et al., 2011). Soils contain a high content of iron, 3.5% on average, and its levels are considerably elevated in heavy loam soils and in some organic soils. Colored soils are largely related to the content and forms of Fe compounds present in them. The

geochemistry, content and distribution of iron in soils are very complex, and are determined by valence changes readily and rapidly occurring in response to different physicochemical properties of soils (Zonn, 1982).

The dynamics of Fe in soils is closely related to the cycles of O, S and C, as well as to the Eh-pH system of the environment and oxidation phases of Fe compounds. Fe is considered to occur in soils mostly in oxide and hydroxide forms or bound in amorphous forms to the surface of other minerals. Also, in soil horizons poor in organic matter, Fe is found mostly in chelated forms. Organic matter has an important effect on Fe oxide formation. At a high pH, pyrite is oxidized, whereas in extremely acid environments (pH<4.5) pyrite is affected by microbial activity.

These processes are mostly associated with low pH levels that have a large effect on the release of the metal (Salomon and Forstner, 1984). Microorganisms play an important role in the formation of iron oxides and their forms. Certain bacteria, such as *Tiobacillium, Metallogenium sp.*, are involved in the accumulation and cycle of Fe (Megonigal et al., 2003).

The content of readily soluble and exchangeable fractions of Fe in soils is very low compared to its total content. In acid vertisols of Serbia, the content of exchangeable and specifically adsorbed Fe is rather low (below 0.5%) compared to total Fe content (Jelić et al., 2011). Also, the content of readily soluble and exchangeable fractions of Fe in pseudogley soils in Central Serbia is negligible (0.14 mg kg^{-1}) compared to its total content (Jelić et al., 2013b).

Therefore, most of the world's soils have a low content of readily soluble and exchangeable forms of iron. Kabala and Wilk (2004) found that readily soluble forms of iron, determined by standard sequential extraction methods, make up 0.01%-0.1% of total Fe, and exchangeable forms account for 0.05%-0.21%.

Acid soils in Serbia show differences between DTPA-extractable iron and total iron content (Jelić et al., 2011). Accordingly, iron deficiency in vertisols of Serbia is not dependent on total iron content in these soils. The same authors observed that the amount of exchangeable iron (fraction I) and specifically adsorbed iron (fraction III) showed no dependence on the iron content in the other fractions, thus indicating very low mobility of Fe in vertisols of Serbia.

Table 1. *Iron content in the tested vertisols of Serbia (mg kg^{-1})*

Location	HF	HNO$_3$	0.1 M HCl	0.005 M DTPA
Cropland (n=10)	37000±4516	31200±4036	53.5±14.3	24.6±19.1
	31000-44000	24500-36900	28.0-69.0	7.0-56.0
Meadow (n=10)	36000±5869	30300±6015	60.6±43.1	30.3±25.3
	28000-44000	22200-36900	25.0-144.0	8.0-86.0
t-Test	0.2117[NS]	0.3709[NS]	0.7726[NS]	1.5102[NS]

"NS"- no significant
Source: *Jelić et al., 2011*

Iron extraction using different extracting agents in acid vertisols showed a strong positive correlation between Fe content in HNO$_3$ and HF (total Fe). Also, Fe content in primary and secondary minerals (fraction V) shows a low level of available Fe (Jelić et al., 2011). A weak correlation was observed between the Fe extracted by different extracting agents (EDTA, DTPA and CaCl$_2$) and the Fe uptaken by test plants (Kreij et al., 1996). Hence, the authors agree that no appropriate method for the evaluation of Fe availability to plants has been formulated (Walsh and Beaton, 1973; Gough et al., 1979).

Good indicators to be used in evaluating Fe availability to plants are: the dependence observed between the amount of Fe extracted and Fe concentrations in plants, and the Fe/Mn ratio in plants which is, in certain cases, due to the antagonistic effect, less than 1.0 (Kastori, 1981; Milivojević, 2003; Jelić et al., 2008). Therefore, iron is not physiologically active, since its function is assumed by Mn, and this may lead to its deficiency. Conversely, in slightly acid and neutral soils, there is no pronounced antagonism, as shown by their ratio>1 (Milivojević, 2003). Increased mobility of Fe in acid soils can increase the level of this heavy metal in soils and plants. Bošković-Rakočević et al. (2014) reported that Fe concentration in acid soils of western Serbia used for plum production did not increase above the maximum permissible limit. However, the content of Fe in plum fruits was more or less above the maximum permissible level for this element in food (30 mg kg^{-1}). Mn content in soils ranges from 411 to 550 mg kg^{-1}. Acid and loamy soils have higher Mn levels compared to alkaline and calcareous soils. Milivojević et al. (2011a) reported a range of 560-1675 mg kg^{-1} for total Mn content in acid vertisols in Serbia (10 locations). The same authors observed significant differences in total Mn depending on the type of land use. Namely, total manganese in meadow vertisols and cropland vertisols was 882 mg kg^{-1} and 927 mg kg^{-1}, respectively,

similarly to the average values for the "world's soils". Adriano (2001) found normal levels of total Mn for most soils in the range of 500-1000 mg kg^{-1}, whereas Freedman and Hutchinson (1981) determined the mean of 850 mg kg^{-1} for total Mn. The dynamics of Mn in soils is very complex, and is governed by different environmental factors, primarily by oxidation-reduction conditions and soil reaction (Han and Banin, 2000; Patrick and Jugsujinda, 1992). Mn mobility in soils is intense. Kabata-Pendias and Sadurski (2004) observed that Mn in the soil solution occurs in a considerable number of cationic (Mn^{2+}, $MnOH^+$, $MnCl^+$, $MnHCO_3^+$, $Mn_2(OH)_2^{2+}$, Mn_2OH^{3+}) and anionic forms (MnO_4^-, $HMnO_2^-$, $Mn(OH)_3^-$, $Mn(OH)_4^{2-}$). Moreover, Mn in soils shows a high degree of bonding to heavy metals (Co, Ni, Cu, Zn, Pb, Ba, Ti, W and Mo), most likely due to its hydroxyl and oxide forms in the soil ($Mn(OH)_4$ and MnO_2) (Mc Kenzie, 1980, Bartlett, 1986). Mn oxides in soils are mostly amorphous, but crystalline varieties have also been identified in some acid and neutral soils (Norrish, 1975). Sparks (1999) and many other researchers (Bartlett, 1986; Negra et al., 2005) suggest that Mn is the key to overall oxidation-reduction processes in soils.

Table 2. *Manganese content in the tested vertisols of Serbia (mg kg^{-1})*

Location	HF	HNO$_3$	0.1 M HCl	0.005 M DTPA
Cropland (n=10)	927±311	850±306	117±17.1	52.5±21.7
	650-1675	550-1600	89.0-154.0	21.0-90.0
Meadow (n=10)	882±252	803±286.5	113±32	59.8±22.2
	560-1460	500-1490	49-178	28.0-106.0
t-Test	0.40[NS]	0.35[NS]	0.05[NS]	0.74[Ns]

"NS"- no significant
Source: *Milivojević et al., 2011a*

Mn distribution in soil fractions is dependent on soil type and geological substrate. The highest amount of Mn i.e. about 50% is generally found in Mn-oxide form (Goldberg and Smith, 1984). In vertisols of Serbia, Mn occluded in oxides made up the largest soil fraction, whereas the percentage of the water soluble and exchangeable Mn fraction was considerably decreased (Milivojević et al., 2011a). The authors also reported that total (HF) and pseudo-total (HNO$_3$) contents of Mn showed no dependence on the tested soil characteristics, except the humus content which had a positive effect on 0.1 N HCl soluble Mn. Milivojević et al. (2011) determined a highly significant dependence of DTPA soluble Mn on soil pH and CaCO$_3$.

Increased Mn mobility in acid soils can significantly increase the level of this heavy metal in soils and plants. Dugalić et al. (2010) found that Mn concentrations in different types of acid soils in western Serbia used for potato production are above the maximum permissible levels and, as such, they can have a harmful effect on crops.

Mn availability to plants is significantly dependent on soil pH. Soil acidification increases the mobility and availability of Mn in soils (Milivojević et al., 2013; Jelić et al., 2013a). However, choice of extracting agents for the chemical analysis in evaluating Mn availability in soils is of great importance. Milivojević et al. (2002) evaluated manganese availability in vertisols of Serbia using the extraction solutions 0.1 M HCl and 0.005 M DTPA, and found that 0.1 M HCl extracted about 13 % of the total Mn content from cropland and meadow vertisols. However, in the same soils, DTPA extracted 5.6% Mn from cropland and 7.4 % from meadow soils. Therefore, 0.005 M DTPA extraction was twice lower than 0.1 M HCl extraction (Milivojević et al., 2002). Also, the same authors observed the highest correlation between the water soluble, adsorbed-exchangeable and reduced fractions of Mn and Mn uptake by plants. In acid vertisols of Central Serbia, increased Mn mobility at low pH, particularly at a pH below 5.5, results in increased Mn availability, and is positively correlated with the clay and organic matter contents (Milivojević et al., 2011a).

Milivojević et al. (2011a) found that cropland vertisols have a good supply of available Mn, based on the average Mn extraction values (in 0.1M HCl- 116.9 mg kg^{-1} and in 0.005M DTPA- 52.5 mg kg^{-1}). Also, meadow vertisols are well supplied with available Mn, but with somewhat lower levels in 0.1M HCl (113 mg kg^{-1}) and somewhat higher levels in the DTPA extract (59.8 mg kg^{-1}) compared to cropland vertisols.

Microbial activity has a direct or indirect effect on Mn oxidation and transformation of Mn compounds in soils (Bromfield, 1978). Microbial degradation of Mn compounds plays an important role, particularly in acid soils, due to a reduction in enzymatic Mn oxidation (+3 and +4) and the production of CO_2 and organic acids (Weinberg, 1977). Furthermore, some microorganisms can lead to Mn deposition in soils through the oxidation of Mn^{2+} to Mn^{3+} or through Mn deposition in carbonate, sulfate and other forms.

Zinc is a biogenic element that stimulates plant growth and significantly contributes to increased plant tolerance to drought and causal agents of crop diseases. Total zinc content in surface layers of different world soils ranges from 17-125 mg kg^{-1} (Kabata-Pendias, 2001). Total Zn in acid vertisols and in most acid soils of Serbia varies between 55 and 119 mg kg^{-1}, whereas available Zn content is low, in the range of 1.0-2.6 mg kg^{-1} (Milivojević et al., 2011b). The very low availability of Zn in vertisols in 10 locations in Serbia was also reported previously by Milivojević et al. (2008). The lowest levels of available Zn were found in Trnava (0.6 mg kg^{-1}), and the highest in Kragujevac (1.9 mg kg^{-1}).

Soil physicochemical properties have an important effect on the distribution and availability of certain zinc fractions in soils (Milivojević, 2003; Milivojević et al., 2011a; 2011b; 2015). The zinc content of soil is closely associated with soil texture, and is typically the lowest in light sandy soils, and elevated in calcareous and humus soils. Available zinc levels in acid soils are mostly low, as often manifested by zinc deficiency symptoms on crops (Jelić, 1996; Milivojević, 2003; Milivojević et al., 2015). However, in high-pH soils subject to organic matter dispersion, Zn adsorption can be reduced due to the formation of organo-mineral complexes, resulting in increased Zn availability (Kuo and Baker, 1980). The cation exchange capacity (CEC) shows an important effect on Zn adsorption in soil. The higher the cation exchange capacity of soils, the higher total Zn content and, hence, the lower Zn mobility and availability (He and Singh, 1993).

Table 3. *Zinc content in the tested vertisols of Serbia (mg kg^{-1})*

Location	HF	HNO$_3$	0.1 M HCl	0.005 M DTPA
Cropland (n=10)	82.7±15.3 60.0-117.0	65.5±10.7 48.0-89.0	3.4±0.9 2.0-5.2	0.8±0.3 0.5-1.6
Meadow (n=10)	82.4±19.0 55.0-119.0	63.2±15.9 41.0-95.0	4.0±2.0 2.9-9.4	1.1±0.6 0.5-2.2
t- test	0.0779[NS]	0.3783[NS]	0.8980 [NS]	1.3329[NS]

"NS"- no significant
Source: *Milivojević et al., 2011b*

Therefore, Zn and other metals in soils exhibiting higher CEC values are more strongly bound, and do not occur in readily absorbable forms, which makes them less available (Adriano, 1986). Acid vertisols in Central

Serbia have a considerable cation exchange capacity (over 25 meq/100 g) and, accordingly, zinc availability in these soils is significantly reduced (Milivojević et al., 2011b).

Zinc in acid vertisols in Serbia exhibits a characteristic fractional composition, with the residual fraction making up the largest percent in the total Zn content (69.0-74.9%), followed by fraction III bound to Fe and Mn oxides (17.5-22.2%), Zn bound to the organic fraction (IV) (very low, 6.7% on average), specifically adsorbed Zn bound to carbonates (the lowest percent, 0.7%) and Zn in the exchangeable fraction as negligible (0.2%) (Milivojević et al., 2011b).

Although Zn is very mobile in most soils, particularly in acid soils, clay fractions and soil organic matter bind Zn quite strongly, especially in neutral and alkaline soils (Peganova and Edler, 2004). Zinc fixation in soil is slow and dependent on soil pH and on the form of the metal added to the soil (Smolders and Degryse, 2006).

The immobilization of Zn in soil is controlled by phosphorus and clays (Kumpiene et al., 2008). Kabata-Pendias and Krakowiak (1995) determined that the clay fraction controls about 60% of Zn in soils. Apparently, there are two different Zn adsorption mechanisms: one in acid soils related to cation exchange sites, and the other in alkaline media, which is considered to be the chemisorption and is highly impacted by organic ligands. Moreover, oxides and hydroxides of Fe, Mn and Al seem to be of importance in binding Zn in some soils. Zn fixation in soils is reduced by microorganisms due to the accumulation of this metal in living cells (Perelomov and Kandeler, 2006).

In the soil solution, Zn occurs both in an unbound form (Zn^{2+}) and bound to cations ($ZnCl^+$, $ZnOH^+$, $ZnHCO_3^+$) and anions (ZnO_2^{2-}, $Zn(OH)_3^-$, $ZnCl_3^-$ (Kabata-Pendias and Sadurski, 2004). McBride and Blasiak (1979) found that Zn binding and fixation to the surfaces of clay minerals in soils is largely dependent on soil pH. At low pH, Zn absorption is reduced, which leads to its increased mobility and leaching. In acid and sandy soils, organic matter is the most important Zn-binding component, whereas Al, Fe and Mn oxides are of minor importance for Zn binding. However, the stability of the Zn-organic matter complex in soils is relatively low, although mineral soils have a high percent of Zn bound to organic matter. Accordingly, different types of organic Zn can also occur in the soil solution.

Conclusion

Acid soils in Central Serbia (over 60% of total arable land) have extremely unfavorable chemical, microbiological and, in most cases, physical properties, which makes them poorly suitable or unsuitable for the cultivation of most crops, susceptible genotypes in particular.

The dynamics, mobility and availability of the microelements Fe, Mn and Zn in acid soils is highly complex, and is governed by a large number of soil chemical properties, particularly by oxidation-reduction conditions, soil reaction and soil texture.

Acid soils in Central Serbia contain physiologically poorly active iron, since its function is assumed by Mn, thus resulting in iron deficiency. However, Mn in these soils shows marked mobility, particularly at a pH below 5.5, leading to a significant increase in both its availability to plants and its levels in soil and plants. Zn content in the exchangeable fraction of acid soils is negligible (0.1%). These soils exhibit a considerable cation exchange capacity (over 25 meq/100 g), thus causing a significant reduction in Zn availability.

The low productivity of acid soils in Central Serbia results from low fertility, primarily due to high levels of mobile Al, low levels of P and base cations, increased solubility of active Mn, and poor availability of Fe and Zn.

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SUSTAINABLE USE OF RESOURCES IN SHEEP AND GOAT PRODUCTION IN SERBIA AND EU COUNTRIES[1]

Lana Nastić[2], Velibor Potrebić[3]

Abstract

The goal of this paper is to present the main features of sheep and goat production in Serbia and compare results with EU countries. The most important sources of data were statistical data (from statistical yearbooks and agricultural census) as well as FADN data for the European Union. It was determined that number of sheep in Serbia increases in recent years while number of goats declines. Sheep and goats are breed mostly in statistical region Serbia South. In the paper are discussed the most important features of these productions and it was determined that other counties in region share the same challenges. Situation in sheep and goat production in EU countries significantly varies concerning many factors such as stocking density, average number of livestock units, subsidies and value of milk production.

Key words: *sheep, goats, subsidies, sustainability*

Introduction

Sheep and goat production had been developed branches of livestock production before the World War II; however, after the WWII, i.e. the law on placing a ban on keeping goats had been passed in 1954, by which enactment the goat production had practically been destroyed.

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Thereby the basic factors, which prevent faster development of forests, have not been taken into consideration, so enactment of the mentioned law had, in fact, meant destroying domestic goat as a very useful domestic animal. About three decades after the enactment of this law, there has become clear enough that some other factors had an effect on our forests destruction: torrent, flood, erosion, wild-fires, and at the most a man by his irrational management of forests, quality of forests had not been improved, although goats had been destroyed (Ziani, 1964).

In Serbia the greatest significance, concerning sheep production, is given to meat production, first of all lamb meat, while production of milk and wool is significantly below this level. As Petrovic et. al. (2010) stated, in Serbia, as well as in the most of European countries, stress is laid on lamb meat, where in the structure of mutton total production, about 70% are slaughtered lambs, and the rest are ewes and rams. They were also mentioned that sheep breeding is mostly extensive and insufficiently organized. The most of sheep population in Serbia is Pramenka (80%), of who the most represented races (breeds) are: Pirot, Svrljig, Sjenica, while the rest 20% are: Tsigai (5%) and hybrids of Pramenka with foreign breeds (15%), primarily Wurttemberg.

When breeding sheep and goats, it is necessary to pay attention to selection of a breed. As Matejas cites (2004), the selection of sheep depends on several factors:
1. Aim of production,
2. System of production,
3. Available agricultural areas,
4. being familiar with sheep production,
5. Facilities for breeding,
6. Areas where sheep are bred,
7. Tradition,
8. Market.

All of these mentioned factors are inter-connected, i.e. they affect mutually to the selection of a breed.

In recent years, in goat production in Serbia has increased a number of producers, who are engaged with the intensive goat production, and first of all, the production of goat's milk, and the producers accordingly purchase the heads of dairy goats, as Alpine and Sana goats.

The Balkan goats is an autochthonous breed of cattle and, as Bogdanovic and others (2008) state, it is well adjusted to modest feeding, keeping and caring conditions, and that robustness can use as the one of the important functional characteristics in the overall improvement of this breed.

Sheep and goat production in Serbia

According to data of the Census of Agriculture, which had been conducted from October 1st to December 15th 2012, a total number of sheep in Serbia was 1,736.440 heads of animals, of which in the north region 348,685 heads, and in the south region 1,380.593 heads.

In Serbia, sheep breeds in 154,972 holdings, of which the largest number of holdings has 3-9 heads of cattle, i.e. 53.21% of the total number of holdings.

There is significantly less holdings with 1-2 heads of sheep, i.e. 8.23%, while 27.27% of the total number of holdings has 10—19 heads of sheep. The holdings which have 20-49 heads of sheep participate with 9.26%, and with further increase of a number of heads per a holding, there comes to reduction of a number of holdings.

Thereby the holdings with 50-99 sheep participate with 1.39%, while the ones with 100-199 sheep have 0.47% in the structure of a total number of holdings. The holdings which have 200-499 sheep are negligible, only 0.15%, while only 33 holdings in Serbia, i.e. 0.02% are those who have over 500 sheep.

A total number of goats in the Republic of Serbia, according to the Census of Agriculture (October 1st – December 15th 2012) was 231,837 heads, of which 25.91% of the total number is in the region of Vojvodina, i.e. 60,063 heads of goat.

A total number of holdings, in which goats are kept, is 62,930, whereat a largest number of holdings with 1-2 goats (even 54.21%), and together with increase of a number of heads per a holding, the same as concerning the sheep production, there comes to reduction of a number of holdings that breed goats. In the total number of holdings which are engaged with this type of production (40.55%) participate holdings with 3-9 heads, while a share of holdings in which 10-19 heads are kept, is 3.76%.

Holdings, which have 20-49 heads of cattle, have a share of 1.20%. It is meaningly a low share of holdings, which have 50-99 heads (0.18%) and in the entire area of the Republic of Serbia, there are 115 of these holdings. Fifty six holdings breed a hundred (100) and more goats in the area of the Republic of Serbia, i.e. only 0.09% of the total number of holdings that breeds goats.

Aiming to a better review of the situation in sheep and goat production, there were analyzed a certain number of sheep and goats in the time period 2006-2014.

A number of sheep in Serbia, in the previously stated nine-year-lasting period, had an increasing tendency at the beginning, and then was realized a significant decrease of sheep number, while just before the end of the period had come to the increasing tendency of heads of cattle (Chart 1).

Chart 1. *A number of sheep in the Republic of Serbia in the time period 2006-2014 (in thousands)*
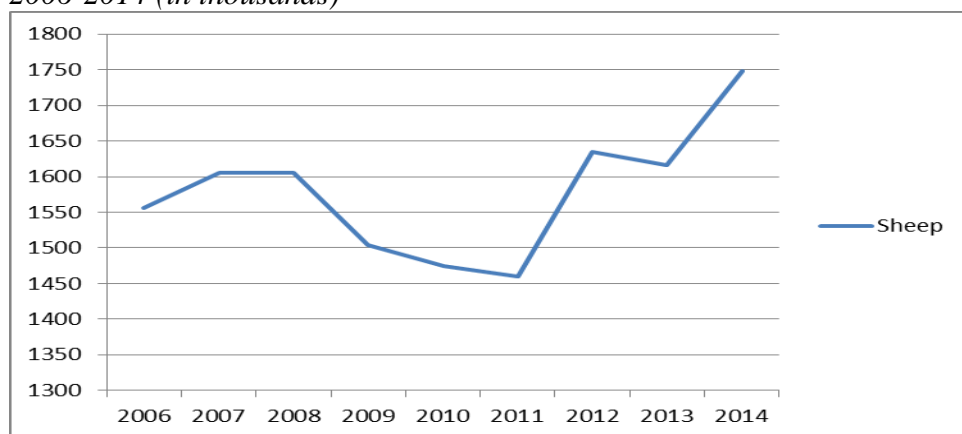
A fluctuating number of sheep has been substantially a result of unfavourable conditions in the market, unsafe sale of sheep dairy products and inability to collect sold products, which represents a limiting factor for development, as sheep, as well as goat production.

A number of heads of goats in the period 2006-2014 had been in steady decline, so their number had been decreased from 299 thousands to 219 thousands (Chart 2).

Chart 2. *A number of goats in the Republic of Serbia in the time period 2006-2014 (in thousands)*

Source: *http://webrzs.stat.gov.rs*
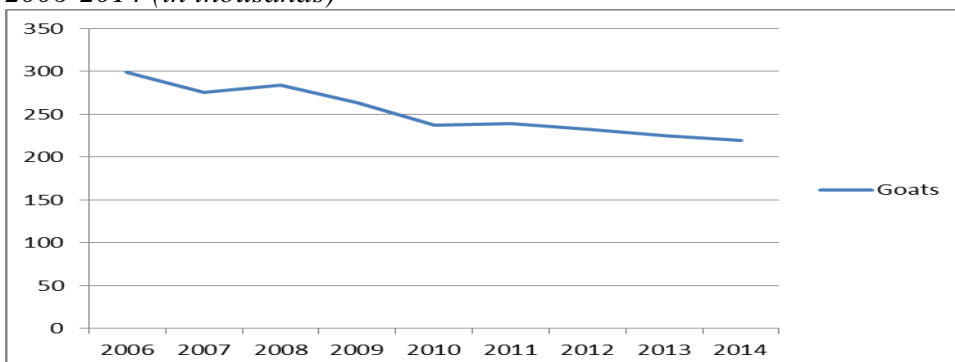
The analysis of a number of sheep and goats by the regions was shown in the table 1.

Table 1. *A number of sheep and goats in Serbia by the regions (on December 1st), in thousands*

Year	SERBIA - NORTH		SERBIA - SOUTH*	
	Sheep	**Goats**	**Sheep**	**Goats**
2006	287	93	1268	205
2007	298	86	1308	189
2008	319	89	1286	195
2009	312	82	1192	181
2010	314	74	1162	163
2011	286	75	1174	164
2012	-	73	-	159
2013	319	58	1297	167
2014	324	60	1424	158

Source: *http://webrzs.stat.gov.rs*
Note: *Without data for AP Kosovo and Metohija. The data refers to the state on December 1st. Revision of the time series 2006-2012 was done, in accordance to the data in the Census of Agriculture (2012). The revised time series was shown for the first time in a database. The data for 2012 were taken on the Census of Agriculture.

Analyzed by the regions, we notice that a number of sheep and goats is significantly larger in the region of Serbia south, regardless to a fact that larger areas of arable agricultural land is in the north region. The largest number of producers in these fields of livestock production deals with extensive production, and therefore such territorial distribution of sheep and goat production results from the production intensity.

Of the total slaughtered cattle in sheep production on the territory of the Republic of Serbia, only small part of it was slaughtered in slaughterhouses and that part is 4.72% of the total slaughtered mass (Table 2). Except this small part, all the rest quantity of slaughtered cattle in sheep production is slaughtered in the agricultural producers' holdings, i.e. outside slaughterhouses.

Table 2. *Gain in weight and slaughter of cattle – according to the origin of slaughtered cattle and the place of slaughter, 2014*

Indicator	Republic of Serbia	
	Gross weight	Net weight
Sheep		
Gain in live weight, t	62944	
Totally slaughtered cattle on the territory of the Republic of Serbia, t	51925	26816
Gross domestic production*⁾, t	54037	27907
Slaughtered cattle in slaughterhouses, t	2452	1266
Average weight of slaughtered cattle in slaughterhouses, t	34	18
Goats		
Gain in live weight, t	6698	
Slaughtered cattle on the teritory of the Republic of Serbia, in total, t	7240	4017
Gross domestic production*⁾, t	7253	4024
Slaughtered cattle in slaughterhouses, t	3	2
Average weight of slaughtered cattle in slaughterhouses, kg	29	16

Source: *http://webrzs.stat.gov.rs*
*⁾Totally slaughtered cattle on the territory of the Republic of Serbia – import of livestock + export of livestock

Only 0.04% of the total slaughtered mass of goat heads on the territory of the Republic of Serbia, almost negligible part, slaughters in slaughterhouses. An average mass of slaughtered heads of sheep in slaughterhouses amounts 34 kg, while an average mass of slaughtered goats is slightly less and it amounts 29 kg. Areas under forage crops and their share in the used agricultural area is of great significance for breeding of all livestock species. In the total area of used agricultural area, a share of areas under forage crops in the period 2006-2013 wasn't peculiarly varying, and it was ranged from 8.7% to 9.2% (Table 3).

Table 3. *Areas of forage crops and used agricultural areas in the Republic of Serbia, in thousands ha*

Year	Used agricultural area	Forage crops
2006	5066	458
2007	5053	457
2008	5055	466
2009	5058	455
2010	5051	460
2011	5056	455
2012	5052	456
2013	5069	442

Source: *Yearbook of the Republic of Serbia 2007-2014*

Producers who are engaged in goat production meet certain problems during the production process. As the most important problems the producers see in sale of milk and dairy products, low purchasing price of milk and inability to collect sold products.

In order to improve the current situation in goat production, as it is stated in the Program of Goat Breeding and Selective Breeding in the AP Vojvodina (2010), it is necessary to:

• Provide sufficient quantities of pastures, basic energy and protein fodder (maize, soy ground grain, sunflower ground grain and other fodder,
• Setting up a satisfying health status of heads of animals and providing their upkeep, as the basic preconditions of continuous goat production,
• Adaptation of the current and building some new facilities for goat breeding,
• Ensure the operation of the Commodity Reserves,
• The state incentive measures, primarily the measures of a credit-monetary policy in order to increase goat production,
• Increase the level of correlation among the primary production and processing industry and trade,
• Set the standards and to determine the quality of products based on them, along with the application of paying based on quality,
• In all these segments, all forms of production should treat uniformly.

In the neighbouring countries, the situation concerning development of sheep and goat production is similar as in the Republic of Serbia. The authors Antunovic et.al. (2012) state the significant imperfections in the Republic of Croatia, first of all, fragmentized land, primarily thinking on

pastures, as well as the unregulated property-rights relations, and problem of goat's milk purchase and milk processing and difficult sale of breeding animals. Both in sheep and goat production are identical problems, but it is inevitable to mention the several-years-lasting problem in sheep production – purchase of wool.

As the authors Grgic et.al. (2009) state, almost every of the main goals of agricultural policy in the Republic of Serbia, can be related to goat production. There are especially related in our region, due to particularity of goats breeding:
- providing the adequate life standard and creating stability of agricultural income,
- preserving natural resources, by improvement of the sustainable, especially ecological agriculture, and
- sustainability and progress of rural areas and values.

Antunovic and others (2012) state that the perspective of sheep and goat production in the Republic of Croatia is good and it reflects in improvement of sheep and goats breeding and adjusting to the market demands, as well as their products branding in conventional and ecological systems of production, which will contribute to increase in economic profit of farmers.

Support to holdings for engaging in sheep and goat production is provided by the Ministry of Agriculture of the Republic of Serbia and within the direct payments, it provides support to the holdings that have the registered sheep and goats through the incentive for high-quality breeding sheep and goats in the amount of 7,000 RSD per a head of animal.

In addition, by the Rulebook on Incentives for Preservation of Animal Genetic Resources are determined the maximum amounts of incentives by a type of incentive. The incentives for the Balkan goat are given (heads of animals older than twelve months) in the amount of 4, 500, 00 RSD/head of animal. There motivates also sheep production, the breed Pramenka (Pirot's, Krivovir's, Bardoka, Lipska, Vlasic, Karakachan) and Cokan Tsigai.

The production development of these two branches of livestock production has been stimulated by the state, applying the specific measures, as the bidding for awarding loans for purchase of a breeding livestock in sheep and goat breeding in 2014, announced by the Provincial Fund for Development of Agriculture, by which had financed

the purchase of the Alpine breed. An annual interest rate for this loan was amounted 2%, with a term of payment of 18 months and a grace period of one year. The funds were set aside for agricultural holdings – legal entities and physical persons on the territory of the AP Vojvodina, registered in the Records of Agricultural Holdings.

Until 2015, the Ministry of Agriculture of the Republic of Serbia had paid incentives for young cattle fattening, pig fattening and lamb fattening. However, since the year 2015 have been paid off the incentives for goatlings fattening, which have been regulated by the Rulebook on conditions and entitlement of the incentives in livestock production, for fattening of young cattle, fattening of pigs, fattening of lambs („Official Gazette of RS“, no. 50/2015). The incentives for lamb fattening pay off in the amount of 2,000 RSD/head of animal.

Sheep and goat production in the European Union

In 2012, in the EU countries were averagely 32.65 hectares of agricultural area, and 13.36 hectares in which forage crops are produced (Table 4).

Table 4. *Total agricultural area and forage crops (in average in the EU, in 2012) expressed in ha*

Year	2012	
Country	**Total Utilized Agricultural Area (SE025)[*]**	**Forage crops (SE071)**
(BEL) Belgium	49.14	28.29
(BGR) Bulgaria	35.71	4.17
(CYP) Cyprus	9.04	2.74
(CZE) Czech Republic	227.86	89.14
(DAN) Denmark	95.26	21.68
(DEU) Germany	85.57	35.58
(ELL) Greece	9.29	2.61
(ESP) Spain	38.65	12.44
(EST) Estonia	125.87	47.85
(FRA) France	85.36	38.69
(HUN) Hungary	46.26	9.35
(IRE) Ireland	50.27	45.34
(ITA) Italy	15.34	5.85
(LTU) Lithuania	48.49	18.74
(LUX) Luxembourg	85.95	63.07
(LVA) Latvia	68.93	29.92

Year	2012	
Country	**Total Utilized Agricultural Area (SE025)**[*]	**Forage crops (SE071)**
(MLT) Malta	2.62	1.21
(NED) Netherlands	35.65	23.34
(OST) Austria	31.46	18.62
(POL) Poland	18.84	4.58
(POR) Portugal	24.19	11.44
(ROU) Romania	10.05	2.89
(SUO) Finland	54.73	22.07
(SVE) Sweden	101.27	48.21
(SVK) Slovakia	521.5	247.98
(SVN) Slovenia	11.57	7.68
(UKI) United Kingdom	161.13	109.21
Average per holding	32.65	13.36

Source: *http://ec.europa.eu/agriculture/rica/database/database_en.cfm*

Note: *Total utilized agricultural area of holding - does not include areas used for mushrooms, land rented for less than one year on an occasional basis, woodland and other farm areas (roads, ponds, non-farmed areas, etc.). It consists of land in owner occupation, rented land and land in share-cropping.

Table 5. *Stocking density (including cattle, sheep and goats) and production of cow's milk per a cow in the EU countries, in 2012*

Year	2012	
Country	**Stocking density (SE120)**	**Milk yield (SE125)**
(BEL) Belgium	2.32	7046.49
(BGR) Bulgaria	1.26	3021.66
(CYP) Cyprus	2.94	7088.08
(CZE) Czech Republic	0.8	7285.08
(DAN) Denmark	1.9	8567.68
(DEU) Germany	1.54	7556.21
(ELL) Greece	1.81	6035.26
(ESP) Spain	0.84	7104.47
(EST) Estonia	0.56	7657.92
(FRA) France	1.25	6981.32
(HUN) Hungary	0.89	6724.59
(IRE) Ireland	1.3	5227.95
(ITA) Italy	1.52	6185.37
(LTU) Lithuania	0.57	5521.67
(LUX) Luxembourg	1.53	7466.75
(LVA) Latvia	0.5	5637.82

Year	2012	
Country	Stocking density (SE120)	Milk yield (SE125)
(MLT) Malta	6.39	6941.98
(NED) Netherlands	2.24	7937.47
(OST) Austria	0.78	6545.55
(POL) Poland	1.51	5069.05
(POR) Portugal	0.71	7241.66
(ROU) Romania	1.45	3261.11
(SUO) Finland	1.11	8647.96
(SVE) Sweden	1	8540.96
(SVK) Slovakia	0.47	6170.17
(SVN) Slovenia	1.18	5331.59
(UKI) United Kingdom	0.98	7200.81
Total (Country)	1.2	6605.38

Source: *http://ec.europa.eu/agriculture/rica/database/database_en.cfm*

Note: *Stocking density – "Density of ruminant grazing livestock: average number of bovine LU (except calves for fattening) and sheep/goat LU per hectare of forage UAA. Forage area includes fodder crops, agricultural fallows and land withdrawn from production (except when non food crops are cultivated), permanent pasture and rough grazing. Stocking density is calculated only for holdings with corresponding animals and with forage area."

The largest areas of total agricultural area per a holding are in Slovakia, the Czech Republic, Great Britain, Estonia and Sweden (over 100 ha), while the least are on Malta, Cyprus and Greece (less than 10 ha). However, a share of areas in which produce coarse fodder in the total agricultural area, varies depending on a country.

The highest share of all EU countries, of areas under forage crops in the total agricultural area, has Ireland, with the share of 90.19%, and then comes Luxemburg (73.38%), Slovenia, while the lowest share have Bulgaria (11.68%) and Hungary (20.21%).

An average number of livestock units of cattle, sheep and goats per a hectare of agricultural area, used for production of coarse fodder, at the level of all EU countries, amounts in average 1.2 livestock units (LU). This indicator is the highest on Malta (6.39%), Cyprus (2.94%), Belgium (2.32%) and Norway (2.24%), while the lowest is in Slovakia, 0.47% (Table 5).

An average production of cow's milk per a cow in the EU countries in 2012 was amounted 6,605.38 litters. The biggest milk production per a cow was realized in Finland (8,647.96) and Sweden (8,540.96), while the countries in which an average production of milk is the lowest in Bulgaria (3,021.66), Romania (3,261.11) and Poland (5,069.05).

In the year 2012, in the EU countries were 26.05 livestock units of cattle in a holding, of which 18.5% of dairy cows, 30.98% of other cattle, 10.86% of sheep and goats, 27.29% of pigs and 11.71% of poultry (Table 6). The significance of sheep and goat production in livestock production can see also through a share of livestock units of these productions in the total number of livestock units. In the structure of livestock units per a holding, a share of sheep and goats varies significantly by states, and in most of countries, it is lower than a share of cattle and pigs in the total number of livestock units. The most important is a share of small-size ruminants in the total number of livestock units in Greece, where it achieves even 73.20%, Romania 44.99%, while in Bulgaria, Cyprus, Portugal and Great Britain it is less than 20%. The lowest share of this indicator is in Denmark (0.05%), Luxemburg (0.19%) and Belgium (0.37%).

Table 6. *The average number of livestock units in a holding, in total and by types of livestock in the EU countries, in 2012*

Year	2012					
Country	Total livestock units (SE080)	Dairy cows (SE085)	Other cattle (SE090)	Sheep and goats (SE095)	Pigs (SE100)	Poultry (SE105)
(BEL) Belgium	132.63	18.65	46.91	0.49	56.14	10.23
(BGR) Bulgaria	10.7	2.66	1.36	2.37	1.91	2.25
(CYP) Cyprus	15.89	1.96	1.26	3.8	5.64	3.24
(CZE) Czech Republic	100.78	25.81	42.98	1.06	18.76	11.53
(DAN) Denmark	156.75	20.49	20.62	0.08	108.58	5.94
(DEU) Germany	89.42	22.27	25.55	0.69	35.76	4.96
(ELL) Greece	6.12	0.31	1.06	4.48	0.07	0.15
(ESP) Spain	22.71	1.63	5.23	4.19	8.67	2.87
(EST) Estonia	38.64	12.86	12.13	1.34	10.74	1.27
(FRA) France	73.16	12.46	31.59	3.56	11.25	14.08
(HUN) Hungary	18.04	2.63	3.1	1.21	5.02	5.96
(IRE) Ireland	59.37	13.57	39.14	6.08	0.19	0.03
(ITA) Italy	12.95	2.33	3.37	1.17	3.53	2.37

Year	2012					
Country	Total livestock units (SE080)	Dairy cows (SE085)	Other cattle (SE090)	Sheep and goats (SE095)	Pigs (SE100)	Poultry (SE105)
(LTU) Lithuania	13.66	5.38	5.06	0.1	2.54	0.54
(LUX) Luxembourg	112.85	26.89	68.48	0.22	15.95	0.97
(LVA) Latvia	20.46	7.11	6.54	0.31	6.17	0.22
(MLT) Malta	14.46	2.23	1.92	0.48	6.15	3.58
(NED) Netherlands	129.4	30.41	24.39	2.55	49.29	21.95
(OST) Austria	24.76	5.87	8.27	0.69	8.2	1.37
(POL) Poland	13.02	3.14	3.03	0.07	5.88	0.76
(POR) Portugal	14.3	1.91	5.38	2.88	0.82	3.2
(ROU) Romania	6.69	1.39	.63	3.01	0.73	0.78
(SUO) Finland	27.98	7.58	10.23	0.61	7.73	1.7
(SVE) Sweden	65.61	13.57	32.59	1	17.07	1.17
(SVK) Slovakia	136.44	45.46	56.38	11.63	14.55	8.05
(SVN) Slovenia	12.61	3.03	5.76	0.38	2.5	0.59
(UKI) United Kingdom	131.05	19.78	52.95	33.01	10.36	14.48
Total (Country)	26.05	4.82	8.07	2.83	7.11	3.05

Source: *http://ec.europa.eu/agriculture/rica/database/database_en.cfm*

At the level of all EU countries, the average subsidies in livestock production per a holding were amounted 552 EUR in 2012, while the subsidies for sheep breeding and goat breeding were 80 EUR (Table 7).

Table 7. *Average subsidies per a holding in cattle breeding, in total and subsidies for sheep and goat production (EUR) in the EU countries for the year 2012*

Year	2012			
Country	Total subsidies on livestock (SE615)	Subsidies dairying (SE616)	Subsidies other cattle (SE617)	Subsidies sheep & goats (SE618)
(BEL) Belgium	3748	0	3745	0
(BGR) Bulgaria	512	181	10	321
(CYP) Cyprus	439	0	0	431
(CZE) Czech Republic	2064	1278	719	67
(DAN) Denmark	468	-14	482	0
(DEU) Germany	104	-47	0	0
(ELL) Greece	88	0	25	59

Year	2012			
Country	Total subsidies on livestock (SE615)	Subsidies dairying (SE616)	Subsidies other cattle (SE617)	Subsidies sheep & goats (SE618)
(ESP) Spain	754	68	555	61
(EST) Estonia	621	202	307	112
(FRA) France	2935	133	2139	463
(HUN) Hungary	744	402	238	40
(IRE) Ireland	297	-99	85	311
(ITA) Italy	90	33	41	4
(LTU) Lithuania	363	0	0	3
(LUX) Luxembourg	46	-1	0	0
(LVA) Latvia	1718	872	382	17
(MLT) Malta	0	0	0	0
(NED) Netherlands	147	-85	3	0
(OST) Austria	724	-51	732	2
(POL) Poland	51	49	0	3
(POR) Portugal	1304	339	645	282
(ROU) Romania	101	0	0	70
(SUO) Finland	10124	5453	3135	355
(SVE) Sweden	1691	1078	0	0
(SVK) Slovakia	4311	3875	162	119
(SVN) Slovenia	279	81	198	0
(UKI) UK	337	0	322	0
Total (Country)	552	106	306	80

Source: *http://ec.europa.eu/agriculture/rica/database/database_en.cfm*

A significant number of countries, the EU member-countries, do not have the subsidies for sheep and goat production, or their number in negligible. The highest subsidy amounts for sheep and goat breeding per a holding have producers in France, on Cyprus, in Finland, Bulgaria and Ireland.

Table 8. *Value of cow's milk, goat's milk and sheep-milk and dairy products in average in all EU countries in 2012*

Year	2012	
Country	Cows' milk & milk products (SE216)	Ewes' and goats' milk (SE245)
(BEL) Belgium	40197	302
(BGR) Bulgaria	2467	710
(CYP) Cyprus	7334	3903
(CZE) Czech Republic	57850	366
(DAN) Denmark	62782	0

Year	2012	
Country	Cows' milk & milk products (SE216)	Ewes' and goats' milk (SE245)
(DEU) Germany	56637	226
(ELL) Greece	860	2823
(ESP) Spain	3612	2518
(EST) Estonia	28959	13
(FRA) France	28769	2801
(HUN) Hungary	5461	15
(IRE) Ireland	21562	0
(ITA) Italy	6828	736
(LTU) Lithuania	7555	1
(LUX) Luxembourg	61957	642
(LVA) Latvia	10600	32
(MLT) Malta	7399	1507
(NED) Netherlands	89842	5761
(OST) Austria	12989	694
(POL) Poland	4354	5
(POR) Portugal	3992	394
(ROU) Romania	1402	1014
(SUO) Finland	28575	14
(SVE) Sweden	43047	0
(SVK) Slovakia	87081	3951
(SVN) Slovenia	4976	40
(UKI) United Kingdom	48448	0
Total (Country)	10857	1123

Source: *http://ec.europa.eu/agriculture/rica/database/database_en.cfm*

Analyzing a share of subsidies for sheep and goat breeding in the total amount of subsidies in livestock production per a holding, there notices that 98.18% of subsidies on Cyprus is for sheep and goat production. In Romania, Greece and Bulgaria, a large amount of subsidies for livestock production is in the sheep and goats production sector. In Ireland, the amount of subsidies for sheep and goats breeding per a holding is higher than the total subsidies for livestock production, due to the negative amounts of subsidies which refer to cattle production.

At the EU level, there produces in average the value of 10,857 EUR of cow's milk and dairy products per a holding, and the value of 1,123 EUR of goat- and sheep-milk and dairy products per a husbandry (Table 8).

The highest value of goat's and sheep-milk and dairy products per a holding was realized in the Netherlands (5,761 EUR), in Slovakia (3,951 EUR) and finally on Cyprus (3,903 EUR).

According to the data described above and the indicators based on them, there can see that, in the EU countries, the most developed and the most significant sheep and goat production is on Cyprus, in Greece and the Netherlands.

Conclusion

A number of sheep in the Republic of Serbia has been increasing latterly, while a number of goats have been decreasing; however, the producers engaged in sheep and goat production meet many business problems, like the problem of selling products, inability to collect the sold products and their low prices.

In the EU countries has been expressed a variance of all analyzed indicators by the states, and the largest number of livestock units of sheep and goats per a holding is in Greece and Romania.

Association of agricultural producers, application of the new systems of production and increase of subsidies for sheep and goat production would improve the results of producers business and would provide development of sheep and goat production in Serbia.

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ECONOMIC EFFECTS OF INVESTMENT IN CONSTRUCTION OF FLOOR STORAGE[1]

Željko Kokot[2], Todor Marković[3]

Abstract

Storage of agricultural products is of very great importance, as it realizes a series of important functions. Reducing fluctuations in market supply, price stabilization and preservation of the quality and weight of grain, are the most important tasks of storage, where floor storage can be one of the solutions. To determine the economic feasibility of construction of floor storage, it is necessary to analyze the movement of purchase prices, in particular, corn and soybean, as well as an analysis of the total building cost of floor storage. With analyzed investment, where the calculative interest rate is 7%, capital value of 7,451,509.8 RSD, respectively annuity income in the amount of 1,060,869.42 RSD is realized. The level of interest of invested funds is expressed by internal rate which amounts 13.7%, and the planned investments would return within six years.

Keywords: *costs, investment, prices, storage*

Introduction

The objective of storage of agricultural and food products is to equalize fluctuations in market supply, then to ensure regular and continuous supply of raw materials for the processing industry, as well as establishing a balance between supply and demand, resulting in a stabilization of market prices (Alexander Corinne and Kenkel, 2012). Tendency to stabilize the prices of basic foodstuffs is one of the main reasons why most developed countries, but also developing countries,

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stimulate and encourage the construction of facilities for storage of agricultural products (Proctor, 2004).

In this paper, the concrete example, presents a method for the economic evaluation of investment in the construction of floor storage, with an area of 1,000 m^2 and a capacity of 650 t, which is intended for storage of corn and soybean. The desired economic effects are achieved by delaying the sale, or achieving major purchase prices, which would therefore mean more profit. This fact also represents the purpose of the construction of such warehouse.

Floor storages built its economy on the difference between the real growth of the sales price of grains and oilseeds (in our case, corn and soybean) and the costs of its storage and shrinkage (Novković et al, 2006). Based on the analysis of these parameters, in the ten-year period (2004-2013), the main aim of the research is to determine the economic effects of storage, while paying particular attention to the definition of the optimal period for the realization of corn and soybean.

Materials and methods

For the realization of the set goal of research, the database of the Statistical Office of Republic of Serbia is used (for the period from 2004 to 2013), then the data obtained from the Municipal Administration of Kula, Real Estate Cadaster of Kula, the company specialized in the construction of floor storage, and data obtained from agricultural cooperative from Kruščić, which plans to build a floor storage.

In the paper, various scientific methods of knowledge and research are used, such as analogy, methods of induction and deduction, and methods of analysis and synthesis. Different professional literature was used to create and design the theoretical part of the work, while the economic efficiency of investment was estimated by the dynamic method for evaluating investment (capital investment value, internal rate of interest, annuity method and return on investment).

The importance of storage

The need for storage of finished products comes from the requisite for delay selling, with the main objective to achieve better economic effects, and higher profits. Storage is particularly important for agricultural

products which are seasonal and arrive once a year and are the subject of trade throughout the year (Novković and Mutavdžić Beba, 2009).

In the economy of countries with favorable conditions for mass agricultural production, the chain of production, trade and processing of grain crops has an important place. Storage of grain crops is a key link in the chain that links farmers, on the one hand, with the subjects of marketing and processing on the other hand.

Storage of grain crops in addition to the basic function of preserving the produced quantity and quality of grain products, also achieves number of other important functions:
- bridges the gap between the seasonal character of production and the continuous nature of processing,
- consolidates fragmented, uncompetitive market quantity produced by individual agricultural producers,
- homogenize and standardize stored quantities, while creating a marketable product with defined quality level (Mastilović Jasna et al, 2011).

One of the most important roles of the warehouse are preserving and storing grains, which are essential in the diet of humans and livestock. As it is known, grain production is characterized by highly seasonal character and in most countries only one harvest per year is done. This means, in order to meet the global demand for food, it is necessary to store a big part of the production of wheat, corn, rice, millet, etc. for a period of one month and up to a year.

Increased interest in the construction of centers for reception, drying, storage, processing and handling of agricultural grain products is the result of evaluation of the profitability of these economic activities (Babić and Babić Ljiljana, 2004).

Floor storages

Floor storage is used for storing and physical protection of the goods or packaged grain (Geoffrey et al, 2011). The facility is built like a house of a rectangular type and consists of a floor, which is concrete, walls, a roof and one or more entrances (Proctor, 2004). Depending on the need, floor storages can be built with fans, windows, artificial lighting, etc.

Very often, the floor storage is divided with the walls, in order to use it for storing more crops in the same time.

The basic division of floor storages intended for storage of grain agricultural products, differs the floor unmechanized warehouse and mechanized warehouse (Babić Ljiljana and Babić, 2000).

Floor unmechanized storage facilities are built of concrete or reinforced concrete elements. In a cross section they have 60 m^2 or more, and the height of filling up the grain mass is 5 m. In the top of the roof structure a gallery is built into, which serves to carry the horizontal conveyor.

Conveyor brings the grain mass and poured it in several places along the warehouse. In this way, more than one bunch of grain will be created, what would not have happened in the case of central loading.

Figure 1. *Floor unmechanized warehouse*
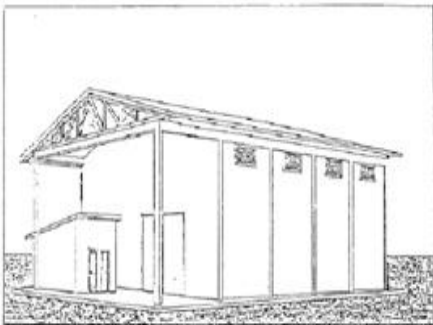
Source: *FAO Agricultural Services Bulletin,1989.*

Excluding grain from this area is quite difficult. When the storage is full, emptying is done by opening in the door with gravity pipes directly into the trailer.

When the level of grain mass is lower than the opening in the door, pneumatic conveyors are most commonly used for the exclusion.

Floor mechanized warehouse (bunkers) are similar in shape and size, to the previous one. The difference is that it enables the mechanized discharge of grain mass, because the floor is not horizontal but it is inclined.

Figure 2. *Floor mechanized warehouse*
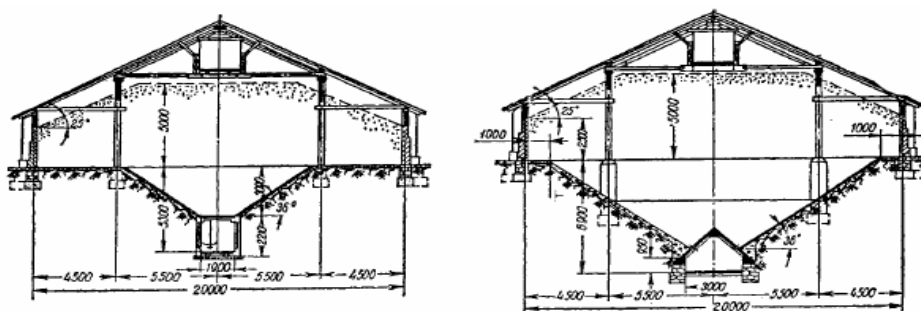
Source: *Voroncev, 1974.*

As already has been said, analyzed floor storage is intended for storage of corn and soybean. Given that this is a direct storing, without preliminary activities, for safe storage of wet grain is necessary to apply the appropriate storage conditions (Milanko Verica et al, 2012). The most important parameters that affect the security of corn and soybean storage are the temperature inside the grain mass, grain moisture and storage time. With increasing humidity and temperature of the stored grain, it comes to acceleration of undesirable physical, chemical and biochemical processes. The enzymatic processes and processes of breathing are favorited and also the intensive reproduction of microorganisms is happening (Sherbakov and Lobanov, 2003).

The heat released in this processes raises the temperature of grain mass, which leads to self-heating, which adversely affects the suitability of grain for further processing (Acasio, 1997). Importance of properly designed storages and exploitation of storage security elements best testify tragic explosions of the largest silo in the world in Wichita, United States (Grosse, 1998) and floor storage in Blaye, France (Masson, 1998).

In order to increase the safety of storage, it is necessary to conduct a series of appropriate measures, where is most important to store corn and soybean only when the grain moisture is at an optimum level.[4] Before importation of grain into the storage, storage must be hygienically correct, and then it is necessary to ensure the unhindered flow of air and of particular concern is maintaining the proper temperature.

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[4] Optimum moisture level in corn is 14%, and soybean 12%.

Investments in agriculture

Investments in agriculture imply all cash issuance, both for basic and current assets. The common goal of investment in agriculture is the realization of a new agricultural production in the long run, increasing or improving the current production, or rationalization of costs with aim of permanent increase in income (Marko et al, 1998).

In agricultural enterprises or individual farms, investments are made in order to (Andrić, 1998):
- purchase agricultural land,
- improve the production capacity of the existing agricultural land (reclamation)
- buying and raising cattle for breeding,
- supply of machinery, equipment and transport means,
- raising perennial crops
- construction of buildings and so on.

Investment costs

The method of determining the acquiring cost of the investment facilities, respectively the amount of necessary investments depends on whether the acquisition of the means of production (production capacities) is done by purchasing on the market (purchase of agricultural machinery, transport vehicles, cattle breeding stock, etc.), or shall be obtained by building in a certain period. In the first case, the acquiring cost of the investment facilities, respectively the necessary investments are made at one point, and include the purchase price of the means of production, including transport costs to farmers' organization, as well as eventual costs of their preparation for use in the company (Andrić, 1988).

Construction costs, respectively the amount of investments, which are made during construction of production and other capacities, for a period exceeding one year, are determined as the sum of all the expenses (investments) at the time of completion of constructing the investment facility. In other words, the total amount of required investments is calculated as the sum of realized investments in the period, discounted using the compound interest at the moment of completion of constructing the investment facility.

It is important to emphasize that in this case the entire investments fund from their own resources, and that there is no need to include into the calculation the possible costs for interest on borrowed funds from banks.

The total cost of building the investment facility, i.e. floor storage is shown in the following table:

Table 1. *Costs of building floor storage with an area of 1.000 m²*

Serial number	Description	Amount (RSD)
I	Cost of obtaining documentation for the location permit	74.420
II	Cost of obtaining documentation for the building permit	4.841.700
III	Cost of constructive part of floor storage	15.370.934
IV	Cost of purchasing and installing weighbridge	1.386.000
V	Costs of installing hydrant network	344.170
VI	Costs of electrical installations	235.090
VII	Costs of obtaining a use permit	288.280
VIII	Costs of registration object	10.790

Source: *Authors' estimate*

Data from Table 1 show that the total cost of building floor storage with an area of 1,000 m² and capacity of 650 t, amounts to 22,551,384 RSD. In the structure of total investments, the costs relating to the actual construction of floor storage dominate (68.20%). Next are the costs of obtaining building permit (21.47%).[5]

In third place, according to the amount of investment needed, are the costs of procurement and installation of the weighbridge, with the participation of around 6%. All other costs are of less importance, given that their share in the total costs is below 2%.

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[5] Costs of obtaining building permit vary, since each municipality separately determine the amount of taxes and the costs of issuing appropriate approvals and decisions.

Diagram 1. *Structure of total investments*

Legend:
- Location permit
- Building permit
- Constructive part
- Weighbridge
- Hydrant network
- Electrical installations
- Use permit
- Registration of object

Values shown: 0,33% 0,05% 1,53% 1,04% 1,3% 6,15% 21,47% 68,2%
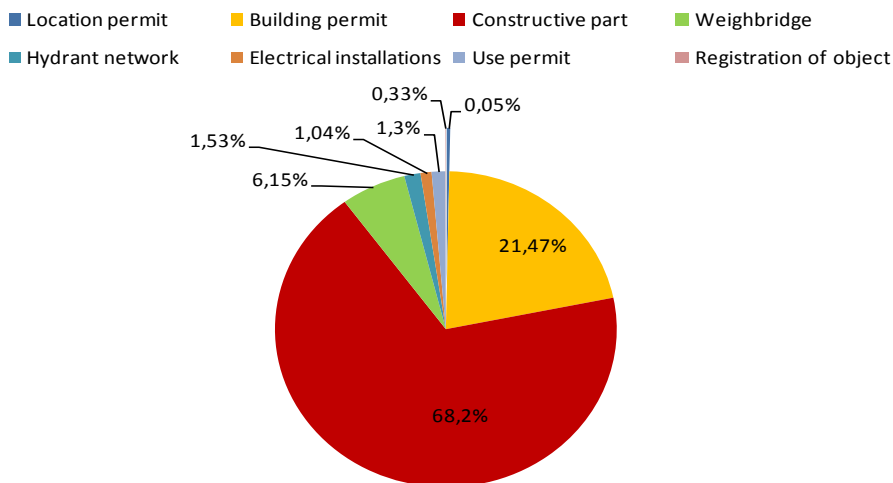
Source: *Authors*

Economic effects of storing corn and soybean

Based on the analysis of monthly trends of purchase prices of corn and soybean, in the period from 2004 to 2013, significant seasonal fluctuations were established. As stated above, the purpose of storage of agricultural products is to delay selling until the moment when the price of specific crop (or oilseed) is most preferable. Sales delaying (storage) economy is based on the difference between the growth of purchase price of agricultural products and the costs of their storing. Since in this case it is not used someone else's floor storage for the purpose of storing, but own, storage costs will not significantly affect the final financial result.

In order to estimate the economic effects of corn storage, it is necessary to analyze trends of average monthly purchase prices in the last ten years (*Tab 2*). This analysis should show is it more profitable for farmers to sell their products immediately after harvest, or to postpone the sale and wait for higher purchase prices. Also, the analysis should demonstrate in what months the purchase prices of corn were the highest, respectively in what period the highest incomes from storing were realized.

Table 2. *Average monthly purchase price of corn (RSD/kg)*

Year \ Month	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
I	9,63	6,58	6,58	9,80	15,83	7,15	10,65	17,35	16,49	23,11
II	10,96	7,42	7,00	10,03	15,39	8,35	10,59	18,24	16,83	22,93
III	10,96	7,25	7,35	9,68	15,12	8,27	10,50	18,23	18,05	21,09
IV	10,86	7,10	7,08	9,74	14,98	8,66	11,16	19,57	17,51	22,35
V	11,10	7,10	7,55	10,58	14,76	10,66	11,51	19,80	19,47	20,37
VI	11,42	7,12	7,93	10,75	15,17	11,11	12,16	20,26	19,52	19,63
VII	11,12	7,09	7,62	11,17	15,02	10,59	14,04	21,26	21,36	18,50
VIII	12,10	7,03	7,85	13,84	11,73	9,04	16,32	20,37	24,86	14,59
IX	10,57	6,83	7,71	13,42	8,60	8,07	16,65	16,61	25,01	13,96
X	6,73	5,69	6,80	14,20	7,31	8,01	14,04	15,24	24,94	13,60
XI[6]	5,54	5,62	7,54	14,53	7,56	8,53	14,47	15,47	24,70	14,03
XII	5,69	5,83	8,54	14,65	7,54	9,58	15,83	15,19	24,19	14,96
Max purchase price over year	12,10	7,42	7,93	13,84	15,83	10,66	16,65	21,26	25,01	23,11
Price at the time of harvest	-	5,54	5,62	7,54	14,53	7,56	8,53	14,47	15,47	24,70
Difference	-	1,88	2,31	6,30	1,30	3,10	8,12	6,79	9,54	-1,59

Source: *Statistical Office of Republic of Serbia*

Based on table 2 it can be concluded that in the observed period were different tendencies in the trends of monthly purchase prices of corn per years. First of all it should be noted that storing was economically justifiable in all the years of the analyzed period, except in the production year 2012, when the highest purchase price of corn was in November (24.70 RSD/kg), but eventually recorded a declining tendency. The highest income from storage was recorded in production year 2011, when it was achieved the highest positive difference between the month when the harvest of corn was made and the month with the highest purchase price. This means that it was possible to make a profit of 9.54 RSD/kg, if the sale of stored corn was executed in September 2012. The lowest earnings of corn storage was realized in production year 2007, when the maximum positive price differential compared to the moment of harvest, was only 1.30 RSD per kilogram, in January next year. The analysis of monthly purchase prices of corn, in the past ten years, led to the conclusion that the farmers, who have opted for storage, while selling the corn can achieve on

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[6] Harvest takes place in the month of November, so the grain moisture can reach the level of 14%.

average for 4.20 RSD/kg higher price than the one they would get if they did not go for storage. If it is known that half of the total capacity of the analyzed storage will be used for corn storage, respectively 325 t, it can be concluded that the annual income, just from the corn storage, will amount to 1,365,000 RSD. Also, it is obvious that the highest income of corn storage is achieved in the period from III to X month of storage, i.e. in the period from January to August. With the extension of storage time, the economic effects are increasing, until two months before the arrival of a new crop. From Table 3 it can be seen that the soybean storage was economically feasible in all the years of the analyzed period. The largest income is accomplished in the production year 2011, when the average purchase price in September 2012 was as much as 28.55 RSD higher than the purchase price of the month in which the harvest of this oilseed was carried out (October). The lowest earnings was generated in the production year 2012, when the maximum purchase price was for just 1.27 RSD higher than the price that farmers would get if they did not store, i.e. if they decided to sold right after the harvest.

Table 3. *Average monthly purchase price of soybeans (RSD/kg)*

Year \ Month	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
I	14,93	12,63	17,61	15,91	27,02	25,60	27,79	31,69	34,52	64,57
II	16,15	16,31	18,74	16,67	30,64	29,26	30,28	34,31	36,19	57,61
III	16,42	17,74	18,99	16,81	34,46	30,28	28,90	33,84	37,64	57,20
IV	19,25	18,37	19,17	17,86	29,69	30,45	30,47	34,56	39,73	58,94
V	20,76	18,01	19,13	19,19	33,29	36,47	31,59	32,09	44,43	59,61
VI	21,40	18,99	21,31	19,03	33,68	33,54	31,71	31,29	49,04	58,81
VII	21,11	18,25	21,60	20,23	31,59	33,85	31,39	33,05	52,55	59,39
VIII	17,40	18,62	21,58	20,01	26,47	26,07	32,57	32,26	61,03	55,01
IX	13,07	16,78	16,23	22,76	24,62	25,07	27,97	33,22	62,01	38,78
X	12,48	16,61	15,97	23,36	24,94	25,90	28,54	33,46	63,30	42,83
XI	12,81	16,77	16,10	23,25	24,83	26,70	30,23	33,46	62,59	42,44
XII	13,18	16,67	15,90	23,89	24,69	28,83	28,96	33,25	61,44	45,28
Max purchase price over year	21,40	18,99	21,60	22,76	34,46	36,47	32,57	34,56	62,01	64,57
Price at the time of harvest	-	12,48	16,61	15,97	23,36	24,94	25,90	28,54	33,46	63,30
Difference	-	6,51	4,99	6,79	11,10	11,53	6,67	6,02	28,55	1,27

Source: *Statistical Office of Republic of Serbia*

Analysis of movement in the monthly purchase prices, in the last ten years, shows that the soybean storage per year can make an average earnings of 9,27 RSD/kg. In our case, this would mean that the soybean storage annually provides income of 3,012,750 RSD.

Also, as in the case of corn, the largest income from delaying of sale is realized in the period from III to X month of storage, where the economic effects of the storage are increasing with the extension of storage time.

Table 4 shows that the analyzed floor storage is able to achieve annual net profit in the amount of 4,271,750 RSD, only in the case of storing corn and soybean.

Table 4. *Economic effects of storage (RSD/yrs.)*

Elements of calculation	Amount (RSD)
- Revenue from storage of corn	1.365.000
- Revenue from storage of soybean	3.012.750
A. Total revenue	4.377.750
- Disinfection	15.000
- Disinsection	30.000
- Deration	6.000
- Calibration of weighbridge	55.000
B. Total expenditure	106.000
FINANCIAL RESULT (A-B)	4.271.750

Source: *Authors' estimate*

Indicators of economic efficiency of investment

An evaluation of the economic efficiency of analyzed investment was made on the basis of dynamic methods, specifically methods of capital value, annuity methods, internal rate of return methods and return on investment methods. To calculate these indicators, previously it is necessary to draw up a cash flow and economic flow of the project (*Tab 5*). The costs of the annuity or financial obligations to creditors are attributed to the cash flow, as costs. Given that in this case there is no

credit investment because the entire investment is financed from its own sources, these costs are not counted. For this reason, the economic life of a project is identical to financial one. It is very important to note that the expected exploitation period of floor storage is much longer than 5 years, but in order to easily make a calculation of economic efficiency indicators of investment, a five-year period is taken.

Table 5. *Economic flow (000 RSD)*

	Year 0	Years of exploitation				
		1.	**2.**	**3.**	**4.**	**5.**
Revenue	-	4.378	4.378	4.378	4.378	4.378
Cash income	-	4.378	4.378	4.378	4.378	4.378
Investments	22.551	-	-	-	-	-
Disinfection	-	15	15	15	15	15
Disinsection	-	30	30	30	30	30
Deration	-	6	6	6	6	6
Calibration of weighbridge	-	55	55	55	55	55
Cash issuance	22.551	106	106	106	106	106
Net income	-22.551	**4.272**	**4.272**	**4.272**	**4.272**	**4.272**

Source: *Authors' estimate*

If the economic efficiency of investment is determined from the difference between total cash income from investment and total cash issuance for investment (usually discounted for the moment when starting to invest), the method of capital value is the object of speaking (Marko et al, 1998). In other words, the capital value of the investment can be defined as the sum of the present value of the economic results achieved during the period of its use. Based on the formula for calculating the capital value of the investment is easy to define criteria for making investment decision. The investment is economically justified when its capital value is non-negative, because only if the net present value is equal to or greater than zero, with the investment can be achieved rate of return equal to or higher than the rate of investment criteria, cost of capital, or the standard rate of return (Krasulja, 1992). Since in this case the capital value is positive ($C_{0,0}^{-} = 7451509.8$ RSD), the investment is economically justified.

If the interest level of investment funds is taken as the main criteria for the evaluation of economic efficiency, then it is more properly determined by the method of internal interest rate. Internal rate of return, as otherwise the internal rate of interest is called, can be defined as the interest rate that equates present value of the expected net cash flow from the exploitation of the investment, during its lifetime, to the present value of capital expenditures in the very investment (Krasulja, 1992). In other words, the internal interest rate is the interest rate at which the capital value of the investment is zero. For an investment to be accepted, according to this method, it is necessary that the internal rate of return is equal to or higher than the calculative interest rate.

On the basis of the equation for calculating the internal rate of interest, data on the annual cash income and issuance and logarithmic tables for interest on the interest, the internal rate is 13.7%. Given that this calculated internal rate of interest is higher than the calculative interest rate, it can be safely said that the analyzed investment is fully economically justified.

Annuity method, which is also called the method of equal installments, consists in determining the average annual increase (or decrease) of the financial operating result during the period of using the investment object. The average annual amount of net annual benefits of investment is determined by transforming the amount of the capital value in a series of equal annual amounts or the annuities in the planned period of the investment. In order to say for a particular investment that it is economically justified, calculated annuity cannot be negative, i.e. an ≥ 0. In other words, if the average annual income is greater than the average annual issuance, positive investment decision can be made (Vasiljević Zorica, 1998), as it is the case with the investment analyzed in this paper, considering that the average annual annuity amounts to 1,060,869.42 RSD.

When analyzing investment, it is also necessary to identify a term of return on investments, i.e. to determine the period of depreciation of investments. The process of determining the shortest period of return on investments is based on a calculation of the time at which the sum of annual cash income from investment will be equal to the sum of the annual cash issuance for investment, discounted to the same clearing moment (Andrić et al, 2005).

Table 6. *Time of return of investments*

Year in the life of the project	Investments		Net income		Uncovered part of the investment
	Annual amount	Cumulative	Annual amount	Cumulative	
0	- 22.551.384	- 22.551.384	-	-	- 22.551.384
1.			4.271.750	4.271.750	-18.279.634
2.			4.271.750	8.543.500	-14.007.884
3.			4.271.750	12.815.250	-9.736.134
4.			4.271.750	17.087.000	-5.464.384
5.			4.271.750	21.358.750	-1.192.634
6.			4.271.750	25.630.500	3.079.116

Source: *Authors' estimate*

Based on data from Table 6, it can be concluded that in the analyzed investment of constructing the floor storage with an area of 1.000 m^2, total invested assets can be returned in just the sixth year after commissioning of the facility.

Conclusion

To determine the economic feasibility of constructing the floor storage, first it is necessary to make evaluation of the economic effects of corn and soybean storage. Analysis of trends in the monthly purchase prices of corn has shown that storing is economically viable in all years of the analyzed period (2004-2013), except for the 2012 production year. Agricultural producers who opt for storage, while selling the corn, can achieve an average of 4,20 RSD/kg higher price than the price they would get if they did not store, i.e., if they sold crops for the purchase price immediately after harvest.

On the other hand, analysis of monthly trends of purchase prices in the last ten years shows that the soybean storage is economically feasible in all the years of analyzed period. Annual earnings of storing are an average of 9.27 RSD per kilogram.

If the total income, which is achieved by storing corn and soybean, deducting the cost of maintaining the floor storage, we get that clear annual profit is 4,271,750 RSD.

Total capital investment in the construction of analyzed floor storage is 22,551,384 RSD, with the expected time of return on investment which is in the sixth year after the completion of the project. The capital value of investment $(C_{0,0}^{-})$ is 7,451,509.8 RSD, while annuity income (an) amounts to 1,060,869.42 RSD.

On the basis of the calculated indicators of economic efficiency, the conclusion is that the investment in the construction of floor storage is absolutely economically justified.

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II SECTION

PRODUCTION AND PLACEMENT OF AGRICULTURAL PRODUCTS WITH SPECIAL QUALITY CHARACTERISTICS

BUILDING FOOD SECURITY AND MANAGING RISK IN THE EUROPEAN REGION-PROVISIONS FOR AGRICULTURE COMMODITIES

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Abstract

Food security depends on giving the people the proper nutritious and healthy goods that enable them to develop social, political and economic activities. Agriculture is the basic component that settles food security among the citizens in any state. FAO is the main global organization that struggles to provide better policies to improve the agri-food sector by making the states aware of the risks that globalization brought through years. Price volatility, resource scarcities, pollution, border diseases and climate change are the major concerns that could affect the food sector and main commodities. Sustainable environment for a strong agriculture development is one of the millennium goals set for the post-2015 agenda of the United Nations. Communities should protect themselves against the possibility of food-shortage emergencies through appropriate use of resources in order to preserve livelihoods as well as lives and property. Europe will have small increases in crop productivity overall and the largest decreases in the Mediterranean and the Western Balkans due to the climate change. Thus, the European countries will seek to coagulate environmental and policies sector and practice by filling the gap between the national strategic documents in agricultural and climate policy and infrastructure. The resources of soil, water and forest have suffered major losses due to the expansion of agriculture, and especially climate change, being a good reason for countries to adopt measures for diversification of agricultural potential, with the responsibility to preserve the environment and natural resources.

Key words: *food security, sustainable development, price volatility, commodities, agricultural potential*

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Introduction - Defining food security as a priority for the European national states

The state source of legitimacy refers to its capacity to offer security, to protect and respect the rights of its citizens, to ensure favorable environment for satisfying all their needs. In the Abraham Maslow's pyramid of needs, the necessity for food security is places on a second level of importance, immediately after the physiological needs.

A state has national security only when it generates food security and when there are enough agro-food products to cover food needs for all inhabitants enrolled in its borders and to ensure, in the same time, food stocks and water resources for people and animals feed, when natural disasters, wars, crises, etc., emerge. With the world population set to reach nine billion by 2050, Europe as well, needs to find ways to radically change our approach to production, consumption, processing, storage, recycling and waste disposal while minimizing the environmental impact.

Agriculture, as the main component of food security, has the potential to play the lead role in the sustainable development, describing a multifunctional character and great impacts: economic (as a provider of foodstuffs, fibers, bio-fuels, and timber, and a source of income for farmers), social (as a source of employment, quality of life and health) and environmental (as a friendly ally for soil, water, biodiversity, landscape and climate). This is why, a weak food security can quickly produce internally seizures and severe social tensions, can harm the physical and mental health of the population, can create economic and political instability, and may evolve into political, economic and diplomatic tensions that will damage the national security.

Moreover, in addition with the moral responsibility to protect life in all its possible meanings and according to the UN Earth Summit of 1992, sustainable land management (SLM) is the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions.[1] Therefore, Food security represents an world issue, because has deep consequences over the globe, making the statement

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[1] FAO, *Sustainable and climate-smart management of land, water and biodiversity*. FAO's framework programme on Climate Change Adaptation, 2013, http://www.fao.org/climatechange/fao-adapt/71589/en/.

that excessive and uncontrolled pollution is another factor that negatively affects food security. Poverty, on the other side, is a multidimensional phenomenon, which includes a material side, refers to the deprivation of material resources to ensure a normal level of any person, a decent living and lack of access to basic services and education or health or even the restriction of fundamental civil rights. The main feature of poverty is the lack of food that individual and global suffering - an alarming number of people worldwide (over 1.26 billion people) [1].

An analysis on the fundamental components of food security

Food issue has two basic components: food policy and nutritional policy. Therefore, food policy is developed on two levels: one is referring to supply and the quality of products, and the others target directly the consumer and its capacity to consumption. These statements point out one or more from the next goals:

- Establishing food prices against international price fluctuations;
- Ensuring a certain nutritional level of the malnourished population;
- Controlling the food prices;
- Limiting the inflationary pressure through the control of the food prices;

Therefore, food policies represent the ensemble of legislative, normative, administrative and financial governmental measures, which are considering already defined objectives. The nutritional policy settles a balance between the physiological needs of food consumption and the contribution of the nutrients for their satisfaction.

Figure 1. *Examples of threats to food security*

	Political	Technical	Demographic / economic	Environmental
Availability	Wars, export restrictions, embargoes, breakdown of international trade	Inappropriate farming practices	Population growth, increased demand, high world prices, difficulties in the balance of payments	Floods, droughts, plant and animal diseases (increased by climate change?)
Access	Civil conflicts, government restrictions	Lack of transport	Economic downturn, unemployment, food inflation	Extreme weather events
Utilisation	Regulatory failures	Contamination	Longer supply chain	Pest and diseases

Source: *Adapted from DEFRA (2010).*

The role of the food production, disponibility and consumption, has deep consequences over the human activity and the future welfare. As food security is placed in complex social, economic, cultural and political

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[1] www.fao.org, accessed at 12.09.2015.

contexts, it is difficult, if not impossible, to disconnect the role of food security from the agricultural sector and food production, rural agricultural reform and economic development.[1]

Food security is closely related to sustainable development, because a proper nutrition and quality food products constitute the basis of the population welfare and of the productivity growth.

Healthy foods contribute, according to the international standards of food safety, at boosting the exports, hence, at the income growth. It is important to be aware of the necessity of quality and nutritious food products, because food safety increases the health of the consumers and is a major component of the future food security. Based on this assumption, emerges the obligation of government to integrate into national policies goals to meet food security and ensure sustainable development.

In this context, food security is defined by the food and water needs of the population and is connected to sustainable development of any nation, according to "Brundtland Report" from 1987, elaborated by "World Commission for Environment and Development": "sustainable development represents the evolution which is trying to satisfy the present needs, without compromising the possibility of the future generations satisfying their own needs".[2]

Therefore, it is created the need of a human-environment relation, to protect the resources that ensure its survival, and furthermore to contribute to a socio-economic development and to assure the necessities for food and health.

Strategic objectives settled to ensure food safety include the next aspects, according to "Codex Alimentarius":

- Perform risk assessments of international food hazard dangers, including health impact assessment of new technologies;

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[1] Mohamed BEHNASSI, Sidney DRAGGAN, Sanni YAYA, *Global Food Insecurity. Rethinking Agricultural and Rural Development Paradigm and Policy,* Springer Publisher, Washington DC., 2011, p. 21.
[2] High Level Panel on Global Sustainability, Sustainable Development: From Brundtland to Rio 2012, United Nations Headquarters, New York, 2010, http://www.un.org/wcm/webdav/site/climatechange/shared/gsp/docs/GSP1-6_Background%20on%20Sustainable%20Devt.pdf.

- Develop guidelines for a systematic approach to developing rapid emergency response, including risk assessment levels ("fit for the purpose");
- Develop an evaluation framework that allows the inclusion of other considerations in addition to security, such as health benefits and socio-economic impacts;
- Further development of internationally harmonized methodologies for risk assessment that reflects the state of science and research in the field;
- Increase awareness and understanding of the links and relevance of food safety in the context of food security and to promote systematic integration of food security policies and interventions to improve nutrition and food availability.

Following these trends, at European level, the European Commission drafted a document entitled "White Paper" of food safety since 2002, with an independent EU Authority, called EFSA for dietary problems. The European policies developed in the field, identifying food safety as a priority, based on the following considerations: protecting and promoting consumer health.

The food production and consumption is essential to any society, and has economic, social impact and, in many cases, on the environment. Although health protection must always take priority, these issues must be considered in the development of food policy. In addition, the state and the environment, particularly ecosystems, may affect different stages of the food chain.

Thus, environmental policy plays an important role in ensuring safe food for consumers while agro-food sector occupies a key position in the European economy, the annual output of food and beverages having a value of € 600 billion.

Also, the food industry is the third largest job provider in Europe, and exports of food and drinks totaling the equivalent of € 50 billion. The agricultural sector contributes with an annual production of about 220 billion € and provides the equivalent of 7.5 million full-time jobs.

The economic importance and the ubiquity of food in our lives suggest that there must be an overriding interest in food safety in society as a whole, and especially among public authorities and producers.

The influential character of the main risks and vulnerabilities of food security

According to the UN Organization for Food and Agriculture (FAO), the earth has enough resources and supplies to satisfy the food demand, but an eventually increase in the food production must happen in the same line with a sustainable development of the land and water reserves, protecting the biodiversity. The agriculture is the main activity across Europe, and for Romania, a country rich in resources, their capitalization is necessary to increase the production and ensure the domestic consumption, alongside with the development of the rural farms and the technological transfer.

Forecasts of Organization for Economic Cooperation and Development (OECD), 2050, occur as a result of analysis of the main challenges of food security due to increasing and aging population, accelerating urbanization level, the greenhouse effect, depletion of natural resources and farmland.

The resources of soil, water and forest have suffered major losses due to the expansion of agriculture, and especially climate change. However, the gap between demand and supply of food has definitely a pronounced impact, the states being obliged to take measures to diversify agricultural potential, with the responsibility to preserve the environment and natural resources.

Agriculture, considered an indispensable element of food security comprises practices of arable land use, and practices for sustainable development of horticulture, forestry and pastoral field. To promote the sustainable development, OECD established at the end of 2014, seven analysis paths, which should support the agriculture:

> ➢ Food and nutrition security and food safety;
> ➢ Global smart agriculture over climate change;
> ➢ Economic sustainability of agriculture;
> ➢ Scarcity of natural resources;
> ➢ Emissions and pollution;
> ➢ Joint policy strategy;
> ➢ Border control managing and eradication of the diseases.

Figure 2. *Risks analysis in agriculture*
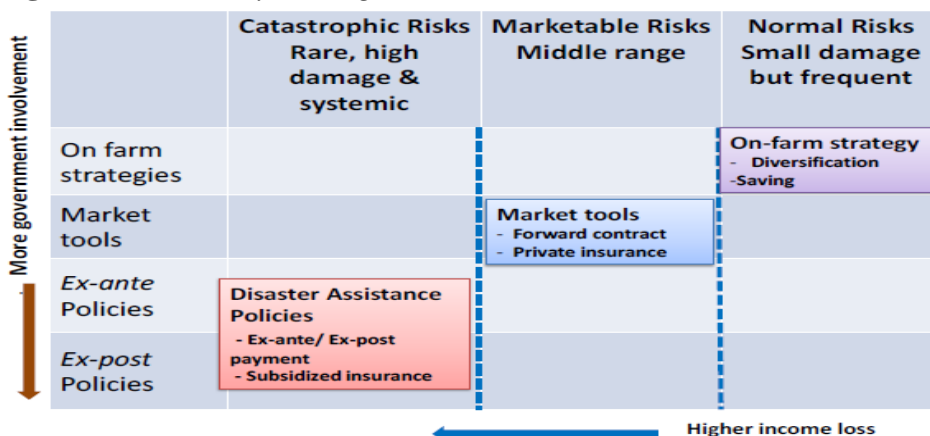
At the same time, a sustainable increase of the agricultural potential refers to the availability, access and utilization of food resources, with serious effects among vulnerable populations, especially in developing countries which cannot provide enough food because of the poverty and lack of developed policies in this regard. Also, the degree of reduced competitiveness, threatens the stability of basic foodstuffs and domestic economy of most countries. Conversely, are the most favored states, namely those states with sufficient agricultural potential that can ensure domestic consumption and build a degree of food self-reliance. These include Romania, a country with rich resources and arable land, which places on 5th position in the European Union.

For Romania, agriculture with its sub-branches - plant and animal breeding, agro-food industry, is one of the most important resources for development.
Also by identifying hazards, threats and risks to food security, can be predicted the main vulnerabilities of agriculture and agro-food industry, which are the most diverse:

- ➢ Vulnerabilities that directly affect the natural environment - soil, water, air, energy;
- ➢ Over exploitation: poor infrastructure, mainly the critical one, starting with infrastructure for production: agricultural equipment morally and physically damaged, storage rooms, insufficiently developed energy grids, transportation networks of food products;
- ➢ Impossibility of accessing European funds, which were established by the Common Agricultural Policy (CAP) 2007-2013;

- ➢ Accentuated fragmentation of the agricultural lands mostly owned by farmers (where only 4% of the arable national land is owned by 50 farmers with exploitation potential and capitalization; only 7 million ha may be the subject of the EU funds because 2. 4 million ha belong to subsistence farms;
- ➢ Lack of adaptation of the legal status of households of the farmers at the micro-farms to qualify both for accessing funds for developing rural infrastructure and improving the living standards of farmers by national funding and accessing funds for agriculture from specific funds.
- ➢ Depreciation of the technical base and investment stagnation, destruction of assets (irrigation, plantations, machinery, livestock, etc.).

Price volatility of the agro-food products. The main factor which influences the food security

Given the recent economic crisis worldwide, the current reality indicates that the extreme price volatility will directly affect food security globally, more amid over-production in some parts of the world and the lack of food in other areas of the world, which otherwise could lead to a more serious crisis - the global food crisis.

Volatility is the relative rate at which the price of a value moves up and down. Volatility is found by calculating the standard deviation of daily price changes updated as follows:
- If the price of a stock moves up or down rapidly in a short time, it has high volatility.
- If the price almost did not change at all, it has low volatility.

The prices of agro-food products are always volatile, and this happens when agricultural markets function as well defined entities. Under economic pressure, increasingly unstable, the phenomenon is widening dangerously, affecting the food security worldwide, thus, price volatility of food products from the latest four years, drastically affected millions of people, undermining the nutritional status and food security at global level. The level of price volatility on commodities markets undermined as well, the provisions for developing countries for economic growth and poverty eradication. After years of fighting historical lows, the food prices have become significant higher and more volatile since 2007. Until now, there

have been many governmental and intergovernmental incentives to protect vulnerable populations against negative impact of more expensive food products, but we can see that so far they have no effect.

In October 2014, the reformed Committee on Global Food Security (CFS) , required the High Panel of Experts on food security and food safety (HLPE) to prepare a report about price volatility, which has to cover " all the causes and consequences of a deepen impact to the in so far triggered food crisis, including market distorting practices and their relation to financial markets, and appropriate and coherent policies, actions, tools and institutions to manage the risks of excessive price volatility in agriculture".[1] This should include prevention and mitigation of basic food prices for vulnerable consumers, especially the poor, women and children for various levels (local, national, regional and international) and it is based on an analysis of existing studies. The study should consider how can ensure food access to vulnerable nations and populations when volatility causes food market disruptions.

Price volatility has a strong impact on food security because it affects household income and purchasing power. It simply can transform a nation of people with average incomes in a vulnerable population, poor and hungry people. Price volatility also interacts with price levels to affect welfare and food security. The higher the prices, the more powerful are the consequences for consumers.

Figure 3. *Factors that influence the price volatility*
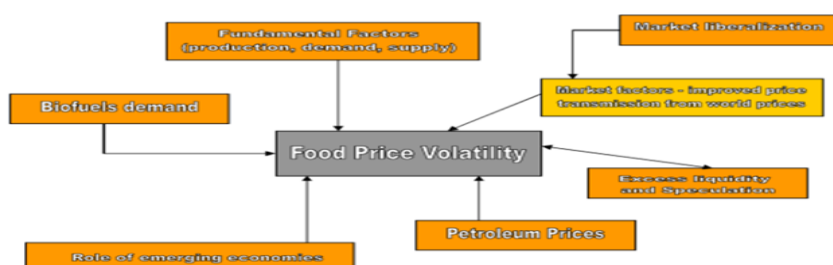
Source: *Own representation. According to www.fao.org.*

To better understand the causes of vulnerabilities and risks underlying the recent behavior of food prices, there are discussed three interlinked explanations - on short-term factors, medium and long.

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[1] FAO, *Committee on Global Food Security*, http://www.fao.org/cfs/cfs-home/en/.

- **The first explanation** defines food prices as a problem of "agricultural price volatility" (implicitly suggesting that high prices will not last) and as a quasi-natural and constant problem in agricultural markets. To understand whether this explanation is consistent with recent trends, must assess whether price volatility seen in 2007 was exceptional. There seems to be a consensus in the fact that price volatility over the last five years has been higher than in the last two decades, but lower than it was in the 1970. With the liberalization of markets in the last 20 years, although, domestic prices in many countries are more connected to international prices than they were in the 1970s.
- **A second explanation** of the current behavior of international food prices indicates that there have been periodic food crises (1950, 1970, and present) which can be explained by the dynamics of agricultural investment. High prices do not always trigger a wave of investment and technological development, which could influence production growth and cost reductions. Instead, the persistence of low prices leads to a reduction in public interest and investment decline. This situation persists until supply is so low that prices begin to raise sharply, which again triggers a new round of investment.
- **A third explanation** forecasts price increases as an early signal of a long-term deficit in the agricultural markets. According to this explanation, the world would be facing the end of a long period of structural overproduction in international agricultural markets, possibly through the widespread use of cheap natural resources (eg, oil, water, biodiversity, phosphate, land), supported by agricultural subsidies in OECD countries. In other words, we may be at the end of a period of historically unprecedented growth in agricultural production, which was based on a strategy similar to mining.

At the same time, new applications for biomass are emerging. Biofuels are just the most visible part of increase in demand for biomass to provide not only food but also building materials, heat and transport. This explanation of rising food prices for many in regards of the deficit is not new, it has been much discussed in 1970. But our understanding and involvement and for political environment have accelerated.

Today and in the near future we will see in Romania, as clearly, the cost of weak industrial farming, scattered lands, lack of cooperation and especially low degree of association, the pollution associated with the lack of a policy

dedicated purely to "food security" and last but not least, of climate change - associated with increased degradation and desertification of agricultural land. We see a lack of strategy and bear the consequences of the economic and agro-food, also the costs of the long-term under-investment in agriculture and agricultural research.

We are asking questions regarding the expectations of climate change and to the way how will be played the introduction of unlimited potential over the agricultural resources from energetic sector. We can be as optimistic as we want that human ingenuity will find solutions, but only if we are prepared to learn from our mistakes of the past.

Given the independent analyzes of the various specialized organizations we have identified a series of causes and influences that threaten food security today.

These are:

- *GLOBAL WARMING;*

- *DESERTIFICATION AND DEGRADATION OF AGRICULTURAL LANDS;*

- *THE ABSENCE OF USING THE OWN NON- AGRICULTURAL POTENTIAL TO THE DETRIMENT OF EXCESSIVE IMPORTS;*

- *THE LACK OF A NATINAL STRATEGY FOR FOOD SECURITY;*

- *GLOBAL ECONOMIC CRISIS;*

- *THE LACK OF INDEPENDENCE OF THE FOOD SECURITY;*

- *DIFFERENT LEVELS OF DEVELOPMENT BETWEEN REGIONS AND COUNTRIES;*

- *PRICES VOLATILITY;*

- *THE LACK OF IMMEDIATE ACTIONS- THE ABSENCE OF COHERENT POLICIES;*

- *THE LACK OF CONTROL AND TRASABILITY ON FOOD CHAIN;*

- *THE LACK OF CONTROL AND PRACTICAL ACTIONS AT GLOBAL LEVEL ;*

- *FOOD SECURITY AND SAFETY ARE CLOSELY LINKED TO THE ECONOMIC GROWTH AND SOCIAL PROGRESS, AS WITH THE POLITICAL STABILITY AND PEACE;*

- *FOOD ACCESS;*

- *CONTROLLED USAGE OF NATURAL RESOURCES.*

Figure 4. *Dimensions of food security*
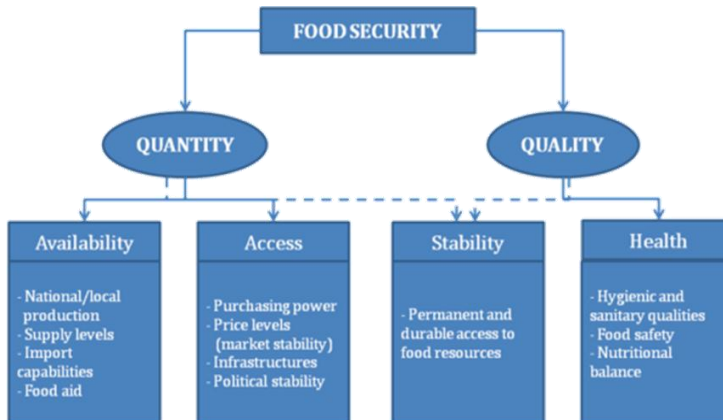
Source: *Own representation. According to www.fao.org and MOMAGRI (Mouvement pour une Organisation Mondiale de l'Agriculture).*

Analysis of price volatility for major international commodities. Forecasts for the main commodities

An analysis of the unexpected price increase, interpreted by the OECD and the World Bank show an interdependence between the macroeconomic environment and agriculture. The macroeconomic assumptions used in the context of globalization, one of the scenarios predicted, together with regional development and sustainability, have mixed implications for EU agricultural markets. The continued growth of world population leads to an increase in food demand and increasing prices for agricultural products, while expectations of a lower economic growth on short-term limited income growth, thus reducing the potential for growth in demand in the near future.

However, for 2020, the GDP should grow by about 2.7 to 3%, based on positive foreign exchange rates, Europe remains a net exporter of commodities such as cereals, meat and dairy products. Agricultural Market in Europe could be destabilized in the coming years due to increasing food prices and agricultural commodity price fluctuations. Progress in agriculture will occur depending on assumptions based on productivity and trade-related policies, but also macroeconomic and trends relating to population changes.

The scenarios indicate long-term positive outlook for crops, because demand is still quite high.

Figure 5. *EU cereals area and yield*
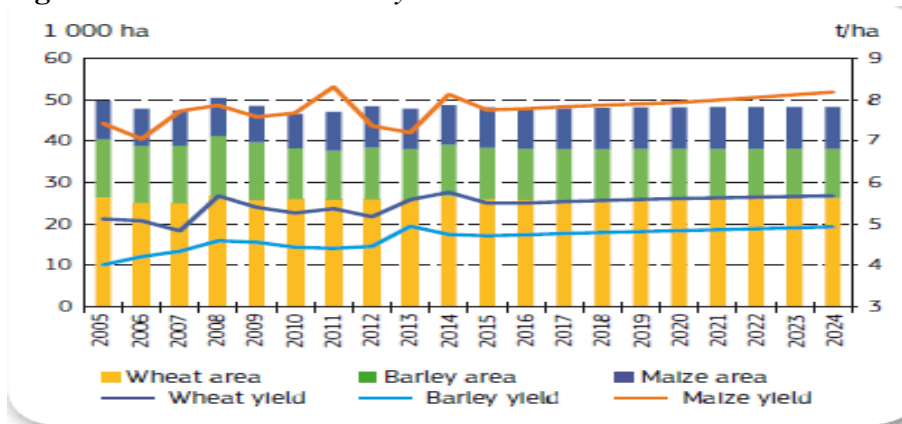
Source: *European Commission Report, 2014 on prospects for EU agricultural markets and income 2014 2024.*
http://ec.europa.eu/agriculture/markets-and-prices/medium-term-outlook/2014/fullrep_en.pdf

Grain market is characterized by strict conditions, fewer stocks and prices are above historical limits. What is worrying is that biofuels market is more dynamic than the food, which has a relative increase. Member's internal policies need to be adapted to meet challenges such as:

- Concerns about food security issues, which completely change how policies are perceived and call for increased productivity.
- EU market orientation and focus on farmers' incomes, which are transparent and questionable for decoupling payments.
- Climate change, affecting not only the results forecast for 2022, but also calls for policy adjustments in terms of their adaptation and mitigation. The answer to this challenge is also being addressed through the development of research and technology, and tools to cope with price volatility.

The commodities globally analyzed in the period 2015-2024, according to the report of the working group composed of OECD, FAO and AMIS are:

- **Grains:**

Grains are still the basic food for human consumption, but their role has changed and will continue to change in the next decade. Corn continues to be

the leading global food and most international organizations in the field estimated as necessary nearly 1.2 billion tons of grain in 2023 to satisfy world demand, which means 150 million tons more than between 2011-13). Demand for feed is the fastest growing sector in the food preferences. In the next decade will require about 160 million tons of supplementary feed. After rapid expansion in the past decade, production of ethanol requires 12% of total cereals with large bean. However, it is assumed that there will be a decrease in production of corn-based ethanol because it will be reached the blend peak in the United States.

- **Meat:**

Even if the grains and oilseeds markets have seen a significant increase in production, meat market values were minimal growth in 2013. Profitability of meat production was very uncertain in recent years since the diseases suffered by animals and high costs food became negative factors influencing the meat sector resulting in increased prices and decreased consumption. Consumption of poultry meat will record the highest growth, remaining the cheapest and most accessible source of meat for consumers with lower incomes. The second favorite meat is pork which will represent approximately 30% of the additional amount of meat consumed in the next decade. Growth is influenced by Asia and the Pacific, especially because Chinese consumers will account for half of global growth.

Figure 6. *World production and consumption of meat 2015-2024*
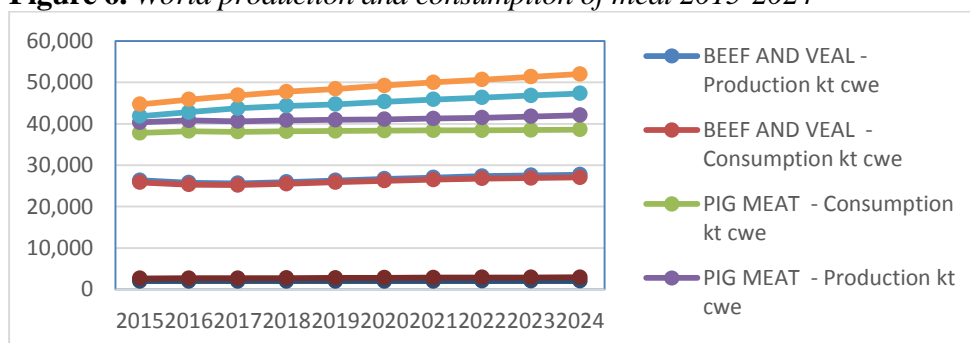
Source: www.ocde.org. Dataset: OECD-FAO Agricultural Outlook 2015-2024

- **Oilseeds:**

The grains and oilseeds markets have seen a significant increase in production, meat market values were minimal growth in 2013. Oilseed cultivated land globally will continue to grow but at a slow pace because

151

demand for sustainable vegetable oils drive up prices. Due to strong demand for vegetable oils and protein, oil consumption will increase by 26% over the next ten years; the highest increase compared to other goods. Human consumption of vegetable oils per capita will increase in the developing economies by 1.3% per year over the next decade, reaching just over 20 kg per capita by 2023 compared with 25 kg per capita in developed economies. Consumption of vegetable oils will reach 13 kg per capita in 2023 in less developed countries.

Figure 7. *Moderate growth in oilseeds production, 2009-2021*
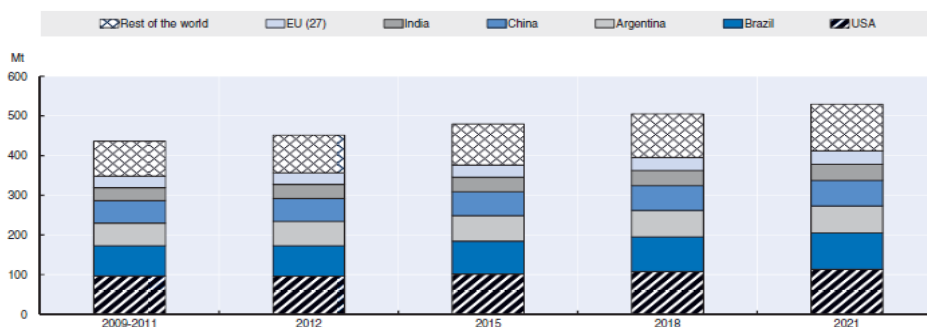
Source: *OECD-FAO Agricultural Outlook, 2012-2020.*
http://dx.doi.org/10.1787/agr_outlook-2012-en

- **Milk:**

According to data and forecasts interpreted by OECD experts, one of the main commodities, "milk" and its derivatives, it seems that India will become the largest milk producer in the world in the next decade, taking over the leadership of the European Union in milk products. Milk production prospects in China were mediocre in this decade due to low levels of production in 2012 and 2013, but it is estimated that milk production will be back on track for growth. Global milk production will grow by 17% over the next decade. This increase will result in increased livestock production that will exceed consumption of accumulated catching from 2014. In 2023, 62% of world milk production will be provided by India, China and Europe. The EU average milk price reached a record 402 EUR/t at the end of 2013 and in 2015, the EU milk price was lower than in 2013 and 2014. By 2024, EU cheese production could reach 11 million tons. Of the additional 1.15 million tons (as compared with 2014 levels) then being produced, only 350 000 tons are expected to leave the EU, increasing EU cheese exports to around 1

million tons in 2024.[1] The highest rate of the increase dairy exports comes from the United States, European Union, New Zealand and Australia. The European Union will remain the main exporter of cheese, but the growth rate is slower than in New Zealand, the US and Australia.

Figure 8. *Outlook for milk production growth*
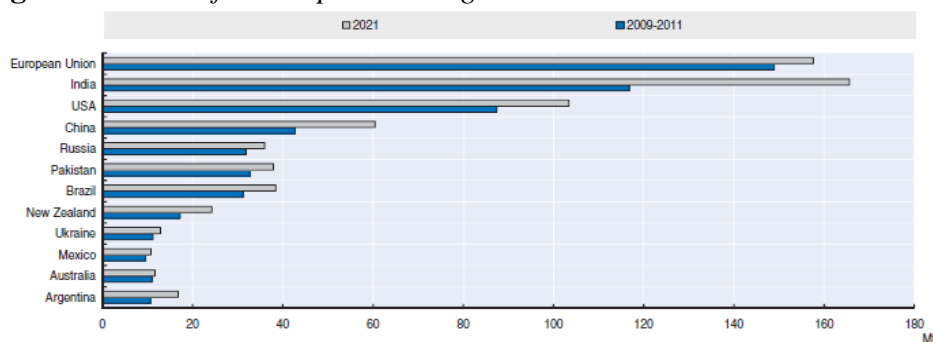
Source: *OECD and FAO Secretariats*,
http://dx.doi.org/10.1787/agr_outlook-2012-en.

According to analyzed data for main commodities, crop productivity will have small increases overall that might be far outweighed by technological development. Yield increases will be mainly in northern Europe, and the largest decreases in the Mediterranean, the southwest Balkans and the south of European Russia, mostly due to climate change and macroeconomic conditions.

Conclusions

Given the current demographic growth, the planet's natural resources are becoming increasingly scarce, and ensuring the necessary food quantity and desired structure is more difficult, on the areas increasingly stretched. Countries that have such resources, and we refer primarily to the land, should adopt economic and technical measures allowing their full recovery in terms of maximum economic efficiency. In the future period, dictates will be the prerogative of the sphere of influence of nutrition and social convulsions caused by famine can only be mitigated by using the "food weapon" instruments.

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[1]European Commission, *Prospects for EU agricultural markets and income, 2014-2024*, p.33.

The report, however, in this analysis we sought to classify not only the conceptual elements of nutrition and food security, but we looked at food security as a factor for increasing the degree of exploitation of the agricultural potential of countries, going on different predictions.

Sustainable agriculture is a necessary condition for reducing food insecurity, but it is not enough in itself. Essentially, agriculture is an indirect factor underpinning food security. Since it is the main activity of the economy of the poorest communities, development provides resources that enable rural residents reduce variations in quantities produced, to ensure surplus food that can cover occasional shortages from households and, most importantly, generate incomes so they can buy food and other basic and diversified commodities. Therefore, a combination of policies is needed in the fight against hunger and malnutrition (including land reforms) and management of water resources. The logic and method of the current system of global food and its ability to meet the food demands in a sustainable manner were questioned. Opponents ignore the problems of conventional agriculture sustainability, productivity attributed to a single set of factors and fail to recognize other possibilities. Increasing food demand of a growing population in a biophysical limitations cause serious threaten for natural resources and people strive to get the more lands already in production to foster their food security.

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BEEKEEPING AS A FACTOR OF DANUBE REGION SUSTAINABLE DEVELOPMENT[1]

Bojana Bekić[2], Marijana Jovanović[3]

Abstract

Beekeeping is one of the most important activities in agricultural production due to the role of honey bees in pollination of agricultural crops. Pollination of crops, but also wild flora, is an ecosystem service provided mainly by honey bees and it is absolutely necessary for maintenance of ecosystem functioning. Besides importance of honey bees in producing quality crops, bees also create honey surpluses which are harvested and can be used as food or for some other purposes by humans. Beekeeping is one of the rare production activities that do not have any negative effect of quality of the environment and actually, this activity enables sustainable development of every natural area. Main goal of this paper will be to analyze, using existing data published in relevant publications, state and possible paths of beekeeping development in the Danube Region, in Serbia. Also, author will research the role of beekeeping activity in reference to three main principles of the sustainable development of Danube region: ecological, social and economical sustainable development.

Key words: *beekeeping, sustainable development, apiary products, pollination*

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Introduction

Honey bee (*Apis mellifera* L.) is an insect which has a key role in maintenance of semi-autonomous and natural ecosystems in the world. Honey bees pollinate about 80% of spontaneous wild flora and over 85% of all agricultural crops. In European Union, beekeeping is considered to be one of the most important sectors of agriculture, with annual economic benefit from pollination of about 14.2×10^9 EUR (De la Rua et al., 2009). In many economically developed countries in the world, beekeeping is a developed branch of agricultural production sector, not just due to pollination services but also from production of honey bee products, mainly honey. Interest for beekeeping in EU and other countries in the world is increasing due to many factors: popularization of bees' importance in nature protection and preservation (i.e. growth of ecological awareness), the fact that this is an activity which can create additional income, it can be a safe haven for unemployed people or from the desire to produce and consume healthy and natural beekeeping products.

Also, increased interest for this production lies in the fact that it has a potential for further development without application of complex and expensive technologies or skills (Hilmi et al, 2011). However, due to environmental degradation for the past several decades, honey bees are subjected to great pressure of many negative environmental factors of which the most important are: environmental pollution by pesticides, intensive agriculture, biodiversity loss, poor natural nutrition, genetically modified organisms, inadequate apiary management and so on. Since 2006, beekeepers in the EU and the USA reported huge losses of honey bee colonies at their apiaries, which potentially endanger, before all, the service of pollination and thus production of enough quantities of food for human and animal nutrition. The cause of deaths is explaining by many factors such as: bee diseases (varoa, nosema etc.), genetically modified crops, decreased gene pool due to artificial insemination of queen bees, agricultural plant protection chemicals, poor bee nutrition and yet unknown biological factors. According to VanEngelsdorp et al. (2009), deaths are caused by synergetic effect of more factors rather than the effect of just one environmental factor. This indicates to the high rate of ecosystems degradation at global level, and necessity to apply clean and safe technologies in food production. Strategies for honey bees' preservation include minimizing or, when possible, eliminating listed negative factors and larger involvement of people in beekeeping.

One of main pillars of sustainable development is increased ecological awareness and nature protection. In agriculture, this considers application of ecologically safe and un-polluting materials and activities in all stages of food production. Beekeeping is an activity which perfectly corresponds to this requirement but, it also generates solid income, which gives a positive economical and social dimension to this production. In Danube region, development of beekeeping trough larger involvement of people in this activity, could increase life standard of present population, especially in rural areas, and could enable maintenance of rich plants' and ecosystems' biodiversity. In such way, development of beekeeping would enable sustainable ecological, social and economical growth of this region.

Material and methods

The basic research method used in this paper was Desk Research Method. The aim of desk research was to identify and analyze existing hard copy and online sources on the state of beekeeping in Danube region and, based on that, to give possible paths for further beekeeping development. Main idea for this topic rose from the fact that honey bees, considering their role in ecosystems and food production, can enable and facilitate sustainable development of Danube region, respecting all three sustainability principles: social, economical and ecological development. In this paper, the role of honey bees and beekeeping in respecting and fulfillment of all three sustainability aspects will be elaborated.

Beekeeping in Serbia and Danube region – current state

In Serbia, longstanding tradition of beekeeping which dates back to the middle ages, and a good state of natural resources, especially vegetation and biodiversity richness, provide an excellent basis for development of beekeeping. According to Zarić et al. (2013), about 60% of beekeepers in Serbia have approximately twenty bee colonies and about 3% of beekeepers can be considered as professional beekeepers with over hundred bee colonies. Beekeepers sell their products, mainly honey, directly to buyers, where products' price is lower in compare to prices of apiary products in EU countries. Annual production of honey in Serbia is about 5 thousand tons and it is mostly presented by linden honey, acacia and sunflower honey. About 10% of total quantities of honey is produced in Vojvodina while the rest is produced in other parts of Serbia (Zarić et

al., 2013). Exact number of beekeepers in Serbia today is not known but estimations are that there is about 30 000 of them of which about 10 000 are members of the Beekeeping Association of Serbia (SPOSA). Based on Agricultural Census 2012, total number of bee hives in Serbia is about 665 000, of which the largest number is located in the region of Šumadija and Western Serbia. In the Danube region, exact number of bee hives is 104 384, which makes 15.69% of total bee hives number in Serbia. In Danube region, the highest number of hives is in the City of Belgrade, Negotin and Sombor while the lowest number is in Sremski Karlovci, Irig and Stara Pazova (Table 1).

Table 1. *Number of hives, associations of beekeepers and number of associations' members*

Municipality	Number of hives*	Number of beekeeping associations[1]	Number of associations' members**
Upper Danube region			
Sombor	7.672	2	71
Apatin	2.502	1	49
Bač	2.165	1	27
Bačka Palanka	3.949	1	23
Middle Danube region			
Grad Beograd	32.160	8	532
Grad Novi Sad	5.356	1	194
Beočin	2.090	-	-
Irig	967	1	8
Sremski Karlovci	434	2	19
Inđija	2.917	1	39
Ruma	3.533	2	35
Pećinci	2.157	-	-
Stara Pazova	2.035	2	38
Pančevo	3.440	2	97
Smederevo	5.324	1	124
Lower Danube region			
Golubac	4.679	2	131
Kučevo	5.389	1	66
Majdanpek	2.278	2	35
Kladovo	3.012	2	52
Negotin	12.328	1	137
Total – Region Podunavlja	**104.384**	**33**	**1684**

Source: *Agriculture Census 2012, http://spos.info/broj-clanova-u-drustvima-i-udruzenjima-spos-a/*
Note: **Agricultural Census 2012, ** members which are at the same time members of beekeeping associations and members of SPOS (real number of beekeepers is higher)*

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[1] http://spos.info/spos/clanstvo/drustva-i-udruzenja-pcelara/

Number of beekeeping associations and societies in Serbia is 217, of which 33 are present in Danube region, which is 15% of total number of associations and societies in Serbia. Most municipalities in Danube region have one or two beekeeping societies or associations except City of Belgrade which has 17 municipalities and therefore there is a need for higher number of beekeeping societies and associations (Table 2).

Table 2. *Beekeepers' associations and societies in the Danube region*

Municipality	Number of beekeeping association[1]	Name of the beekeeping association
Upper Danube region		
Sombor	2	Association of beekeepers „Avram Maksimović", BS „Pčela"
Apatin	1	BS „Dunav"
Bač	1	Association of beekeepers „Mostonga"
Bačka Palanka	1	Association of beekeepers „Pčela"
Middle Danube region		
City of Belgrade	8	Belgrade Association of beekeepers Association of beekeepers „Budućnost", BS „Kosmaj", BS „Obrenovac", BS „Barajevo", Association of beekeepers „Grocka", Association of beekeepers „Ripanj", Association for apitherapy and improvement of integrative protection
City of Novi Sad	1	BS „Jovan Živanović"
Beočin	-	-
Irig	1	BS „Irig"
Sremski Karlovci	2	BS „Stražilovo", BS „Jovan Živanović"
Inđija	1	Association of beekeepers „Roj"
Ruma	2	BS „Nikola Mileusnić"
Pećinci	-	-
Stara Pazova	2	Association of beekeepers „Polen" BS „Jedinstvo"
Pančevo	2	BS „Podružnica", BS „Starčevo"
Smederevo	1	BS „Smederevo"
Lower Danube region		
Golubac	2	BS „opština Veliko Gradište i Golubac" BS „Golubački grad"
Kučevo	1	Association of Homolje beekeepers „Pek"
Majdanpek	2	BS „Poreč", Association of beekeepers „Deli Jovan"
Kladovo	2	BS „Kladovo" Association of beekeepers „Đerdap"
Negotin	1	BS „Hajduk Veljko"
Total	**33**	-

Source: *http://spos.info/spos/clanstvo/drustva-i-udruzenja-pcelara/*

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[1] http://www.spov.info/clanstvo/drustva-i-udruzenja-pcelara,
http://spos.info/spos/clanstvo/drustva-i-udruzenja-pcelara/

Number of beekeepers beekeeping associations and societies in Danube region, which are at the same time member of the SPOS-a, is 1 684 people but it is important to emphasize that this is not the final number of beekeepers in this region, due to the fact that not all beekeepers are member of SPOS-a or even a member of any beekeeping association or society in the region. Nevertheless, according to data found, the largest number of beekeepers is present in City of Belgrade, Negotin and Sombor (Table 2).

Diversification of beekeeping activities

Beekeeping is an activity mainly conducted in rural areas which are sparsely populated, due to special nature of beekeeping, and this is especially true in the case of high number of bee hives. In these areas, beekeeping is, and could be, an important income source for rural population. Generally, major characteristics of rural areas in Serbia and rural agriculture is the following: traditional mono-functional agriculture, agricultural production as main or only source of income, majority of the population engaged in agricultural production, problems in accessing the markets, lack of other work places, decreased possibility for employment other than agriculture, low density of population (Bogdanov, 2011). Development of beekeeping in such areas could increase living standard of rural inhabitants and potentially stimulate development or growth of other sectors of agricultural or agro-food production such as fruit or vegetable growing and processing. Some of the possible ways to increase income from beekeeping could be either increase of number of existing bee hives or diversification of production.

One of the ways to develop beekeeping is trough so called diversification of beekeeping activities. That considers production of larger number of beekeeping products or offering of unique beekeeping service to potential tourists. According to Škrbić et al (2010), diversification of production and services represents the right way of entrepreneurship development and economical strengthening or rural households. Diversified agriculture based on knowledge opens the possibilities for development of industry, transport, storage, trade, services and other sectors of economy in rural areas (Ristić, 2013). Diversification of beekeeping enables creation of profit with smaller number of bee colonies which potentially causes better management of the apiary and production of more quality products (Shiffer, 2014).

161

Competitive advantage of diversified production lies in larger offer of products and services which represent unique combination of traits specific for each family farm, which makes it different in compare to the competition (Popovici et al., 2014). In which direction the diversification will take place is on each husbandry to decide, in accordance with their natural and human resources. Some of the possibilities for diversification of beekeeping at apiaries is the following:

a) *Development of Api-tourism*. This is a new form of tourism which uses advantages of beekeeping as traditional production and variety of beekeeping products which can be studied from ecological, medicinal or gastronomical aspects (Wos, 2014). Leader in this form of tourism is Slovenia which has a long tradition in beekeeping (Šivic, 2013). Besides Slovenia, since 2004, some other countries in the world are trying to develop this form of tourism (Poland, Germany, the Czech Republic, Spain etc.). Api-tourism involves many activities such as visits to apiary, beekeeping museums, organizing bee routes, watching beekeeper at work with bees, extraction of honey, and observing life of bees. Also, it could include learning about melliferous plants, making of added value products at the apiary or tasting of beekeeping products or gastronomical delights.

There is also the health aspect of api-tourism which includes treatment of asthma by inhalation of air from the hive, application of bee venom in treatment of some diseases or massage with honey (apitherapy). Development of api-tourism is a possibility to activate rural areas, create new jobs and promote tradition and culture of rural areas, respecting regional differences. Rural tourism can create leaders for rural space development and to connect people outside the local community and discover new resources and activities which can be transformed into tourist products and services (Bilali et al, 2014). Certain examples of api-toruism already exist in Danube Region. For example, that is beekeeping museum in Sremski Karlovci in possession of family with long tradition in beekeeping.

b) *Production of royal jelly.* Royal jelly is a highly priced product at the market for which there is high demand. It is a product of honey bees' special glands for the purpose of larvae and queen bee feeding. It is a creamy yellow substance which is used in human diet as a everyday supplement or during recovery from illness. It is also used as an

ingredient in cosmetic and pharmaceutical industry. It is sold and used fresh or dried (lyophilized). Price of royal jelly is determined based on content of water, proteins, dry matte and 0-hydroxy-2-decenoic acid (Bekić et al, 2013). To produce royal jelly beekeeper must not be a beginner but experienced beekeeper due to the fact that this production, if not performed well, can weaken the colonies. Official data regarding production of this and other bee products, other than honey, in Danube region do not exist.

c) *Production of bee venom.* Bee venom is a product of special venom gland in bee workers with solely aim to protect the colony from intruders. Bee venom can be extracted from this gland by using specially designed devices which enable bees to be left unharmed. Bee venom is used for medical or cosmetic purposes (in production of gels, creams, balms, ointments, ampoules and masks with anti-age and anti-inflammatory effect). Raw bee venom at the market is in the form of powder, of various shades of yellow. Its price depends on its quality which is determined by concentration of mellitin substance in the venom. Concentration of mellitin depends on environmental conditions, bee race and method of venom collecting[1].

d) *Production of propolis.* Propolis is resinous substance that honey bees collect plants which has antibacterial properties. Bees use it for filling small cracks in the hive and disinfection and human can use it cosmetics and medicine due to its healing properties (for production of creams, pills, toothpastes, shampoos, lip balms, facial masks, breath fresheners, chewing gums and sweeteners). Namely, in traditional medicine it is used for treatment of various skin damages such as burns, irritation, ulcers, blisters, psoriasis, sore throat, toothache etc.). Propolis is sold in raw state (chunks or powder) and as alcohol extract.

e) *Production of value added products from wax.* Bee wax is a product of special worker bee glands and it is essential for building the colony. It is highly wanted product at the market due to the fact that it is used for varies industries. Beekeeper can increase its farm income by making wax candles, cosmetics or wax foundations for his own bee colonies.

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[1] http://beevenomlab.biz/bee-venom/

f) *Production of melliferous plants.* Bee products offered at the market often contain plant ingredients such as essential oils or dried parts of plants. For the purpose of making beauty products it could be useful for beekeeper to grow some medicinal or aromatic plants. Plants chosen by beekeeper may include some economically important plants or plants characteristic for the rural area in which beekeeper lives. It's better to choose perennial plants which can be used for few years instead of annual plants. Such plant species could be sage, thyme, lavender, hyssop or lemon balm (Bekić et al, 2014).

g) *Collection of pollen.* Bees collect pollen for feeding bee brood because it is the main protein source necessary for bees to fully develop. Pollen is used fresh or in dry form as a supplement in human nutrition because it is a rich source of enzymes, vitamins and minerals.

These are some possible paths to development of beekeeping trough diversification of production and services. However, for accomplishment of some of the listed proposals certain preconditions must be fulfilled. For example, for development of api-tourism in a rural area, at least basic infrastructure must exist. That is something on which producer has little influence on and which must be dealt at state level. For value added products from beekeeping, marketing of products must be well designed and market secured. This might be a problem for a producer in rural areas, further away from large cities. Nevertheless, trough surpassing of these obstacles, diversification could be a possible way to sustainable economical, social and ecological development of rural areas in Danube region.

Organic beekeeping – a chance in protected areas

Modern conventional agricultural production is characterized by large use of plant protection chemicals whose production and application is increasing. Some of these chemicals are toxic for bees and lead to chronic or acute intoxication of bees. The most dangerous are neonicotinoides which hold over 25% of world market of insecticides (Bekić et al, 2015). It is scientifically proven that these pesticides have lethal or sub-lethal impact on development of bee brood, that they disable orientation of bees during flight return to the hive because they affect memory and learning of bees. Therefore, it is out of most importance to educate crop producers which chemicals to use and in which way. Many agricultural producers do not understand the role of bees in pollination of crops and the benefits achieved

therefore. In Danube region, there are large areas under agricultural crops pollinated by bees, such as sunflower and rapeseed, thus understanding and cooperation between beekeepers and producers of agricultural crops is fundamental and urgent (Bekić and Roljević, 2013). Especial problem related to these chemicals is their accumulation in the environment including bodies of living organisms and their products. Also, besides neonicotinoides there are other agricultural chemicals toxic for bees such as organophosphorous insecticides, organohlorine insecticides, piretroides etc. Most of these insecticides impact honey bees' nervous system. Neonicotinoides, fluvalinat and fopronil are possibly among factors which cause Colony Collapse Disorder, which is, since it appearance in 2006, spread to many European countries and USA. Official data about existence of this phenomenon in Serbia does not exist. Because of these scientific findings, EU Commission has banned use of neonicotinoides in agricultural production till the end of 2015, when this decision will be revised[1]. This problem is widely spread and very serious, both from economic point of view (beekeeping is an industry worth billions in some countries) and from ecological point of view (pollination and food production).

From all these reasons, and more, some other methods of agriculture production emerged at the surface. One of the most recognizable is method of organic agriculture production which is a guarantee of products' and environmental' safety. It can be applied both in plant and animal production and therefore beekeeping too. The main rules of organic beekeeping include (Bekić et al, 2011):

- Conversion period of bee colonies of at least of one year
- Beekeeper must use only organically produced wax
- Local types of honey bees have advantage over other types and races
- All purchased swarms must be from apiaries with organic method applied in the production
- All food for bees must be from organic production
- Artificial additives in beekeeping products are not allowed
- Treatment against varroa includes application of organic acids, essential oils and biological methods of control
- Hives must be made of wood and painted with organic colors
- Disinfection of hives is done by physical treatment (heat, mechanical cleaning and if necessary sodium hydroxide)
- As in conventional beekeeping all activities at the apiary must be well documented.

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[1] http://ec.europa.eu/food/animals/live_animals/bees/health/index_en.htmv

When talking about conversion period it should be noticed that transition from conventional to organic beekeeping is probably easier than in the case of other agricultural branches.

Main issue in organic production is absence of polluters in surrounding of few km. All these requirements can be fulfilled in protected natural areas which exist in Danube region (Table 3).

Table 3. *Protected natural areas in the Danube region*

Name of protected area	Type of protection	Municipality	Area, ha
Fruška Gora	National Park	Beočin, Novi Sad, Sremski Karlovci, Bačka Palanka, Šid, Sremska Mitrovica, Inđija, Irig	25.393
Đerdap	National Park	Golubac, Majdanpek, Kladovo	63.608
Begečka jama	Nature Park	Novi Sad	379
Ponjavica	Nature Park	Pančevo	134
Tikvara	Nature Park	Bačka Palanka	508
Jegrička	Nature Park	Bačka Palanka, Vrbas, Temerin, Žabalj	1.145
Koviljsko petrovaradinski rit	Special Nature Reserves	Novi Sad, Sremski Karlovci, Inđija, Titel	5.895,3
Gornje podunavlje	Special Nature Reserves	Apatin, Sombor	19.648
Obedska bara	Special Nature Reserves	Pećinci, Ruma	9.820
Bagremara	Special Nature Reserves	Bačka Palanka	118
Kosmaj	Landscape of extraordinary characteristics	Beograd, Mladenovac	3.515
Avala	Landscape of extraordinary characteristics	Beograd, Voždovac	489
Total – Danube Region	**13**	**-**	**130.652,3**

Source: *http://biodiverzitet-chm.rs/biodiverzitet-u-srbiji/zastita-biodiverziteta/zasticena-podrucja/lista-zasticenih-podrucja-republike-srbije.pdf*

In Danube region there are two National Parks, four Nature Parks, four Special Nature Reserves and two Landscapes of Extraordinary Characteristics, which cover total area of 130 652,3 ha. These areas have special flora and fauna, many endemic and relict endangered species, and therefore are out of most importance for protection and preservation. Preservation of these areas is naturally related to organic beekeeping methods. Benefits achieved by this practice would be both for a beekeeper (profit achieved from organically produced products) and for nature and human society in general (from production of safe and healthy products and service of plant pollination). In European Union, there is a strong need for organic honey, especially monofloral honey. In Serbia, almost all honey produced is from conventional beekeeping although there are good natural conditions for organic beekeeping, especially in protected areas. This can be a good chance for beekeepers in Danube region, to add value to their production and profit more from their beekeeping practice.

Certification of beekeeping products

Adding value to beekeeping products has various meanings, from products with added natural ingredients to special ways of products' marketing. However, obtaining some specific certificate could also be a way to add value to the product, and thus increase its final price. Reason for creation of value added products is obvious, and it can be found in the following: more competitive surrounding, chance to be distinguished from the large number of similar products at the market, chance to earn bigger profit, boosting of innovation etc. Beekeeper can certificate for example, *organic production* where that makes him different in compare to the other producers of similar products, which do not apply organic methods of production. But, what can distinguish a beekeeper from other producers at the market is also certification of *products' authenticity*. Honey authenticity can be observed from the aspect of production process authenticity and authenticity of botanical and thus geographical origin (Bogdanov and Martin, 2002). Production process refers to method of honey extraction and potential changing of its composition during production process or after complete extraction. Due to many affairs in the past years linked to food production, large significant nowadays is given to researches whose aim is to prove geographical origin and authenticity of products used for human nutrition, which includes also beekeeping products, mostly honey. Namely, authenticity of beekeeping products can be proven by certain laboratory methods which can confirm

the method of production and the geographical origin of the product. If that geographical area is known to be with preserved environment and traditional beekeeping practice than it is considered the added value to the product. It is believed that this product has higher quality and thus it has higher price at the market, in compare to other similar products. Products with PGI (protected geographical indication) and PDO (protected designation of origin), which are proof of products' authenticity, are very popular. In Europe, currently, there is over twenty different types of honey with protected PDO or PGI, mostly in Spain, France and Portugal[1]. This honey does not contain any imported honey or any additives, and the certificate proves that. Certification enables capturing of market niches which are not under severe competition by large companies because it is related to productions which are limited by a certain geographical area.

Most honey in Serbia is sold at retail market or to wholesale purchasers without any indication of origin. However, in recent years there is a certification process of some honeys made in some areas. Certified honeys in Serbia include: Homolje honey, Linden honey from Fruška Gora and Kačer honey. There are no prescribed quotas for their export to European Union and at domestic and foreign market they achieve higher prices, in compare to similar products without such certificate[2]. So, in the Danube region there are already some certified honeys by their geographical origin. There is a possibility to relate organic production with authenticity of geographical origin for the purpose of achieving even greater added value of honey. For example, in protected area NP Fruška Gora, beekeepers could be producing organic linden honey. Potentially, such product could be successfully sold at the market because it is monofloral and it is of proven quality. But, except the certificate, which is a guarantee of high quality and control, there must be enough quantities of these products for continual sale at the market, which can be achieved by enlargement of production and involvement of more people into beekeeping practice. Also, similar certification perhaps could be achieved in other protected areas in this region. In such way, certification could contribute to sustainable economical and social development of this region.

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[1] https://en.wikipedia.org/wiki/Regional_honeys
[2] http://www.kombeg.org.rs/Komora/udruzenja/UdruzenjePoljoprivredeKacerskiMed.aspx?veza=3404

Conclusion

Beekeeping as an important main or additional source of income has becoming more and more attractive, especially in light of high unemployment rate of rural population and large possibilities for honey export. Also, very important fact is that beekeeping gives a certain extent of autonomy to producers, especially regarding organization of production but also regarding products' sale. Another significant factor which differ this production from other sectors of agricultural production is that main beekeeping product, honey, is a non-perishable product which can be stored for a long time. This gives the producer certain liberty in terms of finding a more favorable buyer or changing his business strategy, if conditions at the market are currently not favorable. For the purpose of beekeeping development in Danube region certain activities should be conducted: diversification of beekeeping, application of good beekeeping practice, quality control and authenticity of beekeeping products, education of fruit and crop producers regarding application of pesticides in agricultural production, establishment of cooperation and experience exchange among beekeeping associations, better marketing of bee products, planting of melliferous trees, beekeeping in protected areas (organic beekeeping), involvement into api-tourism etc. Application of all these activities can lead to sustainable social, economical and ecological development of entire Danube region.

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IMPACT OF THE RUSSIAN IMPORT BAN ON THE SERBIAN PORK EXPORTS AND PRICES

Ivan Djuric[1], Anton Puskaric[2]

Abstract

In this paper we analyze the impact of the Russian import ban for pork originating in the EU on the Serbian domestic pork prices. We use an Autoregressive Distributed Lag Model (ARDL) in order to investigate if the Russian import ban affected the short-run and long-run price transmission from the selected reference markets (i.e. EU and Russia) to the Serbian domestic pork prices. The price transmission analyses indicate significant decrease in the long run price transmission between the EU and Serbian domestic pork markets. The opposite is true for Russian-Serbian price relations. The short-run price dynamics indicate significant increase in Serbian price adjustments after the Russian import ban towards price changes in both EU and Russian markets.

Key words: *EU, import ban, pork, price transmission, Russia, Serbia.*

Introduction

In response to the West's economic sanctions imposed in June 2014, the Russian government imposed an import ban in August 6, 2014 on most foods and agricultural products from the European Union (EU), the United States of America (USA), Norway, Canada and Australia. Thus, the most important trade partners lost their market share on the large Russian market.

The importance of Russian market could be explained by the fact that Russia imports about 50% of food products, mainly meat, fruits, vegetables, fish and milk products. Agricultural import in 2013 was about

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40 billion USD (Djuric et al., 2015a). Russian imports also absorb about 15% of the global trade with products such as frozen beef, fruit and butter.

Concerning pork imports to Russia, the EU lost its market share already at the beginning of 2014 when Russia imposed an import ban towards pork originating in the EU. The main reason was the appearance of several cases of the African swine fever (ASF) on the borders between Lithuania and Poland with Belarus (FAO, 2014).

The ban towards the EU caused significant short and medium-term consequences on the Russian domestic market considering that the EU was suppling about 60% of the total Russian pork import prior to the ban (Djuric et al., 2015b).

Considering that some of the largest trade partners of Russia were affected by the import bans, Russian food importers needed urgently to either increase import from the existing partners or to find new suppliers for banned products.

This was a great opportunity for Latin American countries (e.g. Brazil and Chile), former Russian republics (e.g. Belarus, Kazakhstan and Caucasian countries), some Asian countries (e.g. China), and Serbia to increase the volumes of agricultural exports towards Russia.

For Serbia, a small agricultural export oriented country, Russian market becomes especially important, or in other words more open, since 2011 when Russia allowed tariff free import for numerous of Serbian agricultural products. This agreement caused that the Serbian agricultural export almost doubled towards Russia (Figure 1).

The second large increase in the Serbian agricultural export towards Russia was in 2014 which can greatly be contributed to the increase in Russian demand caused by the agricultural import ban.

This is particularly the case for the pig meat export which rose significantly (see section 2).

Figure 1. *Development of the Serbian agricultural export towards Russia, 2005-2014*
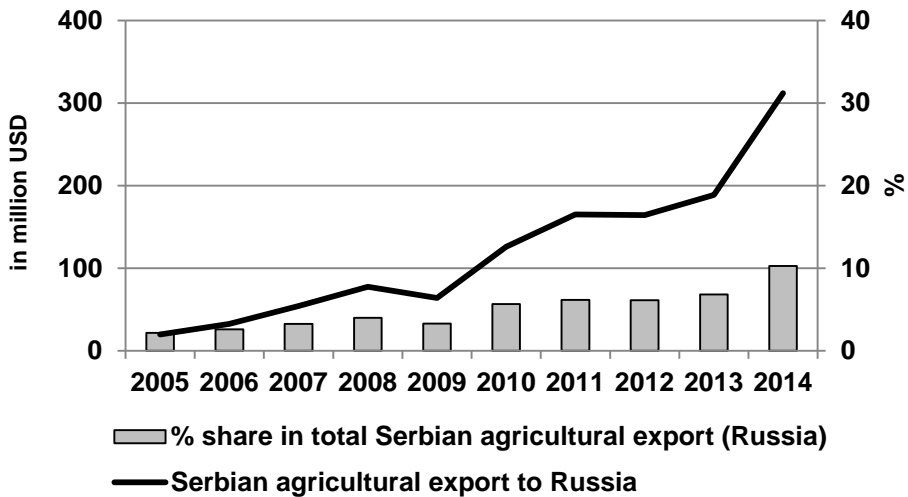
These recent trade developments bring some light to almost devastated Serbian pork production. Unfavorable factors, such as high input costs, low access to capital, the EU ban on Serbian pork export due to the non-accepted vaccination against swine-fever, domestic market uncertainty, and reduced domestic consumption, greatly contributed to the overall critical developments in the Serbian pork sector (Djuric and Petkovic, 2013; Zivkov et al., 2010). Consequently, Serbian pork prices are higher on average compared with the main EU pork producers (Figure 2)

In this paper we aim at investigating if the Russian pork import ban (in February 2014), had an impact on: a) volumes of Serbian pork exports towards Russia; b) level of transaction costs; and c) transmission of price changes from the relevant EU and Russian pork markets towards Serbian domestic prices.

Considering that Serbia was not included in the Russian import ban, we hypothesize that the export of Serbian pork towards Russia increased during the observed period, whereby transaction costs decreased followed by the increase in transmission of price changes from the Russian domestic pork prices towards prices on the Serbian domestic market.

Figure 2. *Serbian and the EU pork prices, 2010-2013*
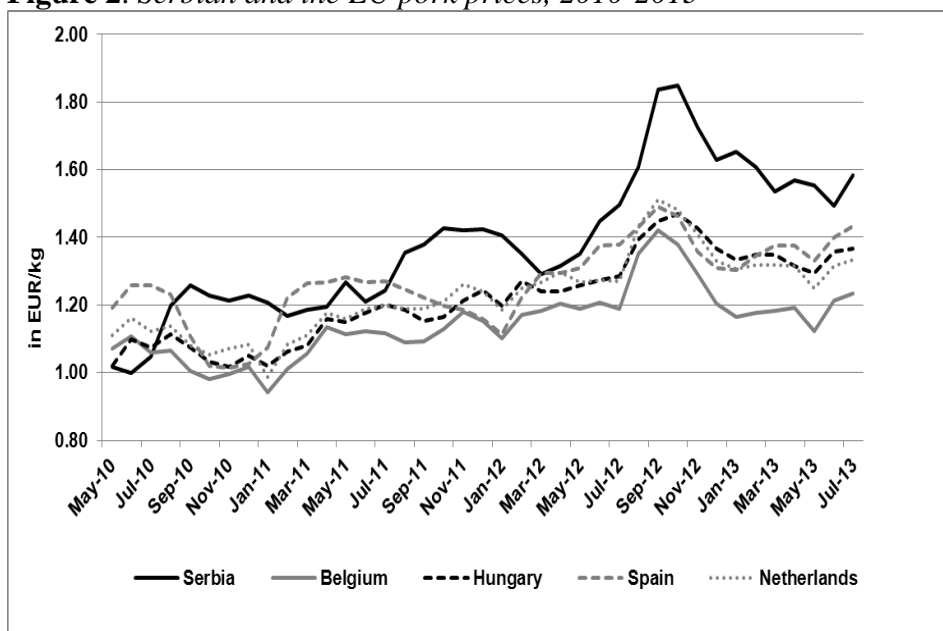
Source: *Djuric and Petkovic (2013)*

For the analysis we use an Autoregressive Distributed Lag model (ARDL) which allows us to access both the short-run and long-run transmission of price changes from reference markets (i.e. EU and Russia) towards Serbian domestic prices. In the first stage we estimate the model for the period before the ban in February 2014. We refer to this regime as to "free trade" regime.

Second, we estimate the model for the period between the first import ban in February 2014 and the second ban in August (i.e. the "EU ban" regime). Estimation of two models for different time periods allows us to identify if the short-run and the long-run price transmission parameters change due to the Russian import ban.

This paper is structured as follows. Section 2 describes the importance of the Russian market for the Serbian pork export. Section 3 describes methodology and data used for the analysis. Section 4 provides empirical results with discussion. Section 5 provides conclusions.

Importance of the Russian market for the Serbian pork export

Total Serbian export to Russia was 857 million USD on average for the period 2010-2014. In total export, agriculture accounts for 21% with an average value of 181 million USD. About 97% of the total agricultural export refers to export of food and live animals. Export of vegetables and fruits, meat and meat products, and dairy products account for 92% of total food and live animals export to Russia (Table 1).

Exports of fruits and vegetables, and meat increased significantly in 2014 compared to the whole observed period (2010-2014). Fruit and vegetable export increased for 34% in value terms compared to 2013, while meat export rose for 1341% (Figure 3). More detailed analysis of exports in 2014 indicate that the average monthly meat export increased for 75%, from 3.6 million USD in the first half 2014 to 6.3 million USD in the second half of the year (Figure 4).

Table 1. *Serbian agricultural export to Russia, 2010-2014*

Product list	Average value (1,000 USD)	Structure Total=100%
00 Live animals	11	0,0
01 Meat and meat preparations	17.719	10,1
02 Dairy products and bird's eggs	13.692	7,8
03 Fish, crustaceans, mollusks	11	0,0
04 Cereals and cereal preparations	6.157	3,5
05 Vegetables and fruit	129.592	74,0
06 Sugars, sugar preparations, honey	179	0,1
07 Coffee, tea, cocoa, spices	251	0,1
08 Feeding stuff for animals	1.803	1,0
09 Miscellaneous edible products	5.793	3,3
0 Food and live animals	**175.207**	**100,0**
11 Beverages	5.844	70,2
12 Tobacco	327	29,8
1 Beverages and tobacco	**6.170**	**100,0**
0+1	**181.377**	**-**

Source: *UN Comtrade, own illustration*

Figure 3. *Serbian exports of meat to Russia, 2010-2014*
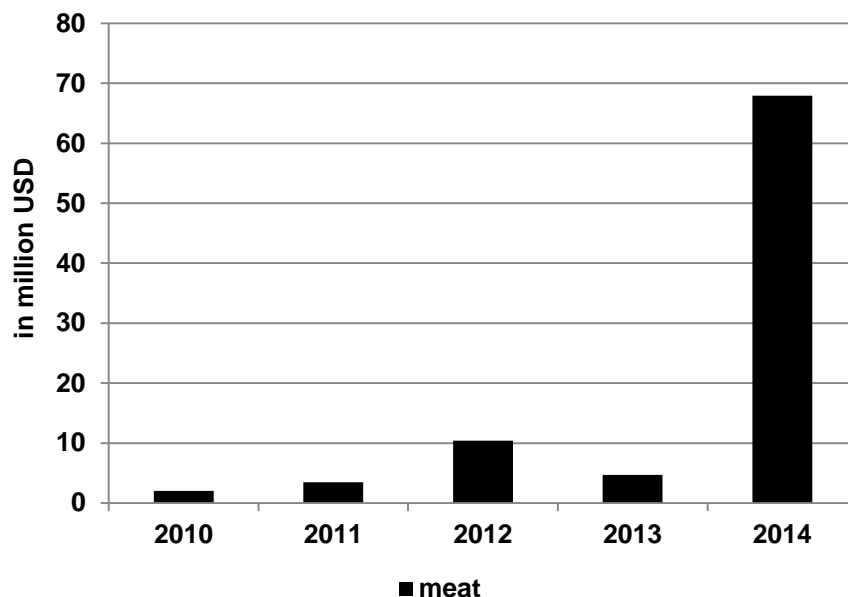
Source: *UN Comtrade, own illustration*

Figure 4. *Development of the Serbian meat exports to Russia, 2014*
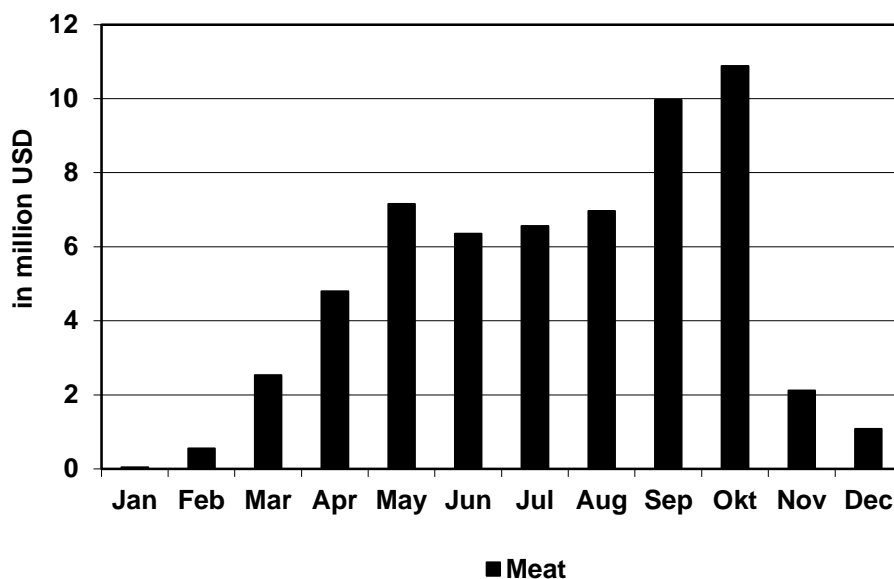
Source: *UN Comtrade, own illustration*

Among meat products, exports of pork accounts for the largest share. For the period 2011-2013, Serbian export to Russia was 1,000 t on average. In 2014, export increased to 14,700 t (Figure 5).

Figure 5. *Monthly Serbian pork export to Russia, 2011-2014*
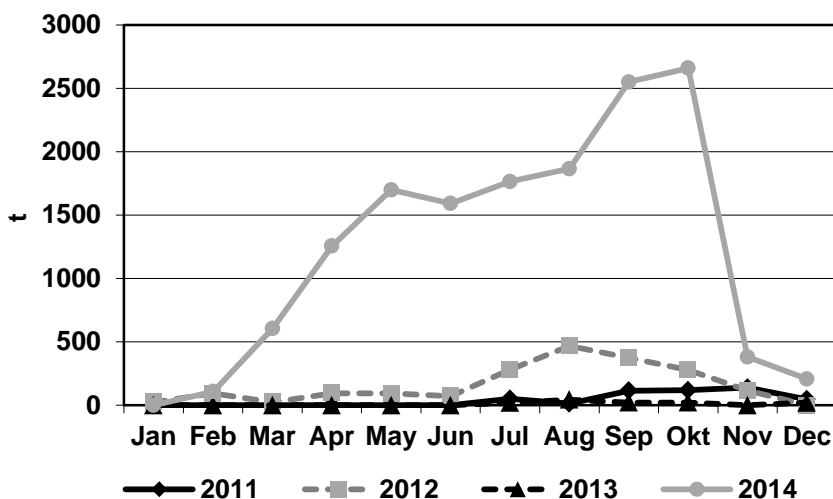
Overall, analysis of trade volumes between Serbia and Russia indicate increased importance of the Russian market for the Serbian agricultural products. Furthermore, Serbian exports of pork grow significantly in 2014, especially after the Russian government imposed import bans in February and August 2014.

Methodology and data

Before conducting the price transmission analysis, we start with identification of the data properties buy conducting the unit root tests. Thus, we tested our time series for stationarity[1] in order to avoid the spurious[2] regression. In this paper we use the augmented Dickey-Fuller (Dickey and Fuller, 1979) and KPSS (Kwiatkowski et al., 1992) unit root tests.

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[1]It refers to the covariance-stationarity: mean of the process does not depend on time (Hamilton, 1994).
[2]Nonsense regression. Obtained coefficients can be highly statistically significant.

Once the properties of the data are identified, the preconditions for the price transmission analysis are fellfield. Considering that most of the agricultural prices are non-stationary (Stigler, 2011), the usage of the cointegrating techniques is one of the most common tools for analyzing price transmission. In general, cointegration models allow for analyzing the stationary long-run relationship between non-stationary data. Furthermore, cointegration models allow for identifying both the short-run and the long-run price dynamics.

One of the most common specifications of the cointegration models is the vector error-correction model (VECM). The main idea of VECM is based on the equilibrium relationship between the observed variables. *"Temporary deviations from the equilibrium are called equilibrium errors, and the forces correcting these equilibrium errors are said to have an error-correcting behavior. The vector included in the model allows for more than one equation with at least two endogenous variables, and for complex interdependencies among them. Thus, the idea is that the part of the disequilibrium from one period is corrected in the next period"* (Djuric, 2014). The VECM can be formulated in the following way:

$$\Delta p_t = \alpha \beta' p_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta p_{t-i} + \varepsilon_t \tag{1}$$

where p_t represents a vector of prices; Δ donates the first difference operator; matrix β is a stationary long-run relationships between the prices (cointegration vector); term $\beta' p_{t-1}$ refers to equilibrium errors of each co-integration relationship for each point in time; α donates the matrix containing the rates at which the price differences react on the deviations from the long run equilibrium (speed of adjustment). The matrices Γ_i contain the short-run reactions of the price differences on past differences and ε_t donates an error term.

One of the main limitations of the VECM model is that it request the time series to be integrated at the same order. Thus, both series should contain a unit root. Nevertheless, some of the price series could be stationary while others contain a unit root. In this situation the VECM is not an appropriate model to assess the cointegration between time series. One of the solutions is to use the ARDL model developed by Pesaran and Shin (1999) and Pesaran et al. (2001):

$$y_t = \beta_0 + \beta_1 y_{t-1} + \cdots + \beta_k y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \cdots + \alpha_q x_{t-q} + \varepsilon_t.$$

$$(2)$$

The autoregressive part of the model refers to the fact that y_t is partially explained by its own lagged values (y_{t-p}). In addition, it accounts for the lagged value of the explanatory variable (x_{t-q}). Thus, the main advantage of this model is that it relies on the bound testing methodology, which allows for cointegration testing between the price series that are stationary and non-stationary, and it allows for estimating both long-run and short-run relationship between prices. This model type allows us to estimate both the long-run and short-run relationship between the time series that are stationary and contain the unit root.

We use the ARDL model for estimating the price-transmission parameters for two different regimes (Figure 6). The "free trade" regime accounts for the period before the Russian pork import ban towards EU (August 2014). The second regime, the "EU ban" regime, accounts for the period between the ban in February 2014 and the agricultural import ban in August 2014.

Data used for the analysis are average weekly prices for pork carcass measured as spot market price at the largest trade markets in Serbia, Spain and Russia (Figures 7 and 8). Pork prices for Spain and Serbia are expressed in EUR/kg. On the other side, pork prices for Serbia and Russia are expressed in USD/kg.

Figure 6. *Regime classification*
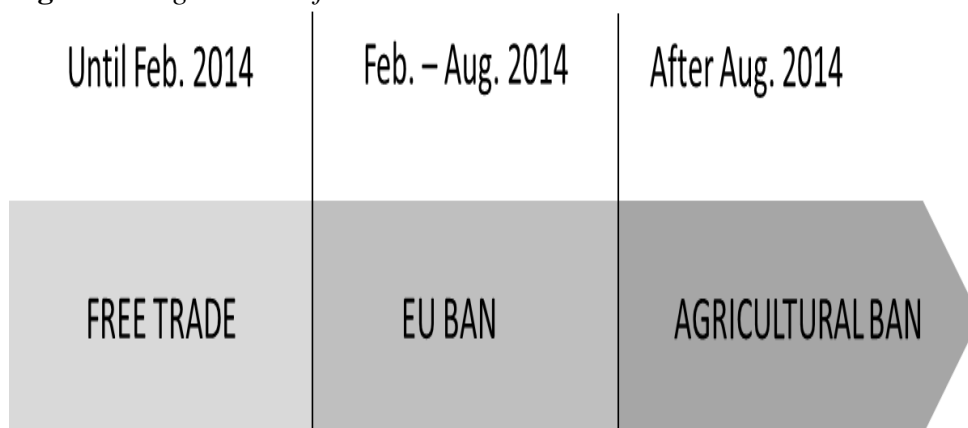
Source: *own illustration*

Figure 7. *Weekly pork prices in Serbia and Spain, 2010-2014*
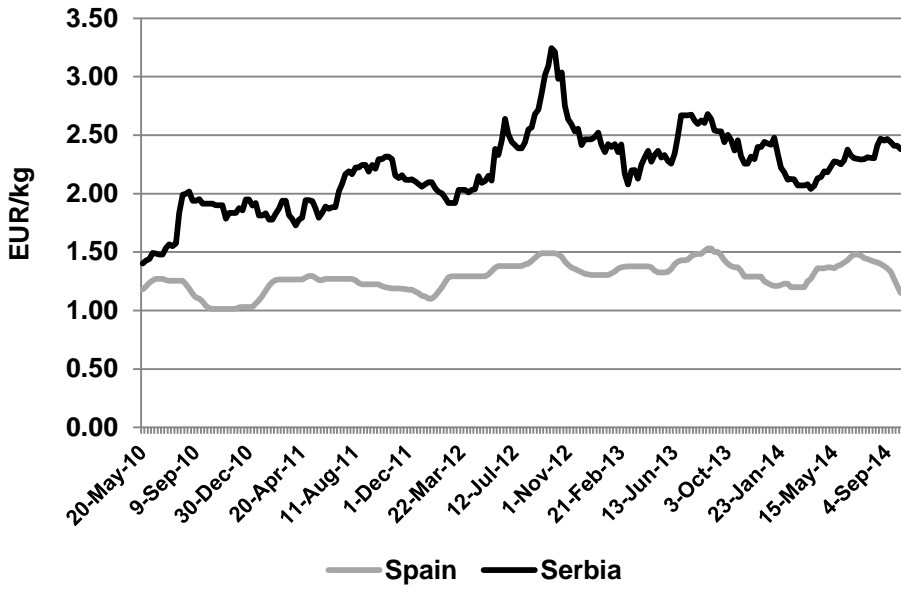
Source: *GEA info center, Irish Food Board, own illustration*

Figure 8. *Weekly pork prices in Serbia and Russia, 2010-2014*

Source: *GEA info center, ROSSTAT, own illustration*

Empirical results

The analysis of the Russian pork import, after the first ban in February 2014, indicate that the non-EU trading partners took over the largest part of the previous EU market share. Namely, Canada increased the share of pork imports to Russia from 13% before the ban to 46% after the ban. Also, Brazil increased the market share from 21% to 38%. For the same period Serbia increased the share in total Russian pork import from 0.5% before the ban to 3% after the ban. After the second import ban in August 2014, Brazil increased the share in total Russian pork import to 78%. For Serbia, market share increased to 8%. The increase in import of pork from the non-EU countries can also be seen by the number of the additional companies that obtained import licenses in 2014 (Table 2).

Concerning the price transmission analysis, statistical properties of the data indicate that some of the price series are stationary and some are containing unit roots[1] (Table 3, A). This is one of the main reasons for using the ARDL model for identifying if the price series are cointegrated.

Table 2. *Number of companies licensed for pork import to Russia (selected countries)*

| Country | until 2014 | Additional number of enterprises | | Total |
| | | 1st ban | 2nd ban | |
		February – August 2014	After August 2014	
Canada	27	+5	+4	36
USA	169	+9	+1	179
Brazil	3	+5	+20	28
Chile	2	+4	+3	9
Serbia	**3**	**+1**	**+3**	**7**

Source: *Djuric et al. (2015b)*

For the period before the Russian ban, our results indicate that there was no transmission of price changes from the Russian pork prices towards pork prices in Serbia (Table 4). Concerning the short-run price dynamics, our results indicate almost similar adjustment of Serbian prices towards the short-run equilibrium with both Russian and Spanish pork prices. We also observe that that the estimated intercept, which could be interpreted as the transaction costs, for the Serbian-Russian price pair is almost three

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[1]Results are based on ADF and KPSS unit root tests.

times higher compared to the Serbian-Spanish price pair. The main reason might be a very low volume of export towards Russia before 2014.

The results for the "EU ban" regime indicate significant reduction of transaction costs between Serbia and Russia, and increase in transection costs between Serbian and Spanish pork prices. The long-run transmission of price changes between Spanish and Serbian pork prices is reduced for a half after the ban followed by significant increase in the short-run price adjustments.

These results indicate that the Serbian pork prices are adjusting very fast to the disequilibrium with Spanish pork prices in the short-run. The main reason is that Serbia started importing large quantities of pork meat from the EU in order to satisfy domestic demand, considering that the largest amount of the domestically produced pork started being exported to Russia.

Table 3. *Unit root and Johansen's cointegration tests*

	A) Unit root tests						
Series	Augmented Dickey-Fuller test				KPSS test		
	test statistic	specification	5 % critical value		test statistic	specification	5 % critical value
$\ln p_t^{S\_eur}$	-2.948	0 lags, constant	-2.874		0.278	11 lags, constant and linear trend	0.146
$\ln p_t^{S\_usd}$	-3.493	0 lags, constant	-2.874		0.231	11 lags, constant and linear trend	0.146
$\ln p_t^{Sp}$	-2.576	1 lag, constant	-2.874		0.132	11 lags, constant	0.146
$\ln p_t^{R}$	-1.708	1 lag, constant	-2.874		0.185	11 lags, constant and linear trend	0.146
$\Delta \ln p_t^{S\_eur}$	-13.530	0 lags, none	-1.942		0.184	8 lags, constant	0.463
$\Delta \ln p_t^{S\_usd}$	-13.125	0 lags, none	-1.942		0.276	0 lags, constant	0.463
$\Delta \ln p_t^{Sp}$	-5.477	0 lags, none	-1.942		0.095	9 lags, constant	0.463
$\Delta \ln p_t^{R}$	-10.449	0 lags, none	-1.942		0.076	9 lags, constant	0.463

Note: Number of lag length is selected according to the AIC.
Source: *Own calculation*

Table 4. *Price transmission results*

country	Spain	Russia
regime	Free trade regime	
model	ARDL (1,0)	ARDL (2,1)
intercept	0.486***	1.120
slope	1.291***	-0.008
speed of adjustment	-0.07***	-0.05***
	EU ban regime	
model	ARDL (1,0)	ARDL (3,2)
intercept	0.604***	0.766***
slope	0.644***	0.237***
speed of adjustment	-0.33***	-0.60***

Note: ***<1% significance level.
Source: *own calculation*

Concerning Serbian-Russian price pair, our results indicate the increase in the long-run price transmission between Serbian and Russian pork prices followed by the significant increase in the short-run price adjustments. Furthermore, the short-run price adjustments are double higher for the Serbian-Russian price pair compared to the price adjustments toward the disequilibrium with Spanish pork prices. We argue that the main reason for the increase in the short-run price adjustments lies in the fact that trade volumes between Serbia and Russia increased tremendously, whereby Serbian exporters have to compete with large non-EU pork exporters. Thus, price changes on the domestic Russian market play an important role for the Serbian traders.

Conclusions

In this paper we analyze the impact of the Russian pork import ban on the Serbian pork export and prices. We also observe the changes concerning Serbian and the EU pork trade and price relations.

Our main approach is based on the price transmission analysis where we use the Autoregressive Distributed Lag model to distinguish between the short-run and the long-run transmission of price changes between the Serbian and the pork markets of the selected countries (i.e. Russia and Spain). Furthermore, we look at the pork export volumes before and after the Russian ban in order to identify a possible trade diversion of the Serbian pork export.

Our analysis of trade volumes indicate that the Russian market become the most important export market for the Serbian pork exporters, especially after the Russia implemented pork meat import ban for the pork originating in the EU. This is also supported by the fact that the transaction costs for the Serbian pork exports towards Russia dropped for almost 31% compared for the period before the ban.

Furthermore, our results indicate significant increase in speed of price adjustment of the Serbian pork prices towards the disequilibrium with the Russian pork prices. Thus, we argue that the short-run changes of pork meat prices on the Russian market started playing an important role for the pork prices in Serbia. The main reason could be the facts that Serbian pork exporters have to be competitive in order to keep the share of pork exports towards Russia.

For further analysis we plan to account for the effects of the agricultural import ban implemented by the Russian government in August 2014. Furthermore, we plan to investigate what are the effects on the Serbian domestic pork market concerning price changes along the pork supply chain.

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GLOBAL TRANSFORMATION IN AGRICULTURAL SECTOR– EMERGENCE AND DEVELOPMENT OF FOOD NETWORKS

Koviljko Lovre, Marinko Kresoja[1]

Abstract

Public interest in food relating to the issues of agri-food product offer is on the rise, both in developed and developing countries. A significant role in raising not only interest but awareness of nutrition and health is played by the media, with direct consequences being numerous regulatory measures and political decisions. In connection to this ensued numerous academic studies which further yielded questions of multidisciplinarity. Focus of attention of the majority of the subject matter are questions about individual and general consumer propensities regarding food. The research also includes the cultural, sociological, geographical and economic aspects.

Key words: *Agriculture, Globalisation, Food Regimes, Food Networks.*

Introduction

For the most part of human history, it is clear that food consumption greatly depended on the location where food was produced. Food supply in ancient times depended on the food sources within tribal territories, which is also true today in spite of the domination of global production. Namely, within a country, highest demand is for domestic products. Of course, the aspect of international trade is no less significant in terms of both national and regional agri-food products whose importance has soared through the process of "food globalization". Such trends disguise heterogeneity and its complexity which directly indicates entire systems of food production, distribution and consumption within a globalized world economy. Naturally, historical experiences concerning food products can greatly vary, from the perspective of developed capitalist countries to those of developing and undeveloped countries.

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Food Regimes as Organizational Concepts

Historically, the concept of food regimes represents an overview of the development of food system on a global scale in terms of: pointing out the importance of modernization in agricultural sector, emphasizing the basic role of food in the global political economy, but also pointing to historical contradictions in certain food regimes which resulted in crises, transformations and transitions.

Along these lines, the food regime analysis indicates structuredness of the perspective of understanding the role of agricultural activity and food in a spatial and temporal accumulation of capital.

The key factors that shaped food regimes and distinguished them are the following:

- international system of states;
- international division of labor and forms of commerce;
- rules and ideolgical guidelines of different food regimes;
- relations between agriculture and industry, in view of the influence of technology and preservation of the environment;
- dominance of different ways and forms of capital accumulation;
- social movements;
- tensions and contradictions within certain food regimes;
- transitions between food regimes.[1]

The above list of factors points to a historical opus and aspirations in conducted analyses of world food regimes. Specific patterns of food trade in world economy indicate a geopolitical dimension of agri-food products, which points to the fact that the agricultural sector should receive equal treatment worldwide. By doing so, global political economy reporting that focuses on the relations between technological and industrial power as the initiator of development or assuming domination has been enabled.

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[1] Bernstein H. (2015) *Food Regimes and Food Regime Analysis: A Selective Survey*, An International Academic Conference: Land Grabbing, Conflict And Agrarian-environmental Transformations: Perspectives From East And Southeast Asia, Conference Paper No. 1, BRICS Initiatives for Critical Agrarian Studies (BICAS), RCSD Chiang Mai University, pp 2.

The aforementioned dimension is reinforced by analyses of store chains and interdependence, as well as fair trade studies which concentrate on relations and influences of food on international trade.

Finally, there is a wide range of studies on agriculture and food which focus on specific case studies, resolving problems concerning famine, technology, culture, social movements and agribusiness. They simultaneously point to certain food regime characteristics in current geopolitical relations. By setting priorities in the ways of capital accumulation of the agri-food sector, global power order and food trade models have been shaped, which in fact represents indicators for food regime distinction. (McMichael 2009)

Recent literature shows additional analyses of food regimes, stressing that the initial concepts of food regimes were mostly "structural", while the modern concepts reflect an evolutionary aspect of food regimes from the period of hegemony in the world order to transitional redirections and different social movements which have shaped the food regimes entirely.

Food regimes are separated by crises of capitalism. In fact, the Great Depression separates the first from the second food regime, while the recession of the 1970s, which was the result of the oil crises 1973-1974, represents the border between the second and the third food regimes. Terms such as "Fordist" or "post-Fordist" have been used as terms to signify the second and third food regimes. Such terminology is opposed by opinions of numerous authors worldwide, hence other terms have been put forth, such as "flexible accumulation" and "flexible specialization".

According to McMichael, today's conceptual forms of food regimes are undergoing substantial transformation, having the society experience it through periods of transition and global uncertainty. He also states that the term "The Food Regime Project" is used to show that the first food regime manifested the historical period of 'The Colonial Project', the second that of 'The Development Project', and the current (third) that of the 'The Globalization Project' which includes all capitals and states.

The term "The Food Regime Project" doesn't exclusively express chronological presentations of intelectual approaches, but it also encompasses the challenges of the omnipresent "corporate" food regime, in regards to the resistance of the farmers who are desperately fighting to preserve farmland and the environment.

Food regimes that dominate metropolises have created a crisis of global proportions. However, movements to preserve rural areas and raise the level of food sovereignty are gaining global recognition and have a preventive role against new blows to farming cultures and diversities.

The First Food Regime (1870-1914)

The first food regime, known as the period of Great Britain's hegemony in world economy, began in 1870 and ended in 1914 right before the start of the First World War. The characteristics of this regime are reflected in the import of various food products to Europe, such as fruit from tropical colonies and grain and livestock from settler colonies. In this period, the status and further development of the industrial class in Europe was established, along with the position and influence of Great Britain as the "workshop of the world". With the introduction of monocultural production in the occupied colonies (thus endangering the food systems and ecological resources of the subjugated countries), Great Britain shifts its production of primary agri-food products to settler colonies in the 19th century (overexplotation of the intact land in the new world). In this way, the agricultural sectors within newly formed countries were established (the USA, Canada and Australia) and patterns were modeled for the "development" in the 20th century which balanced the dynamics between the agricultural and industrial sectors. (McMichael 2009)

The first food regime was founded on an extensive form of capitalist manufacturing relations. Based on these relations, the countries of North America and Western Europe were supplied with the export of unprocessed and semiprocessed foods, as well as other food items that came from colonial countries of Africa, South America, Australia and Asia.

In the 1880s, with the invention of ships with separate storage facilities for perishable goods such as butter, milk and tropical products, came the widening of the product assortment from the colonies, as well as the increase of the transportation distance. Since the first food regime was directed towards industrial capitalism, the European import of wheat and meat was compensated with the export of processed foods, labor force and capital from the European countries.

In time, trade acquired multilateral characteristics and thus affected the collapse of the formerly established trade monopoly barriers of the European colonial system. These changes led to an impactful reconstruction of the world economy.

Namely, international trade enabled the relocation of the agricultural production from Europe to new territories, thus creating three new forms of agricultural relations:

- the exchange of complementary products was replaced by the trade of competitive products, based on the comparative advantages between countries;
- the agricultural households in colonized countries represented a new form of specialized commercial agriculture, but the utilization of industrial capital (chemicals and mechanical technology) rendered a part of the agricultural work process useless;
- the domestic market, within nationally organized economies, initiated a process of organization into agri-industrial complexes.[1]

The first food regime, with its international division of labor based on the principle of cost effectiveness of the agricultural production within newly colonized territories, represented the focal point of the national economy system creation of independent countries. (Friedmann H. and McMichael P. 1989)

The first food regime was further undermined by the global economic recession in the late 1920s and early 1930s, but certain aspects still remained, such as trade in dairy, meat and grain products that originated from extensively farmed zones of South America, Australia and Asia. Also, production of sugar, tropical cultures (cocoa, coconut, rubber, palm oil, bananas) and drinks (tea, coffee) was still organized based on a distorted plantation system, i.e. big, monocultural and high-capital farms, with the use of local labor force which was managed by foreigners, while at present, everything in the food sector is placed under the control of multinational corporations.

The Second Food Regime (1947 – 1970s)

The second food regime began in the postwar 1950s and lasted to the very end of the 1970s. Food flows and growingly noticeable food surpluses in the aforementioned period were relocated outside the United States to the unofficial empire of the postcolonial countries that were strategically important from the time of the Cold War.

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[1] Friedmann H. and McMichael P. (1989) *Agriculture and the State System: the Rise and Decline of National Agricultures, 1870 to the Present*, Sociologia Ruralis 29(2), pp. 102.

In this period, the United States provided aid to the countries weakened by war in food staples and subsidies. Also, incentives were given through a careful and highly selective process with the aim to industrialize Third World countries and instill loyalty to trade imperialism, but also to oppose communism. By accepting these principles and technological achievements following the Green Revolution, developing countries incorporated a model of industrialization of the agricultural sector in their economies. This triggered an agrarian reform which was to expand trade relations to the rural areas, but also to pacify unrests of the unsatisfied peasants.

Simultaneously, agri-business worked out a transnational connection between the agricultural sectors of certain countries, that were otherwise divided into series of specialized agricultural systems interconnected through global supply chains (e.g. the transnational animal protein complex refers to a relation between grains and carbohydrates, soy and protein, with lot-feeding).

In other words, "the development project" universalized a model of economic development of certain countries, whose goal was to create a state system, following the decolonization. At the same time, a new form of "internation labor division" began forming in the agricultural sector, within the transnational commodity complexes. (Raynolds et al. 1993)

The second food regime, broadly referred to as "productionist", represents a period marked by intensive capitalist production relations, which implied modernization and industrialization of the agri-food sector. According to Harriet Friedmann and Philip McMichael, the following processes were a part of the second food regime:

- restructuring of the agri-food sector by the agri-food "capital", with the aim to meet the growing international market demand;
- development of durable foods and capital intensive meat processing complexes;
- spreading the influence of state systems on former colonies (decolonization);
- organization of the world economy under the geopolitical hegemony of the United States;
- growingly pronounced forms of protectionism in the agri-food sector conducted by the states.

Aside from creating capitalists in the agri-food sector, the listed processes also contributed to the restructuring of the developing countries' agriculture. Industrialization of the agricultural sector was greatly stimulated by the widening of the agricultural input assortment (an array of chemical products and advanced agricultural mechanization), as well as the accelerated development of the agri-processing sector. As primary factors of production, farmland and labor force were replaced by capital and so almost all food products underwent the process of "value adding" on their way to the consumer. The agricultural sector saw an increase in the average size of farming households, population migration from the rural areas and a decrease of workers in agriculture.

Such a pronounced reconstruction simply blurred the lines between the agricultural sectors of individual countries, considering that the big industrial capital began to dominate at both ends of the agri-processing chain. By doing so, the agricultural products became the input factor for the processing sector instead of being offered to the consumers in their original form (Friedmann H. and McMichael P. 1989, pp 103).

The agri-industrial capital is also responsible for the growing involvement of former colonies in the global agri-food system. Expansion of food trade between developed and new postcolonially independent countries was led by nationally based agri-businesses of North America and Europe (e.g. Coca-Cola, Del Monte, Heinz, Kellogg, Nabisco, Pepsico and Unilever) which exploited agricultural inputs globally through production contracts.

While those companies became more and more important buyers of tropical primary products, they simultaneously encouraged substituting them with products from more temperate climates (e.g. sugar beet and sugar cane, soy and palm or coconut oil) as well as artificial sweeteners (high fructose corn syrup). Such a trend contributed to further deterioration of the trade position for developing countries, which resulted in their increased dependence on food import and the decreased export of their traditional agricultural products (e.g. sugar, oil).

Global political movements completely shaped the mentioned agricultural development in both food production and consumption. Decolonization process disrupted the functioning of the existing colonial blocks, thus enabling the new states to import food and receive food aid. Such an approach opened the door for further agricultural industrialization of developed countries.

This development led to the substitution of traditional food products which resulted in additional debt to ensure further import. In time, this trend led most developing countries to the problem of overindebtment.

From the aspect of state intervention, the second food regime was formed under the influence of two international contracts:

- Bretton Woods contract in 1945;
- GATT signing in 1947.

The Bretton Woods contract enabled the establishment of foreign exchange rate stability for different national currencies based on the gold standard, which limited diffusion of national model's economic growth. On the other hand, GATT represented a multilateral agreement on regulating international trade flows which excluded the agricultural sector from the system of liberal trade practice. This directly influenced the further development of the state protection systems of the agri-food sector.

In the early 1970s, after the oil and food crisis which also caused a global recession, it became evident that the second food regime had come to an end. Namely, it was in this period that the system established in Bretton Woods collapsed. Grain prices soared, while the protectionist programs in most countries were no longer sustainable. At the same time, there was growing antagonism between policies and measures which regulated the food market in certain countries and more apparent strenghtening of the multinational companies' influence.

The very end of the second food regime has been described in different ways, but all authors agree that the trigger of change was the diminishing of the hegemony in both geographical and political respect. In fact, the European Economic Community (EEC) greatly countered the USA, but the application of export subsidy policies from both parties led to numerous threats that were coming close to a trade war in certain moments. All forms of preferential trade with developing countries ceased and the key moment was a 1973 contract between the United States and the Soviet Union according to which all surplus wheat was withdrawn from the international market. That significantly enhanced the influence of multinational corporations in the food processing sector, which only caused further tensions between the agricultural systems of certain countries and multinational companies.

The Third Food Regime (1980s - present)

At the start of the 1980s, developed countries made considerable efforts to reduce the levels of support in the agri-food sector, mainly because of numerous problems with the growing food surpluses. The altered food regime, following the events that had preceded it, gradually formed an outline, but the aspects that attracted further attention of numerous authors were: the ever increasing global food product trade, concentration of capital in the processing sector, application of biotechnological achievements, consumer preferences and dietary changes, etc.

The third food regime appeared on the political scene in the 1980s, thus furthering the process of including new regions in the animal protein production chain, which could be seen in the examples of China and Brazil. It was also followed by a consolidation of different supply chain forms, including the "supermarket revolution", which provided the more privileged consumers with an improved acessibility to fresh fruit, vegetables and fish. At the same time, more and more farmers migrated to the slums of world metropolises.

Such circumstances imply further efforts in the food production segment, as well as additional fuel expenses on a global scale for food transport to the consumer (in literature the term "food miles" is broadly used). This further increased the friction between big production-distribution chains and various movements for food safety and environement preservation of certain locales. The introduction of "food miles" caused the rise in the price of food products, while mass production instigated the introduction of new standards and more intensive placement of processed foods. Social movements such as Food Sovereignty, Slow Food[1], community supported agriculture, as well as small producers of organic food, expanded the social influence based on principles of democracy, ecology and quality. Whether the inspiration came from alternative social, political or ecological movements, the food system in that shape and form still greatly depends on the use of fossil fuels. This addedly reflects the opposition to the tendencies and regulations of the World Trade Organization (WTO) in order to achieve agricultural liberalization.

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[1] Slow Food represents a movement founded by Carlo Petrini, a political activist of an Italian communist party called Proletarian Unity Party. The movement was formed as an opposition to the growing trend of fast food and the opening of fast food restaurant chains.

Namely, numerous WTO activities represent a turning point in forming a global regulatory structure. By introducing liberalization of trade policies, most developed countries raised the level of competitivness among producers, processers and distributors in the food sector, which had been for many years covered by protectionist measures. According to Harriet Friedmann, new actors appeared on the agri-food production market, such as Brazil, Chile, Dominican Republic, Kenya, Mexico and Thailand, which were until then peripheral countries.

Along with the mentioned bloom in trade relations of the "new agricultural countries", the United States' global domination declines because livestock production inputs, such as meat and processed meat products, are imported from peripheral developing countries. This significantly lowered the procurement costs of meat and processed meat products for processing industry, supermarkets and fast food chains.

Companies involved in producing, processing and distribution in the agri-food sector that developed until the 1970s, grew into the leaders of the new system of competition. In particular segments such as drinks, it is very easy to notice the horizontal and vertical diversification of corporations. In terms of organization, such corporations operate globally and in literature are often called transnational corporations. Since the placement of capital became very flexible and sophisticated within transnational corporations, such companies are enabled to quickly respond in case of structural movements in world economy, as well as to adjust to changes in user preferences.

Transnational companies with their operations and capital accumulation have had a significantly negative impact on regulation capabilities of agriculture and commerce sectors in developing and undeveloped countries. As a result, WTO increased the discrepancy between companies that operate on the global market and national economies by introducing limitation programs of protectionist measures. WTO also has a monitoring role in the creation of new forms of trade relations regulations between countries, multinational and transnational companies and social movements. Although all regulations are formed under the auspices of WTO, tensions between leading trade blocks persist, especially on the questions of trade barriers and free trade.

In terms of biotechnology and application of industrial processes, the appearance of the new food regime represents the change of food product characteristics. The most extreme aspect is manifested in genetic modifications on animal and plant products.

On the other hand, along with the development of biotechnological and modern food processing capabilities, the presence of organic products and their placement on the world market became more and more apparent. With that began a new trend in primary agricultural products manufacturing, which induced a direction change in global production.

The mentioned divergence in approach to food production indicates the change in food demand due to the change in consumer wealth. On the one hand, the constantly growing number of "Fordist" consumers is observed mainly in less developed countries, which supply big multinational companies in the food sector. On the other hand, there is a demand for fresh organic products, most often from people in developed countries, who are mainly supplied by small farming producers.

Following the global food crisis in 2008, confrontation of the two different approaches to food production and processing became more apparent, but it was also equally evident that multinational companies invested considerable efforts and means in order to get into the high quality products' market.

Transition from Food Regimes to Food Networks

Globalization represents a process within which concentration of capital and the world order itself develop in a very fast and creative way. Through this process, integration of economic processes was made possible, as well as manoeuvring space along with the power shift for the decision making to move from the level of individual countries to that of multinational companies. In such a way, via globalization, social, economic and political state institutions collapse, while social and economic hegemony is encouraged along with the conducting of the dominant form of market practice.

Also, there is a considerable number of opinions in broad literature warning about the fact that the globalization process should be interpreted as a stage in capitalism development, i.e. a new form of the creative process.

Therefore, as a development process within the third food regime, globalization is interpreted as a process of growingly encompassing figuration of primarily production and financial sectors, as well as other economic activities.

Last century was marked by the process of abandoning agricultural production as well as rural areas, while the food production process was taken for granted. Unfortunately, transitioning from the 20th to the 21st century, the abovementioned processes were finalized. However, there are new forms of worldwide demand from an ever-growing urban population and such demands are quickly intensifying. The variety of needs of the 21st century population reflects in dietary changes, health preservation, food appeal, environment protection, severe reactions to modern tendency signals, etc. Monitoring of the conservation of rural area resources and the possibility of raw food production and distribution became a preoccupation of the global majority.

In the 1990s, numerous new questions in the agri-food sector arose, while simultaneously calling for more careful analyses. These analyses focused on expressing contradictions but also the unpredictable development of postwar capitalism. This simply created the need to divert the focus to food networks from a general and wide conceptual approach to food regimes.

First of all, food networks play a significant part in development and establishment of advanced forms of social and political relations, of both regions and states. Such an approach represents a form of new and uneven development, which greatly differs from an exclusively globalist approach.

The basic points of food networks and their evaluation are reflected through different aspects, most of all through controlling and creating values outside production location. In that way, there is a tendency towards adding value to food products on their way to the final consumer, instead of at the production location. It is necessary for all business entities to understand the fact that food networks are characterized by operating at a distance, meaning that the food products are largely formed by the non-agricultural sector.

Globalization within food networks develops alongside and is based on resulting effects of operating on both local and regional levels. Therefore, forming of dietary habits, lack of food products in agriculturally undeveloped areas, impacts of excessive offer due to different exchange rates on an international level, are but a few of elements that shape the process of globalization. Technological development and its influence on the society as a whole must be put into a wider context of a knowledge network, with the emphasis on the qualitative properties of food. Determining food values, as a consequence of technological development, is a multilayered problem, insomuch that it includes both production and non-production characteristics.

State regulations are not entirely connected with all aspects of globalization on a functional level. Firstly, all global processes are based on corporate production and distribution, while regulatory state measures are within the legislative framework, whose task is to put public interest above all else. That is how, the retail sector, due to compliance with state regulations, assumed the leading role in the reconstruction of both state and international food networks. Food markets are gradually reorganized based on the demand of certain consumers (commonly the richer class of people in developed countries) and retailer groups.

By doing so, the adjustment of food products to their original form is encouraged, while continuing the process of industrialization. Such processes greatly shaped food production of particular regions, as well as its consumption. This stimulated a new dynamics and spatial dependence to easily shape the uneven development between countries.

Processes of globalization and adjustments of food policies tend to redirect risk and power, thus enabling a decrease in value in one location at the expense of food product value increase in another location. In that way, bases for uneven development are created in new globalist conditions, simultaneously but completely contradictorily to the creation of values. Globalization can, therefore, be interpreted as any other form but space for geographic and economic development.

Contradictions in the food sector, as well as dialectical relationships, are: production/consumption, global/local, repealing/enacting regulations, spaces of power/spaces of dependence, cultural differences/social exclusion, etc. (Marsden T. 1997) This aspect focuses the attention on the possible ways of creating discontinuity and contradictions, but also developing possibilities for overcoming them.

The issues of newly created values in the non-agricultural (post-farming) sector represent focal point of numerous studies. Mere determining of the agri-food products value, measures of labor force spendings and the impact on the environment during production and forms of delivery, require a new and highly integrated approach. The quality of food products represents the essential part of evaluating labor force spendings and the level of environmental protection during the production process. That is what facilitated the creation of one form of significantly wider approaches to social theory within which organization and regionalization are starting points, but also end results.

Determining the degree of risk within the food networks (on the levels of producers, exporters, traders, economic policy creators) shows the need to discern different qualitative criteria. The 21st century retail corporations are the main actors in risk alocation and restrictions within food networks. The listed role is particularly prevalent in Europe, as retailers have a very dominant influence during the agri-food product quality determination.

The uneven development of possibilities for agricultural activities between states is influenced by new forms of institutionalization, regulations and spatial organization. Such forms led to additional research on various interpretations by communities. Of course, all social reactions within the globalized food networks relate to quality, regulations and consumption. However, in order to fit the mentioned issue in the rural milieu, it is necessary to simultaneously observe people and food in the context of food network supply. Also, in the relationship of people and food, things that matter are division or alocation of power and responsibility, means of transferring risks and punishments, as well as the creation of international markets, or pointing to the uneven forms of regional development. Therefore, all-encompassing global concepts cannot be viewed outside of local communities, but quite the opposite, they represent the lifeblood of interrelations and differences within communities.

Connections of Local and Global Markets within Food Networks and Their Relocation

Political economy interprets globalization trend as an explanation of individual state or regional results. The majority of such interpretations refers to numerous insecurities of the processes themselves, regarding different local/regional reach of non-agricultural capital within food networks, differences in enacting or repealing regulations of the agri-food sector, that is, spatial variations concerning the use of labor force.

The bases of such an approach are found in the analysis of production systems. Production systems in such an interpretation use individual agri-food products and monitor the entire chain of production. The beginnings are noted in the agrarian input production, then through the very agricultural production process, then through the agri-processing segment, to wholesale and retail systems and finally to the end users. In that, during the interpretation, factors such as labor process, technology, as well as state policy characteristics, are taken into consideration.

However, the food network concept has been recently interpreted as a model for global and local divergence on the one hand, and a model for interrelation analysis between human and artificial intermediaries in the process of social approach to food on the other hand.

Food networks provide the possibility to show the way in which different actors of the food production and consumption processes shape or are shaped by political, cultural and social environment. (Arce and Marsden, 1993) Conceptually speaking, a food network is somewhat a hybrid that consists of relationships between human subjects in the food chain, but simultaneously encompasses non-human intermediary factors that connect subjects into relationships based on positions of economic power. Examples of non-human intermediary forms include contracts between agricultural producers and processors, followed by regulations between processors and national services, and finally international contracts between multinational corporations and WTO.

The concept of a food network appeared as a practically exogenous interpretation of the ways in which the locales were defined as "segments" of the food system which is organized by powerful global entities. However, the relationship between the global and the local is bidirectional. (Le Heron 1993, 32 – 3) On the one hand, global powers may represent a catalyst for change on the local level, while local initiatives and resistance can influence changes by contributing to the reshaping of national and global processes. However, numerous studies in the first decade of the 20th century indicated that local/regional procedures were still accepted as essential subjects of subordination within relationships of economic power of food networks, while the end users remained relatively passive receivers of food produced by globalized processors and food product traders.

Nevertheless, numerous research points to the fact that, regarding the aforestated claims, there are those that oppose in terms of intellection of power and homogenizational global abilities in the agri-food sector. It was established that the farmers were not passive when it came to accepting ideas of global economic powers.

On the contrary, they developed primarily strategies based locally which originated from culture, ecology and the resources on farm locales. (Van Der Ploeg, 1994, 2003) The basics of the approach include localism, renewal of local knowledge, avoidance of marginalization within the unpredictability of the global market, as well as rural diversification as a way of life strategy.

Different studies show that social/consumer movements are treated with the "collective consumption policy", that the abovementioned movements are evidence of the phenomenon of "more flexible consumption", and that the movements are a part of the development of the "post-modern diet" (Bonanno et al., 1994, Friedland, 1994). Irregardless of the way of defining these movements, the consumer resistance to "industrialized" food products is on a significant rise. Such a rise was globally induced by the creation of political alliances and trade relations between producers and end users.

On the one hand, a growing number of consumers is willing to pay a higher price that provides guarantees of the conditions under which agri-food products were manufactured, as well as guarantees of "chemical cleanliness" of fruit and vegetables. On the other hand, the awareness of health risks as it pertains to consumed food is on the rise. Such kind of risk is today interpreted not only in the ways in which various food products and their quality indirectly influence health (heart disease and obesity), but also directly in the context of food poisoning. Considering the abovementioned, consumer behavior is increasingly in support of alternative forms of food networks that are outside the conventional food networks.

Conclusion

Trade in agri-food products amplify existing dominance of developed countries in contrast of the creation of the global economy. At the same time it affects the differentiation and marginalization of certain developing countries. Instead of harmonization at regional and local level the differentiation of agriculture is enhanced. Analyzing and monitoring of the concept of food regimes from the very beginning is essential It's not so much because of understanding of theoretical approaches, but in order to understand that the food regimes are still forming.

Changes in forming of food regimes are obvious, especially in the last decade. Crisis situations with regard to energy, food and climate change are in the focus of attention. Multinational companies are "buying" access to international food markets. Specifically, MNC's don't use the competitive trade, thus consolidation of companies remains the most critical mechanism of structural changes within the food industry. The concept of food networks refers to the historical development of the global capitalist production and consumption. On the other hand the concept shows the weaknesses in terms of explanations of a wide range of national and regional experiences regarding to development of food systems in general.

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PROJECTION OF EFFECTS OF THE IRRIGATION SYSTEM IMPLEMENTATION IN AGRICULTURE ON THE TERRITORY OF SREM[1]

Marko Jeločnik[2], Jonel Subić[3]

Abstract

Large influence on improvement of plant production lines competitiveness indicators within the national agriculture would have a wider use of agro-technical measure irrigation. Although the implementation of mentioned measure requires relatively large investments, it would certainly contribute in many ways to the improvement of current production results. In focus of this paper were projections of possible effects that will happen after the wider implementation of irrigation on the territory of the Srem Region. Positive effects are recognized in change of the utilized agricultural area (UAA) structure, growth of achieved yields and total production of produced plant species, as like in growth of total incomes from agriculture on mentioned territory. Among all, projections were shown that it will come to relatively small decrease in total utilized agricultural area UAA, then to light changes in the structure of UAA, as well as the establishment of seed production and double cropping system in some portion.

Key words: *Srem, implementation of irrigation, UAA, sowing structure, yields, incomes.*

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Introduction

In all developed countries, even those that do not have adequate conditions for continuous performance and development of agricultural activities, as the main goal is set the primary function of agriculture, provision of a certain level of food security of its citizens. Considering its valuable impact in the process of gross domestic product creation, agricultural production is highly ranked within the Serbian economy, so it could be marked as economy branch with strategic importance.

Although it has being carried out in more than satisfactory natural-climatic conditions, with a firm reliance on tradition, available land complex and human capital, unfortunately during the the last few decades its development often did not follow the trends of modern international practice and scientific-technical progress, so currently its not at the level of its real possibilities in many elements (Jeločnik et al., 2012).

In general, today, the national agriculture is facing with numerous issues, where some of them can be marked off (Jeločnik et al., 2011; Pejanović et al., 2009): from the aspect of organization of large scale commodity production, there is unfavorable ownership structure of family agricultural holdings (expressed fragmentation and atomisation of the estate); in general disunity and disorganization of agricultural producers (fragentized offer), usually followed with small bargaining power (lack of real cooperatives, associations and clusters); unregulation on the segment of national market oriented to agriculture (monopolized demand, price instability and disorders in price parities, spatial and quantitative limitation of the national market, weak or non-existence of vertical and horizontal links in the production chains, administrative barriers in export to the foreign markets, low efficiency of the commodity reserves system, etc.); presence of elements of the agricultural production uncompetitiveness (production extensiveness based on technical and technological obsolescence of the material base, inadequate application of agro-technical measures and chemicals, lack of irrigation systems in function, low level of labour education, etc.); inadequate state support (in creation of the adequate business environment, restrictive agricultural budget, insufficient incentives for agriculture, issues in land policy and agrarian legislation, some privatization of large agricultural holdings were carried out wrongly, etc.); problems in financing (chronic lack of investment, scarce in credit lines adjusted to the needs of primary agriculture, expensive commercial credits, etc.); and other.

By focus just on the results achieved in agriculture from the aspect of hydro-reclamation system use, next issues are imposed: generally small surfaces of arable land are under the irrigation systems; obsolescence, low level of functionality and poor maintenance of existing hydro-reclamation systems; often use of inappropriate technical solutions that are not in line to established crop production; lack of experience and low level of education, at qualified labor, which is required by intensive agricultural production and the irrigation systems use; often inadequate cooperation between water management companies and water users in agriculture; significant water losses during the irrigation activity; undervalued price of water in primary production; low compatibility of grown crops with the time of application and irrigation norms; inadequate implementation of legislation related to use of water and hydro-reclamation systems; and other (Sredojević et al., 2011).

Some of the basic stances of the Gustav Papanek, scientist who was among the first who recognized the need that agricultural development has to have absolute priority, should be also mentioned (Papanek, 1954): modernization, or constant technical and technological improvement of agriculture ussualy has the need for labor from many segments of the national industry; results in agricultural production can be significantly increased with a relatively small amounts of additionally invested capital; as it requires a relatively small investments, agricultural development can represent a significant savings in human capital; many structural changes, within the agriculture, can be realized before initiation of the next level of its technological development and industrialization; some difficulties that are characteristic for industry and service sector development in developing countries, caused by the lack of capital, entrepreneurial skills, or some institutional limitation and inadequacy of physical infrastructure (transport, IT, energetics, etc.), are not so presented in agricultural production, considering that relatively small changes in applied technology may lead to its expressed progress; the overall economic development of certain country, considered through higher incomes and more expressed consumption, initiates or the development of national agricultural, or the import agricultural products; etc.

Reindustrialization of Serbian agriculture, from the standpoint of the used technology and human capital development, should be a factor of agricultural production prosperity, especially in rural areas, as it offers the possibility of more equitable development adjusted to the local natural and economic resources. Experience of developed countries in the field of planning of more balanced regional development, indicate the need for reindustrialization of, before all, outdated agriculture in line with the new industrial policy based on

knowledge. In other words, both, concept of balanced development of the entire economy, and concept of balanced development of individual regions, jointly promote the reindustrialization of national agriculture (Njegovan, Jeločnik, 2013).

Also it is indisputable the importance of investments in scientific-research development, from the aspect of sustainability of entire economic growth, as well as the importance of science in industrial recovery of all economy branches, so even a small country can be in possession of, or it can access to development of high technology elements.

Experience shows that these countries are more resilient in transitional periods, or in periods of economic crisis. Of course, the previously mentioned also implies more expressed cooperation between scientific-research and educational institutions with all participants in the economic (agricultural) activity, how beside the economic growth and development, and better employment of available human capital, in certain moment it could be set adequate competitive position within the world market (Zubović et al., 2013).

Therefore, considering the obsolescence of used equipment and technological solutions, or lack of equipment in primary agriculture (irrigation systems are included), there is a need for higher investments in the modernization of agriculture, which would contribute to its greater competitiveness on the world market (especially the EU market). So, it should be borne in mind that the implementation of modern technological and production solutions into the agricultural practice requires usually large size and financially strong (commercial) holdings (Nastić et al, 2012).

Unfortunately, for a long period is presented certain disparity between the share of agriculture in total investments and the share of agriculture in gross domestic product establishment, as some form of national agriculture negligence. The disproportion is mainly aftermath of the re-allocation of achieved accumulation in agriculture to investments in non-agricultural sectors (Bogdanov, 2004).

Methodology and data sources

The main goal of the paper is to give a projection of assumed effects after the implementation of agro-technical measure irrigation on the entire territory of the Srem Region in the Republic of Serbia, throughout the change of the

211

utilized agricultural area (UAA) structure, increment of yields and total production of grown crops, as well as through the growth of total incomes from the agriculture, within the aforementioned territorial unit. In accordance to that, research firstly presents a current state of agricultural production without use of irrigation, and then expected future state of agricultural production within the potentially implemented irrigation system. Special accent was on production volume and economic effects of irrigation.

As a starting point for the projection of the total utilized agricultural area, after the implementation of irrigation, was taken the statistical database of the Statistical Office of the Republic of Serbia (SORS), leaned to the results of the Census of Agriculture 2012, which includes the structure of agricultural land by way of usage, or by individually sown/planted plant cultures. Also, the assessments have been predicted some changes in the structure of the UAA that will happen after wider implementation of irrigation.

It should be noted that all presented line in plant production are usually in line to the production system in the open field. All projections of the grown crops yield (in t/ha) are based on five-year averages for yields achieved on the territory of Srem, where were used statistical data from the annual publication od SORS (Municipalities in the Republic of Serbia for the period 2008-2012) for the observed territory, as well as the data that represent the results of field research of the Institute of Agricultural Economics (IAE), carried out on the territory of Srem and entire Vojvodina.

Such in case with yields, all price projections for the grown crops are derived from their multi-year trends, taken from the official statistical sources, the database of the Ministry of Agriculture (System of Agricultural Market Information in Serbia - STIPS), as from internal documentation of IAE Belgrade related to comleted field research at the territory of Srem Region and entire Vojvodina. All used and by calculation obtained data were presented by tables and graphs in absolute and relative values. All values for plant production are expressed in national currency (RSD).

For the purposes of this research, it was adopted the technical solution for irrigation system in Srem Region developed by the research team from the Institute for development of water resources "Jaroslav Černi". This solution is in line with existing water sources, demand for water, projected sowing structure, current division of hydro-reclamation system Srem on 5 subsystems and other parameters. Solution includes: a) Territory of Lower Srem (lowland area), which covers: West Srem (lower zone), East Srem

(lower zone) and East Srem (middle zone); and b) Teritorry of Upper Srem (slopes of Fruška gora), which covers: West Srem (upper zone) and East Srem (upper zone).

Sowing surfaces on the territory of Srem Region

After introspection into the structure of utilized agricultural area (in use are 229,196 ha) for the territory of Srem (Table 1. and Graph 1.), it can be seen that arable land and gardens dominate with a share of over 93%. Observing the used land fund of arable land and gardens per groups of grown plants, or per individual plant cultures, it is clear that in sowing structure prevails cereals (mainly corn and wheat), followed by industrial crops (mainly soybean) and sugar beet.

From the aspect of intensity of agricultural activities, the focus is directed to the surfaces under the category of perenial crops (plantations). It can be noted their relatively small share in totally utilized agricultural areas (about 2.8%), where within this category dominates orchards (about 81%) over vineyards (18.4%). In group of grown fruits species prevails apple, plum, peach, sour cherry and pear.

After the realization of assumed wider implementation of irrigation as agro-technical measure on the entire territory of Srem, it could be expected relatively small decrease of the totally used agricultural surfaces (for about 1.8%), what is primarily a result of the decrease in the land surfaces that by the rules are not subject to the application of irrigation (crofts and meadows), but if necessary can be irrigated. Also, the implementation of irrigation assumes slight changes in the structure of the UAA, before all relative increase in the participation of categories of land use - arable land and gardens, at almost 95%, as well as category plantations, to around 3%.

Within the sowing structure by the category of use of agricultural land fund, assumption is that the most of grown plants were represented at approximately identical surfaces. More expresed, absolutely presented variations in sowing surfaces can be observed only in the group of cereals (wheat and corn) and industrial crops (soybean and sunflower). Made projections also assume the establishment of seed production (mainly crops) and establishment of double cropping system (mainly sweet corn and vegetable).

213

Table 1. *Utilized agricultural area (UAA) in Srem Region by land categories and sown plants (current state and coverd by irrigation system)*

No.	Description	Current state			After wider implementation of the irrigation measure			
		Area (ha)	Share in surfaces by category (%)	Share in total surfaces (UAA), (%)	Area (ha)	Index	Share in surfaces by category (%)	Share in total surfaces (UAA), (%)
I	UAA - Total	229.196	100,00	100,00	225.129	98,23	100,00	100,00
II	Croft	1.703	100,00	0,74	0	0,00	-	0,00
III	Arable land and gardens	213.715	100,00	93,25	213.306	99,81	100,00	94,75
1	*Cereals*	*147.058*	*68,81*	*64,16*	*140.664*	*95,65*	*65,94*	*62,48*
1.1	Wheat and spelt	54.928	25,70	23,97	52.540	95,65	24,63	23,34
1.2	Rye	71	0,03	0,03	68	95,65	0,03	0,03
1.3	Barley	3.775	1,77	1,65	3.611	95,65	1,69	1,60
1.4	Oat	154	0,07	0,07	147	95,65	0,07	0,07
1.5	Corn (mercantile)	86.810	40,62	37,88	83.036	95,65	38,93	36,88
1.6	Other cereals (grains)	1.320	0,62	0,58	1.263	95,65	0,59	0,56
2	*Seed production*	*-*	*-*	*-*	*5.500*	*-*	*2,58*	*2,44*
2.1	Seed corn	0	-	-	2.000	-	0,94	0,89
2.2	Seed sugar beet	0	-	-	1.000	-	0,47	0,44
2.3	Seed sunflower	0	-	-	750	-	0,35	0,33
2.4	Seed soybean	0	-	-	1.500	-	0,70	0,67
2.5	Other cultures grown for seed	0	-	-	250	-	0,12	0,11
3	*Legumes*	*83*	*0,04*	*0,04*	*83*	*100,00*	*0,04*	*0,04*
3.1	Peas (dry grain)	12	0,01	0,01	12	100,00	0,01	0,01
3.2	Beans	68	0,03	0,03	68	100,00	0,03	0,03
3.3	Other legumes	3	0,00	0,00	3	100,00	0,00	0,00
4	*Potatoes*	*205*	*0,10*	*0,09*	*205*	*100,00*	*0,10*	*0,09*
5	*Sugar beet*	*12.235*	*5,72*	*5,34*	*12.235*	*100,00*	*5,74*	*5,43*
6	*Industrial plants*	*41.332*	*19,34*	*18,03*	*44.590*	*107,88*	*20,90*	*19,81*
6.1	Tobacco	2.768	1,30	1,21	3.000	108,38	1,41	1,33
6.2	Hop	-	-	-	0	-	-	-
6.3	Oilseed rape	914	0,43	0,40	1.500	164,11	0,70	0,67
6.4	Oil pumpkin	0	0,00	0,00	0,00	0,00	0,00	0,00
6.5	Sunflower	8.756	4,10	3,82	10.000	114,21	4,69	4,44
6.6	Soybean	28.851	13,50	12,59	30.000	103,98	14,06	13,33
6.7	Other plants for oil production	14	0,01	0,01	14	100,00	0,01	0,01

214

6.8	Plants for textile fibers production	1	0,00	0,00	1	100,00	0,00	0,00
6.9	Medicinal and aromatic plants	9	0,00	0,00	45	500,00	0,02	0,02
6.10	Other industrial plants	19	0,01	0,01	30	157,89	0,01	0,01
7	*Vegetable, melons and strawberry*	*2.342*	*1,10*	*1,02*	*2.342*	*100,00*	*1,10*	*1,04*
7.1	Tomato	166	0,08	0,07	166	100,00	0,08	0,07
7.2	Cabbage and kale	94	0,04	0,04	94	100,00	0,04	0,04
7.3	Paper	255	0,12	0,11	255	100,00	0,12	0,11
7.4	Onion	157	0,07	0,07	157	100,00	0,07	0,07
7.5	Garlic	5	0,00	0,00	5	100,00	0,00	0,00
7.6	Cauliflower	14	0,01	0,01	14	100,00	0,01	0,01
7.7	Carrot	15	0,01	0,01	15	100,00	0,01	0,01
7.8	Peas	12	0,01	0,01	12	100,00	0,01	0,01
7.9	Other fresh vegetable	187	0,09	0,08	187	100,00	0,09	0,08
7.10	Melon	1.417	0,66	0,62	1.417	100,00	0,66	0,63
7.11	Strawberry	20	0,01	0,01	20	100,00	0,01	0,01
7.12	From that in protected area	95	0,04	0,04	95	100,00	0,04	0,04
8	*Flowers and ornamental plants*	*10*	*0,00*	*0,00*	*10*	*100,00*	*0,00*	*0,00*
9	*Fodder*	*6.369*	*2,98*	*2,78*	*6.369*	*100,00*	*2,99*	*2,83*
9.1	Mixed grasses	81	0,04	0,04	81	100,00	0,04	0,04
9.2	Silage corn	366	0,17	0,16	366	100,00	0,17	0,16
9.3	Clover	2.542	1,19	1,11	2.542	100,00	1,19	1,13
9.4	Alfalfa	3.259	1,52	1,42	3.259	100,00	1,53	1,45
9.5	Other fodder legumes	41	0,02	0,02	41	100,00	0,02	0,02
9.6	Other plants harvested as green	15	0,01	0,01	15	100,00	0,01	0,01
9.7	Fodder beet	8	0,00	0,00	8	100,00	0,00	0,00
9.8	Other root and leafy fodder plants	57	0,03	0,02	57	100,00	0,03	0,03
10	*Other crops*	*1.308*	*0,61*	*0,57*	*1.308*	*100,00*	*0,61*	*0,58*
11	*Fallow*	*2.773*	*1,30*	*1,21*	*0*	*-*	*-*	*-*
12	*Double cropping system in projection*	*-*	*-*	*-*	*53.327*		*25,00*	*23,69*
12.1	Sweet corn	-	-	-	15.091	-	7,08	6,70

215

12.2	Green beans	-	-	-	7.572	-	3,55	3,36
12.3	Cabbage	-	-	-	7.786	-	3,65	3,46
12.4	Cauliflower	-	-	-	7.786	-	3,65	3,46
12.5	Other plants in double cropping system	-	-	-	15.091	-	7,08	6,70
IV	**Meadows and pastures**	**7.409**	**100,00**	**3,23**	**5.045**	**68,09**	**100,00**	**2,24**
V	**Plantations**	**6.369**	**100,00**	**2,78**	**6.778**	**106,42**	**100,00**	**3,01**
1	*Orchards*	*5.153*	*80,91*	*2,25*	*5.562*	*107,94*	*82,06*	*2,47*
1.1	Plantation	4.090	64,22	1,78	4.499	110,00	66,38	2,00
1.2	Extensive	1.063	16,69	0,46	1.063	100,00	15,68	0,47
2	*Vineyards*	*1.172*	*18,40*	*0,51*	*1.172*	*100,00*	*17,29*	*0,52*
2.1	Sorts for wine with geographical indication	141	2,21	0,06	141	100,00	2,08	0,06
2.2	Other wine sorts	826	12,97	0,36	826	100,00	12,19	0,37
2.3	Sorts for consummation in fresh	205	3,22	0,09	205	100,00	3,02	0,09
3	*Nursery gardens*	*38*	*0,60*	*0,02*	*38*	*100,00*	*0,56*	*0,02*
4	*Other*	*6*	*0,09*	*0,00*	*6*	*100,00*	*0,09*	*0,00*
5	*Fruit*	*5.153*	*80,91*	*2,25*	*5.562*	*107,94*	*82,06*	*2,47*
5.1	Apple	1.639	25,73	0,72	1.769	107,94	26,10	0,79
5.2	Pear	503	7,90	0,22	543	107,94	8,01	0,24
5.3	Peach	728	11,43	0,32	786	107,94	11,59	0,35
5.4	Apricot	130	2,04	0,06	140	107,94	2,07	0,06
5.5	Sour cherry	620	9,73	0,27	669	107,94	9,87	0,30
5.6	Plum	959	15,06	0,42	1.035	107,94	15,27	0,46
5.7	Walnut	112	1,76	0,05	121	107,94	1,78	0,05
5.8	Hazelnut	328	5,15	0,14	354	107,94	5,22	0,16
5.9	Other	112	1,76	0,05	121	107,94	1,78	0,05
5.10	Raspberry	3	0,05	0,00	3	107,94	0,05	0,00
5.11	Blackberry	6	0,09	0,00	6	107,94	0,10	0,00
5.12	Other berry fruit	13	0,20	0,01	14	107,94	0,21	0,01

Source: *Authors calculations according to SORS data.*

Graph 1. *Structure of Utilized agricultural area (UAA) on the territory of Srem region (current state and coverd by irrigation system)*
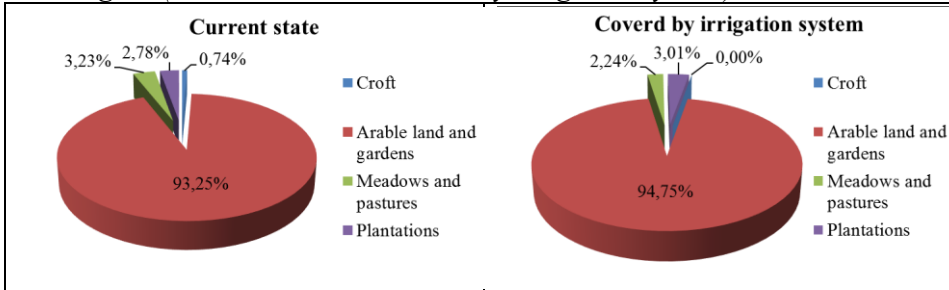
Source: *Authors calculations according to data from the Table 1.*

Observing the structure of utilized agricultural surfaces after the wider implementation of irrigation systems (on entire surface of 225,129 ha), by previously determinated zones of the territory of the Srem Region: (East Srem (lower zone), West Srem (lower zone), East Srem (middle zone), East Srem (upper zone) and West Srem (upper zone)), according to available natural and climatic predispositions, after investing in irrigation systems (Table 2. and Figure 2.) it can be noticed that in all zones will prevail crops production (in the zone of East Srem (upper zone) with up to 95%), while in some zones in higher percentage will be presented vegetable production (West Srem (lower zone), with slightly more than 21%), or fruit and grape production (West Srem (upper zone), with around 7%).

Table 2. *Utilized agricultural area (UAA) on the territory of Srem region (after the implementation of irrigation system) by defined zones*

No.	Zone	Structure of agricultural production after the wider implementation of irrigation measure							
		Fruit production and wine growing (plantations)		Crop production		Vegetable production		Total	
		ha	%	ha	%	ha	%	ha	%
1	East Srem (lower zone)	458	0,7	56.773	86,8	8.200	12,5	**65.431**	**100,0**
2	West Srem (lower zone)	304	0,8	29.607	77,8	8.163	21,4	**38.074**	**100,0**
3	East Srem (middle zone)	1.026	3,1	27.723	85,1	3.830	11,8	**32.579**	**100,0**
4	East Srem (upper zone)	2.487	4,6	51.349	94,6	444	0,8	**54.280**	**100,0**
5	West Srem (upper zone)	2.503	7,2	32.034	92,1	227	0,7	**34.765**	**100,0**
Total		**6.778**	**3,0**	**197.486**	**87,7**	**20.865**	**9,3**	**225.129**	**100,0**

Source: *Authors calculations according to SORS data.*

Graph 2. *Structure of agricultural production by zones of Srem region*
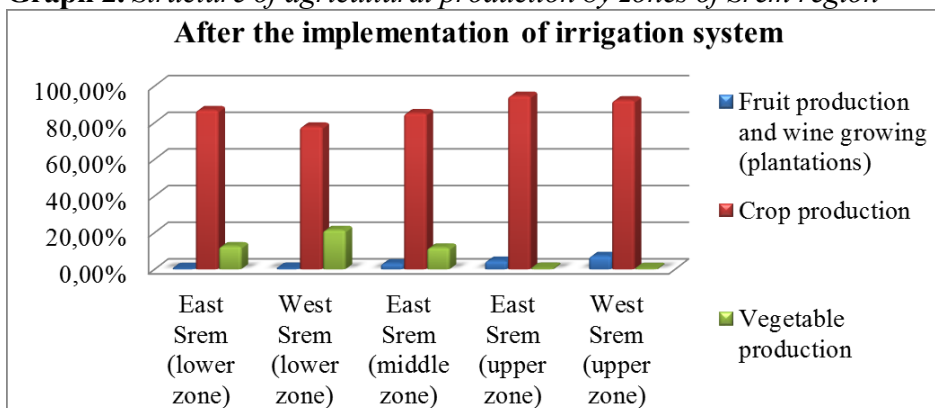
Source: *Authors calculations according to data from the Table 2.*

Incomes from agriculture on the territory of Srem Region

In Tables 3 and 4 are given as gained incomes from certain crops production (based on achieved yields), as well as expected incomes after the wider implementation of irrigation on the entire territory of Srem (based on the expected yields).

It can be noticed that the currently achieved yields at the mentioned territory are satisfactory, if are observed in relation to the average crops yields achieved at national level. On the other hand, achieved yields at all grown crops are far below their yield potential, which could be activated after the wider use of irrigation. In this case, yield growth is especially expressed at some crops, such as corn, sugar beet and soybean. In general, use of irrigation (with certain adjustments in sowing structure and implementation of some new production lines) would lead to duplication of current incomes gained from the production of crops on arable land and gardens (from 27.4 to 59.7 mld RSD).

Also, it has to be explained the basic assumptions of yield and income growth in fruit and grape growing, after the introduction of irrigation. So, irrigation assumes a comprehensive replacement of currently prevailing extensive fruit and grape plantations in conventional form of growing (with a much smaller number of bearing trees/vines per hectare (for example, at apple plantations is usually present planting density of around 2,300 trees/ha), with representation of sorts with lower yield potential and worse quality characteristics of fruits, which are sold in the market at relatively lower prices).

Newly established intensive plantations would be performed by the technology based on integral production, growing form that is based on so-called knip seedling (which in the first year after planting has been already brought to producer certain yields), which allows significantly higher planting density (greater number of bearing trees/vines per hectare of orchard/vineyard (for example, at apple plantation density is about 4,100 trees/ha)), by the presence of modern, higher yields fruit and vine assortment, which gives fruits with better quality. Mentioned is recognized in the production indicators achieved in some modern apple plantations in Vojvodina (Podunavlje a.d., Čelarevo, or Apple World Ltd., Riđica), established in line to technology of South Tyrol (Italy), where at stage of full yielding are achieved average yields of apples of over 70 t/ha. Also, since this is the technology, in which within the production structure dominates the first class fruit (after fruits picking, they are usually classified, packaged and cools), the fruits and grapes sale on national and international markets is usually strategically planned and agreed in advance.

Above mentioned, has implications both to gained incomes (yields), or profitability of established production per unit of production area, as well as on the level of required investment. This type of production requires several times higher investment, given that imposes the need for setting up of multipurpose (modern) irrigation system (function of fertigation, classical irrigation, anti-frost protection, etc.), system for anti-hail protection, as well as the use of special machinery and equipment, or construction of cold storage and ancillary facilities.

Presence of pure economic logic dictates that a high level of investment in production must be justified by higher yields, incomes and total effects of production, together with reduction and control of all production risks, given that all producers expectations are facing in the direction of the investment return within a reasonable period, as to acquisition of a certain profit level. With this in mind, the expectations are that with the intensification of production in orchards and vineyards at the territory of Srem the total incomes will double in fruit production, or tripled in grape production. Observing the individual fruit species, expectations from the implementation of irrigation are going in to direction of duplication of incomes gained in the peach and sour cherry production, to their increase for about 2.5 times in the apple and pear production.

Table 3. *Incomes from agriculture from the Srem Region by land categories (sown plants), (current state and coverd by irrigation system)*

N o.	Descrip tion	Current state					After the wider implementation of irrigation measure				
		Yiel d (t/ha)	Price (RSD/ kg)	Inco me (000) RSD/ ha	Area (ha)	Total income (000 RSD)	Yiel d (t/ha)	Price (RSD/ kg)	Inco me (000) RSD/ ha	Area (ha)	Total income (000 RSD)
I	**Croft**			-	1.703	-			-	-	-
II	**Arable land and gardens**				213.71 5	**27.385. 869**				213.30 6	**59.701. 912**
1	*Cereals*			285,6	147.05 8	15.265. 553			387,9	140.66 4	21.754. 433
1. 1	Wheat and spelt	4,8	22,0	105,6	54.928	5.800.3 97	5,5	22,0	121,2	52.540	6.366.5 58
1. 2	Corn (mercan tile)	5,8	18,0	104,4	86.810	9.062.9 64	10,0	18,0	180,0	83.036	14.946. 399
1. 3	Other cereals (ray, barley, oat)	3,5	21,6	75,6	5.320	402.19 2	4,0	21,6	86,8	5.089	441.476
2	*Seed producti on*			-	-	-			1.934 ,1	5.500	3.948.7 80,0
2. 1	Seed corn			-	-	-	3,6	232,0	835,0 2	2.933	2.449.9 20
2. 2	Seed sugar beet			-	-	-	2,7	293,0	791,1	1.467	1.160.2 80
2. 3	Seed sunflow er			-	-	-	1,8	171,0	307,8	1.100	338.580
3	*Legume s*			255,0	83	10.140			533,7	83	24.989
3. 1	Peas (dry grain)	5,0	27,0	135,0	12	1.620	8,1	27,0	218,7	12	2.624
3. 2	Beans	1,2	100,0	120,0	71	8.520	3,2	100,0	315,0	71	22.365
4	*Potatoe s*	*9,9*	*15,0*	*147,9*	*205*	*30.320*	*27,0*	*15,0*	*405,0*	*205*	*83.025*
5	*Sugar beet*	*45,6*	*4,9*	*223,4*	*12.235*	*2.732.9 49*	*67,5*	*4,9*	*3300, 8*	*12.235*	*4.046.7 26*
6	*Industri al plants*			*1.747 ,7*	*41.332*	*8.065.0 95*			*2.530 ,1*	*44.590*	*12.789. 088*
6. 1	Tobacco	2,5	600,0	1.50, 0	2.768	4.152.0 00	3,6	600,0	2.160 ,0	3.000	6.480.0 00

6.2	Oilseed rape	2,0	29,0	58,0	914	53.012	3,2	29,0	91,4	1.500	137.025
6.3	Sunflower	2,3	35,0	80,5	8.756	704.858	3,2	35,0	110,3	10.000	1.102.500
6.4	Soybean	2,8	39,0	109,2	28.894	3.155.225	4,3	39,0	168,5	30.090	5.069.563
7	*Vegetable*			*2.256,5*	*2.342*	*732.893*			*4.698,0*	*2.342*	*1.210.437*
7.1	Tomato	30,0	15,0	450,0	166	74.700	67,5	15,0	1.012,5	166	168.075
7.2	Cabbage and kale	25,0	14,5	362,5	94	34.075	54,0	14,5	783,0	94	73.602
7.3	Paper	15,0	20,0	300,0	255	76.500	27,0	20,0	540,0	255	137.700
7.4	Cauliflower	10,0	17,0	170,0	14	2.380	22,5	17,0	382,5	14	5.355
7.5	Carrot	15,0	30,0	450,0	15	6.750	40,5	30,0	1.215,0	15	18.225
7.6	Peas	6,4	35,0	224,0	12	2.688	9,0	35,0	315,0	12	3.780
7.7	Other fresh vegetable and melon	20,0	15,0	300,0	1.786	535.800	45,0	10,0	450,0	1.786	803.700
7.8	From that in protected area				95					95	
8	*Flowers and ornamental plants*			*-*	*10*	*-*			*-*	*10*	*-*
9	*Fodder*			*290,8*	*6.369*	*548.920*			*600,8*	*6.369*	*1.334.482*
9.1	Silage corn	28,0	4,5	126,0	431	54.306	40,5	4,5	182,3	431	78.550
9.2	Clover	6,2	12,0	74,2	2.638	195.634	15,8	12,0	189,0	2.638	498.582
9.3	Alfalfa	6,0	15,0	90,6	3.300	298.980	15,3	15,0	229,5	3.300	757.350
10	*Other crops*			*-*	*1.308*	*-*				*1.308*	*-*
11	*Fallow*				*2.773*					*-*	
12	*Double cropping system in projection*			*-*	*-*				*621,0*	*53.327*	*14.509.951*
12	Sweet										

No.	Description	Yield	Price	Income	Area	Total income	Yield	Price	Income	Area	Total income
.1	corn			-	-	-	13,5	14,0	189,0	35.091	6.632.275
12.2	Green bean			-	-	-	10,8	40,0	432,0	18.235	7.877.677
III	**Meadows and pastures**				7.409					5.045	
IV	**Plantations**				6.369	5.491.567				6.778	12.598.481
1	*Orchards*			-	5.153	5.118.285			-	5.562	11.426.481
1.1	Plantation			-	-	-	-		-	5.562	11.426.481
1.2	Extensive			-	5.153	5.118.285	-		-		-
2	*Vineyards*			318,5	1.172	373.282	20,0	50,0	1.000,0	1.172	1.172.000
2.1	Grape – total	9,1	35,0	318,5	1.172	373.282	20,0	50,0	1.000,0	1.172	1.172.000
3	*Nursery gardens*			-	38	-			-	38	-
4	*Other*			-	6	-			-	6	-
Total					229.196	32.877.436				225.129	72.300.393

Source: *Authors calculations according to data from SORS, STIPS and IAE.*

Table 4. *Incomes per fruit species in Srem Region (current state and coverd by irrigation system)*

N o.	Descrip tion	Current state					After the wider implementation of irrigation measure				
		Yiel d (t/ha)	Price (RSD/ kg)	Inco me (000) RSD/ ha	Area (ha)	Total income (000 RSD)	Yiel d (t/ha)	Price (RSD/ kg)	Inco me (000) RSD/ ha	Area (ha)	Total income (000 RSD)
I	Fruit				5.153	5.118.285				5.562	11.426.481
1	Apple (extensi ve plantatio n)	38,4	25,0	960,0	2.320	2.227.200	-	-	-	-	-
	Apple (plantati on)	-	-	-	-	-	63,4	32,0	2.029 ,0	2.504, 1	5.080.867
2	Pear (extensi	30,0	35,0	1.050	843	884.835	-	-	-	-	-

	ve plantation)			,0							
	Pear (plantation)	-	-	-	-	-	54,1	42,0	2.272,4	909,6	2.066.956
3	Peach (extensive plantation)	22,0	50,0	1.100,0	1.075	1.182.390	-	-	-	-	-
	Peach (plantation)	-	-	-	-	-	40,5	57,0	2.308,7	1.160,2	2.678.603
4	Sour cherry (extensive plantation)	15,0	60,0	900,0	915	823.860	-	-	-	-	-
	Sour cherry (plantation)	-	-	-	-	-	25,5	63,5	1.619,4	988,1	1.600.054

Source: *Authors calculations according to data from SORS, STIPS and IAE.*

Conclusion

Having in mind analysis of the current results of agricultural production in the territory of Srem region, as well as projections of expected results in agriculture after the wider implementation of agrotechnical measure irrigation on the mentioned territory, following conclusions could be done:

- by insight into the structure of agricultural land surfaces, on the territory of Srem will be used 229,196 hectares (arable land and gardens dominate with more than 93%);

- observing the category of utilized agricultural area (UAA), that relates to arable land and gardens, in sowing structure prevails cereals (mainly corn and wheat), followed by industrial crops, primarily soybean and sugar beet;

- permanent crops (plantations) have relatively small share in total fund of UAA (about 2.8%), where within the mentioned category dominates orchards over vineyards (ratio 4:1);

- after investment in irrigation system at the territory of Srem, it is expected relatively small decrease in total utilized agricultural area (about 1.8%), before all as a result of reduction in the land category – crofts and meadows;

- construction of irrigation system assumes light changes in the structure of UAA (relative increase in the participation of category arable land and gardens, at almost 95%, and category permanent crops (plantations), at around 3%);

- by use of the irrigation as a agrotehnical measure, projections also assume the establishment of seed production (mainly crops), as well as establishment of double cropping system (sweet corn and vegetables);

- if it is observed the structure of UAA after the implementation of the irrigation system (on the area of 225,129 ha), at a previously determined zones of Srem district, it could be noticed:

- in East Srem (upper zone) will prevail production of crops (around 95%);

- in West Srem (lower zone), vegetable production will be presented in higher percent (around 21%);

- in West Srem (upper zone), in higher percent will prevail fruit and grape production (around 7%);

- currently achieved yields in the territory of Srem are satisfactory, if they are observed in relation to the average crops' yields achieved at the territory of entire Republic of Serbia. However, achieved yields for all grown crops are much below their yield potential, which could be activated after the wider implementation of the irrigation measure;

- with implementation of irrigation, increase of yields will be most noticeable at some crops, such as corn, sugar beet and soybean;

- wider application of irrigation (with certain adjustments in sowing structure, as well as introduction of some new lines of production) would lead to a doubling of current incomes achieved in crops production on arable land and gardens (from 27.4 to 59.7 mld. RSD);

- from the aspect of return on investment and gaining of certain level of profit, expectations are that by intensification of fruit and grape production, on the territory of Srem region, overall incomes will be doubled in fruit production, or tripled in grape production;

- observing the individual fruit species, expectations go in the direction of achieved incomes doubling in the peach and sour cherry production, or increase of incomes for about 2.5 times in the apple and pear production.

Presented projections tend to change and adjust stand to irrigation (as the most important factor for increase, stabilization and quality of yield, as well as the factor of national agriculture competitiveness strengthening) to the interests of agricultural producers, as well as to the soil and hydrological conditions.

According to that, the sowing structure in the conditions of irrigation, at the territory of Srem is adjusted to the requirements of intensive and highly accumulative crop production, that cover needs of the processing industry and animal husbandry, while in line to that, leads the agricultural producers to the core need of the irrigation measure implementation (what will significantly increase the achieved yields and profits).

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CLIMATE AND SOIL FEATURES IN SMEDEREVO AREA IN THE FUNCTION OF FRUIT GROWING AND VITICULTURE[1]

Nataša Kljajić[2], Vesna Popović[3]

Abstract

This paper analyzes the climatic and pedological conditions for fruit and grapevine cultivation on the territory of the city of Smederevo. The analysis of climate parameters and the availability and quality of land resources, of which agricultural production depends on, led to the conclusion that this area has favorable weather conditions and good quality land resources for intensive and profitable fruit and grape productions. In the second part of the paper, the authors analyze the structure of production and yields of fruits and grapes in the period 1997-2013 and propose measures for their improvement by introducing complex agro-technical and hydro-ameliorative measures.

Key words: *climate, soil, fruit growing, viticulture, Smederevo.*

Introduction

The climate system is a complex dynamic system that shows the natural variability and is of global scale. Any disturbance in one part of the planet has a complex, non linear reflection to the other parts of the climate system.

Climate of Serbia can be described as mild continental with more or less localized characteristics. Spatial distribution of climate parameters is caused by geographic location, land relief and local influence as a result of combination of the relief, the distribution of air pressure on a major scale, terrain exposition, presence of river systems, vegetation, urbanization, etc.

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Trend analysis of annual air temperature for the period 1951 - 2012 indicates that rise in temperature is present on the whole territory of Serbia and it is the most intense in the north of Vojvodina province, in *the wider vicinity of Belgrade* and in the Negotin lowland. Summer 2012th was twenty-third consecutive warmer summer than average (*SEPA, 2013.*).

By the end of this century, we can expect further increase in temperature in the territory of the Republic of Serbia (2 °C – 2,2 °C by 2070 and 3,6 – 4,0 °C at the end of the period 2071-2100). Warming is most pronounced during the summer and autumn seasons. Changing rainfall is positive during the period 2011 - 2040 in order to became negative to the end of century when will reach -20%. During the summer season deficit is most pronounced, with a reduction of over 30% in some parts of Serbia by the end of the period 2071-2100 (*UNDP, 2015.*).

Considering viticulture, climate change will change the geographic distribution of wine grape varieties and this will reduce the value of wine products and the livelihoods of local wine communities in Southern and Continental Europe *(Kovats et al., 2014.)*. Some adaptation is possible through technologies and good practice in vineyards, including suggestions to replace rigid concepts of regional identity with a geographically flexible "terroir" that ties a historical or constructed sense of culture to the wine maker and not to the region (*White et al., 2009.*).

Many sustainable soil and biophysical processes management techniques, technological and infrastructural solutions and socio-economic and policy responses are implemented in agriculture in order to adapt to climate change, including permanent vegetation cover, pesticide and fertilizer treatment dates and methods, varieties better adapted to changing climate, early warning systems of droughts and other extreme weather events, pest and diseases risk monitoring, improved irrigation practices, wind, heal and frost damage protection in orchards, etc. (*Popović, Mijajlović, 2013.*).

Material and working methods

Climate specificities in the area of Smederevo were analysed on the basis of the monthly values of climate parameters in the period 1984-2014, received from the meteorological station Smederevska Palanka of the Republic Hydrometeorological Service of Serbia. In doing so, evapotranspiration was determined by the FAO *Penman-Monteith* method, using the following equation:

$$ET_0 = \frac{0.408 \cdot \Delta \cdot (R_n - G) + \gamma \cdot \frac{900}{T + 273} \cdot u_2 \cdot (e_s - e_a)}{\Delta + \gamma \cdot (1 + 0.34 \cdot u_2)}$$

where: **ETo** reference evapotranspiration (mm / day); **Rn**-net radiation from the surface of the crops (MJ / m2xday); **G**-energy spent on heating the soil (MJ / m2xday); **T**-average monthly air temperature measured at 2 meters height (° C); u_2-wind speed measured at 2 meters height (m / s); e_s -saturated vapour pressure (kPa); e_a - actual vapour pressure (kPa); e_s-e_a - vapour pressure deficit (kPa); Δ-slope of vapour pressure (kPa/°C); γ- psychrometric constant (kPa/°C), *(Kljajić and al. 2006.)*.

Data on land resources and the structure of production have been taken from the Statistical Office of the Republic of Serbia, and when analyzing the situation and looking at measures to improve fruit and grape production a number of scientific papers was quoted and appropriate local development documents consulted.

Research results

Climate is the result of the complex and dynamic climate system and affects the development of economy and society of an area. Climate elements have a natural variability of which we learn directly, by meteorological measurements, or indirectly, by using some other methods. With regards to global climate changes on Earth, understanding of climate conditions is essential for the economy of an area and within it, the agriculture with all its branches *(Kljajić et al., 2011.)*.

Two basic climate characteristics, which express the impact of energetic and aerodynamic state of the lower layers of the atmosphere on the amount of energy that land under cultivation receives and gives back to the atmosphere, are: - the reference potential evapotranspiration ETo (mm /day); and - effective precipitation Pe (mm). The energetic state of the lower layers of atmosphere is determined by air temperature and insolation and the aerodynamic state of the lower layers of the atmosphere is defined by relative humidity, wind speed, and amount of effective precipitation.

The data used to determine these characteristics included the following climate elements presented in Table 1: the maximum,minimum and mean air temperature (T, °C); the average sunshine duration (n, hour); the average

230

relative humidity (RH, %); the average wind speed measured at 2,0 m above the soil surface (V, m/s); and the amount of precipitation (P, mm).

Table 1. *Average values of the climate parameters, 1984-2014*

Climate parametrs	Months											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Tmax (°C)	14,0	16,0	22,1	25,3	29,6	33,2	36,1	35,5	31,2	26,2	20,5	13,9
Tmin (°C)	-11,8	-9,9	-5,3	-0,4	4,1	8,8	10,8	9,6	5,2	-1,2	-4,3	-10,6
Tmean (°C)	0,9	2,2	6,6	12,1	17,0	20,3	22,4	21,9	17,0	11,8	6,6	2,0
RH (%)	81,1	75,6	68,3	66,3	67,5	68,2	64,9	65,4	70,8	75,3	78,5	82,2
n (hour)	81,0	105,3	159,4	190,0	240,2	268,2	304,6	287,8	208,5	167,6	106,1	73,5
V (m/s)	2,0	2,2	2,4	2,3	2,0	1,8	1,7	1,6	1,6	1,7	2,1	2,0
P (mm)	45,5	43,0	42,1	52,3	64,4	75,6	59,6	56,2	55,1	51,8	46,9	52,6

Source: *Republic Hydrometeorological Service of Serbia, data for the period 1984-2014.*

The highest values of **air temperature** are typical for the months of July and August, and the lowest for January and February. For the investigated period the highest average value of maximum air temperature was 36,1 °C and the lowest was in January and it was 13,9 °C. The average values of minimum air temperatures ranged between -11,8 °C in January to 10,8 °C in July. Average monthly values of air temperatures ranged from 0,9 °C in January to 22,4 °C in July. The values of air temperature are shown in Graph 1.

Graph 1. *The long term course of monthly air temperature values (Tmax,Tmin),* *1984-2014*
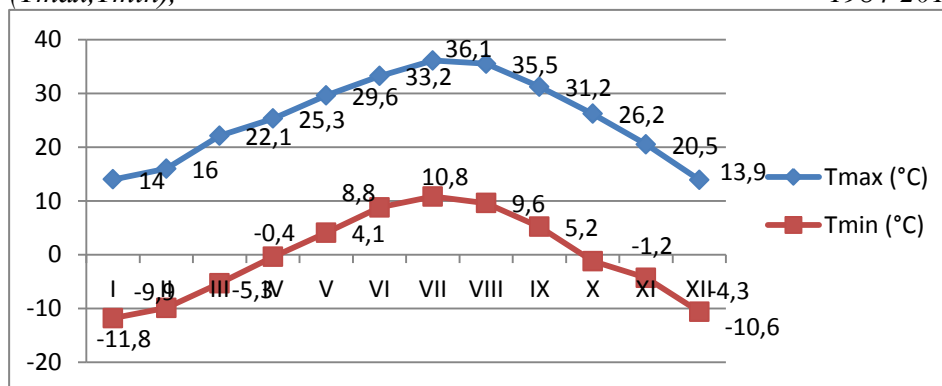
Insolation, as the main source of energy for all physical and chemical processes and phenomena in the nature, and thus the source of life on Earth, by the intensity of its radiation increases the intensity of photosynthesis.

However, insolation can be favourable for the growth and development of plants up to a certain limit, beyond which its effect can be negative. Insolation also affects the intensity of evapotranspiration (ET), specifically the amount of water that is lost from the soil through the physiological processes of plant transpiration (T), and through physical evaporation from the soil surface (evaporation, E) *(Kljajić et al., 2012.)*. In the investigated area insolation varies between 73,5 hours (December) to 304,6 hours (July).

Humidity is a climate parameter that is inconsistent with the intensity of evaporation. If the humidity is lower, the intensity of evaporation is higher, and vice versa. Humidity is the highest in December with average values for the investigated period in the area of Smederevo of 82,2%, while its lowest value is 64,9% in July. With regard to the vegetation period its values range from 64,9% (July) to 70,8% (September).

The effect of **wind** on the amount of water that is lost from the soil and plants through evapotranspiration is very important. The biggest influence is at noon and the lowest at night. Wind speed ranges from 1,6 m/s (August and September) to 2,4 m/s (March). The most prevailing winds are south and north, followed by south-east wind.

Precipitation is the main source of water for plants. To be able to assess how much water plants receive from precipitation, it is important to know not only the annual amount of precipitation, but also its distribution during the growing season by plant phenophases. Average annual precipitation in the investigated period amounted to 645,1 mm. In the vegetation period the average amount is 363,2 mm. Monthly precipitation values in the investigated period in the territory of Smederevo are shown in Graph 2.

Graph 2. *The long term course of monthly precipitation values (P, mm/day),* *1984-2014*
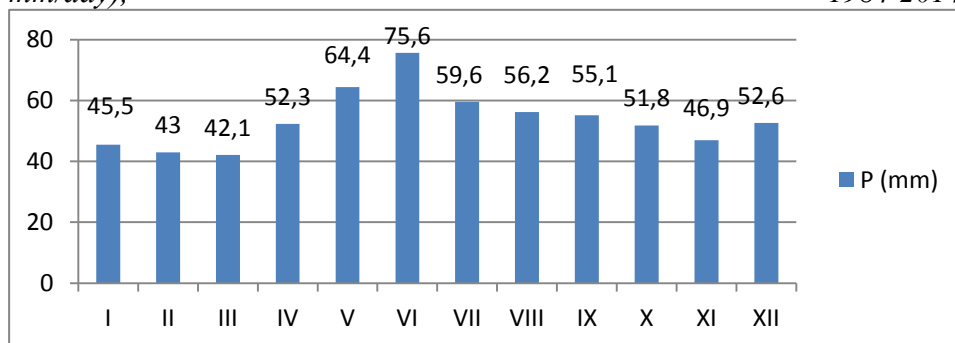
Plants use only a portion of water from precipitation, while the rest of it runs off the surface, or is drained beyond the root zone system, or evaporates from the leaf surface and doesn't even touch the soil surface. Those precipitation amounts that are available to plants represent effective precipitation. The soil usually absorbs about 80% of the total precipitation and that is - effective precipitation (Pe, mm).

The value of effective precipitation depends on the intensity of precipitation, absorption, runoff, terrain slope, soil properties, soil coverage and so on. The total amount of precipitation doesn't take into account less than 3 mm of daily rainfall, and during the summer less than 5 mm of daily rainfall. The amount of water in the soil: During the winter a certain amount of water is accumulated in the soil and is available to plants in the early growing season (early spring crops).

For the purposes of this study it was assumed that all the precipitation that reaches the ground is effective, regardless of its daily amount, because for the slightest rain to fall it needs to be cloudy, which consequently reduces insolation and air temperature at the same time. When raindrops pass through the atmosphere and evaporate, relative humidity is reduced, consequently reducing the overall soil water deficit. Based on this, for the purposes of this analysis, the amount of effective precipitation (average for the period of several years) is 645,1 mm, while during the vegetation period (IV-IX) when plants need largest quantities of water it is 363,2 mm.

Besides precipitation, **evapotranspiration** is the basic element of the water regime and soil water balance, without which one can not imagine neither implementing nor functioning of irrigation. Evapotranspiration is a complex process of water loss through atmospheric evaporation and evaporation through life processes of plants. Potential evapotranspiration is, therefore, the amount of water that may evaporate in any area. It has such an important role in the life and production processes of all kinds of plants, that any crop yield largely depends on it.

Reference potential evapotranspiration (ETo) is the basic numerical value used when assessing it. It expresses the energetic and aerodynamic pressure of the surface atmosphere above the plants, which influences the amount of water, that is, the atmospheric demand that by evaporation and transpiration through stomata a certain amount of water is delivered to it, which will in the form of water vapour saturate the air up to a maximum possible level. Hypothetically, it is equal to evaporation from the soil covered with thick grass in full growth, of uniform height of 0,12 m, an albedo of 0,23, on

medium dry soil surface watered in weekly shifts *(Allen and assoc., 1998.)*. The values of the reference potential evapotranspiration for the investigated area are shown in Graph 3.

Graph 3. *Long term course of monthly values of ETo (mm/day), 1984-2014*
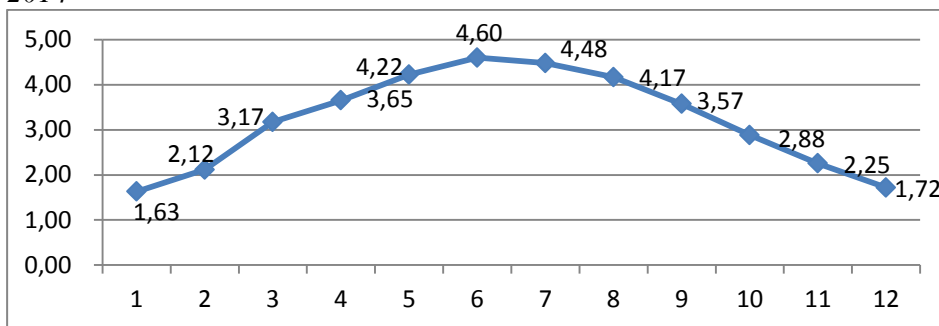
ETo varies in the range of 1,63 mm/day (January) to 4,60 mm/day (July). Its largest values are in June and July, when at the same time there is the biggest soil water deficit. During the vegetation period, its values are in the range of 3,65 mm/day to 4,60 mm/day.The average annual value of the reference potential evapotranspiration is 1.171,68 mm, while in the vegetation period it is 753,40 mm.

Comparing effective precipitation revenue (Pe, mm) and evapotranspiration (ETo, mm/day), expenditures it is clear that in the productive part (vegetation period April-September), precipitation is not able to provide the plant with enough water. The greatest moisture deficit occurs when water is needed most, in the so-called ' critical period ' when the sensitivity towards moisture deficit is increased, and therefore the irrigation intervention is necessary in order to increase crop yield and to establish a stable production.

However, this deficit (or surplus) regarding the climate norm, must not be equated with the irrigation norm, because this is not the same as the deficit-surplus of the soil water balance under cultivated crops, which is the basis of the irrigation regime. However, in the vegetation period soil lacks a certain amount of water which needs to be compensated by irrigation in order to achieve high and stable yields of cultivated crops *(Kljajić et al., 2012.)*.

The implementation of **irrigation** as hydro-technical and hydro-ameliorative measure in fruit production contributes to the production volume increase, improvement of fruit quality and improvement of the economic effects of

investments. Depending on the conditions of production itself and on climate conditions, irrigation can increase crop yields up to 100% and in extremely dry years even up to two or three times *(Kljajic, 2012.)*

For our country, which has variable climate conditions and where precipitation varies in quantity and occurence from year to year, irrigation is an important factor to increase and stabilize agricultural production. Along with the irrigation system other objects are built which can have direct or indirect positive affect on the development of the economy and standard of living. Thus, irrigation has technical, technological, socio-economic and environmental character. Advantages of irrigation can be summarized as follows: more rational use of natural resources, especially soil; the risk of droughts is reduced or eliminated; soil-water-plant ratio is more adjusted; a high yield per unit of capacity is achieved; production is economically more efficient; higher income and a better standard of living for employees and the population is achieved, and the like (*Sredojević et al., 2006.*).

For irrigation to give its maximum effect it is necessary to pay close attention to the proper selection of technologies to be applied and to the choice of the system, all in order to bring the necessary amount of water to the plants rationally and economically. The appropriate standard of watering must be determined, and attention must be paid to the quality of water used for irrigation because of the increasing water pollution.

Watering standard *(Bosnjak, 1999.)* depends on physical properties of the soil, irrigation methods, cultivated crops and root system development (depth and breadth of the active rhizosphere). Water quality testing is required in order to determine the presence of various harmful substances especially the salt content which can significantly affect the process of soil alkalization and salinization that directly affect plants.

The questions of water efficiency did not receive the adequate attention in the Republic of Serbia up until recently, due to underdeveloped irrigation and small water consumption in the sector. With irrigation development, and the advancement of the EU joining process, the questions of rational water use and sector modernization from the technological and institutional aspect are receiving higher significance and must take an adequate place in legislation and strategic development documents in the area of water management (*Popović, Ugrenović, 2015.*).

Irrigation in Smederevo area is implemented on a total of 710 ha, from which: 563 ha of arable land, 142 ha of orchards, 4,0 ha of vineyards. Irrigation for wheat and corn silage is carried out on 197 ha, for vegetables and strawberries on 337 ha, and for other crops on arable land and fields on 29 ha. Surface irrigation method is applied on 47,1% of the land, irrigation using sprinkler system on 13% of the land, and drip irrigation method on 39,80% of the irrigated area. The main sources of water for irrigation are: 69,7% is groundwater on the farm, 4,7% is surface water on the farm, 12,8% is surface water outside the farm, 7,4% is tap water and 5,4% (*SORS, 2013a*).

Development of General irrigation project Udovički Plato is in progress and in the first phase, it will enable the irrigation of 500 ha, and by the end of the irrigation project, of 2.000 ha of agricultural land, mainly orchards. Irrigation will greatly contribute to the stabilization and growth of the crop yields (http://www.smederevo.org.rs/Print-Smederevo_1955_lat).

Land area of Smederevo

The municipality of Smederevo is an agricultural area with soil of high production capacity. It is located at an altitude of 70 -90 m, and the hills on the left bank of the river Velika Morava and the Danube are at 100 -250 m above sea level. There are three dominant soil types in the municipality of Smederevo. In the plain area, which includes the coastal area of the Velika Morava, the Danube and the Jezava, the *alluvial* soil is prevailing. In Sumadija area there is a distinctive soil type, forest soil *gajnaca*, which occupies over 90% of the area. The third soil type is *smonitsa* which extends mainly between the two previously mentioned soil types (Table 2).

Table 2. *Soil types in the municipality of Smederevo*

Number	Soil type	Area (ha)	Percentage (%)
1	Gajnjaca	16.934	40
2	Smonitsa	14.817	35
3	Alluvial	10.584	25
Total		42.335	100

Source: *Support measures program for the implementation of agriculture and RD policies in the city of Smederevo, 2015, OG of the City of Smederevo, no. 3/2015a.*

Gajnjaca (Eutric Cambisol) was formed on the river terraces of Velika Morava, Danube and on tertiary lake terraces. Chemical characteristics generally indicate a weak acid to acid reaction of the soil solution, with a high degree of saturation of colloidal complex with alkali cations, poor in humus and total nitrogen, with medium provision of accessible potassium, and low in phosphorus. Ameliorative measures are primarily calcification (decreasing acidity), and humification (incorporation of organic fertilizers to increase the humus content). This soil type is suitable for cultures like wheat, corn, sunflower, vegetables, fruit and grapevine.

Smonitsa (Vertisol) in Smederevo area stretch at an altitude of 100 to 140m and occupy the bording areas of the Velika Morava alluvion ie. the first terrace above the alluvial belt. Smonitsa is better than gajnjaca regarding its production characteristics and suitability for agricultural production. The reaction of the soil solution is around neutral with medium content of humus, nitrogen and potassium, but a low phosphorus content. Ameliorative measures applied in maintenance and repair of smonitsa are calcification and phosphation in order to repair pH value and phosphorus content. It is possible to have both vegetable and fruit production on this soil type.

Alluvium occurs in the deposit of the rivers Velika Morava and Danube and is the result of accumulation of fine soil material, sand and other materials. Alluvium in farmland areas of Smederevo contains 3-5% of humus which is a meddium value in humus classification. The amount of humus is sufficient to provide favourable water-air and temperature conditions for growing crops. However, it is necessary to maintain the level of humus by entering manure in an amount of 30-50 t / ha in every 4-5 years.

According to data of Republic Geodetic Authority - Real Estate Cadastre Smederevo (2015), the city of Smederevo has 30 cadastral municipalities with 42.116 ha of agricultural land, of which 39.586 ha of utilized agricultural land (fields, gardens, orchards, vineyards, meadows and pastures). The average size of holdings is 4,16 ha and average size of the parcel is 0,34 ha (*OG of the City of Smederevo, no. 3/2015b)*. According to the agricultural census (2012), 7.105 agricultural holdings have at their disposal 38.495 ha of land of which 26.560 ha of utilized agricultural land and 2.609 ha of non-utilized agricultural land (*SORS, 2013a*).

Land degradation due to intensive agricultural production, soil degradation and contamination by industrial activities and excessive use of fertilizers and pesticide, uncontrolled urban sprawl and irregularities in the privatization of agricultural enterprises, are just some of the acute problems that are

registered in the Danube region in Serbia. The City of Smederevo belongs to the Danube region's metropolitan area and carries a significant part of the problems listed (*Popović, Živanović Miljković, 2013.*).

Erosion in agricultural areas, associated with instability of terrain, could result in landslides. The biggest landslide zone of the southeast Pannonia basin is placed between Belgrade and Smederevo, and the largest landslide group covers the length of 700-800 m, width of 4,0 km and a total area of about 3,0 km^2 (*Miljković et al., 2009.*).

The canal network has been built on an area of 8.7 ha, of which is in operation at 4.5 ha, and pipe drainage at 600 ha, but it is not functional *(OG of the City of Smederevo, no. 3/2015b)*. The rehabilitation and upgrading of drainage systems is of particular importance in areas with high groundwater levels (such as Godominsko polje, under the influence of Danube River slow down, caused by the construction of HPP "Đerdap").

Fruit growing and viticulture

Serbia has many natural advantages for ***fruit growing***, especially in hilly and mountainous regions where fruit production far exceeds the profitability of other crops because natural conditions are in favour of this production (*Keserović, 2004.*). A considerable interest among fruit farmers, steady government support through incentives and integration through cooperatives could translate into significant results (*Milić et al., 2011.*).

Due to its mild continental climate, the region of Smederevo has favourable conditions for growing almost all fruit species and grape vines. Fruit production in the region of Smederevo is carried out on 16,6% of the KPZ, a total of 4.412 hectares (4.234 ha of plantations and 178 hectares of extensive plantations), of which peaches on 1.961 ha, apples on 1.340 ha, plums on 333 ha, apricots on 234 ha, sour cherries on 183 ha, pears on 87 ha, while strawberry, cherry, blackberry, walnut, quince, medlar, hazelnut and almond are grown on smaller areas (*SORS, 2013.*).

The economic importance of ***viticulture*** is determined, among other things, by the circumstance that grapevine can be successfully grown in areas that are not suitable for profitable production of other crops, including a variety of light, loose, sandy or gravelly soil, brown forest soil, alluvium and diluvium, soil on mild slopes up to 240 m above sea level, and in river valleys, where there is abundance of sunlight from the water surface. In Serbia, the traditional vineyards are typically located in such terrains with

good water drainage, and in most cases on soil rich in minerals that contribute to the better taste of wine (phosphorus, iron, potassium, magnesium and calcium) (*Popović et al., 2011.*).

Smederevo wine-growing region encompasses hilly terrain of the Danube basin near Smederevo and its hinterland and consists of three parts, separated by the river valleys of Ralja and Konjska reka (Official Gazette of RS, no. 45/2015). Agricultural census records vineyard holdings in Smederevo viticultural area in a total area of 381 ha (1,4% of UAA), of which only 27 ha of varieties with geographical indications, 150 ha of table varieties and 204 ha of other grape varieties (*SORS, 2013a*). The main grape variety is „*smederevka*" which has been grown there since ancient times. Besides smederevka there are other quality wines that are obtained from varieties such as Italian Riesling, Sauvignon Blanc, Semillon and Gewurztraminer. With regards to quality red varieties there are varietal wine Game and rose variety Prokupac. Although they have favorable climate and soil predispositions for the development of diversified fruit and grape production, producers from Smederevo lag behind the national average, at least when it comes to yields of apples, plums and grapes (Table 3 and Table 4).

Table 3. *City of Smederevo: Production and yields of fruits and grapes, 1997-2013*

Year	Apples		Plums		Grapevine	
	ton	kg/per tree	ton	kg/per tree	ton	kg/per vine
1997	16.350	13,6	1.054	6,4	7.955	1,2
1998	11.435	7,7	1.023	6,7	6.510	1,0
1999	18.259	11,0	572	3,5	1.944	0,3
2000	11.899	7,2	838	4,8	4.846	0,8
2001	11.807	7,0	1.284	7,2	4.188	0,7
2002	4.753	2,7	405	2,2	6.053	1,1
2003	16.483	9,3	1.281	7,1	8.395	1,4
2004	10.755	5,9	1.483	7,6	7.522	1,3
2005	12.719	7,4	1.531	7,7	3.911	0,7
2006	19.339	10,4	1.826	9,1	4.980	0,9
2007	15.548	8,1	2.269	10,9	5.170	1,0
2008	18.726	9,6	2.928	12,4	7.163	1,3
2009	20.121	9,8	4.154	16,0	5.823	1,1
2010	21.204	10,2	2.803	10,6	3.844	0,7
2011	24.187	11,3	3.916	14,9	4.222	0,8
2012	15.686	7,3	2.767	10,3	3.743	0,8
2013	26.755	13,5	4.498	15,9	4.236	1,2
Average	16.237	8,9	2.037	9,0	5.324	1,0

Source: *Statistical Office of the Republic of Serbia, Municipalities in Serbia, 1997-2014.*

Table 4. *Republic of Serbia: Production and yields of fruits and grapes, 1997-2013*

Year	Apples		Plums		Grapevine	
	ton	kg/per tree	ton	kg/per tree	ton	kg/per vine
1997	230.074	7,5	462.116	17,6	541.661	2,0
1998	189.491	8,1	477.537	20,5	449.587	1,7
1999	196.474	8,7	379.569	12,2	182.939	1,0
2000	197.490	13,8	351.307	8,2	326.658	0,8
2001	135.374	9,5	333.106	7,8	380.818	1,0
2002	95.584	6,6	197.486	4,7	394.811	1,0
2003	246.138	16,8	570.913	13,4	450.166	1,2
2004	183.571	12,3	561.199	13,2	424.511	1,2
2005	198.030	13,4	304.351	7,1	240.643	0,7
2006	240.320	16,4	556.227	13,3	359.454	1,1
2007	245.228	16,3	680.566	16,2	353.315	1,1
2008	235.601	15,5	606.767	14,5	372.967	1,2
2009	281.868	18,1	662.631	15,9	431.306	1,5
2010	239.945	15,1	426.846	10,4	330.070	1,1
2011	265.676	16,6	581.874	14,3	324.919	1,2
2012	178.713	10,6	391.485	9,7	263.419	1,0
2013	332.255	18,2	738.278	18,7	320.329	1,3
Average	217.167	13,1	487.192	12,8	361.622	1,2

Source: *Statistical Office of the Republic of Serbia, Municipalities in Serbia, 1997-2014.*

The average **apple** production in the period 1997-2013 amounted to 16.237 tons, or 8,9 kg per tree. The highest production was achieved in 2011 (24.187 tons) and the lowest in 2002 (4.753 tonnes). Yield per tree in the Republic during the same period amounted to 13,1 kg.

The average production of **plums** amounted to 2.037 tons, or 9,0 kg per tree (compared with 12,8 kg per tree at national level). The highest production was achieved in 2013 (4.498 tons) and the lowest in 2002 (405 tons).

As for the **grapes**, the maximum production was achieved in 2003 (8.395 tons) with 1,4 kg per vine and the lowest in 1999 (1.944 tons) with 0,3 kg per vine. The average production of grapevines in the period 1997-2013 amounted to 5.324 tons, or 1,0 kg per vine. These yields are more than twice

lower than the maximum permitted yield per vine for recommended/approved varieties of grapevines in Smederevo wine-growing area *(Official Gazette of RS, no. 45/2015).*

Measures for improvement of fruit production and viticulture

In order to achieve a higher level of product finalization, and thus raise the competitiveness on the market, it is necessary to intensify fruit production and fruit processing by using new technologies, healthy planting material, modern machinery and irrigation, as well as organized forecasting and reporting services for plant protection.

The improvement of assortment, as well as thr proper preparation of fruit for the market represent an important basis for the improvement and development of fruit production in general.

Improvement of varieties and fruit growing technology has been for many years one of the priorities in the development of agriculture in Smederevo. Agricultural Development Strategy in the city of Smederevo in the period 2008-2013 recommended the increase of the areas under orchards for about 1.000 hectares, by increasing the number of trees of: apples, from the current 5.438.400 to 6.000.000; peaches, from 982.940 to 1.500.000; plums, from 382.500 to 500.000; and sour cherries, from 345.600 to 500.000 trees.

Land consolidation, specializing in production, construction of irrigation systems, professional training of producers, strengthening producer associations and regional branding for better production and sales, are the measures to improving fruit production which should be focussed on in the future.

Priority should be given to plantations with integrated production of grapes, with reduced application of pesticides, in order to meet the strict standards of quality and safety, required by large trade chains for fruit import and to respond to the growing international demand for quality wines obtained from integrated production.

The tradition of grape growing in the city of Smederevo is almost two millennia long. When PK Godomin went bankrupt in 2005, the capacities for grape processing and wine production were lost.

Due to problems with placement of grapes, the private sector has rooted out significant areas of vineyards, primarily cultivated with „smederevka" variety - the basic raw material for the production of wine.

Agricultural Development Strategy in the city of Smederevo in the period 2008-2013 recommended an increase of production or expansion of vineyards from 1.477 ha at the time, as recorded in the Real Estate Cadastre, to 1.700 hectares in 2013.

The real estate cadastre in 2015 records 1.824 hectares of vineyards (*OG of the City of Smederevo, no. 3/2015b*). It was also recommended to improve the varieties, primarily to renew the brand "Smederevka" by forcing its cultivation in the new plantations.

A more significant place in the new plantations should be given to varieties "Rhine Riesling", "Chardonnay", "Cabernet Sauvignon" and other recommended / approved international varieties, as well as domestic varieties and indigenous and regional varieties of quality white, rosé and red wines with geographical indications as well as for table use of grapes, regulated by the Rulebook on the Viticultural Zoning in Serbia *(OG RS, no. 45/2015)*.

Growing number of successful private wineries primarily oriented towards production of limited quantities of terroir-driven high quality and quality wines with geographical indications will in the future be the mainstay of the development of viticulture and wine production and wine routes of the Danube basin *(Popović, Živanović Miljković, 2012.)*.

Smederevo Wine Route **Golden Hill** includes Smederevo vineyard area of Belgrade wine-growing region, Braničevo vineyard areas of Mlava wine-growing region, and Krnjevo vineyard area of Sumadija wine-growing region *(TOS, 2011.)*.

Conclusion

Smederevo area has favourable climate conditions, physico-mechanical and moisture-air soil properties and favourable hydrologic conditions for irrigation and achieving high production yields. All of this makes the area very suitable for development of all branches of agriculture, including fruit growing and viticulture.These branches have long tradition in this area and significant export potentials.

The climate is mild continental with an average annual temperature of 10,4 ° C. On average there are 205 days during a year with mean daily temperatures of over 10 °C, which provides suitable conditions for long vegetation period for many cultures. The sum of active temperatures during this period is about 3.500 °C - sufficient for successful cultivation of grains, fruits, grapes and vegetables from the agro-technical aspect.

All soil types are generally of deep and powerful horizon, good structure and good production capacity, and may be suitable for intensive crop production. Hydrologic conditions are generally favourable for irrigation of large areas, due to the presence of large water resources and groundwater, but have been poorly utilized so far.

Some of the limitations of fruit growing are: land fragmentation, non-existing irrigation systems, inadequate assortment, lack of legislation and unwillingness to accept new ideas and technologies, such as integrated production.

A strategic approach to sustainable use of land and water resources in agriculture and the improvement of fruit growing and viticulture as well as fruit and grape processing needs to be taken, in order to achieve the required quality and safety level of export food and to ensure the development of wine tourism and overall regional development.

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APPLICATION OF GLOBAL GAP STANDARDS IN AGRICULTURE[1]

Riste Elenov[2], Branka Kalanović Bulatović[3]

Abstract

Global Gap is a standard that covers all the major aspects of production, such as land management, cultivation and harvesting of crops. It also deals with issues of pollution, labor force treatment and environmental protection. This standard follows the production of planting (the origin of the seeds and the history of land) and breeding (monitors the use of herbicides, pesticides and fertilizers-quantity, type, quality, location and method of application), irrigation and harvesting (level of hygiene and storage) to packaging, transporting and placing products on store shelves. Increasing the level of competitiveness of products while ensuring the continuity and the quantitative and qualitative aspect is just one of a series of steps that must be taken. By adopting certain international quality certificates (ISO, HACCP and Global GAP) gain significantly better position in international trade, and it is easier to achieve other specific certificates. Market orientation in the world and European markets will be increasingly directed towards the quality of the product, so that some of the lines of development can be identified in the production of traditional products from home-grown, organic produce and products known geographical origin. In this way you can find many export and development opportunities and exploit existing potential of agriculture.

Key words: *Quality Standards, Global Gap, agriculture, competitiveness*

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Introduction

International standards set by the International Organization for Standardization (ISO) define the implementation and management of quality at all stages of production, processing and transport. The quality management system ISO 9000 forms the basis of modern production. Part of this is the food production (Babovic, 2005). The European Union has made the management system standards of ISO 14000 and legally defined consumer protection. HACCP (Hazard analysis and critical control points) (HACCP) is a systematic approach to the identification, assessment and observation of microbiological, chemical and physical hazards and risks associated with food handling.

HACCP is used in the production, processing and services in order to safeguard human health and the environment against chemical, biological and physical agents. The control system protects the domestic market from import of goods that are risk for the health of the population, as well as encourage exports.

The introduction of the system of standards and controls in the food production process gets the most important condition for entry into foreign markets. In many countries for the purpose of safety and quality, food production is legally regulated. Standard systems have multiple features to ensure the safety of consumers in terms of quality and safety of food that is consumed, and also to perform better control and supervision on food distribution and during food distribution it is easier to exclude products which do not meet the set standards (Veljkovic and Sevarlic, 2010).

Good Agriculture Practices (GAP) refers mainly to primary agricultural production, and the main objective is to produce a valid heal than food safety, which can go as high-quality raw materials for further processing or consumed as fresh (Veljković i sar., 2007).

Global Gap certification performed more than 100 independent and accredited certification bodies in more than 80 countries worldwide and certificate is available for all agricultural producers who show a willingness to introduce the Global Gap certificate.

Global Gap includes both annual inspection during production and additional unannounced inspections. Global Gap is composed of a set of

documents to be used in production: general provisions, control points, compliance criteria and checklists. Global Gap was established by private individuals who made voluntary standards for the certification of all agricultural products worldwide. The aim was to create and establish a single standard for good agricultural practices worldwide, with emphas is to different agricultural products can be certified Global Gap (http://www.mobes.rs/usluge/global-gap.html)

The introduction of quality standards in food production is becoming a necessity but also increasingly a legal requirement. In fruit processing it is mainly applied HACCP quality standards, and the primary fruit production increasingly uses the application of Global Gap standards (which evolved from earlier known Eurep GAP standards).

Namely, these quality standards are based on: good manufacturing practices (Good Manufacturing Practice - GMP) and good hygiene practices (Good Hygiene Practice - GHP) and together they were applied and included in good agricultural practices - GAP (Dillon and Griffith, 2001).

Although the experience with the application of modern quality standards in general in our country is negligible, though lately attempts are being made to master this important issue in agriculture as a whole. Therefore, the main aim of this paper is to consider the theoretical and methodological aspects of the implementation of Global GAP system in food production. Global Gap is a management system in the primary production of food and a key reference for Good Agricultural Practice in the global market, following the demands of consumers in agricultural production.

To create this thesis literary sources were used relating to the system of standards in agriculture, which are shown in the literature. Advantages and the most important principles are described in details regarding application of Global Gap as significant quality management systems in primary production.

That is, based on empirical facts from various resources (copyrights, publications, books, brochures, magazines, etc.), there has been an attempt to apply the Global Gap in food production, according to which the optimum requirements will be filled of all links in the chain from producer to consumer.

The Research Results

Application of Global GAP system

Food production is a complex system, and it must be seen as a chain composed of a large number of links (primary agricultural production, industrial processing, transportation, sales, government regulations, education of participants within the chain, etc.). Each of these links is essential, and each of them significantly affects the quality and safety of food. All individuals involved in the food chain (primary producers, processors, distributors, consumers) have their share of responsibility to produce safe food, which is suitable for the use by the final consumer.

Increasing the level of competitiveness of products while ensuring continuity and with qualitative and quantitative aspect is just one of a series of steps that must be taken. Adopting certain international quality certificates (ISO, HACCP, GLOBAL GAP) gain significantly better position in international trade, and it is easier to achieve other specific certificates. Market orientation on world and European markets will be increasingly focused on product quality, so that some of the lines of development can be identified in the production of traditional products from home-grown, organic products and product with known geographical origin. In this way many export and development opportunities can be found and the existing agricultural potentials can be used as well.

Profit maximization as the primary factor in the functioning of the world economy has led to the industrialization of global proportions. The industrialization of agriculture has affected the implementation of a wide range of chemical products (pesticides, additives, hormones ...) which led to the awakening of consumer awareness about the health and quality of food consumed. Because of this, the demand for high quality food, produced in a healthy, ethical manner that does not end anger consumer health has a positive growth trend, especially in developed world economies that import large quantities of food-cheap food and agricultural products from under developed or developing countries. To trade was carried out as efficiently as possible, the need for standardization of production or products. Also, the willingness of consumers to pay for expensive agricultural products whose quality is no guarantee, said the producers, companies and supermarket chains that also

initiated the introduction of standards in the production and control of agricultural products.

Global Gap is a standard that deals with control of all activities in the primary agricultural production that is in the production of agricultural products which are consumed fresh, yet can be used for industrial processing, and control processing that follows in the process of primary agricultural production - control of the harvesting process and immediate products handling after harvesting. In addition, by simple handling are considered manipulative activities (washing, calibration, storage, packaging, transport etc.).

Global Gap standard goal is to strengthen the confidence of customers in terms of quality and health safety of agricultural and other primary products, as well as reducing negative environmental impact of the current mode of agricultural production, employee safety in the agricultural production and animal breeding.

Requirements of consumers to buy natural, delicious and fresh products produced on a "natural and healthy manner" in a process that the environment all the more pronounced. The entire system of Global Gap is placed at the service of consumers, under the principle that everyone has the right to food the quality and, above all, safe!

The story of the Global Gap standards begins in 1997 with the initiative of 17 European retail chains (Lidl, Metro, Tesco, Sainsbury's, Marks & Spencer, Conad, Coop, Spar, McDonalds Europei etc.) in order to find a durable and effective decision to control the fresh fruit and vegetables. The same year, a working group of European retailers (EUREP - Euro-Retailer Produce Working Group) is established in order to prevent scandals related to food safety in their own facilities.

In this respect, it was decided that non-governmental and non-profit organization "Food Plus " from Cologne to be given the task of drawing up standards for good agricultural practices (Good Agriculture Practice - GAP) that would regulate the origin and safety of fresh fruits and vegetables in retail stores. At the same time, "Food Plus" became technical secretariat of EUREP association, a standard, whose foundations were laid, and was named EUREPG.AP. Thanks to the successful expansion of certification schemes, in 2007 changed its name to Global GAP.

Global Gap certification is carried out in more than 80 countries worldwide and is binding in 60% of the European retail network. The standard applies to all production processes and work activities taking place on the farm. In fact, this quality standard monitors safety of products "from farm to fork" and is in accordance with HACCP standards, Veljković i sar.(2007. i 2010.) i Štrbac (2009).

Global Gap is a management system in agriculture and primary production of food and a key reference for Good Agricultural Practice in the global market, following the demands of consumers in agricultural production.

The goal of Global Gap is to strengthen the confidence of customers in terms of quality and health safety of agricultural and other primary products as well as reducing negative environmental impact of current mode in agricultural production, the safety of employees in the agricultural production and animal breeding. Requirements of consumers to buy natural, delicious and fresh products, produced on "natural and healthy manner" in the process that does not disrupt the environment, are even more emphasized.

Global GAP is a system of quality assurance measurements that is agricultural products from land to entering the processing in factory.

Global GAP is standard used before production, that is certificate that covers the process of entering into farm production (ex, cattle food or seedlings), as well as all work activities regarding products manufacturing until the final product that leaves the farm.

Global Gap is a unique standard that is applicable to all types of primary products whose production developed specialized requirements, thus, in:

• Crop production - fruit and vegetables, flowers and ornamental plants, combined crops, fodder, green coffee and teas,

• Livestock production - cattle and sheep, dairy, livestock, poultry,

• Aquaculture - trout, salmon, carp, catfish, pike ...

> Global GAP certificate:
> • emphasizes efficiency and safety in food production,

- increases the competitiveness of companies in the global market,
- visibly reduces barriers to international trade,
- increases profits,
- emphasizes efficiency of the company that follows the most demanding,
- international standards.

Source: (http://www.mobes.rs/usluge/global-gap.html)

Principles of Global GAP:
- limited and controlled use of all kinds of agrochemicals,
- hygienic handling during manufacture and handling of agricultural products,
- providing guidance and logging of all activities while ensuring traceability,
- unified rules which allow impartial verification (confirmation that everything was done as it should)
- communication and exchange of opinion among producers, traders and users of the product,
- environmental concern for protection and sustainable development,
  responsible treatment of employees on the farm,
- concern for the welfare of farm animals.

The benefits that organizations can achieve by introducing the Global GAP:

- increasing the safety of agricultural products,
- reduction of the risk of food poisoning,
- producer responsibility towards environmental issues,
- improving communication within the supply chain,
- care for employees,
- constant control,
- greater competition,

- reducing costs,
- reduction of legal claims,
- compliance with laws and regulations,
- providing access to the international market,
- increasing the confidence of customers and other interested parties.

Global Gap standard is primarily designed to reassure consumers about how food is produced on the farm by minimizing detrimental environmental impact by reducing the use of chemical inputs and ensuring a responsible approach to the workers safety and health, as well as animal welfare.

The main reasons that led to the development of Global Gap certification schemes:

1. The need of retailers to trade with agricultural products without technical barriers on the world level and to enjoy the trust of its customers;

2. The need for responsible agricultural producers to have certificates showing that they comply with the rules of good agricultural practices and their products are safer than non-certified ones;

3. The need consumers to buy agricultural products for which there is no guarantee that they are healthy, grown on farms where they take care for environmental protection, and employees' rights protection and welfare.

Application of Global GAP standards in plant production

GlobalGAP quality standard is mandatory in more than 60% of the European retail network, which has been applied in more than 80 countries worldwide. This is an international commercial standard, which includes the production of primary products and activities of manipulation and distribution of products after the harvest to the final consumer. Is the application and dissemination of good agricultural practices (Good Agricultural Practice). Basically, this quality standard monitors product safety "from farm to fork". GlobalGAP standards are in accordance with HACCP standard (Hazard Analysis and Critical Control Point) and

represent the application of HACCP principles to primary agricultural production and are based on critical control points during the manufacturing process.

Crop Production, which includes fruit and vegetables is consisted of phases that can represent any control points, such as:

1) field history, that is plot (orchard);

2) soil chemical analyses;

3) the use of healthy planting materials and seeds;

4) the application of fertilizers;

5) application of herbicides;

6) pests and diseases monitoring ;

7) use of pesticides;

8) harvesting;

9) transport to cold stores or warehouses;

10) receipt of raw materials (fruit and vegetables), grading, washing and further dealing;

11) packaging, labeling and delivery of goods.

For each of the identified points supporting documents are required that confirm during production environmental protection measures were taken, that it has been taken care of employees health and safety, as well as that procedures which quarantee healthy products are applied.

Standard documentation monitors and records data on the production and the producer as well as the employees. Data on production usually includes: folder field or plot (orchard), where data on crop rotation and chemical composition of soil erosion are recorded, also in case the soil is exposed and the emergence of pollution garbage risk, waste material or other forms of environmental contamination. It is necessary that on the farm and on the orchards there is specially equipped place for waste disposal, also a fitting rooms for workers, sanitary and plumbing, as well as prescribed hygienic conditions.

Recorded information about raw materials- Seeds and Seedlings (if they have the necessary certificates), energy consumption in the production process (electricity, gas, coal), the consumption of pesticides (the time of

treatment and records on used products), the consumption of fertilizers (quantity and type by lots), irrigation water safety, the use of mechanization (certified) and others.

Information on the manufacturer typically include basic information (name, address, place), which tools in the production and technology are applied, whether they are members of associations, cooperatives and the etc. Data on employees also include qualifications, whether they attended training on use of mechanization, use of pesticides and work safety.

Documenting and recording of performed activities is generally a problem in agriculture, but when such records once is established and all necessary data are collected then you must continue with their regular entry.

Promptness in keeping records is a basic requirement that applies to the implementation of GlobalGAP standards. At the same time records and documentation follows the implementation by stages of production and confirms that all necessary measures are applied in order to avoid risks of contamination, which ultimately identifies the product and guarantee its quality. Also, the production by the principles of GlobalGAP proves that the highest safety and hygiene standards are used and that the product (fresh fruits and vegetables) is completely and healthy safe for further use.

In particular, the GlobalGAP standard for fruit and vegetable production consists of checkpoints whose fulfillment is controled by internal and external inspections (Damljanović, 2011). Internal inspections are those carried out by the producer himself or by someone hired for that purpose. Internal inspections are those that are implemented by the producer itself or by the persons hired by the producer for this very purpose. Internal inspection is mandatory, yet its results are not relevant for certificate obtaining.

For the purposes of official certification, that is obtaining a certificate external inspection is required and carried out by trained and registered inspector who is employed in the certification house, which has the authority (accreditation) for certification of GlobalGAP-in.

In version 3 of GlobalGAP standards 236 control points exist and in version 4.0, the number of control points is 234 (the revision of the standard 19-point is thrown, 10 points are merged into 5 and 22 control

points are new). Each of them is controlled and the result is entered in the checklist (ie. Check list). The result or the response to the request of the control points can be:

a) **YES –** in case the condition from a certain control point is met,
b) **NO –** in case the condition from a certain point is not fully met or is not met at all
c) **NOT APPLIED** (N/P)- in case the condition from a certain point is not applied in the production itself, so in this case it can not be controlled at all (ex. In case in the production irrigation is not applied or used, all points reffering to it are not applicable).

All control points (234 in total) are divided into 3 areas:

- **"All Farm base-AF"** (51 control points, reffering to the most general demands on the level of agricultural holding control points),
-**"Crop Base-CB"** (113 control points, reffering to mutual criteria for all herbs and crop production), and
-**"Fruits and Vegetables-FV"** (70 control points, referring to fruits and vegetables production demands).

There are three types of control points:

- **Reccomendations** (22 control points which are not important for the certificate ie. It is possible to get a certificate though none of them is met. However, these points should be kept in mind because it is possible that some of them would be important for the process of certification in one of the next version of the standards)

- **Mostly binding** (117 checkpoints whose fulfillment is taken into account when making decisions about the process of certification. It is necessary to fulill at least 95% of the points of this type that are applicable in the relevant proizvodnji, eg. Out of 117 control points, 100 predominantly binding points are applicable. It is necessary to fulill at least 95 of those 100 points), and

- **Mandatory** (95 checkpoints whose fulfillment is taken into account when making decisions on certification. It is necessary to fulfill all the points of this type that are applicable in the relevant production- eg. Out of 95 points 80 are mandatory and it is necessary to complete all 80).

Picture 1. Global G.A.P

A significant problem of modern production and fruit placement on markets in the future is a packaging and logistics in the production process. In that regard, firstly, it is necessary that the package is adequate, in order to ensure that the product can withstand transport and the longer it stays in the desired condition. On the other hand, given the relatively low unit value products, packaging costs have a significant share in the selling price. From the two above-mentioned reasons the choice of adequate packaging is very important to the competitiveness of these products.

In our country wooden and cardboard packaging are represented, plastic one is also produced in the country and partly imported, while the glass one is almost exclusively imported. Proper packaging and labeling is the next important step in the production chain. Fruit that is not well packed decays faster.

It is necessary to mention few common elements of packaging:

1. Byers require packaging that is not harmful to health and which is recycled. This item becomes more and more prominent worldwide because the largest retailers of fruits are in the same time the most concerned about environmental protection.
2. Variability is another feature of packaging, because in the world there are no packaging standards and there are a number of different packings, which are different for small and large consumers. Shipping companies prefer uniformity.
3. Because of retail, printed packaging is increasingly present in different colors with visi ble logo in order to attract consumers and connect with local brand manufacturers.
4. Modern packaging should be designed specifically for each type of fruit, in order to prolong product freshness and mitigate losses, but at the same time to adapt to the market needs and demand.

5. Packaging should be practical, with very little free space, at the same time to protect the product from mechanical shocks during transportation.

Documenting and registration of performed activities is traditionally agricultural problem, but when registration like this one is maintained and all the necessary data are collected it is necessary to keep them up to date. Accuracy during data registration is the main condition to apply GlobalGAP standard. With the data registration and documentation there is manufacturing realization by phases. It confirms that all the necessary measures are applied to avoid all the contamination risks. The bottom line is to identify the product itself and guarantee for the quality. GlobalGAP production proves that the highest safety and hygiene standards are used and that the product (fresh vegetables and fruits) is completely safe for the health and ready for the use.

Diagram 1. *The chain of plant production and quality request*
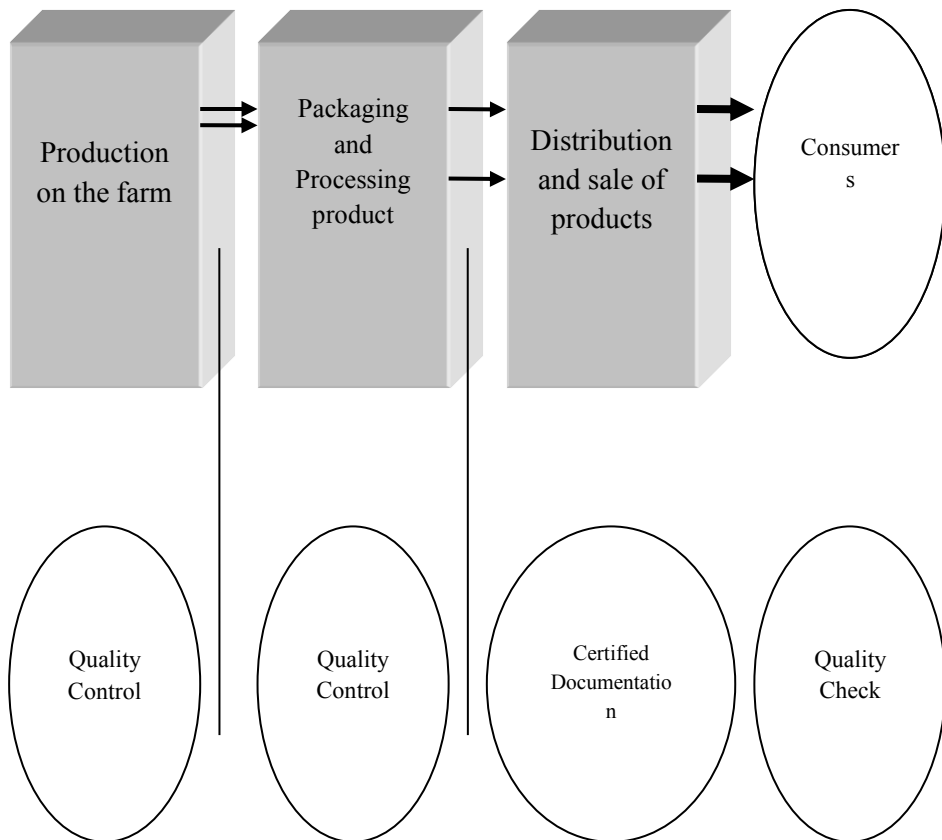
Diagram 1 shows all the phases of fruits and vegetables producing. The first phase is production at the household, where the quality control would be maintained by importing of Global GAP standard; the second phase is packing and processing of fresh fruits and vegetables to other final products and the quality control would be performed by importing of HACCP standard.

The third phase is further distribution of the products that have the control documented (origin, cetrificates and documentation). The fourth phase is the product consuming, and the final mark about criteria - color, tast, aroma will be given by the consumers themselves.

As the real conditions of our agricultural and manufacturing practice are at the moment, memorizing, oral infotmation and experience are much more used than the data registration, but this is not enough to make right business and economic decisions. This is even more clear when it comes to smaller agriculture manufacturers, who are insufficiently organized and cannot maintain data registration.

To make fruit production better organized in the wider area and to fulfill the conditions of modern market business referring to quality and range it is necessary to find the solution to import the mentioned systems and standards.

One of the solutions for the fruit producers is to develop the quality system on the association level and to realize the process while paying respect for all the necessary elements and requests regarding quality system in the orchards of affiliated greengrocers.

Technical instructions are given on the integrator level (association, cooperation) and that enables unique production technology maintained by associated greengrocers. Uniform technological processes with measures that control eventual risks and dangers, which is documented with necessary data registration through manufacturing steps, can provide fulfilling of conditions necessary for quality certificate.

Conclusion

Given the importance of the European market for product placement, the successful exchange of goods, capital, information and labor, it is necessary to establish a unified quality system with the EU. So that

products must comply with the requirements of ISO 9000, ISO 14000, GLOBAL GAP and HACCP.

International standards prescribed by the International Organization for Standardization defined the implementation and management of quality at all stages of production, processing and transport.

The quality management system ISO 9000 forms the basis of modern production. Within this framework is food production. The European Union has made the management system standards of ISO 14000 and legally defined consumer protection.

HACCP is a systematic approach to the identification, assessment and observation of microbiological, chemical and physical hazards and risks when handling food. Global Gap is an international standard that encompasses the commercial production of primary products and activities of manipulation and distribution of products after the harvest to the final consumer.

Global GAP standards in accordance with HACCP (Hazard Analysis and Critical Control Point) represent the application of HACCP principles to primary agricultural production, yet are based on critical control points during the manufacturing process.

Global Gap is a standard that covers all the major aspects of production such as land management, cultivation and harvesting of crops. It also deals with issues regarding pollution, labor force treatment and environmental protection.

This standard follows the production of planting (the origin of seeds and the history of land) and breeding (accompanied by the use of herbicides, pesticides and fertilizers- quantity, type, quality, location and method of application), irrigation and harvesting (the level of hygiene and storage) to packaging, transporting and placing products on store shelves.

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THE ECONOMIC EFFECTS OF THE MILK PRODUCTION LEVELS AT THE ROMANIAN GOATS BREEDS

Rodica Chetroiu[1], Călin Ion[2]

Abstract

The paper presents the research results on the milk production and the economic effects obtained at the two Romanian goat breeds – Alba de Banat and Carpatina, from a goat farm of the South-East Region of Romania. Thus, the productive level of Alba de Banat breed is upper than Carpatina with 40.94%. Also, there are productive differences between lactations, the highest milk production being obtained in lactation 3, with an upward trend from the first lactation. The economic effects are reflected by technical – economic indicators, such as: average yield, total output value, total costs, unitary cost, variable costs, labor productivity in terms of value, costs for 1,000 RON main production, profit per unit of product, rate of return, breakeven point in physical and value units, rate of operational risk, safety index etc.

Key words: *goats, milk, production, indicator, cost, profit*

Introduction

In present, worldwide, the raising goats sector tends to become increasingly more important to national economies, being also a factor of economic development, particularly for rural areas. In all countries, due to the accelerated increase in the number of human population, is pursuing the most efficient exploitation of the animal resources, applying more efficient technologies for animal breeding. In this context, raising goats has known lately a remarkable development, both worldwide and in Romania. This is due to the fact that, through their productions, the goats

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provide significant quantities of milk and meat confirmed as dietetic, low cholesterol and treating or improving some diseases.

The two autochthonous breeds which are exploited in Romania are Carpatina and Alba de Banat. Carpatina breed is an ancient, rustic, resistant breed, which was created through natural selection, with an average production of 220-280 l of milk, while Alba de Banat is an ameliorated breed, with a higher productive potential compared to Carpatina – an average of 450 l, between 250-1300 l. The main exploitation direction of the goats of these breeds is the milk production and the secondary production consists of kids, youth and invalid animals.

Material and method

The research was conducted in a goat farm of the South-East Region of Romania, at the two Romanian goat breeds – Alba de Banat and Carpatina.Determination of the milked quantity of milk was done by the official control of milk production, on different lactations, performing 6 official controls, from April to September. The calculation of lactation period and of milk production per lactation was conducted using the method Fleichmann (Pascal, 2007):

$$MS = I_0M \left(\frac{M_1 + M_2}{2} \right) + I_1 \left(\frac{M_2 + M_3}{2} \right) + ... + I_{n-1} \left(\frac{M_{n-1} + M_n}{2} \right) + I_nM_n$$

In which:

MS – milk production per lactation;
M_1, M_2, M_n – milk quantity at the control of 24 hours;
I_0 – period in days between the beginning date of milking and the date of the first control;
I_1, I_2, I_{n-1} – number of days between 2 controls;
I_n – number of days between the date of the last control and the date of ending lactation.

Together with the quantity milked, it was added the milk sucked by kids, thus resulting the milk production per lactation. The assessment of the milk quantity sucked by kids was done for two successive periods: the period of suckling from calving until the age of 28 days (the specific consumption is 5.5 kg milk sucked, for 1 kg weight gain), followed by the

second period - from the age of 28 days to 45 days, when the kids weaning occurs (the specific consumption is 4.5 kg milk sucked, for 1 kg weight gain).

The indicators are instruments for monitoring, assessment, forecasting and decision support, whose main quality is the capacity to illustrate, in a concise way, the complexity of the phenomenon studied. They were calculated using the formulas established in the specialty literature.

Total output value $VQ = VQp + VQs$,

In which:
VQp – main production value;
VQs – secondary production value.

Total costs $ChT = ChV + ChF$,
In which:
ChV – variable costs
ChF – fixed costs

Variable costs $Chv = Chf + Chec + Chmed + Cham + Chap$
In which:
Chf – fodder costs;
$Chec$ – energy and fuel costs;
$Chmed$ – vet costs;
$Cham$ – other materials costs;
$Chap$ – supply costs.

Unitary cost $Cu = Chp/Qp$
In which:
Chp – main production costs;
Qp – main production.

Labour productivity in terms of physic $Wf = Co / Qp$
In which:
Co – total consumption of hour-men
Qp – main production

Labour productivity in terms of value $Wv = VQp / Co$

Costs for 1000 RON main production $Chp/VQp = (Chp:VQp) \times 1000$

Profit or loss per unit of product Pr/l = Pr / Qp
In which:
Pr – total profit

Rate of net return Rrn = (Pr/Chp) x100

Breakeven point in terms of value PRv = (ChF /MCV%) x 100
In which:
MCV – margin on variable costs

Breakeven point in terms of physic PRf = PRv/Pu
In which:
Pu – unitary price.

Rate of risk of operation Rr = PRv/VQp

Safety index Is = (VQp – PRv) / VQp.

Results and discussions

Average production

Chart 1 shows the comparative evolution of milk production at Alba de Banat breed, on different lactations, in 2014.

Chart 1. *Productions of milk on lactations, at Alba de Banat (kg)*
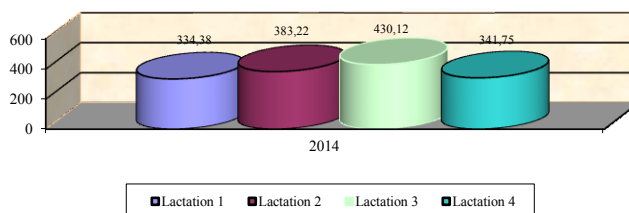
Source: *Own calculations*

Thus, the milk production at lactation 2 is higher than the first lactation by 14.6%. The highest milk yields were obtained at lactation 3 (by 28.6% higher compared to the first lactation), with an upward trend from the first lactation.

After the 3rd lactation, the milk production declined, near the amount of the first lactation. Taftă V. (2002) shows that at the first lactation, the milk quantity is 20-30% lower compared to the 3rd lactation, as confirmed by the outcome of this research study. In Chart 2 is presented the evolution of milk productions at Carpatina breed, on different lactations, in 2014.

Chart 2. *Milk productions on lactations at Carpatina (kg/head)*
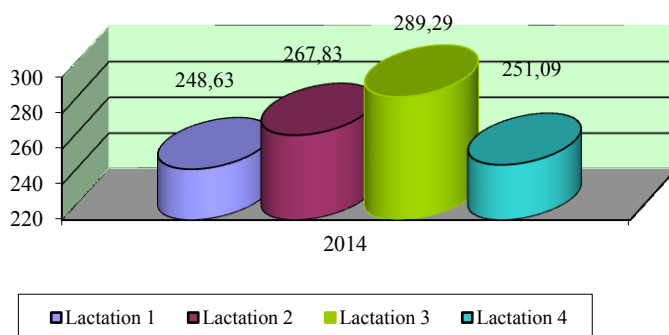
Source: *Own calculations*

Like Alba de Banat breed, the largest milk productions at Carpatina were obtained at the lactation 3 (by 16.4% higher than first lactation 1), with an upward trend from the first lactation. Comparatively, the average productions at the two breeds are presented in Chart 3.

Chart 3. *Average milk productions at the two breeds (kg/head)*
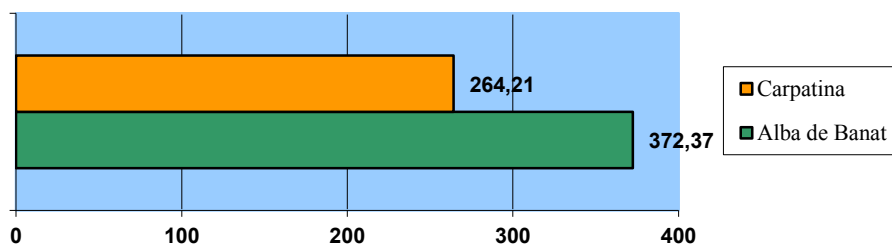
Source: *Own calculations*

Analyzing the two breeds milk production, results that, at Alba de Banat, the productions are superior to Carpatina by 34.5% at lactation 1, by 43.1% at lactation 2, by 48.7% at lactation 3, by 36.1% at lactation 4 and by 40,9% at average level.

Duration of lactations

As duration of lactations, at Alba de Banat, the most extended was lactation 3 (245 days), and the shortest – lactation 2 (227 days) (Chart 4).

Chart 4. *Duration of lactations at Alba de Banat (days)*
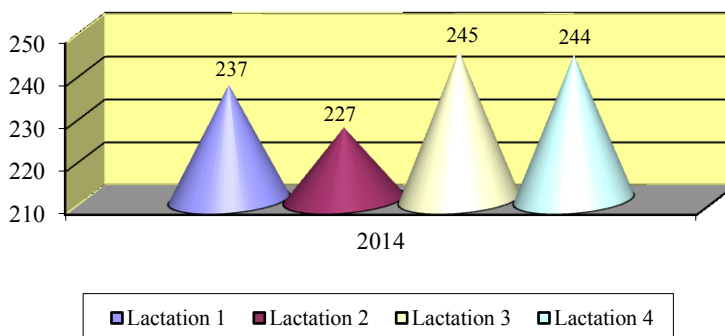
At Carpatina, as duration, the most extended was lactation 1 (269 days), and the shortest – lactation 4 (247 days) (Chart 5).

Chart 5. *Duration of lactations at Carpatina (days)*
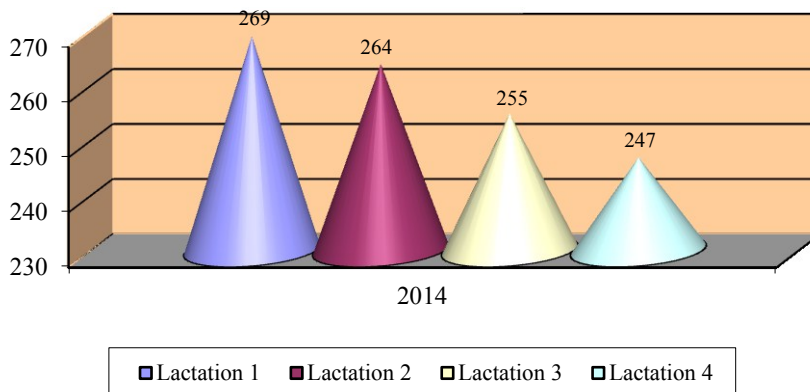
Comparatively, the average of duration of lactations was larger by 8.6% at Carpatina compared to Alba de Banat, so, opposite to the level of production between the two breeds (Chart 6).

Chart 6. *Average duration of lactation at the two breeds (days)*
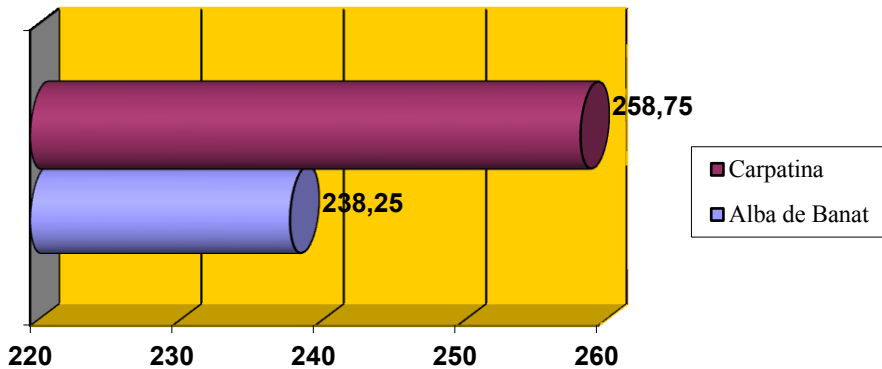
Source: *Own calculations*

Total output value

Regarding the economic results, these are illustrated by the values of the economic indicators calculated. Total output value (on unit of product), formed of the main production value and the secondary production value, is highest at Alba de Banat, by 2.3% compared to Carpatina (Chart 7).

Chart 7. *Total output value (RON/kg)*
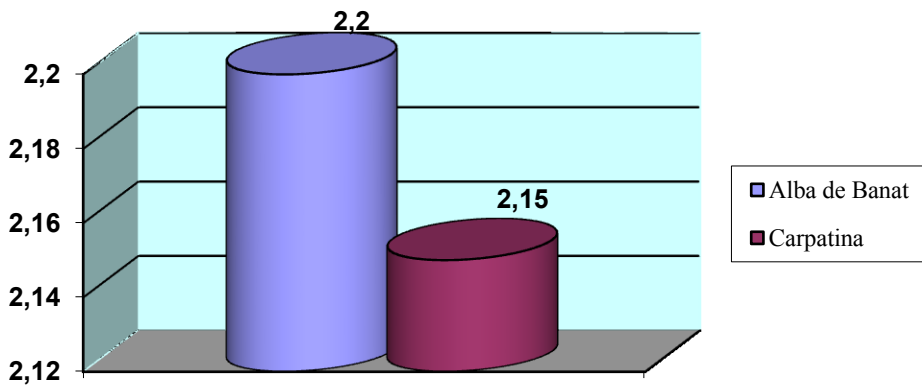
Source: *Own calculation*

Total costs

The total costs per kg of milk – the lowest costs were for Alba de Banat, 1.72 RON, reduced by 17.4% compared to Carpatina (Chart 8).

Chart 8. *Total costs (RON/kg)*
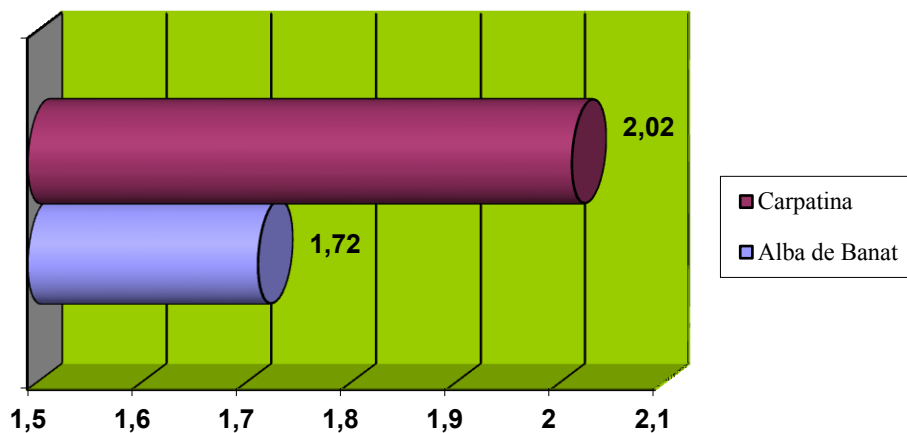
Source: *Own calculation*

Unitary cost

The unitary cost per kg of milk had the lowest level at Alba de Banat –
1.21 RON/kg, reduced by 29.8% compared to Carpatina (Chart 9).

Chart 9. *Unitary cost (RON/kg)*
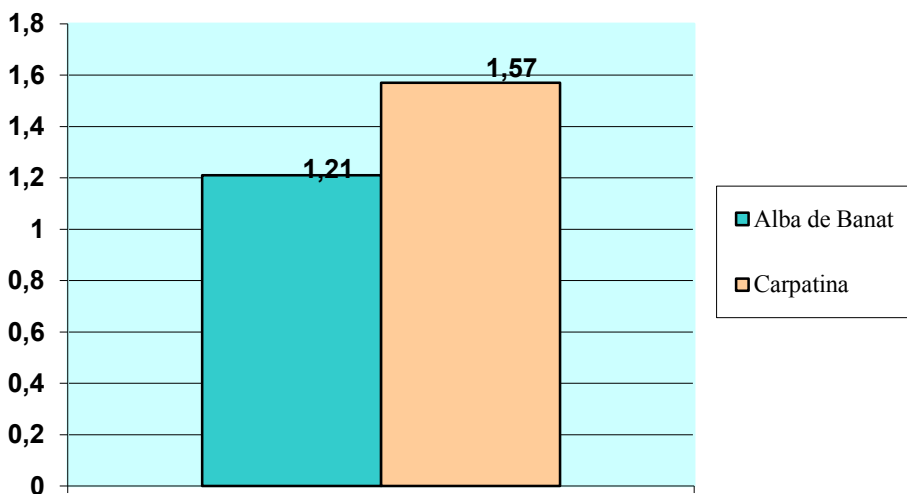
Source: *Own calculation*

Variable costs

The indicator of variable costs has the highest value at Carpatina, cu larger by 17.9% compared to Alba de Banat, affecting, finally, the level of the rate of return at this breed (Chart 10).

Chart 10. *Variable costs (RON/kg)*
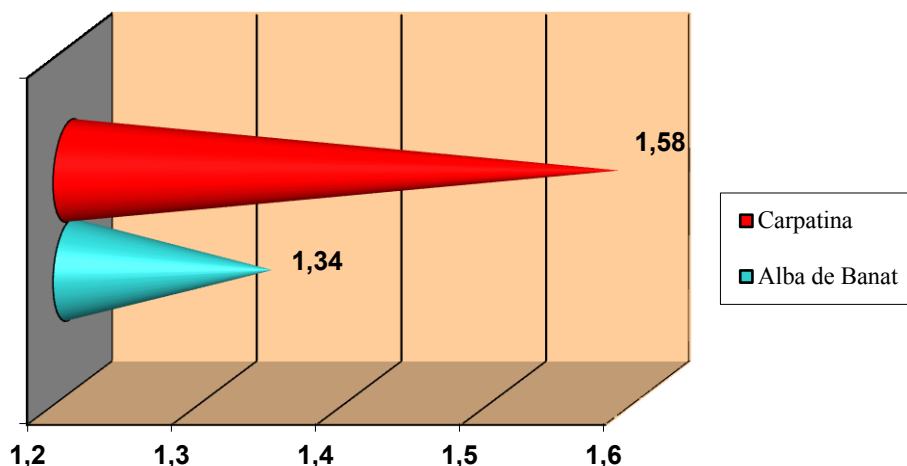
Source: *Own calculation*

Labour productivity

The productivity is the efficiency that the production factors are combined and used with in the production process, being a qualitative indicator of economic performance, whose evolution reflects, in a summary form, the technologies and organization of production improvement, labor qualifying and training (http://socio-umane.ct-asachi.ro/e107_files/downloads/Economie/Producatorul...pdf).

In the Charts 11 and 12, there are illustrated the 2 indicators regarding labour productivity, in terms of physic and value. Physically, the productivity expressed of hour-men/kg of milk, is lower at Carpatina, in the sense that it consumes 14.3% more for the milk production, compared to Alba de Banat. The labour productivity in terms of value at Alba de Banat is superior compared to Carpatina by 17% (Chart12).

Chart 11. *Labour productivity in terms of physic units (hour-men/kg of milk)*
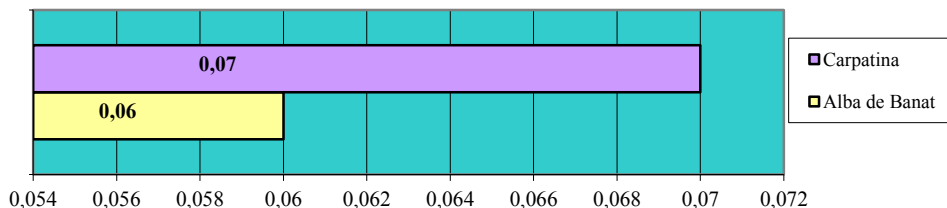
Source: *Own calculation*

Chart 12. *Labour productivity in terms of value (RON/hour-men)*
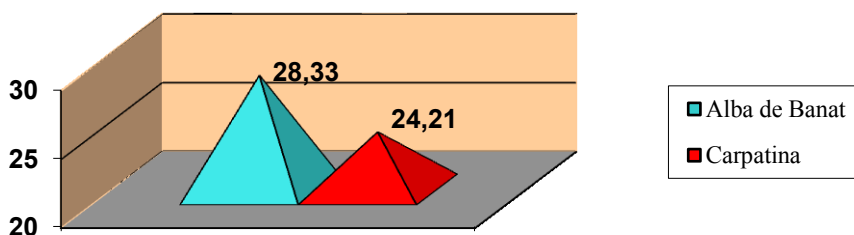
Source: *Own calculation*

Costs for 1000 RON of main production

The Chart 13 illustrates another indicator of efficiency – costs for 1000 RON of main production, of which results that the lowest costs were at Alba de Banat, by 30.2% lower than Carpatina, showing that the allocation of factors and costs are assigned more efficient in case of high levels of productions.

Chart 13. *Costs for 1000 RON of main production (RON)*
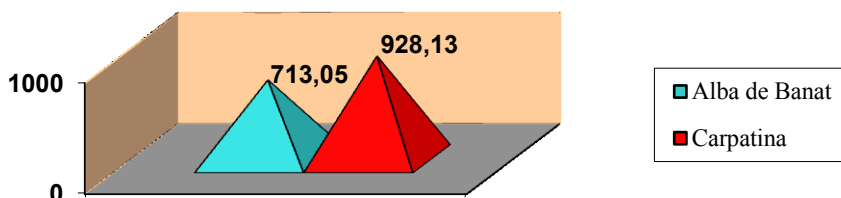
Source: *Own calculation*

Profit and the rate of return

The profitability analysis is not limited to investigating its absolute indicators, but also the relative indicators, obtained by rationing the results to the resources allocated for activity. In absolute size, the profitability is expressed through *profit* (as an indicator of its volume), and, as relative aspect, by *rate of return* (measures the degree to bring profit by using resources) (Vlad Mihaela Cristina, Toma Elena, 2007).

The calculations show that profit per kg of milk is higher at Alba de Banat (0.49 RON), compared to Carpatina, where is only 0.12 RON/kg of milk (Chart 14). As a result, the rate of net return is much superior at Alba de Banat (41.19%), compared to Carpatina (15.18%) (Chart 15).

Chart 14. *Profit per unit of product (RON/kg)*
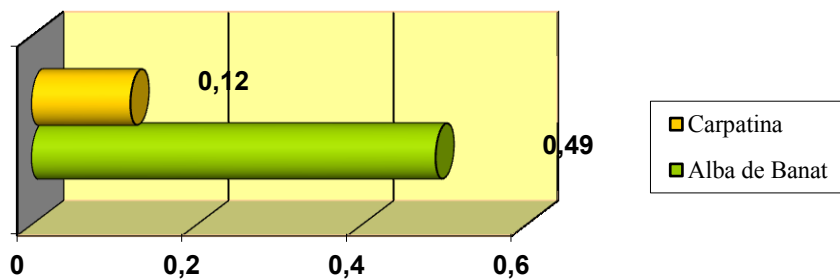
Source: *Own calculation*

Chart 15. *Rate of net return (%)*
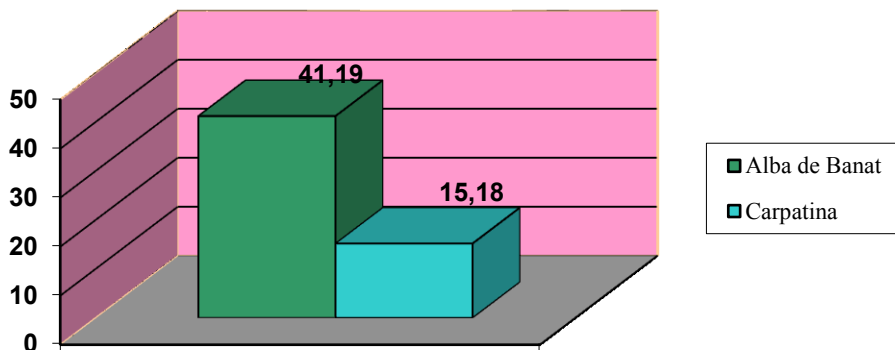
Source: *Own calculation*

It is important to mention that, without valuing the secondary production (kids, youth, reform), even if the farm receives subsidies, farm operation is not profitable, because the total costs per kg milk are higher than the income derived solely from delivering milk.

Breakeven point

The breakeven point (dead point, or critical point) represents the activity level of farm, at which there are no losses (incomes are equal to costs). So, overcoming this level (critical point), the farm activity becomes profitable (Vintilă Georgeta, 1999). In this study case, the breakeven point represents the quantity of milk sold, that covers all costs (fixed plus variable), the result of operation being zero (profit zero).

Calculations show that the value of the lowest breakeven point is at Alba de Banat (330.24 RON /head) compared to Carpatina (395.52 RON/ head), meaning that over these values of production sold per animal, the activity at this breed starts to produce profit. Under these values, the activity produces losses.

We observe that, at Carpatina, the efforts for sale should be more intensively compared to Alba de Banat, in order that incomes to cover costs (Chart 16).

Chart 16. *Breakeven point in terms of value (RON)*
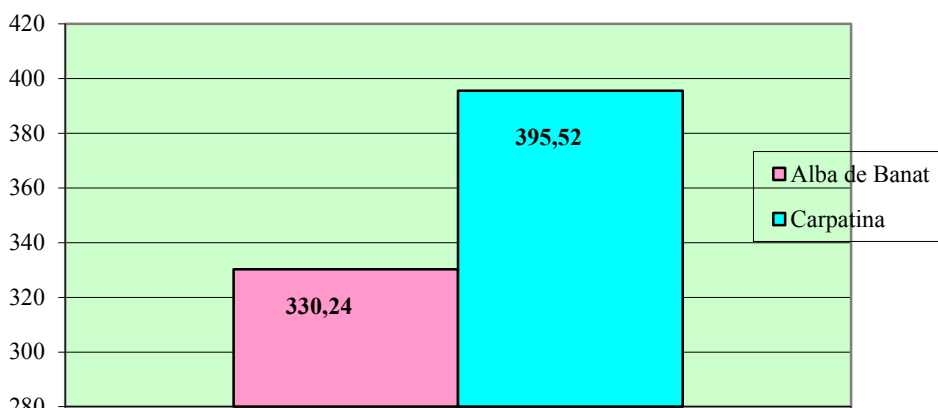
Source: *Own calculation*

In physical units, also, (kg), the same indicator has the lowest value at Alba de Banat (194.26 kg), representing the minimum quantity of milk sold, per animal, under that the farm has losses. By comparison, the value of the breakeven point at Carpatina is 233.32 kg (by 20.1% higher) (Chart 17).

Chart 17. *Breakeven point in terms of physic units (kg)*
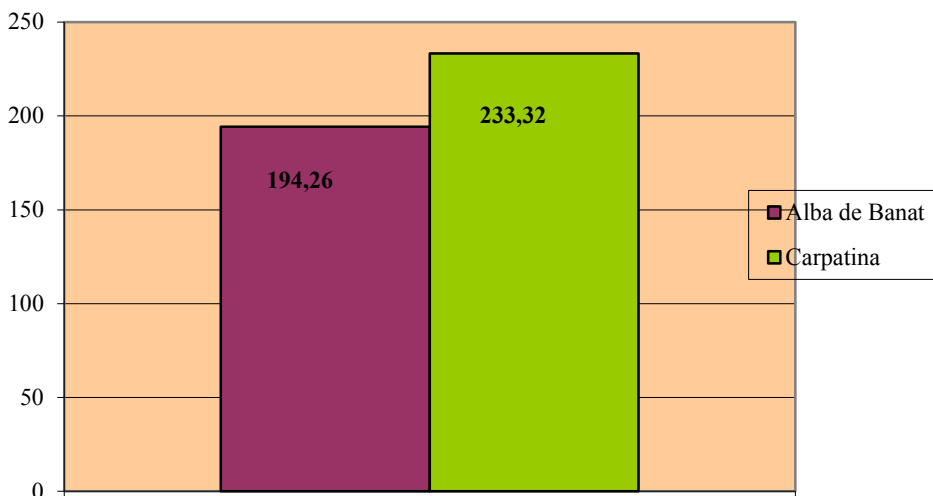
Source: *Own calculation*

Rate of the risk of operation

The risk of activity depends not only on general factors (sale price, cost, revenues) but also on the level of fixed costs, the same level of fixed costs being better covered by a higher level of incomes (given that the fixed costs must be paid even without sales) (Vintilă Georgeta, 1999). On the other hand, the breakeven level is lower, the operating risk is lower.

The rate of the risk of operation, as a ration between the breakeven point in terms of value and the main production value, illustrated in Chart 18, shows that, in this study, the highest risk is of Carpatina (99%), the value being 57% at Alba de Banat.

Chart 18. *Rate of the risk of operation (%)*
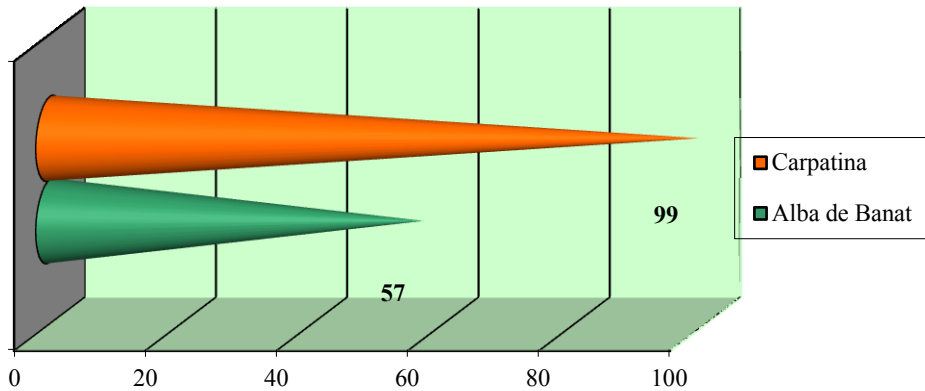
Source: *Own calculation*

Safety index

Opposite to the risk of operating, there is the safety margin of farm activity, expressed by the safety index (which depends on the main production value and of breakeven point). This indicator expresses the farm capacity to change production and to adapt to market requirements. The higher the value, the farm flexibility and economic risk are lower.

Calculations show that the highest safety index is of Alba de Banat (0.43), at Carpatina being very low, of only 0.01 (Chart 19).

Chart 19. *Safety index*
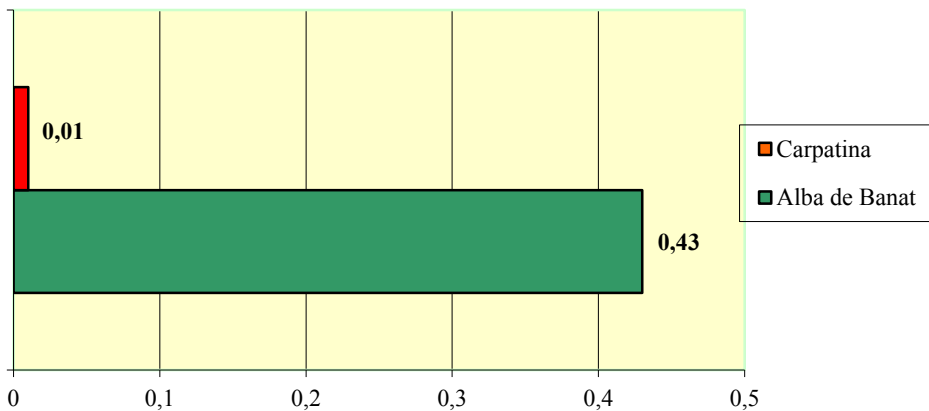
Source: *Own calculation*

Conclusions

The place of goat species in Romania is becoming more important, especially given that the consumption of goat milk is increasing considerably, both in the domestic and international market. The productive levels of goats' breeds are different, depending on their genetic potential, the degree of improvement and specialization, of production and reproduction technology applied etc. The goat breeds in other countries, specialized in milk production, produce between 600-800 kg and may even exceed 1000 kg per lactation.

The research results highlight that milk production levels of both native breeds show big differences, Alba de Banat being superior to Carpatina by 40.9%, confirming the higher degree of improvement of the animals from the first breed mentioned. However, the characteristics of rusticity, resistance to environment conditions of Carpatina do this breed to keep the attention of farmers, practicing improving breed-crosses with other breeds, more productive and resulting hybrids with superior abilities both in terms of milk production and the degree of resistance to environmental conditions.

The policy of promoting the goat milk is a useful tool to help farmers in their efforts to conquer new markets, to gain market share and increase exports, things that, on medium and long term, will help to restore the balance on market. In an increasingly competitive market, the EU programs for rural development can help the producers to reach at the agricultural standards and quality agreed by EU, starting from the specific conditions and coordinates.

Beyond the figures reflecting the low levels of production at indigenous breeds, it can hide the danger of abandoning them for purely economic reasons. They can however be used to create new breeds for dairy and meat, bearing resistance genes, adapted to our climate, as is the case of Carpatina. In this direction, the Ministry of Agriculture and Rural Development has adopted the program of financial support in the form of minimis aid for conservation of indigenous breeds of animals, which includes those two native breeds of goats - Alba de Banat and Carpatina.

Regarding the economic results, in the conditions of reduced milk productions, the costs per unit of output increase and profitability declines, resulting in the necessity to increase the production level,

specially at Carpatina, through the measures to be taken by implementing the levers at the disposal of technological engineers: breed selection, intensive breeding, proper feeding, ensuring technological factors and microclimate.

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THE POSSIBILITY AND MODERN ACHIEVEMENTS IN UTILIZATION AND USE OF WHEY[1]

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Abstract

Dairy industry keeps developing some new, enriched dairy products, which have proved themselves as very good. The dairy products, as we know from ancient times, have started to develop into a new generation of dairy products with different characteristics and better nutritive and health value. The whey beverages also belong to this group – a by-product which had been thrown away for a long time as waste or has been used as a fodder. Thus, down to the present day, there has been developed a whole range of whey beverages, whether they were produced by native sweet or acid whey, by deproteinized whey, of fresh whey diluted with water, fermented whey, or the powdered beverages with addition of different flavours. There are also alcoholic beverages, as the whey beer or wine, as well as the beverages of low alcohol (less than 1.5%). This paper tries to point out to some possibilities and modern achievements in exploitation and use of whey.

Key words: *composition of whey, alcoholic and non-alcoholic beverages, functional additives*

Introduction

One of the most important problems of a modern mankind is the lack of food problem. The problem appeared due to a large increase in population and insufficient food production in the countries with the largest increase in population. In this respect, besides the production increase, there is also

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put a question of more rational exploitation of food ingredients, which has already produced for the needs of man. If we observe the production and processing of milk from that point of view, whey is surely one of the most present by-products, with which most of milk nutrients are practically lost.

According to the average composition, whey contains around 93% of water, over 50% of dry matter turns into water, which depends on the basic composition of milk, as well as on the technological processes of cheese production, i.e. casein in which whey is produced. The composition of whey inputs are lactose as the most, less than 1% are the whey proteins, and in smaller quantities are present minerals and vitamins liquefiable in water and fat.

The possibilities of using whey in food industry are great, which is why have made efforts for a long time that whey uses regularly in human nutrition, not only as a fodder. The basic division of whey depends on a way of the casein coagulation, so it is divided on whey made by an acid activity (acid whey) and whey made by enzymes activity (sweet whey) (Tratnik, 1998). The acid whey is tastier and more stable, it contains less lactose and milk fat. There is also technical whey, which gets by precipitation of milk protein with different agents in regard to the ones which use in production of acid and sweet whey.

In food industry whey can be used in different ways, although it most often processes into the powder whey or there produce concentrates and isolates of some components as proteins and lactose. By dehydration of fresh whey, there gets the powder whey, which can be sweet (pH 5.6), acid (pH 5.1), demineralized powder whey and the powder whey without lactose. They often use as additives in food industry, while demineralised whey and lactose free whey often use in production of food for children.

The most valuable component of whey is the whey protein, which significantly differs, by its characteristics and activity, from the basic milk protein – casein. In fresh milk is around 80% of casein and approximately 20% of the whey protein which have different features. The most important components of the whey protein are beta-lacto globulin, alpha-lacto albumin, immunoglobulin, enzymes, free amino acids, lactoferrin, blood serum albumin and glycomacropeptides.

Considering that the whey proteins have the exquisite functional features (solubility, viscosity, emulsifying and gelling ability, water absorption), it provide them to fit into numerous dairy products, and primarily for the purpose of a biological value increase (Tratnik, 1998). The whey proteins stimulate the growth of some lactic acid bacteria, which is especially important in application of probiotic cultures, which adapt themselves and grow slower in milk, especially the bacteria *Bifidobacterium bifidum* (Krsev, 1989). They use as substitution for milk fat, too, which represents a big advantage for production of light milk and cheese spreads, fermented beverages and various desserts (Tratnik and Bozanic, 1996 b). Therefore, whey is mostly used for the production of the whey protein concentrate (WPC) and lactose which has the largest share in it.

For the purpose of obtaining the whey protein concentrate of wanted composition and depending on further use, today apply mostly a combination of different membrane processes as: ultra-filtration (UF), diafiltration (DF), micro-filtration (MF), reverse osmosis (RO), and often demineralization processes are included: ion exchange (IE) or electro-dialysis (ED) (Tratnik, 1998).

The application of micro-filtration (MF) in whey and milk processing has the specific significance for the micro-biological quality and durability of functional dairy products, especially in production of food for children (Borovic, 1993). Modernizing the membrane equipment and other processes of separation provides new and better opportunities for whey exploitation.

The largest part of the whey dry matter is lactose (approximately 70%), as very important source of the whey energy value, with multiple functions. Some of the beneficial effects of lactose are: stimulation of intestinal peristalsis, facilitation of calcium and phosphorus absorption, setting up a slightly acid reaction in the intestine, by which prevents the growth and multiplication of harmful bacteria.

It provides an optimal level of magnesium, and thereby enhances degradation of milk fat and other nutritive ingredients in the human organism. Technical processing of whey causes transformation of the specific lactose percentage into lactulose, which is considered as a promoter of the bifidobacteria growth (Tratnik, 2003).

Composition of whey

As we have already stated, whey is the main by-product of dairy industry. The biggest problem of dairy industry is that only 10-20% of milk uses for getting a specific product, while 80-90% of milk belongs to whey. About 6% of the total annual produced whey gets directly as a by-product during the casein production from skimmed milk, while a much greater amount of whey (94%) gets in the form of cheese whey, which is left after the production of various types of cheeses.

That is the reason why the whey problem mainly brings down to invention of such types and shapes of whey, which technology is simple and economically justified for our industry. One of the most economical ways of whey processing is the production of beverages, by which, within just one process all whey potentials as a raw material are used.

The composition and main features of whey depend on milk quality and production technology. According to the average composition, whey can consist around 93% of water, and around 50% of milk dry matter (solid) turns to water, and it can vary from 6% to 7%. Lactose makes the largest component of the whey, while approximately 1% is the whey proteins. In smaller quantities are present also minerals and fats.

The biggest differences are concerning the amounts of calcium, phosphate, lactic acid and lactate, which are more present in acid than in sweet whey (Table 1). The sweet whey, except the whey protein, contains also glycomacropeptide (GMP), which originates by enzymatic hydrolysis of *k*-casein.

Table 1. *Typical composition (g/L) of sweet and acid whey*

Component	Sweet whey	Acid whey
Total solids	63,0-70,0	63,0-70,0
Lactose	46,0-52,0	44,0-46,0
Proteins	6,0-10,0	6,0-8,0
Calcium	0,4-0,6	1,2-1,6
Phosphates	1,0-3,0	2,0-4,5
Lactates	2,0	6,4
Chlorides	1,1	1,1

Source: *P. Jelen, Whey Processing, in: H. Rginski, J.F. Fuquau, P.F. Fox (Eds.),Encyclopedia of Dairy Sciences, Vol.4 Academic Press-An Imprint of Elsevier, Boston, London, 2003, pp. 2740.*

As for   the share of protein, it is slightly lower in whey got in the production of cheese from ultra-filtered milk. Anyhow, the share of protein in acid and sweet whey is almost equal and they exactly are the ingredients which put whey in the limelight concerning the dairy products market (Tratnik, 1998).

Different thermo-sensitive fractions as β-lactoglobulin, α-lactalbumin, blood serum albumin, immunoglobulin and thermostable fraction of proteases-peptone go to the whey proteins. Of the total share of protein in whey, beta-lacto globulin makes a half of it.

Next in line concerning the share is α-lactalbumin with 22%, then immunoglobulin, proteases-peptone, blood serum albumin and in smaller quantities are present lactoferrin, lactaline, glycoprotein and transferrin. In 1986, Kinsella had described in his research the milk proteins with special reference to their physical-chemical and functional features. In the table 2 was shown the total share of the proteins in whey.

Table 2. *Amount of proteins in whey*

Whey proteins	% of total
β-laktoglobulin	50
α-laktalbumin	22
Imunoglobulins	12
Protease peptons	10
Blood serum albumin	5
Others	1

Source: *Kinsella, J.E.(1986.): Milk proteins: physicochemical and functional properties. Critical Reviews in Food Science and Nutrition, 21, 197-262.*

Thanks to a high share of essential amino acids, first of all lysine, cysteine and methionine, the whey proteins belong to the most valuable proteins in nutritive sense, and they have much bigger biological value in comparison to casein, as well as other proteins of animal origin. Utilization of the whey protein in organism is closely connected to the relation cysteine/methionine, which is in the whey protein almost ten times higher than in casein.

It is necessary to mention also free amino acids, which share in whey can differ and it depends mostly from the level of casein hydrolysis in the production of various types of cheeses (acid or sweet). Owing to that fact,

the share of free amino acids in sweet whey is approximately four times higher, while in acid whey even up to ten times higher than in milk, which is shown in the table 3 (Tratnik,1998).

Table 3. *Content of aminoacids (mg/l) in whey*

Whey	Free aminoacids		Aminoacids in proteins	
	Total	Essential	Total	Essential
Sweet whey	132,7	51,0	6,490	3,326
Acid whey	450,0	356,0	5,590	2,849

Source: *Tratnik, LJ. (1998): Mlijeko-tehnologija, biokemija I mikrobiologija, Hrvatska Udruga, Zagreb*

Daily needs for most of the essential amino acids can be satisfied by consuming about 1.5 l of whey or 0.5 l of milk (Popovic-Vranjes and Vujicic, 1997).

There should also mention that the whey proteins have excellent functional features, as: good solubility, ability of gelling and emulsification, and that is why their concentrates often use in food industry. Immunoglobulins and other glycoproteins as lactoferrin and transferrin, enzymes lysozyme and lactoperoxidase, as very significant components of the whey immuno active composition are necessary to mention, too. They have antimicrobial characteristics, and they can reduce or inhibit allergic reactions (Tratnik, 2003).

Lactose makes the largest part of the whey dry matter -solid (around 70%) and it is very important source of the whey energy value, and has a multiple function. Lactose has the beneficial effect on stimulation of the intestine peristalsis, makes easier the absorption of calcium and phosphorus, as well as setting up slightly acid reaction in the intestine, by which prevents the growth and reproduction of harmful bacteria. Likewise lactose provides an optimal relation of magnesium, by which influences to degradation of milk fat and other nutrients in human body. During the thermal treatment of whey comes to transformation of certain percentage of lactose into lactulose, which is among the promoters of bifidobacteria growth.

Vitamins soluble in water transfuse from milk to whey, but their share is very changeable depending on the method of the whey storing. The whey in its composition can have larger amounts of vitamin B2 (riboflavin), as

well as cobalamin and folic acid from milk, which pass in whey during the production of cheese.

In the dry matter (solids) of whey, the composition of minerals is very changeable and it ranges from 7% to 12%., which depends on the technological procedure of cheese production (Popovic-Vranjes, Vujicic, 1997). From milk to whey pass also all dissolved salts and micro-elements, but also salts added during the cheese production. Related to it, the share of calcium and phosphorus is much higher in acid whey, considering that at the higher acidity of environment, the solubility of these minerals is also higher.

Production

Over 100 million tons annually amounts the world production of whey, and approximately 50% of this amount is produced in the European Union (EU). Approximately 6% of the total annually produced amount of whey gets directly as a by-product during the production of casein from skimmed milk, while around 94% gets in the form of cheese whey which is left after the production of various types of cheeses.

The amount of whey got by cheese production is almost equal to the amount of milk which is necessary for its production. Which means that, during the production of 1 kg of cheese is made in average 9 kg, i.e. 8-12 l of whey depending on the type of cheese which is produced. According to the data on cheese production projected until the year 2019, the scientists consider that the world production of whey until the end of 2019 will record a permanent growth of around 2% per a year.

The situation in the Serbian market at the moment is such that the production and export of whey are negligible (minimal). Annually from Serbia exports whey in the amount of a tens of thousands of US dollars, while import is higher and it ranges from 1.9 to 4.7 million US dollars.

Mostly imports from Croatia, Belgium, the Netherlands and Hungary.
On other continents also trades with whey. The most important exporters are Germany, France, USA, New Zealand and the Netherlands, and the most important importers are the Netherlands, China and USA (Obućina B., Bardić D., Dulić Marković, Bernardoni P. , 2010.).

The world processing of whey is mainly based on its utilization in production of the products which do not require the expensive technological processes. In consideration to the permanent production growth and the fact that whey has been recognized as a raw material with great potential, there is more and more researches directed to its maximum utilization.

The structure of milk production in Serbia is such that almost 90% of the products produced every year belong to the group of fermented products and liquid milk (Jelinić,J., Đurović, S., 2009.*)*. In regard to the fermented products, the amount of the whey products is negligible, which leads to the conclusion that, by the whey fermentation, could get the products, which would take more significant place in the range of dairy products meant for general consumption. Considering that the current absence of plants for whey processing, encouraging the processing of whey in Serbia would save a lot of money, which currently uses for import of whey. Regarding the perspective of utilization of whey as the raw material and according to the existing condition of equipment in Serbia, the basic goal should be encouraging the whey exploitation in food industry.

In most of industrially developed countries in Europe and United States of America, whey has found a significant place in food industry, so in those countries' market can find a wide range of the whey products or in which it has been significantly represented. In our country also make efforts in using this important by-product of dairy industry in order to reduce losses of the whey nutrients. Whey has found wide application in food industry, in bread and rolls industry, confectionery products industry, in meat industry and the production of various creams, soups, sauces and toppings in which it is mostly used as the concentrated whey or the powder whey. Its application in dairy industry is very significant.

Dried whey is a good substitute for skimmed milk powder in the production of ice-creams, and various desserts and beverages are made of whey. It adds to whipped cream in order to get stable foam, and it uses in the production of yoghurt and other fermented beverages for enrichment and increase of biological value of the products. Some types of cheeses are produced of the whey albumens, as the albumin cheese – curd, hard cheese – manur, etc. Due to a great content of lactose and biologically valuable proteins, there makes also a wide range of food for children and various kinds of dietary products based on whey.

Whey is very important for the pharmaceutical industry, too – through the lactose which uses for the production of tablets, usually as an inert carrier for the medicinal substances.

Bakovic and Tratnik (1979a; 1980) have shown numerous possibilities of using whey and its products in many branches of food industry, by pasteurization, thickening and fermentation. Today the tendency of lactic-acid fermented beverages production is especially represented in food industry, for example fruit- or vegetable-based juices, milk and whey beverages, which are extremely healthy so called "functional' food products.

Processing whey into beverages

The production of the liquid whey beverages makes certain difficulties. First of all, a large share of water in the content of liquid whey makes it a very suitable environment for the growth and the reproduction of microorganisms, due to which it is necessary to apply the heat treatment. On the other hand, the whey proteins are thermo-labile and they start to denature at the temperature of $60\ ^0$ C, so at the usual heat treatment (72^oC/15-20s), a part of the existing proteins are deposited, which substantially complicates the process of its heat treatment. That is why the heat treatment at high temperatures replaces with the membrane processes, e.g. micro-filtration, application of ultra-sound or some other procedures. Solubility of the whey proteins can increase by using the ultra-sound (Rezek-Jambrak and associates, 2008), by which decreases a sediment, which is formed during the beverage storing. Besides, by acidification of whey to pH<3.9, the whey proteins become thermostable, and thus their coagulation can be prevented, even when using the UHT sterilization (Jelen, 2003).

The next problem in the production of whey-based beverages is relatively high share of minerals in the whey solids, because they exactly are responsible for undesirable salty taste of whey. The problem is particularly pronounced in acid whey, in which the amount of dissolved minerals is greater due to an increased share of lactic acid, which results in the production of the whey-based beverages with lumping and increased acidity of an end product. In order to avoid these problems, there enriches whey with various additives of fruit concentrates, which would neutralize the unfavourable sensory features of the whey-based beverages, especially of tastes (Koffi and associates 2005).

Whey non-alcoholic beverages

Processing whey into beverages has started in seventies, and up to date has developed a whole range of the whey beverages. Non-alcoholic whey beverages mean a diversified group of products derived exclusively by mixing the native sweet, rarely acid whey with various additives, as the ones from tropical fruits (but also other fruits, as for example apples, pears, berries), cereals and their products (the most often bran), protein isolates of vegetable origin, CO_2, chocolate, cocoa powder, vanilla and other aromatized additives. Special attention in this group was paid to development of the fermented beverages production using robotic strains, and it is the most important to choose an adequate bacterial cultures in order to get a highly-valuable functional product of acceptable sensory features. Dietary beverages, the beverages with hydrolyzed lactose, the beverages similar to milk and the powder beverages also belong to the group of the non-alcoholic whey beverages.

Numerous patents have been registered in the last twenty years and they contain the recipes of various beverages of whey, with addition of a certain quantity of fruit concentrates, whereby the share of dry matter (solids) of the fruit component varied from 5% to 12%. Aromas that are usually suggested as the best, which manage the best to mask the undesirable smell of whey after cooking, as well as the sour-salty taste as: citruses and tropical fruits additives, like mango, banana or papaya. There were also tested the additives of various other fruits, such as apples, pears, peaches, apricots and sour cherries. As the most successful has shown an additive of berries concentrate, owing to the significant presence of iron and antioxidants as very important in the production of the nutritionally enriched beverages of whey.

Some scientists have developed, except fruits, the recipes for the whey beverages with additives of chocolate, cocoa powder, vanilla, cereals, honey and other favourable aromatized components. The addition of cereals, i.e. their bran is very important procedure, because in that procedure gets the beverage enriched by dietary fibres, essential acids, as well as the hypoallergenic proteins, which are favourable for consumption in allergic people and children.

There have appeared recently the beverages with addition of CO_2, in combination with fruit additives, where refreshing taste masks undesirable smell and taste after cooking milk.

In order to obtain the products of desirable sensory characteristics, the production of the fermented beverages of whey has shown as the best option. In the range of beverages which produce based on whey as a raw material, a special place take the fermented beverages based on whey, which can be divided into two groups: functional and probiotic. Both groups have a beneficial effect on the host organism, but in two different ways.

The probiotic beverages are characterized by a direct action of live microorganisms (probiotics), while the functional beverages are characterized by an indirect action through metabolites, produced by the micro-organisms during the fermentation, and which are also called biogenes.

During the fermentation, the components of whey degrade into different functional substances, such as lactic acid, butyric acid, bioactive peptides, β-galactosidase and exopolysaccharides, which point out to a significant impact to the human organism (A. Y. Tamime, R. Božanić, I. Rogelj, 2003.).

Studies confirm that fermented products based on whey have the beneficial effects in the following cases: in case of lactose intolerance, infections of gastro-intestinal tract, viral diarrhoea, diarrhoea caused by antibiotics, as well as gastritis caused by the bacteria *Helicobacter pylori.* On the other hand, probiotics as an integral part of the fermented beverages affect favourably on human health by stimulating the growth and micro flora activities, which is naturally present in human gastro-intestinal tract. Besides these beneficial effects, the functional food and thereby also the beverages do not consider as a medicine, because they have an effect only on improvement of essential bio-chemical functions in the human body.

In the group of non-alcoholic whey beverages belong also the dietary beverages, the beverages with hydrolysed lactose, the beverages similar to milk and the powder beverages.

Thanks to its composition, whey is very suitable raw material for the production of dietary beverages in simple way, which includes the addition of some sweeteners, usually saccharin and cyclamate, then the addition of apple or tropic fruits fruit base, as well as the addition of some stabilizer. These beverages have a very low energy value, which ranges from 104 kJ/100 mL to 113 kJ/100 mL, therefore they are suitable for a wide group of consumers.

The liquid or the powder whey mixes with skimmed or rich milk, selected vegetable oils, hydrocolloids and emulsifying agents, during the production of beverages similar to milk. During the production of these types of beverages adds milk for the purpose of firmness and density improvement.

In this group of beverages, the most significant is "Way-Mil", very similar to cow's milk by its appearance; it has a specific taste and can mix with additives like chocolate and fruits. This beverage includes around 2-4% of fats, 1-1.5% of proteins, 4-5% of lactose, around 0.7% of minerals, as well as vitamins soluble in water (Popović-Vranješ, A., Vujičić, I., 1997.).

The powder beverages make a wide group of beverages, which must distinguish by good instant features, and they can be enriched with vitamins and minerals. These beverages should have a long best-before date and good solubility. Owing to easier transport and storing, they have an advantage in regard to the liquid whey beverages, which is very important for nutrition of population in difficult life conditions and are poor in proteins. In the production of these beverages, whey usually mixes with soy, powder fruits, concentrated fruit juices, and there adds the concentrates of whey proteins, too.

Alcoholic whey beverages

Whey is a very good raw material for the production of alcoholic beverages, considering that a major part of dry matter is lactose (around 70%). The alcoholic whey beverages can be divided into the beverages which contain small amount of alcohol (1.5%), such as a whey beer or a whey wine. The production of these alcoholic beverages of whey comprises whey deproteinization, concentration, fermentization of lactose or the addition of saccharose up to a desirable share of alcohol (0.5% – 1%), and then follows flavouring, sweetening and bottling. During the

production, a part of lactose turns to lactic acid, and it gives a refreshing sourish taste to the final beverage, and it ferments the rest to alcohol. From this group of beverages, some of the most famous are "Milone", which gets by fermentation of a kefir culture and the whey wine "Serwovit", produced in Poland.

The whey beer, which produces with or without malt, considers being a very nutritious beer enriched with minerals or as the beverages which contains starch hydrolyzates and vitamins. The only problem concerning the production is a fact that there is the presence of fat that might affect a loss of beer foam, a bad smell and a smell caused by poor solubility of the whey proteins, as well as the impossibility of lactose fermentation by beer yeast.

The whey wine has a small amount of alcohol 10% - 11%, it is flavoured by fruit aromas and is intended for younger population. Technological procedure of the whey wine production comprises clarification, deproteinization, hydrolysis of lactose with β-galactosidase, cooling, adding yeast and fermentation, aging, filtrating and bottling. In the preparation of this beverage, there was put a lot of effort, but the scientists still search for an ideal recipe and they meet many difficulties. Considering that whey is very worthy source of nutrients, they do not give up lightly from the invention of an optimal technological procedure of the production. (Popović-Vranješ, A., Vujičić, I., 1997.).

Thanks to lactoferrin, the whey beverages can use as the functional food for the purpose of iron absorption increase. However, they can also decrease iron necessary for the growth and reproduction of pathogens in the intestines and in that way they strengthen the immune system, which is extremely important in nutrition of small children. These beverages can improve the absorption of calcium, which is very important when it comes to older persons, who increasingly suffer from osteoporosis. With the addition of rye and oat bran in the beverages, as well as the isolates of soy and potato proteins, they are ideal for persons who suffer from allergies to milk proteins or persons suffering from celiac disease. Many clinical studies have proved that the whey beverages, especially fermented, act antihypertensive (lower blood pressure). They also use as a meal substitution for people with overweight, elder people and sportsmen. Market research point out to a fact that fermented/or fruit whey beverages are consumed by women who take care of a healthy and balanced diet,

then children, as well as the other consumers who use these products for breakfast or a healthy snack (Huth and associates, 2006).

These are just some of the possible ways of the whey beverages consumption, and depending on the production method and used additives they can use in much wider scope.

As far back as 460 B.C. the father of medicine Hippocrates had noticed the value of whey as a therapeutic beverage, so he had recommended the use of whey as a cure for the therapy in the treatment of various types of diseases, such as skin diseases, tuberculosis, jaundice and alimentary canal diseases. In developed European countries in 18th and 19th Century (Switzerland, Germany and Austria) had considered that whey had diuretic characteristics and that it can help while recovering after illness or hard physical work.

It seems that the time is coming when the modern man is just discovering its importance in the daily diet.

Conclusion

Every year the whey production is increasing and in modern dairy industry it is a growing problem, considering its exploitation and possibility of using the whey products. On the other hand, whey is a significant polluter of the environment when thrown, and also the destruction of whey is as expensive as the costs of its further processing. That is the reason why, nowadays, the whey problem brings down to discovering of such types and forms of the whey product, which might find as much as possible usability at a reasonable economy. By further research in this field, in close cooperation with the dairy industry, would provide the possibility of increasing utilization of whey through products interesting as from the standpoint of nutrition, as well as sale.

In the paper was introduced a wider possibility for utilization of whey, where a special emphasis was put on its attractiveness. One of the ways to include whey in daily diet of people, i.e. to activate its common processing in food industry, is the production of fermented functional beverages based on whey. With this was made another effort to preserve large quantities of whey for human nutrition, by producing the products with simple technology and economically justified for our industry.

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POT MARIGOLD – ONE OF THE MORE DEMANDED MEDICINAL PLANTS[1]

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Abstract

For several years, one of the more demanded medicinal plants in the Republic of Serbia has been pot marigold. It is an annual plant species whose blossom is utilized (Calendulae flos). Its use is manifold: can be used internally and externally. Most of its use takes place in pharmaceutical industry because of its extremely beneficial effect on the skin. It is also used in traditional medicine for the production of a large number of various phytopreparations. The benefit of introducing this plant species in production is the fact that it can be grown in our two regions of production: the lowlands (Vojvodina) and hilly and mountainous areas (Central Serbia). Hence, the aim of the study is to provide a review of some of the most significant historical, morphological, agrotechnical, technological, pharmacological and phytochemical features of pot marigold. The final section of the paper includes an overview of several recipes for the preparation of different phytopreparations which are still used in the Republic of Serbia.

Key words: *pot marigold, blossom, production, the use, recipes.*

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Introduction

The demand for pot marigold flower has been considerable in the long term, and the price of a kilogram of dried blossom in 2013 was in the range from 4.4 to 6.15 € (euros). Given that one hectare provide about 1.000 kilograms of dried blossoms of this plant, it can be concluded that it is particularly attractive for growing. The harvesting of pot marigold blossom, however, requires a lot of human labour, which, if seasonal workers are hired, can greatly increase the production cost. If it is a family business, the cultivation of medicinal plants is best to be started on smaller areas of 10 to 20 ares per plant species in order to avoid possible losses and increase incomes per unit produced (Filipović and Popović, 2014).

Pot marigold (*Calendula officinalis* L.) belongs to the aster family (*Asteraceae*). Commonly known by the names of: marigold, ruddles, common marigold, garden marigold, English marigold and Scottish marigold, it is an annual, less frequently biennial herbaceous plant. The official use of this plant implies dried pot marigold blossom (*Calendulae flos*). In the last few years, in the global and the national market, it has become a very sought-after raw material. In the past few years, the price of one kilogram of this dried blossom, compliant with quality standards, has been around 4 Euros. Nowadays, it is also grown as an ornamental plant, because its attractiveness and long flowering period sets it in many gardens, herb gardens, balconies and terraces.

The plant got the name "*calendula*" the Latin noun "*calendae*" (the first day in the month), and is associated with the fact that blossoms open with the sunrise and close with the sunset (Morgan, 1967). The therapeutic use of pot marigold was known to the inhabitants of ancient Egypt, where it spread from to the rest of Europe (Moghaddasi Mohammad & Kashani, 2012). Pot marigold was known in all ancient cultures as a medicinal plant for treating the diseases skin, digestive tract, of inflammatory and infectious diseases, as a remedy against jaundice, fever and some minor ailments, but also, as a plant with magical and spiritual properties, as well as a spice. As a spice, it is mostly used as an addition to salads, broths and meals (Savić & Popović, 2008). It was also used to provide colour to meals, fats and fabrics. In ancient Rome, it was believed that the pot marigold blooms on the grave of a Vestal Virgin (a priestess of goddess Vesta) who died of grief, unhappily in love with a Roman youth. Otherwise, pot marigold is popularly known as "the herald of the rain", i.e. as a barometer for the rain, because if the blossoms are closed in the morning, then it will surely rain during the day.

As an annual plant, pot marigold has a deep spindle-shaped root. Depending on the growing conditions, the stem height can range from 40 to 70 cm, is angular, with short internodes and a very branchy and hairy lower part. As a matter of fact, the whole plant is covered with tiny hairs, and the stem, the blossom and the leaves are aromatic and sticky to the touch (Jančić, 2004). The leaves are arranged alternately, they are oblong-lanceolate, light green, hairy and slightly serrulate or entire by their edge. The lower leaves are larger, spatulate in shape and petiolate, whereas the upper ones are sessile and oblong to lanceolate in shape. The blossoms are yellow-orange or yellow-reddish, though there are also the forms with white, yellow and red blossoms. The flowers are arranged in single large blossom heads on long blossom stems, which are set at the ends of plant stems, with a diameter of 4–7 cm (Schönfelder I. & Schönfelder P., 2004; Blaschek et al., 2010). Blossom heads consist of blossoms with ray petals with three teeth, with the marginal parts of a yellow-orange colour, and with cylindrical central florets. Tongue-shaped blossoms are arranged in 2–3 rows. Pot marigold can bloom from May to November. Its fruit is a prickly achene, brown in colour. The fruits are bent towards the center of the flower head. The weight of 1000 seeds amounts to 5–10 g. The seed is germinant for 5–6 years.

Growing conditions

Pot marigold originates from the Mediterranean region and the western parts of Asia. It grows in different climatic conditions. Areas with a moderately humid and warm climate are the most favorable for its growth. Pot marigold is a heat-loving plant, which favourises sunny locations. It is grown in crop rotations. In our conditions, as the hot and dry summer period sets off, this plant starts flourishing and making seeds rapidly. It is tolerant to drought, but with lower yields and quality of raw materials. It is not too demanding when it comes to air temperature. Worldwide, different varieties of pot marigold are selected, which are accommodated to specific agro-ecological conditions of cultivation (Novak et al., 1999). The customary time for sowing in our agro-ecological conditions is the last decade of March and the first decade of April, when the soil temperature in the seeding layer ranges from 4 to 6 °C. To make the yield and blossom corpulence satisfactory, it takes medium light, fertile soil with plenty of moisture for the growing. It grows in poorer-quality soils just as well, but in order to achieve higher yields and better quality, it takes a soil with a medium concentration of nutrients. This plant has a long vegetation period, which takes place until the first autumn frosts. In average conditions, its seed emerges in 4–5 days. These plants develop

rapidly, and in 40–50 days, they begin blooming. It is grown for its rich blossoms, mostly in Russia, the Czech Republic, Slovakia, Austria, Switzerland and Estonia. In our country, it is increasingly being grown, mainly in Vojvodina. It grows wild in the gardens, on abandoned soil plots and roadsides.

Technology of the cultivated plant production

As an annual plant species, pot marigold has to be grown in a crop rotation. The most suitable pre-crops for pot marigold are annual legumes, then fertilised row crops and small grains. With its active substances, pot marigold successfully reduces the number of harmful nematodes, which are a problem in the cultivation of certain plant species (sugar beet, carrot, tobacco, etc.). On the other hand, due to frequent harvesting, harvesters frequently pull out weeds they come across, thus reducing their numbers, which is important for the growing the crops to follow, where the herbicide use is reduced to a minimum, and with some other crops, even completely omitted.

The primary treatment is carried out in the autumn to the full depth. Immediately after the ploughing, it is necessary to "close" the soil with some light tools, and let it overwinter as such. If the soil is ploughed in the autumn, and overwintered in closed furrows, then the pre-sowing preparation is most commonly done in one pass (with a seedbed conditioner), immediately before the sowing. Fertilizers are applied in the quantities which, in turn, depend on soil fertility. Manure is avoided because its intake reduces blooming. In practice, in the selection of mineral fertilizers, the most commonly used ones are those in which there is a higher content of phosphorus. Phosphorus is especially important for increased production of inflorescence. The amount of active matter which is most frequently applied in practice prior to the autumn treatment varies in the range of: 40–60 kg/ha N, 80–100 kg/ha of P_2O_5 and K_2O. In recent years, various kinds of mineral fertilisers are increasingly used, of which a substantial part is allowed in organic production, as well as growth stimulators, which have a positive impact on the yield of pot marigold and the quality of pot marigold blossom (Hassan et al., 1991; Kandeel, 2004; Azzaz et al., 2007; Shokrani et al., 2012).

The largest areas in Serbia are under the variety *Domaći oranž* (*Domestic orange*), which is well adapted to our climatic and agro-ecological conditions. The cultivation of this variety can provide 400–700 kg/ha of dry coronal petals, that is, 1.000–2.000 kg/ha of dry blossoms. Locally, the

following are also grown: *Orange King*, *Gelb Orange*, *Plamen*, *Plamen Plus*, *Prince Golden* and others.

Pot marigold is produced by direct seed-sowing. Pot marigold is sown directly with machines (wheat or vegetable precision seed drills) in late March and early April. The row spacing is 50 cm, the sowing depth is 2–3 cm, and the amount of seeds for sowing is usually 6–8 kg/ha. For a faster and better "start", the sown areas should be rolled after sowing. If the conditions are favourable, the seeds germinate and emerge in about 20 days. After the emergence, at the stage of 3–5 leaves formed, the plants growing too dense undergo thinning of 5–8 cm spacing between plants in the row. Thinning provides an average of 15–20 plants per a length 1 meter.

The care the pot marigold variety is similar to the care of other annual crops and consists of inter-row cultivation, hoeing, nutrition and irrigation. In the vegetation period, 1–2 treatments of inter-row cultivation or hoeing are necessary in order to avoid crust formation and weed growth.

In this country, not a single herbicide has been registered that can be applied in pot marigold crops. In the recent period, in the practice and research of weed control, three groups of herbicides have been used, divided by time and the mode of application. The first group of herbicides is applied prior to sowing with the integration of products into the soil, and this group includes the following herbicides: Treflan (1.5–2.0 l/ha), Flexidor (0.40–0.75 l/ha), Chlorthal dimethyl 750 WG (8–12 kg/ha), Ramrod (2 l/ha) and others. On this occasion, broad-leaved and narrow-leaved weeds are suppressed in their phase of germination and emergence. The second group is applied after sowing and before emergence, and in it includes: Stomp 330E (1.5 l/ha), Butisan 400 SC (2.0–2.5 l/ha), Kalif 480 SC (0.15–0.2 l/ha) and others. During the vegetation period, i.e. after the emergence, the following can be used: Betanal AM 11 NEW (twice: 1.5 l/ha + 1.5 l/ha), Kerb 50 W (3–4 l/ha), Asulox (5.0–10.0 l/ha) Poast Ultra (0.30–0.45 l / ha) and others (Forcella et al., 2012). In the suppression of narrow-leaved weeds until the moment of their blooming and earring, these ones can be used: Fusillade super, Furore super, Select super, Gallant super, Kletox and others.

Crop protection with fungicides is applied only with the onset of certain diseases and pests. Occasionally, in wet years, Alternaria black molds appears (*Alternaria calendulae*) Fusarium wilt of carnation (*Fusarium oxysporum f. sp. dianthi*) and powdery mildew (*Podosphaera xanthii*, earlier known as *Erysiphe cichoracearum*). Successful suppression of these

pathogens can only be brought about by the use the fungicides appropriate for that particular purpose. In extremely wet years, the damage caused by powdery mildew can reach up to 60–80%. Plants infected with powdery mildew in the second half of August usually have small blossoms, they turn dark and wither. For its suppression, there are no registered fungicides in this country. Therefore, we must use the experience of the European Union member countries and other countries where there are registered preparations. Still, most commonly in practice, pot marigold crops are treated against mildew even in this county's market, but with most preparations registered for the use with other plant species. Those are: Chorus 75 WG (200 g/ha), Kumulus DF, Kolosul (3.0–5.0 kg/ha), Sumpor SC-80 (3.0–5.0 l/ha), Armicarb "O" (2.5–5.0 kg/ha), Armada 50 WDG (0.5–1.0 l/ha), Cosavet DF (2.5–5.0 kg/ha), Tilt 250 EC (0.5 l/ha), Thiovit Jet 80WG (5.0–7.0 kg/ha), Karathane Gold 350 EC (0.4–0.6 l/ha), Stroby DF (2 g/10 l of water), Topas 100 EC (0.25 l/ha), Eclair 49 WG (0.5 kg/ha), Nimrod 25 EC (1.0–2.0 l/ha), Sekuenca (0.13 l/ha), Punch 40 EC (40–50 ml/ha), Quadris MAX (2.0 l/ha), Score 250 EC (0.2 l/ha), Folicur EM 50 WP (0.35 l/ha), Rubigan (0.1–0.2 l/ha), Zato (150 g/ha) and the like. In the years with a greater amount of water sediment, more treatments are carried out, as follows: Treatment 1, prior to the emergence of blossom buds, Treatment 2, prior to the opening of blossom buds, Treatment 3, after an instance of picking, and Treatment 4 (if necessary, depending on weather conditions). In years with a moderate amount of precipitation, one preventive treatment is sufficient. In dry years, the caterpillars of cotton bollworm and small (cabbage) white occur, which are possible to suppress with insecticides that act both against laid eggs and against hatched larvae. These insects can cause considerable damage in July and August. Just hatched caterpillars drill their way into the blossom calyces. It is a direct damage to the blossom. The treatment is with insecticides as soon as the first egg occurs. Some of the insecticides that can be used are: Avaunt 15 SC (0.2-0.25 l/ha), Thiodan E 35 (1.2-1.8 l/ha), Fastac 10 EC (0.10–0.12 l/ha), Calypso 480 SC (0.1 l/ha), Karate Zeon CS (0.15 l/ha), Decis 2.5 EC (0.2–0.3 l/ha), Talstar EC 10 (0.1–0.15 l/ha) or Coragen 20 SC (0.1–0.2 l/ha). The insecticide Affirm SG 095 can be used too, which is on the basis of emamectin benzoate. One of the integral measures of the suppression is the planting of cabbage next to pot marigold, which reduces caterpillar attacks. Another from this set of measures is the application of the products for spraying the leaves of tomatoes, primarily against small (cabbage) white, but acts against caterpillars as well. If these measures do not stop them completely, it is necessary to use an insecticide with lower toxicity and withholding period.

If the need arises for supplemental feeding, it is done when the plants develop 4–5 permanent leaves, in order to accelerate plant development. For that purpose, it is best to use KAN (27% N) or AN (34% N) in the amounts of 100–200 kg/ha. The first supplementary feeding takes place with the first inter-row cultivation, and the second one as needed. Irrigation is most commonly applied in cases of prolonged drought, and is usually done in July and August (Filipovic & Kljajic, 2015).

Pot marigold blossom is collected only in dry and fine weather. The harvest is done during the daytime, most commonly from 10 a.m. till 5 p.m., that is, in the period when dew is gone. There is noose in picking it early in the morning, because the blossoms have not opened yet, and after 17 p.m., they are closing. The hand-picking of blossoms can usually begin in late May. Only open blossoms are picked, which contain the most of medicinal matter. If weather conditions are favourable, the harvesting is performed daily. At the beginning and at the end of the harvesting period, the harvesting takes place successively, every second or third day, and sometimes even less frequently. The blossoms are picked together with calyx leaves, and coronal leaves are uprooted subsequently. Only the blossom heads are collected, without stems, and then the green part – the calyx – is torn off, and what remains is the corona only. If the occurrence of powdery mildew is strong in intensity, in late July or early August, when the lower leaves start to turn yellow, the plants are mown to 10–15 cm above the ground, and carried away from the field, and then, the soil is supplementary fed with 30–40 kg/ha N. In about three weeks, the plants will be blooming again, and the blossoms will be possible to collect until the frost period. The harvested blossoms will preserve the colour and the quality only if they are immediately dried after picking. The collecting is done in sunny weather, when the healing properties of this plant are the most prominent.

Smaller quantities are dried spread in a thin layer in a drafty and shady place, and larger amounts are dried in a drier at 35–40 °C. During the natural drying, the blossoms should be properly allocated, and should by no means be placed over one another, so as to prevent their weight "burnout". Dried blossoms are supposed to be orange in colour, and to be without stalks. Completely dry blossoms are placed in paper bags, and stored in a dry and drafty place on wooden shelves or on pallets. From about 6–7 kg of raw blossoms, 1 kg of dry blossoms are obtained. The yield per hectare is 800–1.000 kg of petals or about 1.500–2.000 kg of dried blossom heads.

The coming section includes the Table 1, which shows the approximate cost estimation of the conventional pot marigold production designed for an area of one hectare.

Table 1. *Approximate cost estimation of the production of pot marigold blossom on one hectare area*

Costs	(€)
Mineral fertilizers	258
Plant protection products	74
Seeds	240
Ploughing to 30 cm	83
Mineral fertilisation 3x	40
Sowing preparation	20
Sowing wide-row crops	24
Irrigation	80
Inter-row cultivation 2x	32
Crop treatment with plant protection products 3x	68
Seasonal workforce	1.440
Costs of drying	120
Total costs (T)	**2479**
Income	
Blossom yield (1.000 kg) x price (4.7 €) (P)	**4.700**
Total income	
Profit (P – T)	**2.221**

Source: *Jevđović et al., 2011*

As can be seen from the Table 1, the highest share in the costs of pot marigold blossom production represents the share of seasonal workers. By the reduction of its participation, higher profits are achieved. Most often, in practice, it is the case that the producer of pot marigold blossom hires family members, relatives and friends in carrying out the harvesting. On the other hand, on the occasion of mechanized blossom picking, it comes to the reduction of the number of buds, which reduces the yield to some extent, and also requires subsequent finishing in order to separate the green mass (stems and leaves), and to reduce the length of blossom stalks to the acceptable length of 2 cm (Veselinov et al., 2014).

In comparison with conventional production, the organic one excludes the use of synthetic products, and protection carried out through preventive measures mainly, whereas, during the vegetation period, those measures are mechanical, less commonly biochemical, which involve the use of a biopesticide. For primary mineral nutrition, organic fertilisers such as manure and compost are mainly in use, and one of the plants that can be composted is pot marigold itself. The total aboveground biomass (excluding the picked blossoms) is a waste product of pot marigold that can be composted, and, depending on the weather, it averages about 6 t ha-1, which accounts for about 55% of the total mass that occurs in the production of pot marigold (Filipović & Ugrenović, 2013).

Chemical composition and the use

According to its chemical composition, the blossom of pot marigold (*Calendulae flos*) contains: 2–4% saponosides (calenduloside), min. 0.4% of flavonoids, carotenoids, triterpene alcohols and other terpenoids, polyacetylenes, polysaccharides, essential oil, tannins, sterols, mucus, organic acids, bitter ingredients, calendulin and others (Khalid & da Silva, 2012; Lim, 2013; Tucakov, 2014).

Pot marigold is not official by the Ph Jug V, but is prescribed in previous releases of the German and the Russian Pharmacopoeia, as well as in the amendment of the European Pharmacopoeia (Ph Eur 7.0, published 2011). According to a relevant monograph of dried pot marigold (Calendula blossom – *Calendulae flos*: Monograph Number 01/2011:1297), the Ph Eur Pharmacopoeia 7.0. prescribes the minimum of 0.4% of flavonoid content, expressed as hyperoside ($C_{21}H_{20}O_{12}$; Mr 464.4). Besides, the foreign matter this drug can contain includes a maximum of 12.0% of moisture, 10.0% of ash, 5.0% of calyx parts and 2.0% of other foreign matter. On the other hand, according to the Regulation on the quality of tea, herbal tea and their products (Official Gazette of the Republic of Serbia, 4/12), for the *Calendulae flos* drug, the allowed amounts are up to 12% of moisture and 10% of ash content, and of by-side impurities, there can be up to 5% of leaves and 2% other impurities. What is used in diet are marginal (boundary) blossoms– petals or whole flower heads. Both parts of the plant have a faintly aromatic odor and a bitter-salty taste (Blumenthal et al., 2000). Dried milled pot marigold petals are used as a substitute for expensive saffron. Such powder provides meals, especially rice, with beautiful yellow colour,

and it is also used in making noodles. In some cases, the stems and leaves are also collected.

The active ingredients of pot marigold act antiseptically, they relieve spasms, help to stop bleeding, accelerate wound healing, and its polysaccharides act as immunostimulants. However, pot marigold finds its most widespread use in dermatology. It is right to say that pot marigold is a "plant for the skin", because there is no skin disease where pot marigold cannot help, and this plant used for both internal and external application.

It is also effective in treating acne, warts, cysts, ulcers, eczema, psoriasis and seborrhea, hemorrhoids, herpes zoster, fistulas, impetigo, skin inflammation, peeling skin, oily face skin, mastitis, burns, rashes, various skin infections, urticaria, wounds (abscesses), poor-healing wounds, mammalian bites and insect stings, etc. For these purposes, it is most commonly used in the form of macerations, balsams or ointments. Pot marigold maceration (obtained by macerating in a type of vegetable oil, most commonly, the sunflower one, as well as in olive, sesame, flaxseed or macadamia oil) represents natural cosmetics that effectively protects and nourishes both young and mature skin.

Teas and other pot marigold products very successfully mitigate and treat many other diseases. Pot marigold extract also displays the cytostatic and antitumor activity. Pot marigold balsam is known to treat chapped lips, bruises and varicose veins, as well as hemorrhoids.

In both official and traditional medicine, pot marigold is used for making various diuretic teas for the treatment of stomach and duodenal ulcer, of menstrual cycle disorders, and of painful menstruation, hemorrhoids, varicose veins, eczema and inflammatory conditions of the skin, for mouth and throat rinse and with digestive problems. Extracts made from the blossom heads are used against cholesterol excess in the blood. They are used in the form of various balsams to treat wounds, sprains and swelling, burns and ulcers, as well as the stings of bees and wasps (Jančić, 1988). It is successful in fighting the problems with the liver, kidneys and urinary tract, and is used in the treatment of herpes virus and hepatitis. It is also applied in the treatment of diarrhea, inflammation of the intestines, stomach spasms and against constipation.

Thanks spasmolytic and anti-inflammatory effects of flavonoids, this plant relaxes the tone of smooth muscles, eases digestion, food is better degraded

and resorbed, and the inflammation of the colon is soothed (Bashir et al., 2006). Flavonoids act preventively against the damage caused by UV radiation, because they provide the protection for the skin and the eyes (Bonina et al., 1996). It strengthens the immune system, which makes it beneficial to be consumed against influenza. In Russia, in the combination with nicotinic acid, it is used for the preparation of finished "CN" products, having application in the symptomatic treatment of certain types of tumors (Ul'chenko et al., 1998).

Position of pot marigold as the raw material needed to produce different types of phytopreparates of the Institute for Medicinal Plant Research "Dr Josif Pančić" from Belgrade

For several years, for its own purposes, the Institute has been purchasing a portion of dried pot marigold flower from abroad, mostly from Egypt. The Egyptian pot marigold is cheaper than the domestic one, which is harvested solely by hand, but, in turn, it is of poorer quality. On the other hand, through cooperation, the Institute is trying to revive the production of pot marigold with our people too. There are a number of cooperators who have mastered its production technology, and supply the raw material of required quality. Unfortunately, despite the satisfactory price of dried pot marigold flower, primarily due to the large volume of work, or because of the long harvest season, a certain number of cooperators give up this kind of production. After performing the quality control of the delivered calendula drug, begins the processing and production of various types of phytopreparations based on this plant.

Dried pot marigold blossom or the *Calendulae flos* drug enters the composition of various tea blends produces and packed by the Institute for Medicinal Plant Research "Dr Josif Pančić". Those are primarily: Tea Number 16 ("Tea against the Kidney Inflammation"), Tea Number 53 ("BILAX – Tea against Constipation") and Tea Number 92 ("Tea for the Relieving of Candidiasis Symptoms").

The tea mixture "*Calendulae compositum*", which can be purchased in the "Plant Power" chemist's shops of the Institute in Belgrade and Pančevo, as well as in other shops, has a beneficial effect to reduce menstrual pain, to help with fibro adenomas and breast cysts, with polyps in the uterus, ovary cysts and in general immunity strengthening.

The tea is prepared and drank as instructed on the package, is used for three consecutive months, and then, after a break of a month, the use can be repeated for another three-month cycle. In addition to the above-mentioned products, the Institute also has to offer a number of phytopreparations and cosmetic products based on pot marigold blossom ("Oily Pot Marigold Gel", "Day and Night Cream for Daily Care of All Skin Types", "Hand Cream with Pot Marigold Extract", etc.).

Recipes with pot marigold

In the following section of the paper, a few recipes are given that were created as part of traditional medicine, and some of them are used nowadays as the standard recipes, whose application has found its place in pharmaceutical industry as well as in cosmetics (Gostuški, 1979, EMEA, 2008; Re et al., 2009; Tucakov, 2014).

Pot marigold tea for internal use

Pour one cup (200 ml) of boiling water over one to two teaspoons of pot marigold blossom. Cover the dish, and let it steep for 10–15 minutes, then strain the tea. Drink a cup of unsweetened tea three times a day.

Pot marigold tea for external use

Pour half a liter of boiling water over two tablespoons of pot marigold blossoms. Cover the dish, and let it steep for 10–15 minutes, then strain the tea.

Tea against menstrual pain

Pot marigold blossom tea is particularly effective in relieving painful menstruation, but also, in regulating improper and irregular menstrual cycles. Its consumption should start seven days before the beginning of menstruation, and continue drinking it during menstruation as well, ever until menstrual period completion. The tea is prepared in the way that two dl of boiling water are poured over one to two pot marigold blossoms. The tea can optionally be sweetened with honey, and one needs to drink two to three glasses a day.

Pot marigold blossom bath

A well-known old fashioned therapeutic practice is baths of various medicinal plants. Pot marigold baths used to be prepared by our ancestors, but they are used today just as well, because they are very effective in the treatment of hemorrhoids, vaginal infections, genital herpes, bladder infections and many other ailments. Pot marigold bath is prepared as follows: Pour cold water over one to two cups of fresh or dried pot marigold blossom and let it steep for one day. Having steeped, the mixture is heated to boil, and added to a warm bath.

Fresh pot marigold juice

To prepare fresh pot marigold juice, both fresh and dried blossoms and stems can be used. Freshly-picked blossoms and stems need to be washed well, and then, mixed up in a juicer or blender. This juice is rather strong in taste, so it may diluted with carrot or apple juice.

Pot marigold balsam

Finely chop fresh marigold blossoms and mix them with coconut oil. Warm the mixture slightly, and then, let it cool. If the cream is too thick, it can be diluted by adding of a portion of another base oil. This cream is useful for the treatment of varicose veins, skin infections, eczema, athlete's foot, and many other ailments.

Pot marigold ointment

Add 50 grams of dried and minced marigold blossom to 500 grams of warm unsalted pork fat. Fry it all together for about 5 minutes, and let it steep overnight. The next day, warm it up again, then strain it. Pour it into glass containers, and leave it in a cool place (also, possible in a refrigerator). It is best to keep it in a dark glass container in a cool place. It shelf life is about 6 months. If it is kept longer, its fat rancidifies (i.e. becomes spoilt). This cream is useful for make-up removal, chapped hands, lips and heels, various eczema, against the pain in the legs and others.

Oily macerate (marigold oil)

The preparation of oily macerate (marigold oil), begins in the period when marigold is in full bloom (July and/or August). What is picked are peak-

bloom blossoms, and they are placed in plastic barrels (for larger quantities) or in jars with airtight lids (for smaller amounts), and then poured-over with unrefined, virgin or other type of oil. Depending on the amount you want to prepare, you need: 200 grams of marigold blossom, 1 liter of olive oil, preferably cold-pressed. Adjust this ratio to the amount that you want to use. The oil is immerged, subsequently strained, and finally, ready to use.

There are instances where the oily macerate thus obtained is further supplemented with beeswax, which has been heated in an enamelleddish to the point of complete melting, but as much as to make the oil boil. After that, propolis is added, and the mixture is stirred with a wooden spoon until it cools down. It is best to keep in a dark glass container in a cool place. Its shelf life coincides with that of pot marigold ointment, which is about 6 months. If it is kept longer, its fat rancidifies (i.e. becomes spoilt).

Tea for the body cleansing and the immune system strengthening

This tea cleans the body of toxins and strengthens the immunity. In one liter of water, put:

- 5 to 6 tetterwort leaves (or 5-6 grams of dry matter);
- 5 to 6 nettle leaves from the top of the plant (or a 5-6 grams of dry matter);
- 5 to 6 leaf of pot marigold with tree and flower (or 5–6 grams of dry matter);

Cook all together, and, when the water boils, strain and cool down.
This tea is drunk both hot and cold, at least one liter day in several doses. This means that a new quantity of tea is cooked every day, and that is in the morning. The tea is drunk continuously for 21 days, which is a sufficient dose on an annual basis for the healthy. And, the sick, after the first round, make an interval of 7 days, during which time the control is performed at the doctor's, and, if necessary, the procedure is repeated. It usually takes 2 to 3 rounds to get cured. From previous experience, in some users, this tea cured lung cancer metastasis and cervical cancer at an advanced stage.

Anti-ulcer tea

To cure from ulcer, the tea is recommended consisting of: 100 grams of comfrey, 100 g of marigold and 50 g of common knotgrass (Polygonum aviculare). Pour 250 ml of hot water over one full teaspoon of this mixture. Let it steep for 20 minutes, then strain it. Drink three cups a day.

Tea against diarrhea and dysentery

When it comes to diarrhea (or diarrhea) and dysentery, the daily consumption is recommended of 6 tablespoons of the tea of dried calamus rhizomes of and 2 cups of pot marigold tea. With such treatment, bowel movements success fully normalizes in a relatively short time.

Conclusion

In our country, the conditions exist for the successful production of pot marigold, starting with agro-ecological through human to technological ones. However, the shortage of workforce in the countryside, reluctance and quick giving up on growing are the factors that make this raw material mainly imported. On the other hand, several positive examples of successful producers, the existence of varieties suitable for growing in our climate and several companies that could buy the raw material produced give the reason for optimism when it comes to the production of pot marigold. Its widespread use and the possibility of the development of new uses, as well as a large number of official and traditional preparations, provide great potential in terms of growing and processing pot marigold blossom.

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THE IMPACT OF COMPETITIVE ADVANTAGE ON MARKET SHARE IN THE CASE OF ORGANIC PRODUCTION[1]

Vladimir Matović[2], Tatjana Brankov[3]

Abstract

The constant presence of change in the market environment assisted by global trends has a direct impact on the ability of market participants to maintain or increase their market share. The processes of internationalization and globalization of business, changes in legal regulations, faster technology development and transfer of information, demographic changes and changes in consumer preferences, are only some of the factors that pose challenges, primarily, the entities whose main activity is production.

Key words: *market share, competitive advantage, marketing strategy, global trends*

Introduction

The development of the agricultural sector has a direct positive impact on the overall economic development of Serbia in accordance with the participation of agriculture in the gross domestic product, employment and exports. With the opening of Serbia towards its surrounding countries in the transition process as well as an intensive process of integration into world trends and institutions greatly changes the existing environment in which the domestic manufacturers operate.

As profit is the main reason for doing business, it is necessary to find ways of its creation and increase in continuity. Comparative advantage is

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materialized in the availability of a ceratin resource in large quantities or from cheaper sources even if it initially may be the basis for better market results in the long run, especially bearing in mind the global market, greater efficiency based on the application of innovative technology and better specialization, it loses importance.

1. Market share as a result of business performance

Market share in national terms is most commonly associated with the ratio of sales realized by the specific market participant and the sale of an entire branch to which it belongs and can be expressed: naturally ,by value or the kombination of both. In addition to the above mentioned, for the precise definition of a market share it is also necessary to define: what product and service we are defining, what is the observed period (day, month, year) and in which market (local, regional, international or global)? A market share defined like this isn't only used to control businesses but also as a basis for defining the necessary projections which gives the ability to manage a market share. The selection of a specific option depends on *internal factors* such as the <u>effects on earnings</u> and <u>perceived risk</u> but also from *external* in the specific case of <u>focus of competition</u> in a particular market segment.

1.1. The strategy of market share management

There are three basic strategies in the management of market shares: creating or increasing, maintaining, and decreasing of market share. <u>Creating or increasing market share </u>is an offensive strategy that aims to improve the position of the enterprise in the market at the expense of competitors.[1] Creating and maintaining competitive advantage predicts certain conditions such as: selecting the branches in which competitive advantage can be created, sufficient capital intensity of market segments which gravitate to, price competitiveness and competitiveness in terms of quality and funding opportunities and readiness to bear certain risks, etc.

From the perspective of customers, the aim is to attract both existing customers and customers of competitors that are present on the market which they gravitate to. The previous can be achieved by extending the use of the product, increasing the level of its consumption or encouraging

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[1]Milisavljević, M., Marketing, Savremena administracija, Beograd, 2001, str 415-416.

its faster replacements.[1] The strategy of maintaining market share represents a defensive strategy aimed at safeguarding the progress already made in the event that it is satisfactory in terms of management or is the result of a dominant position in the industry. The strategy of reducing market share represents an exit strategy when the market efforts have not led to satisfactory profitability and we turn to the elimination of unprofitable customers or products. This strategy is selective and it is not long term, it refers to a limited period of time and less attractive areas of business.

1.2. Criteria for the selection of an adequate strategy

The participant's choice of market strategy depends on the nature of the market segment which they are focused on. In case it is necessary to define a strategy for an already gained market segment where the market participant has a satisfactory market position and a certain differential advantage over the competition then the ***maintenance of market share*** will be used, by positioning on the basis of additional benefits for consumers and highlighting the benefits of the offer and the reputation of the supplier.

In the case it is a neutral market, in which none of the competitors achieve a significant advantage and where there are no dominant operators, an ***offensive strategy*** is recommended in order to recapture the market share from competitors and positioning if not as a leader then as a successor. In the market of direct competitors is necessary to resort to ***aggressive strategies*** for their extrusion for what is necessary to have certain prerequisites, such as manufacturing, financial and sales potential.

Without going into the nature and character of the product on sale but considering final products with a higher degree of processing, the phase of the life cycle at which the product is in also has a direct impact on the management of the market share. Namely, in the growth phase, the value of the market share is growing faster in relation to costs therefore an ***offensive marketing strategy*** should be used - winning, where investments in winning market share shall be treated as investments so it is necessary to perform a constant analysis of their legitimacy.

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[1]Senić, R. Upravljanje rastom i razvojem preduzeća, Savremena administracija, Beograd, 1993, str 310.

In the stage of maturity is necessary to apply the ***maintaining strategy*** while in the decline stage the solution should be the ***strategy of reduction*** of market share.

The strategy of a large market share is appropriate for entities that have a greater amount of resources for its implementation. This strategy allows the reaping of effect of economies of scale, and on that basis, the lowering of the associated costs but on the other hand requires quality management, modern technology and respectable marketing experience.

The strategy of a small market share remains available to market participants in smaller or medium format whose availablity of resources, knowledge and experience is limited. Preconditions for the implementation of these strategies are a good market segmentation, greater efficiency in the use of resources in the field of research and development, focus on meeting the needs of targeted segments and a flexible marketing approach.

1.3. Classification of market competition

According to the market position they occupy all market competitors can be divided into four basic groups:

1. **The Leader –** they lead in the branch and have the largest market share, usually over 40%.

Leaders set an example compared to other in terms of price changes, the introduction of new products, covering the distribution and intensity of promotion. Other companies in the industry recognize its dominance and can either imitate, avoid or challenge the leader. As no single leader has a guaranteed long stay on the leading position they must keep finding ways to expand overall demand, protect existing market share and its increase. Leaders can accomplish an expansion of their market in the following ways: finding new customers, finding new applications for the product or by encouraging existing customers to a greater use of the product.

Other companies prey on their vulnerabilities and try to take advantage of thier weaknesses hence market leaders must constantly expand and protect their market share which is best achieved by the implementation of innovation where product prices have to be at the level of expectations of customers in terms of viability and the perception that they have about the specific brand.

2. **The Challenger -** fighters for bigger market shares that mostly take the second and third places and in any case are located very close to the leaders. Their market share generally moves around 30%.

Challengers constantly monitor the market leaders and other competitors, and prey on a chance to turn their weakness into an advantage. Challengers realize the increase of their market share by making an attack on the market leaders and rivals who's business is not going well or an attack on small businesses of local and regional character that are unable to withstand the competition.[1] The options that challengers have available are: frontal, flank, comprehensive, bypass and guerilla attack.

Frontal attack involves the concentration of all available forces against the main strengths and advantages of competitors. Targets may be products, prices, propaganda etc. Flank attack means having a concentration of all the power towards the vulnerable areas of the business of major competitors and / or by completing smaller parts of the market that are not covered by the competition but which tend to significantly increase the market.

Comprehensive attack means the concentration of activities on formulating a package of offers that customers can not refuse because it contains all the elements they want, everything offered by the competition but a shade more. Bypass attack involves the diversification of non-related products or new technology products which will soon replace existing products. Guerrilla attack involves a strategy of harassment and exhaustion of a large number of competitors in the various fields where they are not sufficiently established. Harassment and exhaustion of the stronger opponent is usually done through the expansion of promotions, special services to the consumer, selective price reductions, offers of a greater choice of varieties, etc.

3. **The Follower** - seeks to retain its market share without incurring higher costs. If market competitors estimate that is risky to attack the leaders they would rather opt for succession rather than to attack. The theory identifies three types of followers:[2] direct followers, followers at disposal, and selective followers,

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[1] Kotler P., Keller K., Marketing mandžment, Data status Beograd, 2006., str 355-358.
[2] Milisavljević M., Marketing, Savremena administracija, Beograd, 2002., str. 418

The direct follower- who zealously imitates leaders or challengers believing it will be easier to survive by following in their footsteps. Followers at disposal - they mimic the leaders in prices, innovation and distribution but also keep some differentiation believing that it can be an opportunity if the leader backtracks. Selective followers - who follow the leaders only in the segments where they has obvious benefits while in other areas they go their own way for which they believe could lead in the future.

4. **Tamponer** – they supply smaller market segments which larger market participants are not interested in. These market participants are specialists in meeting the needs of smaller market segments that are characterized by a specific demand - market niches.

Niches that are interesting are those that with their size and market power can provide profitability, the possibility of future growth, which are not attractive for future competitors and for which tamponeri have enough knowledge and resources with which they can satisfy their needs. However, filling the market niches is followed by a high risk because the market niche either might dry up or be attacked. Therefore tamponers try to diversify and distribute the risk by filling a large number of market niches simultaneously.

As a final stage in the distribution of the value from production to the end consumption sales has an important impact on both the management of the market share and the competitiveness of the market participants. Sales success depends on many factors inside and outside of the company. Therefore, the management of the sale is to be approached strategically and is chaired by the four main stages, namely: planning, organizing, leading and controlling. There is a wide application of TQM - total quality management in the effort of optimizing all the necessary functions and processes in order to reach a better level of service and quality.

In addition to TQM other quality control programs were introduced into the food industry, programs such as HACCP, ISO and Six Sigma as a successor of TQM which represents a methodology that supplies business processes with tools that can enhance the implementation of activities. With this performance is increased and variations are reduced in the implementation process, areas are revealed where reductions can be made and losses in profits can be reduced, efficiency of labor and product quality.

The best example of market tamponers in agricultural production are producers of organic food. The share of organic products in the world market is recording a steady growth. According to Organic Monitor sales of organic food and beverages in the world has reached a value of 64 billion US $ in 2012.[1] In the US, sales have increased from US $ 11 billion in 2004 to US $ 27 billion in 2012, or 39 billion US $ in 2014. Areas under organic crops in the US and the EU account for about 5% of the total cultivated farmland.[2]

US participation in the overall market for organic products is 44% and the EU 41% (FIBL&IFOAM, 2014). According to UNCTAD data (United Nations Conference on Trade and Development, 2013) 2 million farmers deal with organic production (80% in developing countries). Sales rose in all regions of the world but the demand is biggest in North America and Europe. The US participation in the overall market amounts to 44% and the EU 41% (FIBL&IFOAM, 2014).

The largest consumption of organic products per capita of the EU is in Denmark (162 Eur), Luxembourg (134 Eur) and Austria (127 Eur) (Table 1). In the observed period (2006-2011) in all EU countries for which data was available, total consumption of these products per capita was recorded in all countries except the UK. By far the largest increase in consumption per capita was recorded in Spain.

Table 1. *Changes in organic production per capita*[3]

	2006	**2011**	**Eur**
Austria	64	127	63
Belgum	23	40	17
Bugaria	0	1	1
Cypress	2	2	1
Cezch Rep.	3	7	4
Denmark	80	162	82
Estonia	-	-	-
Finland	11	22	11
France	26	58	32
Germany	56	81	25
Greece	5	5	0

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[1] http://www.organicmonitor.com/
[2] http://ota.com/sites/default/files/indexed_files/StateOfOrganicIndustry_0.pdf

Hungary	2	3	1
Ireland	16	22	6
Italy	19	28	9
Latvia	-	2	-
Lithuania	-	2	-
Luksembourg	85	134	50
Netherlands	28	46	18
Poland	1	3	2
Portugal	-	2	-
Romania	1	4	4
Slovakia	1	1	0
Slovenia	5	19	14
Spain	2	21	19
Sweden	42	94	52
Great Britain	42	30	-12

Source: *http://ec.europa.eu/agriculture/evaluation/market-and-income-reports/2013/organic-farming/chap2_en.pdf*

Available data point out that the consumption of organic products per capita in Serbia amounted to 5.5 Eur in 2012, which is approximately equal to the Greek consumption, but about 30 times less than in the biggest consumers in European countries (FIBL&IFOAM, 2014).

This is a clear indication of underdevelopment of the organic products market in Serbia. There are only 6 specialized markets, 4 are located in Belgrade and 2 in Novi Sad.

The most certified organic products on the Serbian market originate from imports except for certain quantities of fresh and processed fruits and vegetables of local origin. Since 2013, when this kind of production is recorded, organic products such as fresh milk, yoghurt and cream are present on the market.

One of the reasons may be the higher price of organic products as listed in the following table. Based on the foregoing, it can be concluded that limited revenues and a modest standard of living lead to the fact that organic products are not a priority for domestic consumers.

Table 2. *Minimal and maximal price span in retail of organic and conventional products of fresh fruit and vegetables in markets (January-October)*

Product	Belgrade			
	Organic product, price (EUR/kg)		Inorganic product, price (EUR/kg)	
	Min	Max	Min	Max
Tomato	1.6	2.0	0.4	1.8
Potato	1.1	2.4	0.3	0.7
Onion	0.7	1.5	0.3	0.9
Apple	0.9	2.5	0.2	1.3
Apricot	2.0	2.9	0.7	4.4

Source: *http://www.terras.org.rs/*

However, organic production has continuous growth. In 2013, there were 258 certified producers of organic food in Serbia compared with 40 producers registered in 2012.

In the mentioned 2013, organic production was produced on about 5.400 hectares, of which 2,500 hectares are certified and the rest in the certification process. One can express the conclusion that the quantities of organic products in Serbia increase from year to year (Table 4).

Table 3. *Total production of organic products in Serbia (in tons)*

Crop	2008	2009	2010	2011
Corn	869,5	1.173	1.837	2.226
Wheat	455	578	819	1.333
Soy	704	984	1.467,4	1.475
Apple	15.300	22.800	22.610	24.650
Raspberry	1.755	2.432	2.884	4.012
Strawberry	302,5	441	571,5	969
Plum	6.150	10.030	11.979	18.450
Sour cherry	1.440	1.800	1.350	2.040

Source: *http://www.terras.org.rs/*

Increased production of organic products in Serbia is in line with the global trend of increasing demand for products that contribute to health.

2. Competitiveness and how to achieve it

Competitiveness is an indicator of business success in the market participants' adaptation in the domestic and foreign market conditions. In order to create and maintain competitive advantage <u>strategies</u> have the key role as a way of realization of the defined goals. In modern business conditions characterized by constant change it is understandable that the objectives are defined as "stretchable" which leads to the degradation of some and the creation of other markets depending on the factors affecting the business and the resources with which it has access to.

And what is present here is <u>the primacy of immaterial over material</u> so in the aim of building and maintaining competitive advantages, more attention is paid to the immaterial resources like knowledge, professionalism and specialization, intellectual property (brands, patents), reputation, publicity and public relations which market participants have towards its core business and customers.

2.1. Techniques for achieving competitive advantage

The main objective of the current market participants is to achieve sustainable a competitive advantage and maximum market share. Achieving sustainable a competitive advantage is only possible if market participants find ways to carry out activities differently than direct competitors or to implement similar actions but in a much better way.[1]

In order to formulate competitive strategies necessary to do an <u>analysis of long-term attractiveness of a market or market segment.</u> The above analysis is based on the belief that a particular company and its competitive ability are influenced by environmental factors, including: entry barriers, the existence of potential new entrants, bargaining power, power of buyers, bargaining power of suppliers, substitutes and competitors.[2]

However, the above-mentioned external analysis is insufficient to formulate specific competitive strategies. Of importance is the

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[1]Porter M., E., Competitive Strategy: Techniques for Analyzing Industries and Competitors, Harvard Business Review –
www. Harvardbusinessonline.hbpd.harvard.edu
[2] Jovanović P., Strategijski menadžment, Visoka škola za projektni menadžment, Beograd, 2007., str. 44

understanding of the competitive environment and the effects of direct competitors up to now and the assessment of potential ways that competitors can jeopardize business of a concrete market participant. A market participant must start from defined plans and to create an adequate vision of development that is aimed at consumers and to fight for gaining technological advantages.[1] There are three basic competitive strategies that are widely used by market participants: strategy of diferentiation, strategy of focus, and strategy of cost leadership[2]

The strategy of differentiation is a relatively expensive strategy in which the emphasis is on distinguishing your offer compared to the competitors offer in the superlative, and based on those characteristics customers value the most. The previously stated is exactly the greatest difficulty for adequate implementation because you need to be very careful in changing the elements of the offer to which customers are very sensitive.

On one hand, the change should be evident and tangbile without changing the character of the product and its position in the minds of consumers, and on the other hand it must not be incremental and negligible because the higher price of the new product will be difficult to justify. The differentiation strategy is said to be expensive because it relies mainly on the innovative role that requires additional costs and increases the price of the mechanism for the return on investment. Market participants may be differentiated in various ways ranging from new product development all the way to improvements of related services.

The strategy of cost leadership is based on the formation of prices at a lower level than the competition but without reducing the quality of the product. Market participants can find capabilities for the scope for reducing the price if they look through their internal capabilities, the effects of economies of scale, better relations with suppliers that lead to a more efficient use of capacity, generating savings on the basis of experience, tighter control and significant market share.

The strategy of cost leadership has certain limitations, which are reflected in the potential for using lower cost to jeopardize the position of the brand

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[1] Unković M., Međunarodna ekonomija, Univerzitet Singidunum, Beograd, 2010., str. 207.
[2] Unković, M. i Cvjetičanin D., Konkurentnost u trgovini: Aspekt mikrokonkurentnosti, Univerzitet Singidunum, Beograd, 2012.

in the minds of consumers and to send a negative message about reducing the level of quality. This is primarily based on the fact that consumers realize branded products as better, more successful and more expensive than average products in the industry. On the other hand, this strategy has limitations (a bottom limit) in the form of cost price below which it can not go. <u>The strategy of focus</u> practically represents the implementation of the strategy of cost leadership and / or the strategy of differentiation on a particular market segment.[1]

Once you achieve a competitive advantage it is necessary to maintain it and contantly improve it. If it will succeed and in what time it will be kept depends on the *nature of the competitive source* on which market participants build their own advantage. Effects with the most restrictions and possibility of duration are obtained by using cheap labor or raw materials, while the biggest and longest results are obtained using sophisticated technology, innovation, etc. In addition to the nature of the source of competitive advantage *their number* is essential as well.

Better results are always achieved if the company can create a competitive advantage from several sources primarily due to the distribution of risk and making it dufficult to copy for the competition. In the end, *the speed of development and adaptation to changes in the environment* are an important factor. Market participants should if not constantly extend their lead over the competition then at least develop and advance at the speed with which the competition is copying them.

One of the best ways of differentiation of offers is precisely the expansion of the sales assortment of organic products. Consumer demands that are directed towards food security and a high degree of quality are strengthening from year to year, together with the strengthening of the movement for environmental protection and the development of analytical instruments that have the task to determine the effect of external factors on the environment.[2]

The previously mentioned has led to the emergence and development of the market of organic products. Besides caring for personal health

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[1] Mašić, B.,Strategijski menadžment, Univerzitet Singidunum, Beograd, 2009., str. 232-233.
[2] Lazić B. , Malešević M., Osnovni principi organske poljoprivrede, Z. Rad. N. Ins. Rat. Povr., 40, 439-445 (2004).

customers also pay more attention to the preservation of the overall environment and the importance of organic farming, which is less detrimental to the overall living environment compared to inorganic production, further increases.[1] In numerous studies, health care is cited as the main motive for buying organic products, which leads to the need to satisfy specific market requirements. Even manufacturers who do not produce organic products nor have them in the offer, adapt their products to new trends, mostly through: reducing the amount of salt and sugar in their products, reducing the amount of additives, enriching existing products with various vitamins, probiotics etc., reducing the amount of trans fats, etc.

The model which was defined by Brankov in 2014 shows that the main motive of domestic consumers to buy products that are not treated with pesticides is the concern for personal health and the environment.[2] The same survey shows that caring for their own health is a stronger motive. From this we can draw the conclusion that the motives of Serbian consumers are identical to the motives that are present in other European consumers.

Finally, the results of these analysis show that Serbia has a strong interest in organic products. Serbia has very good conditions for organic production:[3] the required agroecological conditions, uncontaminated resources such as land and water.

Conclusion

Integration processes followed global trends demand a change in the current orientation and implementation of the market model in the economy in general and agriculture in particular. In recent years, Serbian agriculture and food industry have achieved significant growth, with a rate greater than the growth of total exports by achieving a surplus in foreign trade. Foreign trade was the largest with countries with which we have signed agreements on foreign trade, primarily members of the EU.

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[1] Schifferstain H.N.J., P.A.M. OUDE OPHUIS, Health-related determinants of organic food consumption in the Netherlands, Food Qual. Prefer., 9, 119–133 (1998).
[2] Brankov, Tatjana Papić, Šibalija Tatjana, and Subić Joel. "Serbian consumers' willingness to buy food products produced without the use of pesticides." Romanian Biotechnological Letters 19.4 (2014): 9605.
[3] Vlahović B., ŠTRBAC V., Osnovne karakteristike tržišta i marketinga proizvoda organske poljoprivrede, Ekon. Poljopr., 54, 131-147 (2007).

Important partners are also members of CEFTA and the agreement with Russia.

But the results will not be positive in the next period if adequate support and incentives are not provided in the pre-accession period, in terms of financial incentives and adequate policy of subsidies. All the more, because Serbia still has a net potential in agriculture which is not sufficiently exploited because there is no export development strategy and appropriate stimulative measures for economic policy. Stronger presence in foreign markets involves strategic development of export-oriented production, improving its productivity, enhancing price competitiveness, diversification of production, innovation monitoring, raising product quality and brand building for key export agricultural food products.

In the internationalization of their business local market participants should approach in stages, first by achieving a leadership position in the domestic market. Parallel to this, it is necessary to develop an export distribution network. In order for domestic market participants to find their place in the market of the European Union it is necessary that they develop a defensive competitive advantage in the global market that can not be easily copied and counteracted in the short term. There is a direct correlation between quality and competitiveness, because the level of quality indicates the level of competitiveness. The European market, which is critical for the agri-food sector in Serbia, imposes the obligation to introduce standards in food production while global environment requires that the marketing of food takes place with the help of innovative marketing to build brands and export orientation.

The influence of local associations (clusters, franchising systems) on competitiveness in trade in agricultural products is also important. The main objective of the reform of the agrarian sector is the creation of the concept of integrated rural development as a future basis for the development of agriculture in Serbia. It deals with the abandonment of the sectoral approach, the promotion of the territorial approach and the parallel development of agriculture and trade.

Lack of adequate institutional support and limited financial resources both own and borrowed still a present a limiting factor for domestic market participants and limit them in achieving competitive advantage. The legislation, subsidy policies, institutional support and the creation of an environment that will foster the development of competitive advantages

in the areas identified as essential for the further development of the agricultural sector is a necessary set of measures that domestic market participants need in order to adequately respond to the challenges of the environment and find ways to be competitive with foreign market players.

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III SECTION

STRENGTHENING INSTITUTIONS AND REGIONAL COOPERATION IN FUNCTION OF AGRICULTURAL DEVELOPMENT

AGRO-FOOD TRADE BETWEEN SERBIA AND EU WITH FOCUS ON COUNTRIES OF DANUBE REGION

Boris Kuzman[1], Milan Stegić[2]

Abstract

This paper analyzes the foreign trade of agro-food products between Republic of Serbia and the European Union with special emphasis on trade with the nine European Union member states that are part of the Danube Region (EU9). Period between 2004-2013 has been analized, covering three enlargements of the European Union and implementation of the Interim Trade Agreement between Serbia and the European Union. Data used are the official data of the Statistical office of the Republic of Serbia and EUROSTAT, in order to identify changes in the relative importance of EU9 in trade with Serbia. The research results will confirm importanceof EU9 in relation to all EU Member States and that Serbia, with its natural characteristics and geographic location, have opportunities for improvement of mutual trade relations that are still not used to a greater extent.

Key words: *Danube region, EU, Serbia, agro-food, international trade*

Introduction

Serbia, as a country in which the agro-food sector has greater significance than the EU average (Ministry of Agriculture and Environmental Protection of Republic of Serbia 2014), tended to take full advantage of the trade liberalization with the EU as its most important market, but was also concerned primarily as a result of low level domestic agro-food sector competitiveness. The liberalization of agricultural prices began in the 1990s and has continued during the 2000s. As in the previous decade, the agricultural price policy has been characterized by instability and the

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lack of long-run, systematic solutions (Bogdanov and Christmas 2010). On the other hand, the potential of the EU market stems from the fact that the EU is a net importer of agro-food products as an opportunity for exporting countries which are predominantly agrarian-oriented (Puškarić and Kuzman 2014).

Nine EU Member States (hereinafter referred to as the EU9)are part of the Danube region and among the most important trade partners of Serbia in the agro-foodsector. Precisely for this reason, we analyzed agro-foodtradebetween Serbia and the EU9 making the parallel with respect to agro-foodtrade with all EU Member States (hereinafter referred to as the EU28). The observed period is also significant for the fact that the Interim Trade Agreement (ITA) between Serbia and the EU, which entered into force in 2009, contributed to the liberalization of mutual trade relations, especially in terms of customs duties reduction of Serbia towards the EU Member States, but also due to the fact that in the observed period the three EU enlargements took place. The process of integration of Serbia and the EU directly increases the opportunities for development of agricultural production, development of animal husbandry and fisheries (Antevski et al. 2012).

Methodology

This paper analyzes trends in agro-foodtrade between Republic of Serbia and the EU Member States belonging to the Danube Region. Under agro-foodsector, for the purpose of this paper,we refer to all products of Section 0 - Food and beverage and 1 - Beverages and tobacco of the Standard International Trade Classification, version 4 (United Nations Statistic Division 2006).

The data used for research purposes are the official data of the Statistical office of the Republic of Serbia (SORS) and official data of the Directorate General Eurostat (EUROSTAT) as the official statistical body of the EU, bearing in mind that the methodology of presenting information are completely harmonized presenting the FOB type in exports and CIF type in import. In the case of the EU, analyzed data includeIntra and Extra trade.

Data published by the SORS and EUROSTATare statistical data, and all values are expressed in current prices. Bearing in mind that the survey covers a period of 10 years, presenting the results of research in current

prices will not provide realistic results of trade changes. In this respect, all values used in the study, are re-calculated into constant prices in order to realistic results that can be followed over time. Converting current to constant prices, in this paper unit value index (Unit Value Index)is applied, which is calculated using the following formula (IMF 2009):

$$P_{cons}^{t} = P_{cur}^{t} / P_{U}^{0}$$

whereP_{cons}^{t}shows export/import values in time$t$expressed in constant prices, P_{cur}^{t} shows export/import values in time$t$expressed in current prices, $P_{U}^{0}$is indexof unit value in the base year0.

In order to provide comprehensive analysis, standard statistical methods such as mode, median, arithmetic mean and trends are used in this research.

The volume of agro-food trade between the Republic of Serbia and the European Union

Serbia, as a country whose strategic goal is EU membership, in the last 15 years has strengthened its political and economic relations with EU member states.

Particularly important step in mutual cooperation has been achieved through the Process of stabilization and association, and the implementation of the Interim trade agreement (ITA) that is in force since 2009.

Today, the EU is the most important foreign trade partner of Serbia in general, but also in agro-foodtrade (53% share in 2013). The largest number of countries of the Danube region are among the EU member states (Figure 1).

The volume of foreign agro-food trade between Serbia and the EU28 records a constant exponential growth with the total trade value of EUR 11.5 billion in the observed period, expressed in constant prices (Chart 1).

The annual average growth rate is 8% with relatively low variability of 23.6% with a constant surplus of Serbia in mutual trade. During the whole period, Serbia has reached a surplus of EUR 2.8 billion, expressed in constant prices. Within the EU, agro-food trade between Serbia and EU9,

makes 56.6% of total trade with EU28 with the fastest growth rate of 11.3% and a moderate variation of 35%. In relation to EU9, Serbia recorded a surplus of 1.95 billion EUR, which makes 69.1% of Serbia'ssurplus with EU28.

Chart 1. *Volume and balance of agro-food foreign trade between Serbia and the EU9 in the period 2004-2013, expressed in EUR at constant prices (base year 2013)*

$y = 3E{+}08e^{0.1229x}$
$R^2 = 0.9414$
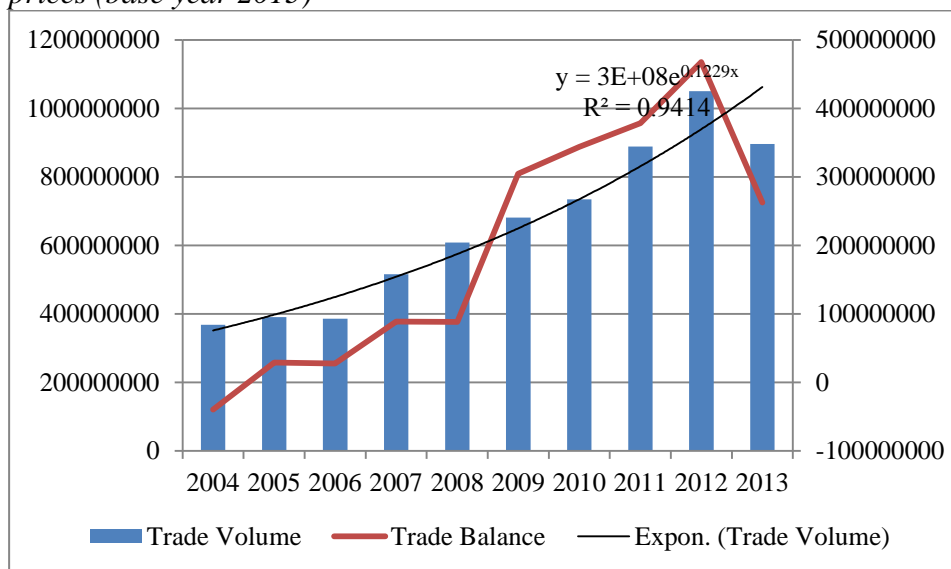
Source: *Author's calculations based on the SORS and EUROSTAT data.*

In trade with EU9 and EU28, the most important trade divisions are division 05, division 04 and division 06 (Chart 2). In contrast to the EU28, where the most important is division 05 with an average trade share of 31.8%, in the case EU9, the most important is division 04 with an average trade share of 32.5%.

During the first half of the period, division 05 had the most significant relative trade, share, but in the second half of the period division 04 took over the dominant position.

The highest relative importance of division 04 was recorded in 2012 when it accounted 49.5% of total trade.

The third most important division, both for EU28 and EU9 is division 06 with the observed trend of declining in relative importance which is

recorded to be greater in case of EU28. The highest relative importance in trade with EU9 was recorded in 2005, when it stood at 17.9%, while the lowest was recorded in 2011 and amounted to 9.1%.

Figure 1. *The importance of individual EU28 countries in agro-food trade volume with Serbia in the period 2004-2013, expressed in EUR at constant prices (base year 2013.)*
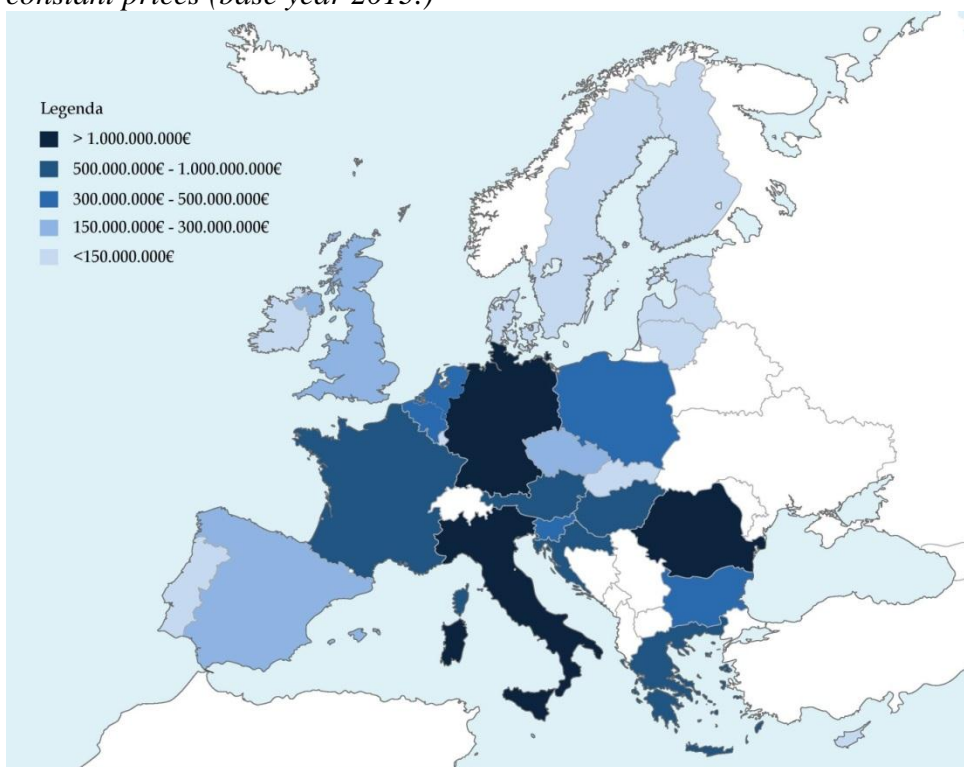
Source: *Graphic illustration of the authors based on SORS and EUROSTAT data.*

The most important foreign trade partner of Serbia in EU9 in the reporting period was Germany with a share of 26.1% and the realized trade value of EUR 1.7 billion.

In trade with Germany, Serbia registers surplus in mutual trade, which amounted to EUR 429 millionin the reporting period expressed in constant prices. Trade volume is growing at an annual average growth rate of 4.6% and relatively low variability of 15.2%.

Chart 2. *The relative importance of SITC divisions[3] in agro-food trade between Serbia and EU9 in the period 2004-2013*
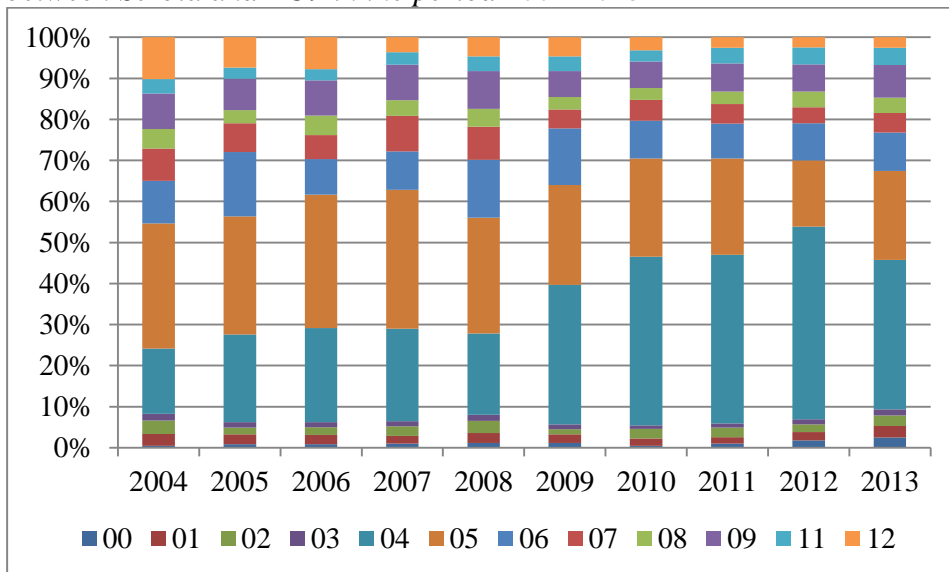
Besides Germany, the most important trade partner of Serbia among EU9 countries is Romania, which together with Germany accounts for almost half of the trade between Serbia and the EU9. The trade volume of agro-food products between Serbia and Romania in the reporting period reached a level of EUR 1.48 billion expressed in constant prices, which makes 22.7% of total trade agro-food products with the EU9. In the trade with Romania, Serbia registers a surplus in mutual trade, which in the reporting period amounted to EUR 1.3 billion indicating an extremely high importsto exports coverage. Trade with Romania recorded a very dynamic growth at an average annual growth rate of 55.1%, with strong variability of 92.3% as a result of the intensification of trade in the second half of the period.

Croatia, as the youngest EU member state is the third most significant trade partner of Serbia among EU9 countries. Croatia can again be seen as a preparatory test for the Serbian agro-industrial complex in terms of compliance with EU standards and placement of agro-food products to

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[3] 00-Food and Live Animals, 01-Meat and meat preparations, 02-Dairy products, 03-Fish, 04-Cereals, 05-Fruits and vegetables, 06-Sugar, sugar preparations and honey, 07-Coffee, tea etc., 08- Feeding stuff for animals, 09- Miscellaneous edible products and preparations, 11- Beverages, 12- Tobacco and tobacco manufactures

the EU market (Kuzman 2014). The trade value with the Croatia in the reporting period reached the value of EUR 951 million, expressed in constant prices with a share of 14.6%. Unlike trade with Germany and Romania, with which Serbia has a surplus in mutual trade, in the case of Croatia, Serbia recorded deficit of EUR 122.6 million during the reported period. Trade between Serbian and Croatian is growing at an average annual growth rate of 7.6% and relatively low variability of 27.6%.

Figure 2.*Balance of foreign exchange between Serbia and the EU28 in the reporting period 2004-2013, expressed in EUR at constant prices (base 2013)*
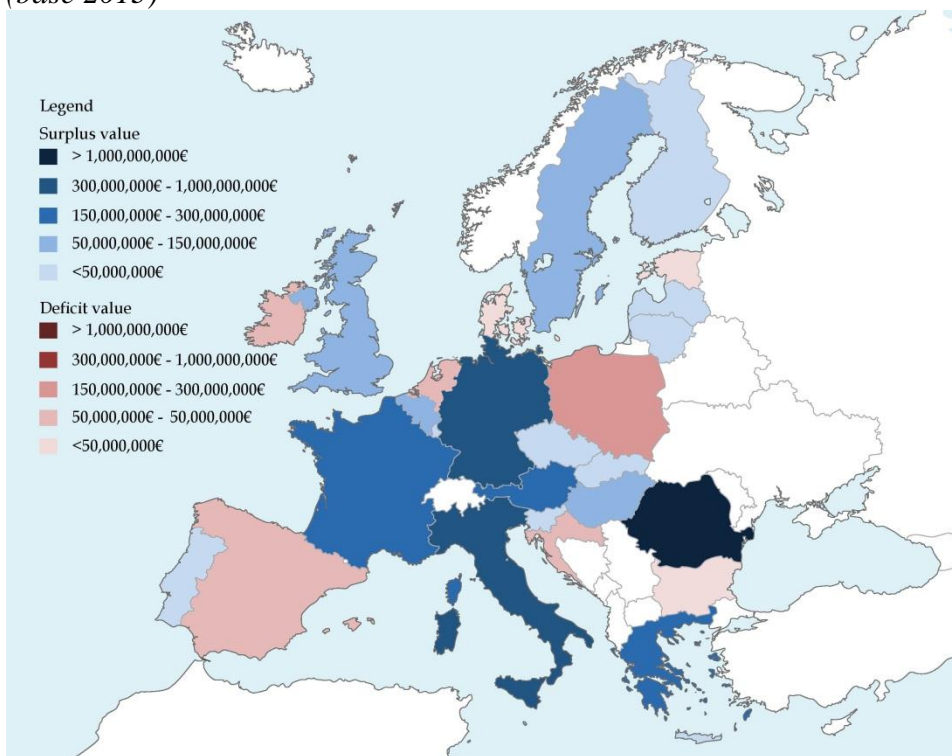
Source: *Graphic illustration of the authors based on SORS and EUROSTAT data.*

If we look at the trade results between Serbia and individual EU member states, we observe that there are significant differences in the results achieved (Figure 2). With 20 EU member states, Serbia recorded a surplus in the mutual trade of agro-food products, while with eight Member States Serbia recorded a negative trade balance. Looking at EU9, only in trade with Croatia and Bulgaria, Serbia recorded a deficit in

336

mutual trade, while with the other EU9 countries recorded a positive balance. The highest surplus value of EUR 1.3 billion, Serbia has reached in trade with Romania accounting 46.6% of the total surplus. Only in the first reporting year, Serbia recorded negative balance in mutual trade, comparing to reaching positive balance in all subsequent years. Apart from Romania, Serbia recorded good results results in trade with Germany and Austria with which a surplus was recorded in all observed years, while in trade with Hungary deficit has been recorded in some years.

Agro-food export of the Republic of Serbia to the European Union

Agro-food export from Serbia to the EU28 reached EUR 7.2 billion in the period expressed in constant prices. Year after year, Serbia achieved growth of export value at an average annual growth rate of 9.9% and relatively low variability of 28%. In relation to the first year observed during the period, the value of exports increased more than twice the EUR 457 million in 2004 to over one billion euros in 2012, when it recorded the largest export value. The export of agro-food products on the EU9market, Serbia has realized agro-food export worth EUR 4.2 billion, which makes 59.1% of total exports to the EU28. It is important to stress that exports to the EU9 is more dynamic with an average annual growth rate of 18.5% and a moderate variability of 46% (Chart 3).

The agro-food export to the EU9 market, fluctuations between the most important export divisions have been observed during the reporting period (Chart 4). Exports of products in the division 05, recorded a total export value of EUR 1.5 billion, expressed in constant prices, with an average share of 42.4%. The highest relative importance was noted in the first reporting year when it stood at 62.4%, with a noticeable tendency of declining in relative importance of exports, which is the lowest in 2012 with a share of only 20.4%.In parallel with the decline in the relative importance of the division 05, growth of the relative importance of the division 04 has been recognized with the lowest share of 6% recorded in the first reporting year, but with significantly higher relative importance in the second half of the period. In 2012, the relative share of export of division 04 in total export to the EU9 is the largest and has reached 57%.

The relative importance of division 06 products, export recorded the total export value of EUR 571 million, with the largest relative share achieved in the second reporting year with a share in 24% of exports. Over the

years, the relative importance of exports declines with the lowest recorded value share of 10.1% in 2011 with a relatively stable share in the last observed years.

Chart 3. *Agro-food exports of Serbia to the EU9 2004-2013, expressed in EUR at constant prices (base 2013)*
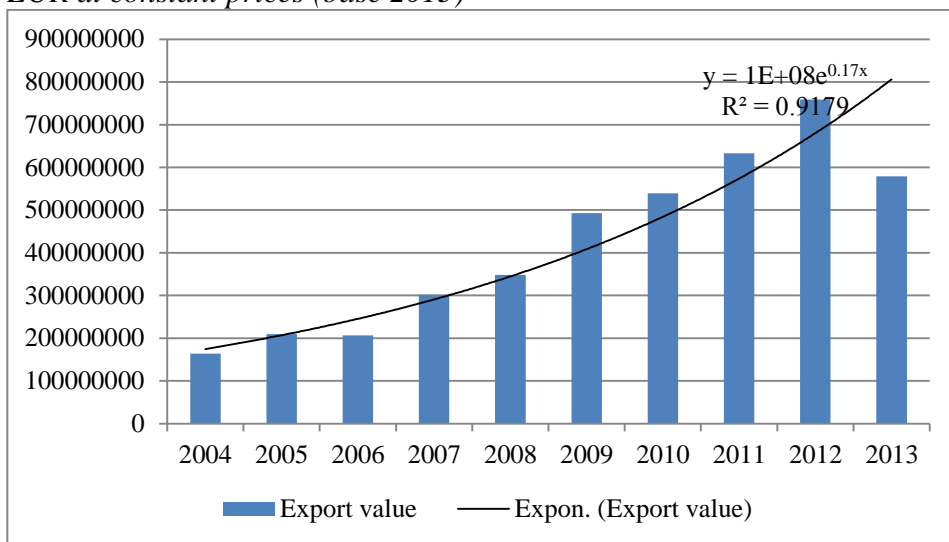
$y = 1E+08e^{0.17x}$
$R^2 = 0.9179$

Source*: Author's calculations based on the SORS and EUROSTAT data.*

The most important trade partner of Serbia in export of agro-food products in the EU market is Romania with exported goods worth EUR 1.4 billion, expressed in constant prices, which makes 33% of total exports to the EU market.

The growth of exports of agro-food products on the Romanian market is extremely dynamic after the entry of Romania into the EU, which contributed to achieving high average annual growth rate of 67%, with very strong varying intensity of 96.1%. Extremely high annual growth is a result of the increase in value of grain exports, primarily corn. It is particularly interesting that in the first reporting year, Serbia's export to Romania was at the level of EUR 5 million, and after the entry of Romania into the EU, Serbia used the privileges of liberalization of free trade agreement withthe EU.

Significant growth in export value occurs continuously from 2008 to 2012when export value reached the maximum amount recorded in the reporting period of EUR 409 million. A total of 96.8% of the value of

exports to the Romanian market was realized in the period from 2008. The export of agro-food products to Romania entirely dominated by products under the *division 04* constituting 91.2% of total exports to Romania.

Chart 4. *Relative importance of SITC divisions in Serbian agro-food export to EU9 market for the period 2004-2013*
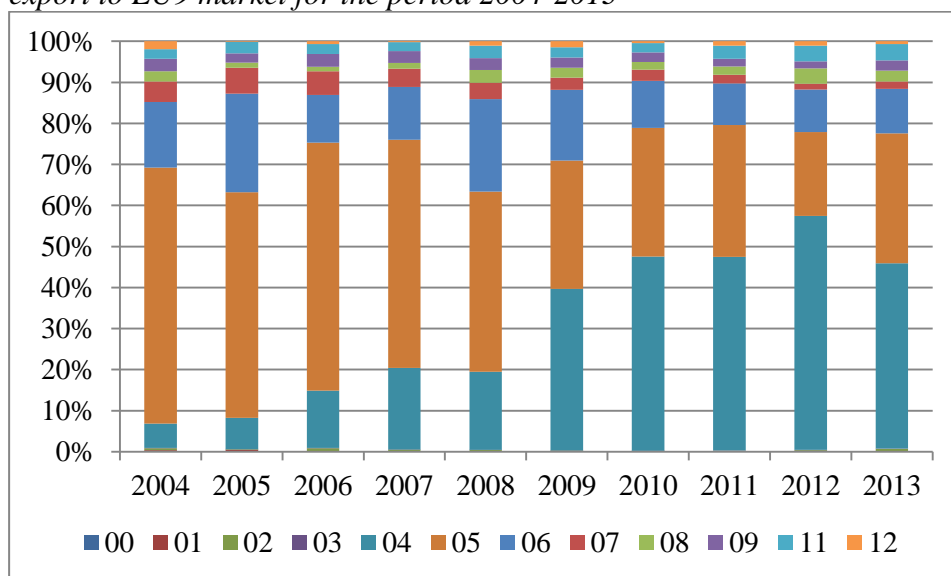
Apart from Romania, as the most important export trade partner of Serbia in the EU9, the second most important export market for Serbia on the EU9 is Germany in which Serbia exported agro-food products worth EUR 1.1 billion expressed in constant prices, which makes 25.2% of total Serbian exports to the EU9 market. In contrast to the dynamic development of exports to Romania, exports to Germany was stable at an average annual growth rate of 6.6% and relatively low variability of 20.9%.

The maximum value of exports to the German market was recorded in 2011 when it reachedEUR 135 million of agro-food products expressed in constant prices. The export of agro-food products to Germany was entirely dominated by products under the *division 05* with a share of 84.1% of total exports, while exports of frozen raspberries and other berries was the most important export product of Serbia.

Figure 3. *The importance of individual EU9 member states in agro-foodexport of Serbia in the entire period from 2004 to 2013, expressed in EUR at constant prices (base year 2013.)*
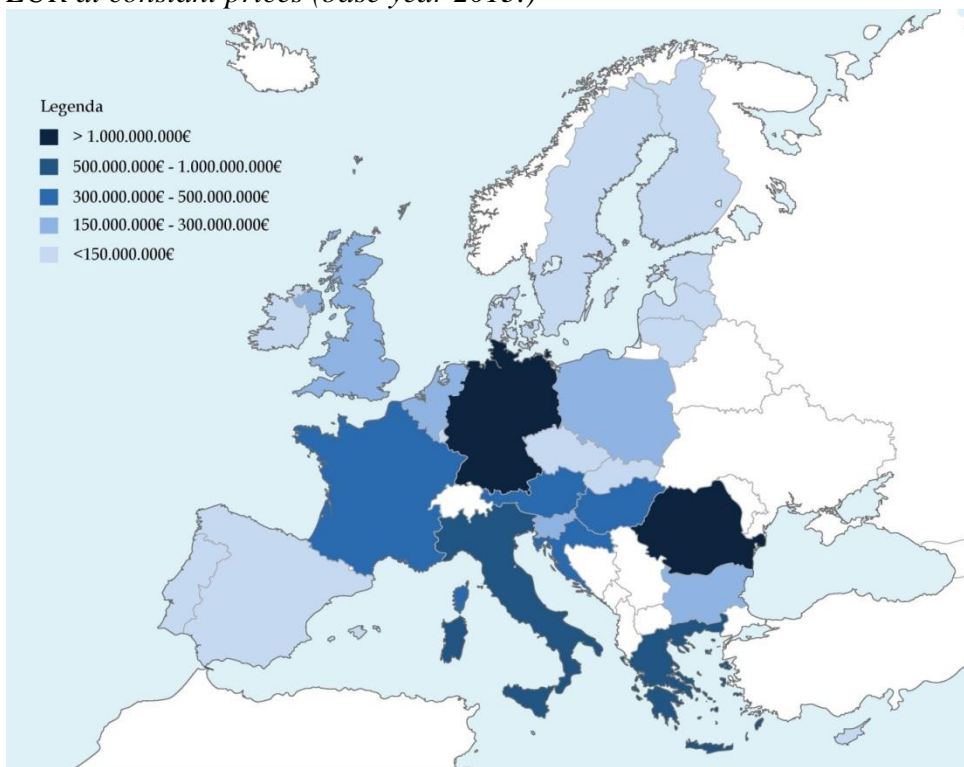
Source: *Graphic illustration of the authors based on SORS and EUROSTAT data.*

In addition to Romania and Germany as the most important partners of Serbia in export of agro-food products within the EU9, equal relative importance in Serbia's exporthadexport to Hungary (10.2%), Austria (9.9%) and Croatia (9.8%). In all three cases, there is a trend of growth in export value of agro-food products. The importance of SITC divisions among the mentioned countries is different. Namely, in exporting to the Hungarian market, export of division 06 products dominated with a share of 53.4% in exports to the Hungarian market[4], while the export share of the division 05 product was lower by 18.8%.The Austrian market completely dominated by the export of *division 05* products with a shareof total exportsto the market of Austria by 71.8%, of which the most

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[4]The most important export product of Serbia within the *division 06* on the Hungarian market is sugar

significant was the export of frozen raspberries and other berries.Unlike exports to Hungary and Austria dominated by the export of products from a single division, in the case of a Croatia wider range of divisions were represented. However, in export the most important is*division 12* with the share of exports to the Croatian market from 34.3%[5] and *division 05*, with a share of 27.2%.

Imports of agro-food products of the Republic of Serbia from the European Union market

Imports of agro-food products in Serbia from the EU28 in the reference period reached EUR 4.3 billion, expressed in constant prices. Imports of agro-food products from the EU28, on average, grew more slowly than the increase in the export value at an average annual growth rate of 5.4% with relatively low variability of 22%. The largest decline in the import value was recorded at the height of the global economic crisis (in 2009) with the realized value of imports of EUR 337 million, and it continued upward trend in imports in the following years. The highest value of imports was recorded in 2013 and amounted to EUR 620 million. Imports of agro-food products from the EU9 in the reporting period amounted to EUR 2.3 billion, which makes 52.5% of total Serbian imports from EU28. The results achieved withEU9 countries are almost identical with the results of the EU28 bearing in mind that in the reporting period the growth of import values is realized at an average annual rate of 5.4% and relatively low variability of 20.4% (Chart 5).

Certain deviations from the import structure from EU9 compared to the EU28 have been observed. While in the case of imports from the EU28 most important is*division 05*, in the case of EU9 import products from the *division 05* do not belong to major import products group. The main import products are *division 09* products with a share of 18.3% in EU9 imports, *division 12*, with a share of 11.9%, *division 07*, with a share of 11.7% and *division 04* with a share of 10.3%. In all major divisions, the downward trend is observed in the relative share of imports, which is strongestwith*division 12* products, while in the case of the most significant import *division 09* tendency of relative importance growths is visible.

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[5]The most important export product of Serbia under *division 12* on the Croatian market are cigarettes containing tobacco

Chart 5. *Imports of agro-food products of Serbia from EU9 market in the period 2004-2013, expressed in EUR at constant prices (base 2013)*
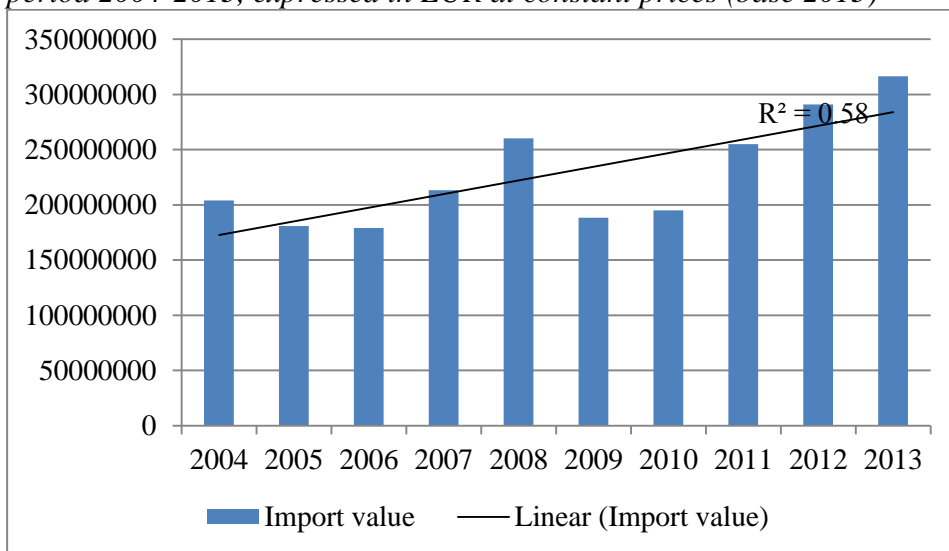
On the import side, the most important trade partners of Serbia from the EU9 are Germany, Croatia, Hungary and Austria. The most important trade partner of Serbia in import is Germany with a total value of imports of EUR 637 million in the reporting period, expressed in constant prices, which accounts for 27.9% of total EU9 imports of agro-food products.

Imports from Germany grew at an average annual growth rate of 2.7% with relatively weak variability of 16%, indicating a rather high stability of growthvalue. Unlike Serbian exports to the German market, which is completely dominated by the export of fruits and vegetables, imports of agricultural products is diverse with six divisions having the share of imports exceeding 5%, as well as three divisions with a share of 4% to 5%.

The most significant relative importance is with *division 09* and the realized import value of EUR 265 million and a share of 25.8% with a constant tendency to increase the import value. As the second most important division appears *division 12* with the realized import value of EUR 134 million and a share of 21%, withobserved oscillations in the imports value during the period under review, anddeclining trend at an

average annual rate of 7.1%[6]. In addition, the significant divisions are also *division 07* (10.3%), *05* (8.8%), *02* (8.7%) and others.

Chart 6. *The relative importance of SITC divisions in the agro-food import in Serbia from EU9 for the period 2004-2013*
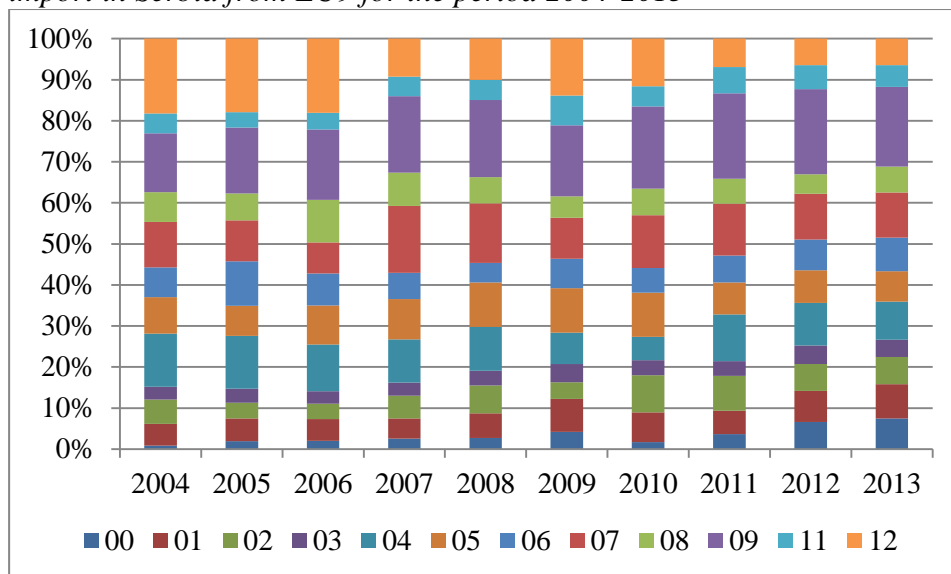
Croatia as EU member state since 2013, is long-time trading partner of Serbia in the exchange of agro-food products. Although Croatia is not a relatively important trading partner in agro-foodexport from Serbia[7], in imports significance is far greater with a realized imports value of EUR 537 million, expressed in constant prices, which makes 23.5% of agro-foodimports from the EU9. The significance of the Serbian imports from Croatia, is manifested through negative result in mutual exchange with the recorded deficit of EUR 122 million. Imports from Croatiais realized at an average annual growth rate of 7.7% and relatively low variability of 23.1%. In case of Croatia, diversification can be seen in the import divisions also. A total of seven divisions recorded a share higher than 5%, of which the most important is *division 09* with a realized value of imports of EUR 107 million and a share of 19.9%, with apresent permanent tendency to increase. In addition, the import of *division 12*

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[6]The most important import product from Germany within *division 09* is other food preparations, while in *division 12* the most important import product is cigarettes containing tobacco.
[7]Croatia is ranked 8th Serbia's export partners among EU28

product realized import of EUR 91 million, with recorded total agro-food imports share of 16.9% from Croatia[8]. In addition to these major import divisions, important divisionsare*division 03* (11.9%), *division 07* (11.2%), *division 05* (10.2%), *division 04* (7.5%) and others.

Figure 4. *The importance of individual EU countries in agro-food imports in Serbia in the entire period 2004-2013, expressed in EUR at constant prices (base year 2013.)*
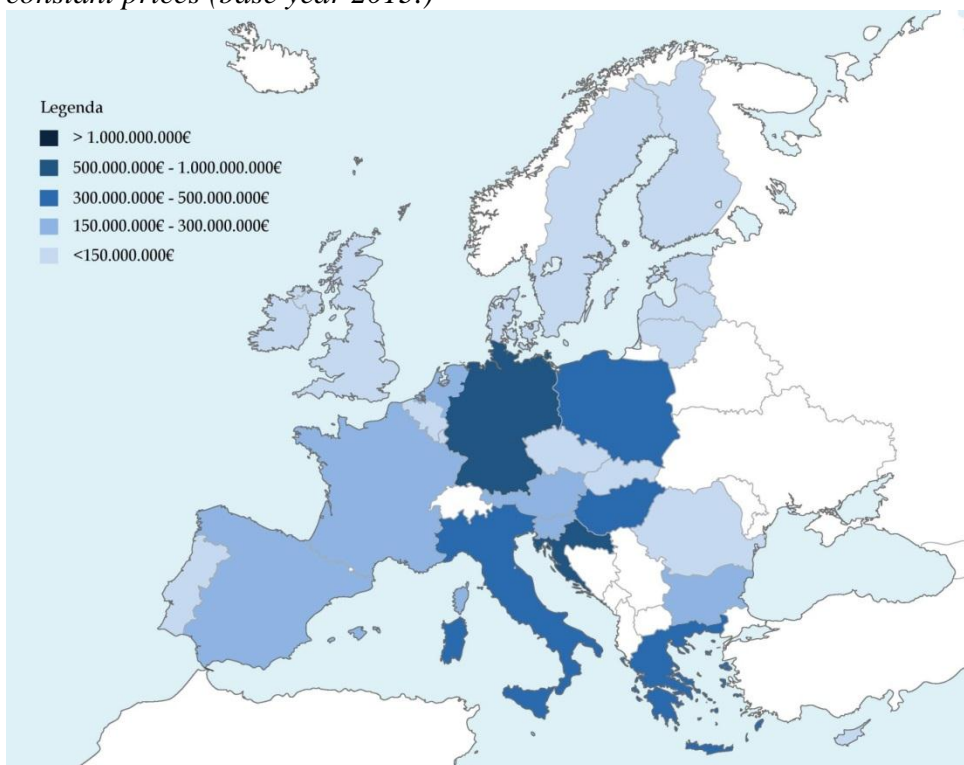
Source: *Graphic illustration of the authors based on SORS and EUROSTAT data.*

In case of Hungary, diversification among import divisions is also recognized. Thus, the most important products in imports are within the *division 04* and *division 09* with the share of 14.6% respectively. Although not as significant in total imports, in the case of Hungary the third and fourth most important products are located within the

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[8]As in the case of imports from Germany, the most important import product within the *division 09* is other food products, while in the case of *division 12* most important import product is cigarettes containing tobacco

division08-Products of animal feed (13.2%) and *division 01*-Meat and meat products with a share of 12.2%. Finally, in the case of Austria, the most important import products are within the *division 09* with a share of 20.7%, *division 07*, with a share of 16.2%, *division 05*, with a share of 12.6% and *division 11* with a share of 12.2%.

Conclusion

Trade liberalization between Serbia and the EU28, with no doubt contributed to the enhancement of mutual trade relations in agro-food sector, which is manifested, above all, with trade value growth. On the other hand, the trade relations between Serbia and EU9 in the observed period were characterizedby dynamic growth in the trade value compared to the EU28 due to the fact thatentry of Romania, created better usage of river transportation by the Danube, primarily in corn export, which has contributed directly to the dynamic growth of trade value.

Also, a significant difference in the structure of agro-food trade comparing EU28 and EU9 has been recognized bearing in mind that *division 04* has greater significance in EU9, while in the case of EU28 significance is with*division 05*.

Analyzing all agro-food products at SITC level during the implementation of ITA, we observed that the number of traded products increased. However, the wide possibilities of liberalization of mutual trade relations have not been exploited fully, which leaves room for further improvement of trade relations.

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11. Statistical office of the Republic of Serbia: Data base on international trade http://webrzs.stat.gov.rs/WebSite/public/ReportView.aspx, (March-September 2015.)

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EDUCATED WORKFORCE AS A FACTOR OF AGRICULTURAL DEVELOPMENT OF THE DANUBE DISTRICT[1]

Branko Mihailovic[2], Drago Cvijanovic[3]

Abstract

In the paper were studied the existing and future needs for highly educated workforce, which have served agriculture development of the Danube district. The purpose of this research is in profiling staff that will help agricultural producers and enterprises to fulfil their goals, solve problems related to business and management, identify and use new possibilities, increase their agricultural knowledge and apply in practice the acquired knowledge. The Danube district has a great potential in agricultural sector, which has not been completely used. Accordingly, it is necessary to profile the professional staff in this field, so agriculture could contribute significantly to economic development of the Danube district. It is, as well, very important for development of Serbia, having in mind its correlation and impact to other sectors, due to the fact that it employs, directly or indirectly, numerous people, participates significantly in foreign trade, provides food safety of population and contributes to rural development and ecological equilibrium.

Key words: *agriculture, education, competitiveness, knowledge economy, human resources.*

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Introduction

Agriculture in Serbia meets many problems, which have been inter alia the result of restrictions occurred in terms of economic environment and agrarian policy carried out after the WW II until the dissolution of the SFRY, difficulties have arisen in the past fifteen years and difficulties in adjustment to the market economy. Agriculture in Serbia has been encumbered by consequences of the centrally-planned economy regarding ownership and land use. The policy is necessary for development, which can have an effect on increasing productivity through restructuring and investments, and it implied the clear property rights and the establishment of an efficient land market, credit and inputs inevitable for agricultural enterprises. Even though the micro-economic sector is the source of economic growth in every country, there asks a question whether and how it can successfully work in a country without defined and developed basic elements and postulates of a legal state and market economy. Exactly the reforms of political and state institutions, the legal reform (especially in the field of labour legislation, intellectual property, competition law), inefficient judiciary, underdeveloped markets (especially financial), unfinished processes of restructuring and privatization of large and public enterprises, inadequate physical infrastructure and unsuccessfully established institutional-legal frameworks to repress a corruption – represent a stumbling stone of Serbia on the way of competitiveness and sustainable economic development, according to assessment of many international institutions.

Great differences regarding development among Serbian regions manifest also through indicators of business demography. Greater opportunities for establishing new businesses have the prospective entrepreneurs in developed areas. The analysis points out that leads the way *the City of Belgrade* (11,939 or 28.7% of all newly-established firms in the year 2011) and the *South-Bac district* (4,291 or 10.8%).[4] In these districts, there are also greater opportunities for survival and development of started business activities, so the survival rate is higher (66.0% and 64.0% respectively). On the contrary, in the *Pirot district* were registered only 371 newly-established companies or 0.9% of their total number in Serbia in 2011, while in this year 421 economic entities were closed. The net effect is the

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[4] The report on small and medium-sized enterprises and entrepreneurship for the year 2011, Ministry of Finances and Economy, Ministry of Regional Development and Local Authority, National Agency for Regional Development Belgrade, October 2012, p. 22.

greatest in the City of Belgrade, where the survival rate (2/3 of the established economic entities) is the highest. At the same time, in the *Danube district* 1,291 economic entities were closed, while the survival rate was 61.2%.[5] Long-lasting crisis in the domestic economy has brought about to decrease of accumulative ability of agricultural enterprises in the *Danube district*. In such situation, there is neither a critical mass of funds necessary for organizing the investment activity, nor readiness to take over the follow-up financial risks. In the World Bank report, called the "Public Financial Support for Commercial Innovation" (January 2006) were analyzed various financial instruments, which could stimulate business innovation and provide series of recommendations for reforms, which should precede, so that these instruments could be well used. The goal of this report is to offer the opportunities for the European and Central Asia countries, especially the transitional post-communist countries and non-EU-member countries, increase productivity and economic growth by creating the favourable environment for applying knowledge in economy, through innovation and learning. Robert Solow has started the research, which helped the economists to get to know that permanent economic growth has depended more on technological changes than the accumulation factor, i.e. the traditional factors.[6] The basic pillars of knowledge-oriented economy are the following: economic stimulation and institutional regulations; education and training; information infrastructure and innovation systems. Therefore, if the states invest the additional resources in research and development, and they at the same time don't provide also economic relief and incentive bonuses, they don't improve information infrastructure and educational system and if they don't include the private sector and don't develop the innovation system – money will be just wasted.

In accordance with it, the goal of this research reflects in profiling staff that would contribute to agricultural producers and enterprises to increase their agricultural knowledge and apply in practice the acquired knowledge. The subject of the research conducted **is** educated workforce in the function of agricultural development of the Danube district. Research design includes the following fields: educational structure of

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[55] The report on small and medium-sized enterprises and entrepreneurship for the year 2011, Ministry of Finances and Economy, Ministry of Regional Development and Local Authority, National Agency for Regional Development Belgrade, October 2012, p. 22.

[6] Solow, R.M. (1956): "A Contribution to the Theory of Economic Growth", *The Quarterly Journal of Economics,* Vol. 70, No. 1. (Feb., 1956), pp. 65-94

population in the Danube district, creation and cancellation of jobs by the regions, trends on labour market of the Danube district, technological potential of food industry, restructuring of agricultural enterprises of the Danube district as an indicator of need for highly-educated personnel, development of human capital in agribusiness and more significant social inclusion.

In realization of the research task was used a desk research of data regarding the human resources and agriculture of the Danube district. Such research implies using the data from the official resources: National Employment Service, Republic Bureau of Statistics, National Employment Strategy for the period 2011–2020; as well as reports of regional development agencies. In the paper was also used data from domestic and foreign literature. Accordingly, there can get more reliable answer to the key questions, which have arisen within the analysis of the educated workforce as a factor of agricultural development of the Danube district.

Educational structure of population in the Danube district

In economic theory, but in modern practice too, it is well known that: if the total capital, as the production potential, conditionally divides into a *natural capital* (C_n) and a *human capital* – physical and intellectual (C_h), it is necessary that the total capital reserves ($C_n + C_h$) do not decline during the foreseeable time.[7] The obvious condition is to provide the certain substitution level between different forms of capital, i.e. to replace the inevitable decrease of the natural capital with increase of the available human, primarily the intellectual capital. This can achieve the best by increasing the application of already acquired and new knowledge and the best modern production practice, i.e. by using resources of the total scientific-technical and cultural potential. In other words, the economy transition implies more significant apply of knowledge, innovation and new technologies, which includes numerous reforms in the field of education, science, scientific-research institutions and consulting.[8]   The

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[7] Milanović, M., Stevanović, S., Đorović, M. (2008): "Developmental advantages and elements of the Belgrade agrarian-rural multifunctionality", International Scientific Meeting: Multifunctional Agriculture and Rural Development III – rural development and (un)limited resources, 4-5th December 2008, Faculty of Agriculture in Zemun – Belgrade, Book 2, pp. 83-89

[8] Cvijanović D. (2009): System of Education, Scientific-Research and Consulting Work in Agriculture of Serbia, page 61-72. 113th Seminar of the European Association of

substantial contribution and the major role in satisfaction of this important condition belongs exactly to science, profession, i.e. the adequate network of institutes and faculties, which would provide the inevitable support to enterprises in managing the transformation processes, as well as in creation of a new sector. Consequentially, there is necessary the decentralized and the regional approach to education. In such conditions, the educational structure of population in the Republic of Serbia represents a special challenge. The problems in accessing education have not been solved, a high dropout rate of children at all educational levels, and concerning most indicators we have brought up the rear in Europe.

Still around 10% of population do not finish the primary school (do not enrol in school or drop out during the primary education). Between 90-95% people enrol the secondary school, after finished primary school (around 80% of a generation), and around 15% of enrolled people do not finish the secondary education (approximately 35% of a generation). Only 13% finish two-year-college-level education or university education. Situation is slightly better if we look at the active population only, although the level is far lower than the EU average (19% with a tertiary diploma opposite to the EU average of 30%).[9] Reducing a number of persons who quit education and increase of the share of highly-educated population in the total population represented the challenge for the Republic of Serbia, too, and the EU has defined it as one of its priorities.[10] In the Danube district registers the following structure of population according to school qualification (*Table 1*):

- Without school qualification: 4,788;
- Incomplete primary education: 22,589;
- Primary education: 41,960;
- Secondary education: 81,802;
- Two-year-college-level education: 7,790;
- University education: 10,125;

Agricultural Economists (EAAE) – The role of knowledge, innovation and human capital in multifunctional agriculture and territorial rural development. Editors: Danilo Tomić, Zorica Valjiljević, Drago Cvijanović. Publisher: Institute of Agricultural Economics, Belgrade. December, 9th-11th 2009 Belgrade, Serbia.

[9] Poverty Reduction Strategy for the period 2011-2020, "Official Gazette of RS", no. 55/05, 71/05 – correction, 101/07, 65/08 and 16/11, p 19

[10] Poverty Reduction Strategy for the period 2011-2020, "Official Gazette of RS", no. 55/05, 71/05 – correction, 101/07, 65/08 and 16/11, p 19

Table 1. *Age of population 15 years and over according to the professional qualifications, Census for 2011*

Region Area Town-Municipa-lity	Total	Without school education	Incomplete primary education	Prima-ry educati on	Second-ary educati on	Two-year-college -level educati on	Univer -sity educa-tion	Unkn-own
Danube district	169,857	4,788	22,589	41,960	81,802	7,790	10,125	803
Velika Plana	35,093	1,100	5,709	9,340	15,991	1,296	1,456	201
Smederevo	91,562	2,573	10,176	22,532	45,248	4,482	6,140	411
Smed. Palanka	43,202	1,115	6,704	10,088	20,563	2,012	2,529	191

Source: *Municipalities and regions in the Republic of Serbia, 2013, Statistical Office of the Republic of Serbia, http://webrzs.stat.gov.rs/WebSite/*

The lack of qualified workforce, which would match the employers' requirements, i.e. deficit of competences and working skills, is the characteristic of workforce not only in *the Danube district*, the Republic of Serbia, but in most of the EU-member countries. It is difficult to expect that the existing educational system will be able to realign in the short term in accordance to changed structure of demand for labour, qualifications and skills.

The problem also represents the lack of the national qualification framework which implies the established qualifications, describes the qualification levels, relations, but also the totality of subjects and processes which concern their establishment, the method of acquisition, comparison, recognition, assurance of quality and standards, and which is adjusted to the European qualification framework.[11]

In accordance to the National Employment Strategy for the period 2011-2020, the key challenges in educational policy reflect, first of all, in insufficient adjustment of employment, education and scientific-technological strategies, lack of legislation in the field of the adults' education, connection of formal and informal education, and problems of lack of institutions in accordance with the needs of the adults' education quality standards.

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[11] Poverty Reduction Strategy for the period 2011-2020, "Official Gazette of RS", no. 55/05, 71/05 – correction, 101/07, 65/08 and 16/11, p. 19.

Creation and cancellation of jobs by the regions

The highest gross rate of jobs creation in the year 2011 had the region of Vojvodina. However, in this region has been realized at the same time the largest outflow of employees, so seemingly significant growth of employment has contributed the rate of newly-created jobs of 2.02%, or approximately near the republic average.[12] According to the same source, the Belgrade region had the lowest gross rates of creation and cancellation of jobs, so the gross rate of job creation had amounted 2.07%, or a bit more above the average net rate of created jobs in the Republic of Serbia. In the region of Sumadija and West Serbia was evaluated the highest net rate of job creation, which was amounted 2.25% in 2011, so it could be the important indicator of the regional economies recuperation. Meanwhile, in the region of South and East Serbia was realized the lowest net rate of job creation, 1.59 (*Table 2*).

Table 2. *Gross and net rates of creation and cancellation of jobs by the regions, in percentage, 2011*

Region	Gross rate of jobs creation	Gross rate of jobs cancellation	Net rate of jobs creation (+/-)
Belgrade Region	7.00	4.93	2.07
Region of South and East Serbia	7.05	5.46	1.59
Region of Kosovo and Metohija	0.00	0.00	0.00
Region of Sumadija and West Serbia	7.50	5.25	2.25
Region of Vojvodina	8.52	6.51	2.02
Total:	7.45	5.42	2.03

Source: *Employers Survey, National Employment Service, 2012*

The largest share of unemployed persons seeking employment for over 12 months (long-term unemployment – *Table 3*), has been recorded in Ras region (75.42%), Jablanica region (72.39%), Rasina region (71.53%), Morava region (71.36%) and Toplica region (70.54%), while the smallest share of long-term unemployment has been recorded in Central-Banat region (53.74%), North-Backa region (54.79%), Belgrade region (56.41%), Danube region (57.92%) and Branicevo region (58.56%).[13]

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[12] Analysis of labour market and forecasting needs on the labour market in the Republic of Serbia, National Employment Service, USAID, Belgrade, September 2012, p. 27.

[13] Work report of the National Employment Service for the year 2012, Belgrade, March 2012, p. 10.

Table 3. *Areas with the largest and the smallest share of long-term unemployed persons in the total number of unemployed persons in the district at the end of 2012*

Region	Share	Region	Share
Ras	75.42%	Central-Banat	53.74%
Jablanica	72.39%	North-Backa	54.79%
Rasina	71.53%	Belgrade	56.41%
Morava	71.36%	Danube	57.92%
Toplice	70.54%	Branicevo	58.56%

Source: *Work report of the National Employment Service for the year 2012, Belgrade, March 2012, p 10*

Trends on the labour market of the Danube district

The adequate goal is the affirmation of sustainable employment increase trend, which is followed by the growth of adult population share on the labour market, recognizing the reality and prospects of the *labour market in the Danube district*. Fulfilment of these two goals would decrease employment, as among persons who search for employment actively, as well as among discouraged persons who temporarily left the labour market.[14]

More significant improvement of terms on the labour market, which is expected after completing public companies restructuring in 2014, in the first phase will contribute not only to the employment increase, but also with additional inflow of unemployment, through comeback of inactive persons on the labour market. The most important factor that will affect the employment increase should be the establishment of new enterprises. Since in this scenario, a number of unemployed persons remain relatively stable and high, the primary power which has an effect on decrease of unemployment rate should be the employment growth.

Privatization of enterprises in Serbia aims to increase the total business efficiency. However, to obtain the ultimate goal, the side effects reflect in termination of jobs and lay-offs. Transition has been followed by the „transitional shock" which manifest through decrease of business activity

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[14] Mihailović, B., Paraušić, V., Simonović, Z. (2007): *Analiza faktora poslovnog ambijenta Srbije u završnoj fazi ekonomske tranzicije,* monograph, Institute of Agricultural Economics, Belgrade.

and price pressure. Likewise, after privatization there is the effect of the „neutron bomb" which reflects in significant lay-offs of workers in privatized enterprises.[15] In such conditions, according to evaluations of the World Bank, it is necessary to create 40% of the national income in a new sector, in order to annul negative effects of the transitional shock. Experiences of the transitional-leader countries point out to the significance of foreign investors, who have proved to be good owners, with great positive effects on growth of productivity, volume of production, investments in enterprises, etc. Partly is surprising a fact that there are some positive effects on employment growth in the long-term. Taking over enterprises by the foreign investors has brought about to significant reduction of an employee number. However, after implemented changes, investments and training companies for the competitive business on the world market, there notices a tendency of employees increase in these enterprises.[16]

According to data of the Statistical Office of the Republic of Serbia, in the Danube district in 2012 was registered totally 36,596 employed persons (*Table 4*). Thereby, 26,947 employees are in legal entities (companies, enterprises, institutions, cooperatives and other organizations) and 9,649 private entrepreneurs (self-employed persons) and their employees. In the Danube district register 185 employees/1000 inhabitants, while the average for the Republic of Serbia is 240 employees (in the Belgrade region 341).

Obviously, there is a significant regional asymmetry in the regional employment. In such conditions, there is inevitable an efficient income policy, which would represent an important factor of enabling environment for efficient business and investments and one of more important instruments for aggregate demand control, the price stabilization and the competitiveness increase. Synchronization of salaries trends and labour productivity growth should support long-term sustainable economic growth, increased investments in development, new technologies and new workplaces. It would lead to improvement of competitive ability of economy, and on the other hand, there would decrease the inflationary pressures.

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[15] Mihailović, B. (2007): *Uloga konsaltinga u restrukturiranju preduzeća u tranziciji*, monograph, Institute of Agricultural Economics, Belgrade

[16] Djankov, S. (2000): "Enterprise Restructuring in Transition: A Quantitative Survey", *World Bank Working Paper*, p 33

Table 4. *Emloyees, Annual average¹,* 2012

Region Area Town-Municipality	Totally employed²	Employees in legal entities (companies, enterprises, institutions, cooperatives and other organizations)³	Private entrepreneurs (self-employed persons) and their employees	Number of employees per 1000 inhabitants	
				Total	Employees in legal entities
REPUBLIC OF SERBIA	1,727,048	1,341,114	385,934	240	186
Belgrade region	566,807	468.706	98,101	341	282
Danube district	36,596	26.947	9,649	185	136
Velika Plana	7,212	4.449	2,763	178	110
Smederevo	21,228	16.138	5,090	197	150
Smederevska Palanka	8,157	6.361	1,796	164	128

Source: *Municipalities and regions in the Republic of Serbia, 2013, Employment and earnings, Republic Statistical Office, Republic of Serbia,* http://webrzs.stat.gov.rs/WebSite/

¹ Annual averages calculated on 31st March and 30th September

² Employees in legal entities have been comprised (companies, enterprises, institutions, cooperatives and other organizations), private entrepreneurs (self-employed persons) and their employees.

³ Employees in small companies have been included (up to 50 employees), who had not been comprised by a regular semi-annual research, but they had been assessed by the Survey for the supplement of semi-annual research on employees.

Increase of employment and salaries can be achieved by the improvement of technological production base of the privatized enterprises, with support of foreign direct investments, which enable not only transfer of technology, but also becoming familiar with modern management concepts and techniques.

The salaries and employment can be achieved by improving the education of the Danube district population in the field of entrepreneurship and agriculture as well, by which it would make a possibility of these husbandries transformation into the small and medium-sized enterprises in the field of agribusiness.

Consequentially, it would lead to reduction of the regional gap in employment and salaries. For example, in 2012, the average net salary in Belgrade was 51,121 RSD, while in the Danube district it was registered at the level of 38,588 RSD (*Table 5*).

Table 5. *Average net earnings, by the districts and municipalities, annual average*

Region	2008	2009	2010	2011	2012
Republic of Serbia[1]	32,746	31,733	34,142	37,976	41,377
City of Belgrade	40,089	39,862	42,489	46,986	51,121
Danube district	34,117	30,653	34,082	36,766	38,588
Velika Plana	28,403	26,958	28,832	32,872	37,215
Smederevo	37,586	33,115	37,524	40,458	41,499
Smederevska Palanka	28,877	26,642	28,216	29,118	31,509

Source: Republic Statistical Office, Republic of Serbia,
http://webrzs.stat.gov.rs/WebSite/
[1] Since 1999 without any data for AP Kosovo and Metohia

Technological potential of food industry

Technological backwardness of Serbian industry represents a serious obstruction to further development of industrial production and the high production standards and final products quality achievements, which today requires on high-developed countries markets.[17] In accordance to the surveyed 154 enterprises (small, medium and big-sized enterprises) in the whole Serbia the data shows that the average age of machines and equipment in food industry is 27.17 years (*Table 6*).

Table 6. *Technological backwardness of food industry in the Republic of Serbia – data by the regions*

Region	Economic branch	Number of enterprises per an economic branch	Average number of machines in enterprises	Average age (age of machine production/total number of machines)
Vojvodina	food	6	16	1987 (22)
Belgrade	food	6	14	1986 (23)
Central Serbia	food	5	12	1982 (27)
East Serbia	food	4	9	1980 (29)
West Serbia	food	4	20	1981 (28)
South Serbia	food	4	29	1975 (34)
Total number of enterprises in a sample		154		1980 (29.5)

Source: *Employers Union of Serbia, 2010, p. 4.*

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[17] Employers Union of Serbia, 2010, p. 4.

In Central Serbia, the average age of machines and equipment in food industry is around 27 years. It is obvious that without modern machines, the commodities made in Serbia cannot achieve the high quality standards and they cannot be competitive on foreign markets.[18] Mostly, the construction and the *level of technical-technological equipment* of food industry do not represent a limiting factor of agricultural production increase, but it significantly differs by the sectors. A specific number of enterprises is at the top of technical-technological equipment and disposes with highly-educated staff, while other enterprises lag behind the modern technological and marketing requirements. Since the beginning of the privatization process, the most was invested in oil industry, beer industry, dairy industry, confectionary industry and water processing industry, while on the other hand, less investments and less technological equipment were registered in sugar industry, meat industry, fruit and vegetable industry. At the same time, there is a relatively *low capacity utilization of food industry* (a level of capacities utilization, projected for the SFRY market and it ranges from 30% to 50%). The highest utilization level is regarding the capacities for mineral water production, oil refineries, mills, fruit and vegetable processing capacities, production of confectionery, breweries, dairies and sugar refineries.[19] The lowest level of utilization has the capacities for fodder processing and slaughterhouses, which causes inefficiency in business and poor competitiveness of this sector.

Restructuring of agricultural enterprises of the Danube district as an indicator of a need for highly-educated personnel

The agricultural enterprises of the Danube district have to make some significant changes in order to come out from the economic crisis. Restructuring can be defined as an activity that is carried out in an enterprise, which performances are declining, so an enterprise would survive and then make a shift towards the profitable business. Restructuring in our conditions have to cover all areas of enterprises in the Danube district. It implies that it has to accomplish as ownership, market, organizational, business and financial transformation. There many individual changes and interventions, which can be implemented in every enterprise aiming to improve the

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[18] Employers Union of Serbia, 2010, p. 5.
[19] Mihailović, B., Cvijanović, D., Cvijanović, G. (2010): "Analiza performansi preduzeća u agrokompleksu Srbije", *Zbornik naučnih radova 2010*, Vol. 16, no.1-2, Institute PKB Agroekonomik, Belgrade, pp. 265-273.

business results. When the performance of an enterprise cannot assess as satisfying, there are necessary the changes in organization, structure of jobs, assets of an enterprise and its financial structure, etc.[20] A need for restructuring makes demand for staff in this fields, which could be carriers and actors of economic changes. In practice, it appears to be a kind of a "personnel paradox". That is to say, in most of enterprises of the Danube district, it is necessary to make personnel restructuring, which mostly implies the reduction of employees' number, and at the same time they have a few relevant professional personnel. At the same time, employers would gladly employ quality highly-educated personnel because they know by experience that potential benefits of their engagement are greater than expenditures for their salaries.

Creating business-attractive agricultural enterprises initiates the need for personnel in the field of entrepreneurship and agriculture. It is necessary to profile personnel, who would help enterprises to make their goals, solve the problems related to business and management, identify and use new possibilities, increase their knowledge and to apply that knowledge practically. In the domestic economy, there is a lack of knowledge in the field of business planning, which is inevitable when opening small and medium-sized enterprises.[21] The essence of needed changes we can define as a new entrepreneurial society, which encourages taking risk and creates new entrepreneurial knowledge. Each dimension of enterprises restructuring is specific and it requires the professional expertise and experience of the personnel.[22]

- *Ownership restructuring* represents the privatization of domestic enterprises which results by transformation of social and state capital into equity.
- *Market restructuring* means redefinition of the market on which an enterprise appears, aiming to improve sales and business. There are numerous enterprises in the Danube district which treat the market

[20] Mihailović, B., Pejanović, R., Paraušić, V. (2012): "Enterprises' competitiveness advancement of Serbian agrarian sector through strategic planning and organizational changes", *Competitiveness of agro-food and environmental economy* (CAFEE`12), Bucharest academy of economic studies, Bucharest – 8-9 November 2012, pp. 53-61.

[21] Mihailović, B. (2008): "Uloga konsaltinga u razvoju malih i srednjih preduzeća u Srbiji", *Ekonomika Niš*, Faculty of Economics in Nis, Association of economists „Ekonomika" Nis, no. 1-2/2008. pp. 101-110

[22] Mihailović, B. (2007): *Uloga konsaltinga u restrukturiranju preduzeća u tranziciji*, monograph, Institute of Agricultural Economics, Belgrade.

research projects as a great and unnecessary expense since they consider that they completely know their customers needs, i.e. that they know well the market. However, the increasing number of enterprises understands the importance of the market and the approach to scientific methods in implementing this activity, or they leave it to the specialized institutions.

- *Organizational restructuring* represents the change of organizational model of an enterprise and a concept of functioning. It is necessary to conduct an analysis of organization, create intervention strategy, create the report, etc. The special expert teams engage in order to make the state diagnosis in an enterprise.
- *Business restructuring* results in significant changes in activities of an enterprise. The goal of these interventions is to increase the economic value of a firm and improve its negotiating power on the market.
- *Financial restructuring* involves a change in the capital structure of an enterprise, thus changing the relation between ownership and debt. The domestic enterprises have a disrupted financial balance, inappropriate structure of source of funds, as well as high indebtedness.

Restructuring of the agricultural enterprises of the Danube district is a consequence of a delayed reaction and adjustment to changes. However, the enterprises restructure in developed market economies. The difference is in a fact that their experience in market conditions makes them capable to adjust simultaneously and make changes in business, organization, a method of funding, etc. It can be expected that the domestic enterprises, after restructuring as a result of the economic crisis, will enter the period of efficient business, when it will be competent to adjust to modern trends. The essence of an enterprise restructuring in the Danube district is in increase of external and internal competitiveness through opening up to the international market and pressing forward making new small and medium-sized enterprises.

Development of human capital in agribusiness and more significant social inclusion

In the sector of agribusiness, education and extension represent the significant factors of business modernization. In support to this argument, there should mention the proven fact that investing in extension (and agricultural researches) brings around 40% of the average earning rates,

which is "much more than other investments in agricultural development".[23] Improvements of managerial abilities and skills can be achieved by the high-quality training and education. Steeve Goss, the consultant of the European Reconstruction Agency and the Ministry of Agriculture, Forestry and Water Management of RS, points out that good training and advices to agricultural producers are the most important and the most useful way of the state support. Development and improvement of human capital is of great importance for the employment strategy and policy. Raising the quality of labour force through education and trainings and social inclusion of individuals and groups, who are in the situation of social exclusion, will contribute to economic and social development of the Republic of Serbia.[24] Due to significance of the educational system development, it is very important to establish cooperation and coordination between the relevant actors, in order to manage education properly, spot defects responsible for dysfunctional relation among supply and demand on the labour markets and in order to create favourable social and business environment, which would instigate the investments.

Accordingly, in academic education exactly, the development of innovation and transfer of the innovative knowledge and technologies from the academic to the economic sector, represent the most important form of activities which stimulate development. In that sense, there should stimulate the mutual work of universities, research institutes and economy, as well as the use of equipment and knowledge of present at universities and institutes by the economic entities and *vice versa*, as well as the students' projects and practice. Labour market policies should increase the share of additional education and trainings program in measures of the active employment policy, which comprises various qualification and training programs, additional trainings and retraining, functional primary education of the adults, as well as to direct those programs to the most threatened groups on the labour market and the individuals with multiple-vulnerability factors, primarily through strengthening of capacities at the local level for improvement of education and training development. The training programs should adjust to the employers needs, as well as to the needs of individuals, aiming to increase competitiveness.

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[23] Van den Ban, A.W., Hawkins, H., S. (1996): Agricultural Extension, Blackwell Science, UK, p. 13.
[24] National Employment Strategy for the period 2011−2020 , „Official Gazette of RS", no. 55/05, 71/05 − correction, 101/07, 65/08 andi 16/11, p. 24.

Conclusion

Research has shown that it is necessary to promote the entrepreneurship and the entrepreneurial learning and education. The support reflects in providing consulting services, as well as on encouraging self-employment through continuous entrepreneurial education and training. Many factors affect less investment in the Danube district, primarily high commercial and non-commercial risks, slow economic transition and underdeveloped institutions, which, in practice, guarantee rights deriving from the private property and the contracts. Serbia has to encompass its self in territorial, status and economic sense, as well as to finalize the privatization of enterprises, as the main lever of the market economy affirmation. Improving business conditions in the Danube district requires that the competitiveness sources move toward high education, the efficient market and the ability to earn on the existing technology, i.e. the focus of the economy should be moved from the physical resources toward knowledge. This is especially since many enterprises in the Danube district have unfavourable business performances, which manifest through declining the market share and profitability, the increase in borrowing, inadequate investments and increased volume of new business ventures at the expense of a primary business. It is evident that adequate entrepreneurial knowledge and innovated managerial skills are necessary.

More important role of the states is to implement the necessary structural reforms in order that the investments in education and innovations could benefit. That is to say, the state funds are anyway meager; therefore they should be engaged where they can return the best. If a state has a lack of the institutional framework and innovation and information infrastructure or a lack of suitable sets of economic policies and incentives, insufficient correlation between the scientific institutions and the private sector, inadequate educational system and similar, the funds used for support to research and development, as well as innovations might be just wasted.

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FORECASTING OF REPRODUCTION PARAMETERS AND RATIONALE FOR STATE SUPPORT OF AGRICULTURAL ENTERPRISES

Darya Sidorova[1], Alexander Tenishchev[2]

Summary

The article deals with the contradictions between the existing reproduction parameters in the agricultural sector and the need to maintain and increase the production volumes established up to Russia's WTO accession due to domestic sources of financing in the medium term. To determine the rational reproduction parameters and justify the most appropriate directions of state support of the agrarian sector enterprises, the authors developed a simulation model of forecasting the reproduction process, the use of which allows estimating the change in its parameters in the future, taking into account the impact of various economic factors. As a result of the conducted research the differentiation of state support for agricultural producers is proposed, depending on the type of reproduction provided by them, and taking into account the requirements of the WTO.

Key words: *agriculture, reproductive process, simulation modelling, state support.*

Introduction

Agriculture is one of the most important sectors of the economy of any country that provides the population with food, supplies a significant part of raw materials for light, food and processing industries. The existing form of agricultural reproduction has a substantial impact on the state of

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the industry: consumption volumes of means of production by the industry affect the pace of development of agricultural machinery, automotive and chemical industries.

Therefore, currently one of the basic conditions for food security of every state is the steady development of the domestic production of high-quality agricultural products (Van Broekhuizen R., et al, 2015; Daly S., 2015; Moragues-Faus A., 2014; Syomin A. N., Kibirov A. Ya., 2013; Schmook B., et al, 2013; McMichael P., 2012), which is based on sustainability of the reproduction process in agriculture, which requires scientists around the world to develop tools to maintain the continuity of the reproduction process in the agricultural sector and enhance its effectiveness (Koval O. M., 2013; Sigarev M. I., et al, 2015; Stadnik A. T., et al, 2015; Giray H., 2012).

However, the modern forecasting techniques for the parameters of agricultural reproduction are practically absent, and therefore require active scientific research in this area. The main purpose of the work is to determine the rational reproduction parameters through the use of simulation modelling and study the most appropriate directions of state support of the agrarian sector enterprises, which determines its relevance.

Material and Methods

The object of the study is the large and medium size agricultural enterprises of the second natural-economic zone of Stavropol Territory.

The subject of the study is the set of methodological and practical aspects of the reproduction process in agriculture.

Despite the large number of works in the field of agricultural reproduction parameters forecasting, there is currently insufficient number of ways to determine its rational parameters, the use of which would help to assess the impact of various economic factors on it. The most successful solution of this problem can be through the use mathematical modelling methods, which allows us, to play different situations and avoid fundamental mistakes. With that in mind, based on the proposed by S. B. Gilev mathematical model of the reproduction process in agriculture, in the spreadsheet application Microsoft Office Excel, we developed a simulation model for the reproduction process forecasting in order to assess the perspective change of its parameters under the influence of

various economic factors: production costs, proceeds from its implementation, cost recovery, inflation level, dividend policy (Gilev S. B., 2000).

The model has a universal character and allows building different scenarios of the reproduction process, both for certain companies and for their groups a specific type of reproduction. Moreover, the use of this model allows forecasting the need of agricultural organizations in the investment resources required to make up capital as well as circulating assets.

The data for the practical approval of the proposed simulation model were extracted from the annual reports of agricultural enterprises of the second natural-economic zone of Stavropol Territory.

Results

In modern agriculture, one of the main indicators characterizing the efficiency of production in the industry is the level of profitability. As it is known this indicator demonstrates that all production costs are recovered by the proceeds in cash, the costs are reimbursed, then the profits are generated.

However, it should be noted that profitability does not allow determining whether it was possible for agricultural enterprises to update machinery, adopt new intensive technologies and modern methods of farming. Consequently, using only this indicator is impossible to estimate the parameters of the reproduction process, emerging on each individual enterprise under the influence of a variety of both internal and external factors, the direction of which is ambiguous.

When constructing the proposed simulation model of the reproduction process forecasting in agriculture indicators of cost recovery were used instead of the level of profitability indicators, because, in your opinion, it is more indicative of the results in a particular production cycle.

Besides, it was taken into account that each factor of production contributes to the creation of products, while there is a definite relationship between the volumes of production and essential factors, as well as among the factors of production themselves.

367

The developed model was tested on the example of the three groups of agricultural enterprises of the second natural-economic zone of Stavropol Territory, providing simple, expansion and contraction types of reproduction (Sidorova D. V., 2012; Skripnichenko Yu. S., Eremenko N. V., 2012).

For the construction of these models the average indicators of production costs value, the proceeds from its sale, as well as inflation in 2009-2011 were used. In addition, it was considered acceptable that current tendencies of change in production volumes, cost recovery and the rate of accumulation in each subsequent production cycle remain unchanged.

It was also assumed that after the completion of the year, the part of the net income is spent on consumption in the form of dividends payment, and the remaining net income corresponding to the rate of accumulation of 0.5, is reinvested in production. The adopted level of consumption provides the payment of dividends at the enterprises of the first cluster equal to the amount of 0.04 rub. per 1 ruble of own funds, of the second cluster - 0.03 rubles. At higher rate of accumulation, in our opinion, for an extended period it is impossible to renew the industrial relations.

When constructing the simulation model of the reproductive process forecasting for enterprises, providing simple reproduction, it was considered that the agricultural enterprises of the group, providing constant in real terms production volumes achieved average sales revenue amounting to 161.73 million rub. when production costs were 145 790 000 rub. and, accordingly, their cost recovery was 1,109 (Table 1).

The analysis of calculation results revealed that under the influence of inflation in each subsequent cycle of production prices for material resources and agricultural products grew, and therefore production costs and revenue from its implementation increased. It should be noted that inflation is a factor that has a particularly negative impact on the process of reproduction in agriculture.

As it was revealed earlier, the requirement of simple reproduction, taking into account the impact of inflation processes is to have sufficient funds for the purchase of material resources at the beginning of each subsequent production cycle of the enterprise in the same amount, but at increased prices.

Table 1. *The forecast scenario of reproduction for enterprises providing a simple form of it*

Indicators		The average for 3 years	The year of the forecast period					
			1	2	3	4	5	6
Revenue from sales, mln. rub.		161.7	174.1	187.4	201.8	217.2	233.8	251.7
The growth rate of production volumes		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Inflation index: annual		-	1.077	1.077	1.077	1.077	1.077	1.077
for the forecasting period		1.00	1.077	1.159	1.248	1.343	1.446	1.556
Costs for 1 rub. of revenue, rub.		0.90	0.90	0.90	0.90	0.90	0.90	0.90
Change in cost, %		1.000	1.077	1.159	1.248	1.343	1.446	1.556
Production costs, mln. rub.		145.8	156.9	168.9	181.	195.8	210.8	226.9
Costs for simple reproduction, mln. rub.	total	145.8	156.9	168.9	181.	195.8	210.8	226.9
	at the expense of returned costs	-	145.8	156.9	168.9	181.9	195.8	210.8
	at the expense of net income	-	11.1	12.0	12.9	13.9	15.0	16.1
The need for expanded production costs at the expense of net income, mln. rub.		-	0.0	0.0	0.0	0.0	0.0	0.0
Net income, mln. rub.	total	15.9	17.2	18.5	19.9	21.4	23.0	24.8
	dividends	7.9	8.6	9.2	9.9	10.7	11.5	12.4
	accumulation fund	8.0	8.6	9.3	10.0	10.7	11.5	12.4
	the lack of working capital financing (-)	-	-2.57	-2.77	-2.98	-3.21	-3.46	-3.72
The share of the accumulation fund for the simple reproduction of working capital		-	0.0	0.0	0.0	0.0	0.0	0.0
The share of the accumulation fund for the expanded reproduction of working capital		-	0.0	0.0	0.0	0.0	0.0	0.0
The balance of own funds for capital investments, mln. rub.		-	0.0	0.0	0.0	0.0	0.0	0.0
The share of net income on capital investments		-	0.0	0.0	0.0	0.0	0.0	0.0
The cost fixed production assets, mln. rub.		217.1	214.5	211.7	208.7	205.5	202.1	198.3

Source: *own calculations*

For the annual maintenance of invariable in real terms production volumes, enterprises have to compensate the effects of inflation due to their profit.

However, while maintaining the existing level of the rate of accumulation and cost recovery, as calculations showed, its size, starting with the first simulated year becomes insufficient to maintain the simple reproduction, with its own sources of capital investments are absent (share of net income allocated for capital investments is 0.3).

The above situation leads to the necessity of depreciation charges misuse and reduction of the nominal value of fixed production assets at the end of the sixth production cycle compared with the base period by 9%, while the real value - to a much greater extent.

As a result, both quantitative and qualitative characteristics of the means of production will decrease, as well as their operational capabilities. From the above it can be concluded about the deterioration of the reproduction process parameters in the agricultural enterprises of the group while retaining its trends.

Change of the model parameters allowed determine that for providing the simple reproduction at enterprises of this group the cost recovery should not be below 1.15, which, according to our calculations, corresponds to the level of profitability of 30-35%.

To ensure the expanded reproduction the cost recovery should exceed 1.61, which corresponds to the level of profitability of 80-90%. These results will provide an appropriate inflation rate and the rising cost of basic means of production.

In Table 2 the impact of various economic factors on the reproduction process parameters at enterprises is simulated that have been identified by us as the leading in extended reproduction, as evidenced by the growth rate of output in real terms (average for 2009-2011 - 13.2%) .

The average annual proceeds from sales are 272.43 mil. rub., the production costs are 255.56 mln. rub., and their return on investment is 1.066 mil. rub.

The lower level of cost recovery in comparison with enterprises carrying out the simple reproduction is connected with the fact that by sending considerable amounts of money for updating of production fixed assets, enterprises get the products at a higher production costs, primarily due to depreciation.

Table 2. *The forecast scenario of reproduction for enterprises providing an expanded form of it*

Indicators		The average for 3 years	The year of the forecast period					
			1	2	3	4	5	6
Revenue from sales, mln. rub.		272.4	332.0	404.6	493.0	600.8	732.1	892.1
The growth rate of production volumes		1.132	1.132	1.132	1.132	1.132	1.132	1.132
Inflation index: annual		-	1.077	1.077	1.077	1.077	1.077	1.077
for the forecasting period		1.00	1.077	1.159	1.248	1.343	1.446	1.556
Costs for 1 rub. of revenue, rub.		0.94	0.94	0.94	0.94	0.94	0.94	0.94
Change in cost, %		-	1.077	1.159	1.248	1.343	1.446	1.556
Production costs, mln. rub.		255.6	311.4	379.5	462.5	563.6	686.7	836.9
Costs for simple reproduction, mln. rub.	total	255.6	275.1	296.2	318.8	343.2	369.5	397.7
	at the expense of returned costs	-	255.6	275.1	296.2	318.8	343.2	369.5
	at the expense of net income	-	19.5	21.1	22.6	24.4	26.3	28.2
The need for expanded production costs at the expense of net income, mln. rub.			36.3	83.3	143.7	220.4	317.2	439.2
Net income, mln. rub.	total	16.9	20.6	25.0	30.5	37.2	45.3	55.2
	dividends	8.4	10.3	12.5	15.2	18.6	22.6	27.6
	accumulation fund	8.5	10.3	12.5	15.3	18.6	22.7	27.6
	the lack of working capital financing (-)	-	-45.6	-91.9	-151.0	-226.1	-320.9	-439.8
The share of the accumulation fund for the simple reproduction of working capital			0.0	0.0	0.0	0.0	0.0	0.0
The share of the accumulation fund for the expanded reproduction of working capital			0.0	0.0	0.0	0.0	0.0	0.0
The balance of own funds for capital investments, mln. rub.			0.0	0.0	0.0	0.0	0.0	0.0
The share of net income on capital investments			0.0	0.0	0.0	0.0	0.0	0.0
The cost fixed production assets, mln. rub.			312.0	305.8	299.7	293.7	287.8	282.0

Source: *own calculations*

The analysis of the calculation results shows that in this group of enterprises as well as at enterprises providing a simple form of reproduction, the impact of inflation processes leads to even more negative consequences.

Even in the first forecasting production cycle the amount of net income, while maintaining the rate of accumulation and the payback is not enough to maintain even the simple reproduction.

At the same time the shortage of net income, required for the expansion of production, increased from 46 to 440 mln. rub.

As a result, the cost of fixed production assets will be reduced as amortization charges must be fully directed to working capital financing.

It should be mentioned that at the established rate of inflation during the last 3 years at the enterprises of this group from their own sources of investment, the simple reproduction is possible only under the condition of maintenance the cost recovery at least at the level of 1.15.

But for production growth by only 5% per year the cost recovery should reach a value not less than 1.61, which, according to our calculations, corresponds to the level of profitability over 80%.

The cost of fixed production assets at the same time may be increased in 1.56 times, which almost corresponds to the rate of inflation.

The construction of the simulation model of the reproductive process forecasting for enterprises providing narrowed reproduction showed the following.

The annual average growth rates of production volumes in real terms at the enterprises of the group, as well as at the agricultural enterprises, leading a simple reproduction, virtually equal to 1.

However, production costs exceed the revenues from its implementation (on average for 2009-2011 by 15%), and thus there is no net income when level of profitability is 5% (Table 3).

Thus, the definition of these enterprises as performing narrowed reproduction is quite justified.

In such circumstances of management, the compensation of inflation effects is not possible, and therefore it is impossible to replenish the resources required for the implementation of the simple reproduction. Their shortage for the forecasted 6 years will be about 118 mln. rub.

Table 3. *The forecast scenario of reproduction for enterprises providing a narrowed form of it*

Indicators		The average for 3 years	The year of the forecast period					
			1	2	3	4	5	6
Revenue from sales, mln. rub.		96.4	103.8	111.7	120.2	129.4	139.3	150.0
The growth rate of production volumes		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Inflation index: annual		-	1.077	1.077	1.077	1.077	1.077	1.077
for the forecasting period		1.00	1.077	1.159	1.248	1.343	1.446	1.556
Costs for 1 rub. of revenue, rub.		1.15	1.15	1.15	1.15	1.15	1.15	1.15
Change in cost, %		1.000	1.077	1.159	1.248	1.343	1.46	1.556
Production costs, mln. rub.		110.8	119.2	128.4	138.2	148.8	160.1	172.4
Costs for simple reproduction, mln. rub.	total	110.8	119.2	128.4	138.2	148.8	160.1	172.4
	at the expense of returned costs	-	110.8	119.2	128.4	138.2	148.8	160.1
	at the expense of net income	-	8.4	9.2	9.8	10.6	11.3	12.3
The need for expanded production costs at the expense of net income, mln. rub.		-	0.0	0.0	0.0	0.0	0.0	0.0
Net income, mln. rub.	total	-14.4	-15.5	-16.7	-18.0	-19.3	-20.8	-22.4
	dividends	-7.7	-7.7	-8.3	-9.0	-9.6	-10.4	-11.2
	accumulation fund	-7.8	-7.8	-8.4	-9.0	-9.7	-10.4	-11.2
	the lack of working capital financing (-)	-16.2	-16.2	-17.5	-18.8	-20.2	-21.8	-23.5
The share of the accumulation fund for the simple reproduction of working capital		-	0.0	0.0	0.0	0.0	0.0	0.0
The share of the accumulation fund for the expanded reproduction of working capital		-	0.0	0.0	0.0	0.0	0.0	0.0
The balance of own funds for capital investments, mln. rub.		-	0.0	0.0	0.0	0.0	0.0	0.0
The share of net income on capital investments		-	0.0	0.0	0.0	0.0	0.0	0.0
The cost fixed production assets, mln. rub.		119.3	114.5	109.9	105.5	101.3	97.3	93.4

Source: *own calculations*

Study of the consequences of changes in parameters of the model showed that the simple reproduction in this group of enterprises (similarly as at enterprises, providing a simple form of the process under study) is possible, while ensuring cost recovery of 1.15 or level of profitability of

30-35%, 6-7 times higher than its value on an average for 2009-2011. The cost of the basic means of production while using its own sources of financing may be increased only by 10-12%, which is 5 times lower than the rate of inflation. It should be noted that even with cost recovery at the level of 1.61 only the real level of capital-labor ratio can be saved.

Thus, based on the analysis of the results it has been determined that to maintain the production volumes at the enterprises of all groups, the cost recovery should not be below 1.15, which corresponds to the level of profitability 30-35%, that is 1.5 times higher in relation to the achieved during the period 2009-2011. (Table 4).

In accordance with the indicators of the "State agriculture development program and regulation of markets for agricultural products, raw materials and food for 2013-2020" to ensure expanded reproduction in the agrarian sector it is necessary to increase the growth of production volumes by 3.3-3.4%. In our opinion, for such agricultural region, as Stavropol Territory, this figure should be at least 5%.

Table 4. *Forcasting reproduction parameters*

Parameters	Type of reproduction		
	Simple	Expanded	Narrowed
To save the average production volumes:			
payback, %	115		
profitability level, %	30-35		
increase in the cost of fixed assets, %: nominal	1.3	28.4	10.9
real	-34.9	-17.5	-28.7
To ensure the growth rates of production volumes 5%:			
payback, %	161		
profitability level, %	80-90		
increase in the cost of fixed assets, %: nominal	45.3	94.6	61.9
real	6.6	25.1	4.9
capital-labor ratio in% to the second cluster	41.4	100.0	17.3

Source: *own calculations*

To ensure the expanded reproduction in these farms, the level of profitability should exceed 80%. These financial results provide real growth of fixed assets only for enterprises, which provide simple and

expanded reproduction. However, enterprises of the first group will not be able to reach even the currently existing level of capital-labor ratio of the latter. The results of the study allow concluding that the reproduction process parameters in agriculture influence on the cost recovery, the rate of accumulation and the rate of inflation. Thus, inflationary processes have the greatest impact on the activities of agricultural enterprises, which are entirely dependent on the government policy.

In turn, it is possible to suppress their negative impact only by increasing the rate of accumulation or the cost recovery. However, in our opinion, the use of the first method is rather limited, since no or low dividends make the production relations impossible and first of all, property relations.

As a result, there will be a reduction of insufficient investment attractiveness of agriculture and the outflow of funds into other more profitable industries. Therefore, the main way to preserve the existing parameters of the reproduction process is to increase the economic return on the basis of transition to innovative production, which is possible under the condition of adopting appropriate measures of state support.

We believe that under conditions of limited allocated for these purposes budgetary funds such measures should be differentiated, taking into account prevailing at each enterprise type of reproduction and forecasting of its improvement possibility in the medium term. Developing measures to improve the reproduction of the industry, it must also be taken into account that at the moment of Russia's accession to the WTO, in accordance with the requirements of the organization, the terms and conditions of support for agriculture are different.

The main innovation is the reduction of measures for direct support of agricultural production and making distorting effects on trade, the so-called "yellow" basket, and the increase of measures of "green" basket, contributing to the improvement and development of the production in the industry. In accordance with the above, for the first group of enterprises, the scientific support of innovative development acquires a special significance. It should be noted that the I. G. Ushachev also points to the need to introduce the achievements of agricultural science and continuous improvement of knowledge for the stabilization process of reproduction in agriculture (Ushachev I., 2012).

Scientific support of agricultural reproduction takes place outside the framework of a particular enterprise and includes the search for modern methods of management, as well as conducting research in the field of improvement of existing and creation of new science-based technologies, machinery systems and equipment for the production, processing and storage of crop and livestock products taking into account the capacity of a specific region. These measures will allow reduce production costs, and thus increase their return on investment.

However, innovation does not often reach the specific enterprise. Therefore, the state should encourage not only scientific research, but contribute to the implementation of its results. In order to increase the demand for the achievements of agricultural science their approbation on simulative enterprises is required, since only assessing benefits of innovation, enterprises can improve their practical interest to them. As the research and development themselves, their implementation should be supported by the state.

A significant impact on the state of the reproduction process in the agricultural enterprises is made by the instability of the industry, caused by daily, seasonal, interannual variations in natural and economic cycles. From unpredictable weather conditions prevailing under the influence of these variations, crop productivity is directly dependent, in its turn, affecting the revenue and, consequently, profit of the enterprises, which is one of the main sources for reproduction. This fact makes it necessary to use measures for stabilization of production in the agricultural sector, including agricultural insurance, which is also included in the "green" basket of state support measures. It is noteworthy that in recent years only about 30% of agricultural enterprises in Stavropol Territory have resorted to the insurance industry, while the share of insured acreage of crops in the total area does not exceed 20-30%, almost 100% of which are plantings of winter crops. From the above follows that insurance in Stavropol Territory is underdeveloped.

It is necessary to take into account the fact that the machines and tractors at agricultural enterprises, leading a simple reproduction, both morally and physically become outdated (Sidorova, 2012). This means that these enterprises must use the investment loans for modernization and subsidies within the "green" basket of state support of agriculture. Furthermore the maximum efforts should be made to attract foreign investments.

Rationalization of the reproduction process in enterprises, carrying out an expanded view, the studied process can be achieved by using previously proposed activities. Since enterprises in this group have their own funds, in order to increase the efficiency of agricultural production, the most attention should be paid to the implementation of new technologies.

To restore the parameters, required for simple reproduction at the enterprises, ensuring its narrowed form, the increase of high payback almost 2 times is required. In this regard, the use of measures included in the "green" basket of state support is not enough and during the next 3-4 years it is necessary to resort to measures of "yellow" basket, that at the time of WTO accession should be reduced, but companies of this group cannot do without them.

As conducted studies have shown, at these enterprises not only the basic but also the working capital, needed for reproduction is not recreated. Therefore, the main importance in the financing of productive activities is given to short-term loans. Functioning in terms of inflation annually increases the need for funds not only for the acquisition of material resources, but also for the service of the involved loans.

As a result, they are actually unprofitable, as the profit of these enterprises is often lower than bank interests. This requires subsidizing interest rates on loans for this group of enterprises. It is important to note that the low efficiency of enterprises activities complicates their access to loans. It is possible to solve the problem first of all by giving short-term loans secured by future production, as well as attracting regional authorities to guarantee.

Significant costs are due to high energy tariffs, prices for mineral fertilizers, plant protection products, seeds, feeds, resulting in need of partial compensation of costs for their acquisition, is also carried out in the framework of the "yellow basket" of state support for agriculture. It is also necessary to ensure strict monitoring from the state for the effective utilization of the budget funds. However, these activities are not enough to recreate the fixed assets of enterprises with narrowed reproduction, and therefore they need to actively contribute to the search for external investors. Using the proposed measures should help to restore the rational parameters of the reproduction process in enterprises of each of the three groups under consideration.

Conclusions

The proposed simulation model for the reproduction process forecasting may find practical application in the medium- and long-term forecasting and planning of the region development. Currently, the key parameters of the industry development are determined, often on the basis of extrapolation or the method of "from the achieved level", and their scenario differences may be determined subjectively or, at best, expertly. The usage of the proposed model will improve the validity of the medium and long term planning of the industry development, taking into account the existing potential.

Moreover, this simulation model, the possibilities of which are considered on the example of Stavropol Territory, can be used at the federal and international levels, especially if the calculations will be carried out region-wise. In addition to the above, the observation can be both selective and continuous. Consolidation and comparison of the results enables the management bodies in agriculture come up more reasonable to determining the size, direction and differentiation of state support for the industry, necessary to ensure the innovative development of enterprises. As a result, the targeting and efficiency of budgetary funds will improve, and state authorities will be able to really manage the reproduction process in one of the most important sectors of the economy.

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AGRICULTURAL EXTENSION SERVICE IN VOJVODINA: EVALUATION OF EXTENSION WORK WITH FARMERS IN VOJVODINA

Dejan Janković, Marina Novakov[*]

Abstract

In this paper, the authors analyze selected data from the evaluation of extension service in Vojvodina, Republic of Serbia, which was conducted during 2012 and 2013. The paper points to the importance of theoretical and methodological frameworks for extension evaluation in general, but also to theoretical and hypothetical framework that was used for the conducted evaluation. Selected results from this research show that the characteristics of the selected farms significantly differ from the Serbian average (a larger farm size, higher education level…), and that the most commonly used are (expensive) individual methods in extension work, mainly for the transfer of technologies and information to the farmers. The farmers' attitudes regarding quality of their cooperation with the extension service of Vojvodina are positive.

Keywords: *evaluation, agricultural extension service, Vojvodina*

Introduction

Monitoring and evaluation are two processes of great importance for the successful functioning of the institutions of agricultural extension and advisory process. However, in many extension systems they are often ignored. According to the findings of the FAO, only about half the national extension systems have some sort of monitoring and evaluation within their system. What is even more disappointing is the comment that even these existing functions of monitoring and evaluation are often

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disorganized, lacking systematic approach, *ad hoc* carried out and only limited to certain areas. Negative attitude towards monitoring and evaluation and the relatively high costs for these activities are considered to be the underlying causes of this situation (Swanson, Bentz and Sofranko (Ed.) 1998). The theory that deals with issues of monitoring and evaluation, contains a number of definitions of these terms, the debate on the methodology of performance (qualitative and quantitative methods), attitudes about the functions of these indicators, attitudes on the use of evaluation results, the impact evaluation on stakeholders etc. To the same extent that is necessary to plan extension programs, it is necessary to carry out the monitoring process and evaluation. It is very logical that that we ask ourselves to what extent we have achieved what was planned, where were difficulties in achieving what was planned, what it means for planning of future activities, whether resources were properly used, to what extent farmers participated in the realization of the planned activitie etc. In this sense, all stakeholders in AKIS should be interested in such analysis (Janković & Petrović in Petrović (ed). 2007: 198-221).

Agricultural extension for farmers in Vojvodina is a relatively new and has started since 2000. In the former Yugoslavia, as well as in Serbia – Vojvodina, extension activities were mainly practiced on large state (social) farms, the so called "Agro-kombinats", which were established under the former socialist system. The network of agricultural stations (services, agro institutes) provided and charged for expert help for the Agro-kombinats (with which they were even integrated for some time), agricultural cooperatives and other agricultural organizations. During that period, extension activities relating to the farming community was minor and mostly done through winter lectures in villages and via field days. With disintegration of Yugoslavia and privatization of Agro-kombinats, the network of agricultural stations have had to be transformed and in new conditions they have had to orientate their extension activities much more towards the farmers. As a result of transformation in 2007, the Agricultural Extension Service has been established in Vojvodina. In establishing a new and different Agricultural Knowledge and Information System, this extension service finds itself faced with plenty of demands and problems in its work (Petrović (ed). 2007).

Since 2000, agricultural extension service in Vojvodina has never been evaluated if we have in mind systematical evaluation of activities of the extension service, especially with farmers. Extension activities have been monitored and "evaluated" in a strict administrative sense by Provincial Secretary of Agriculture, Water Management and Forestry. Authors may also claim that, beside similar administrative "evaluation" in Republic of

Serbia in general, there have never been any (publicly known) systematical evaluations of agricultural extension service in Serbia at all, especially those that involve feedback from farmers who use extension services. This is not surprising if we have in mind that evaluations of such kind are pretty rare and if they exist, the results are often used for internal purpose. In this paper, authors will present only some basic findings from the evaluation of Vojvodinian Extension service that has been conducted during 2012 and 2013[1].

Theoretical and methodological framework of the evaluation of extension

Monitoring in the extension includes continuously checking of the progress in achieving the extension program, based on the overall planning and planning of activities and resources (budget planning). It identifies the need for relatively short-term measures that would correct the deviation from the planed. Unlike monitoring, evaluation involves periodic verification of the effects of extension. It rethinks the extension concept/methods and their effectiveness. The evaluation identifies the medium- and long-term adaptation of the extension plans, as well as the need to modify them. The first question that arises is: what should be evaluated? While this seems simple, many authors suggest that the answer to this question is not simple. There are different levels of evaluation extension program (Van Den Ban and Hawkins 1996: 206).

8. Consequences for society
7. Consequences for the target group
6. Behavioral changes in the target group
5. Changes in knowledge, attitude, skills, motivation and group norms
4. The farmers' opinion about extension activities
3. Farmers' participation in extension activities
2. Implementation of the programme by extension agents
1. Programming of the extension activities.

As already mentioned, the evaluation requires significant financial resources, especially if the implemented from an "outside". There are certain assumptions about the advantages and disadvantages of external and internal evaluation.

External evaluators: can take a "fresh" look at the program; not personally involved, so it is easier to be objective; they are not a part of the normal power structure; gain nothing from the program, but may gain prestige from the evaluation; trained in evaluation methods, may have experience in other evaluations; regarded as an "expert" by the program; an "outsider" who may not understand the program or the people involved; may cause anxiety as program staff and participants are not sure of his or her motives.

Internal evaluators: know the program only too well; find it hardest to be objective; are a part of the power and authority structure; may be motivated by hopes of personal gain; may not be specially trained in evaluation methods, have no more (or a little more) training than others in the program; are familiar with and understand the program, and can interpret personal behavior and attitudes; known to the program, so pose no threat of anxiety or disruption, final recommendations may appear less threatening (Hoffmann et al. 2009: 190)

Agricultural Extension Service of AP Vojvodina (further PSS APV) is operating in the territory of APV in the jurisdiction of the Province Secretary of Agriculture, Water Management and Forestry within the organization of 13 agricultural stations. One part of authority in the work of agricultural stations, and partly their advisory work, is in the jurisdiction of the Ministry of Agriculture, Forestry and Water Management.

As already mentioned, the development of extension activities in relation to farmers takes place in the last fifteen years and significant role in the organization, financing and control of these activities has a province Secretary. In accordance with the importance of the agriculture sector in APV, the role of agricultural extension is of particular importance for raising the level of knowledge, abilities and skills of producers and the application of new technologies in order to modernize agriculture. These needs in the agricultural sector, and the importance of PSS APV and in Serbia as a whole, have been recognized in many strategic documents in the Republic of Serbia.

In accordance with specifics of Vojvodina as a region with highly productive agriculture and integrated economy and the specifics of inherited organization and structure of the system of agricultural stations, Vojvodina (as region) has huge interest (in accordance with the principles of decentralization) to improve the organization and functioning of the PSS in its territory. The organization and financing of the PSS APV, within the (state owned) agricultural stations network, takes place as a state-organized and funded extension service which is free of charge for farmers. In this framework extension activities are conducted mainly within the concept of selected farms and activities with producers through the winter schools and lectures, the mass media, on the field days, practical demonstrations and similar.

The overall objective of the project was to evaluate the PSS APV because there was a great need for an analysis of this institution with the aim of detecting opportunities for improvement and extension work in order to eliminate deficiencies in its functioning. Project activities focused on the analysis of two interconnected segments:

1. Evaluation of the functioning of PSS APV – based on the analysis of activities of key stakeholders in the extension in Vojvodina;
2. Evaluation of the method and effects of extension service on the basis of existing documentation and a random sample of cca. 300 selected farms with which the advisers cooperated in the period from 2007 to 2009.

The purpose of the analysis of the first segment of research was the analysis of the whole system and the way the PSS APV functions because it represents an objective macro conditions and factors affecting the extension activities in the Vojvodina. The purpose of the analysis of the second segment was to analyze the ways and the effects of extension services in relation to the target groups, i.e. the analysis of the adequacy of the response to the needs of target groups (farmers). An integral part of this segment was basically an analysis of all indicators of their work (effectiveness, efficiency, relevance, quality of work and satisfaction of farmers etc.).

The problem of evaluation could have been even more widely grounded, but for this occasion the research team believed that it was important for the analysis to show how the macro objective factors, such as the organization, financing, planning etc., affected the extension process. Also, it was important to investigate the influence of the mezzo level in extension such as the organization of extension work within the

agricultural stations and, finally, how is it affected by the micro level that involves the level of the extension agent, characteristic of his/her work, the degree of farmer satisfaction with the service. In accordance with so defined research problems, target group of evaluation covered both the Secretariat and agricultural stations, but also extension agents and farmers (as end users of the services i.e. clients).

In the evaluation process the research team insisted on maximum participation of all stakeholders and research has been carried out with the aforementioned key stakeholders of advisory process in Vojvodina which has resulted in a very good basis for evaluation analysis and interpretation of data. This was considered as important feedback for all stakeholders in the extension system concerning the advantages, disadvantages, recommendations for improvement, etc.

Key activities of the evaluation team related to the analysis of existing documentation regarding extension activities (plans, programs, budgets, monitoring system - a system of information, supporting documents, records, decisions) and analysis of information obtained by interviews, surveys, focus groups with all of the stakeholders: management of the extension on the level of the province Secretariat; management on the level of agricultural stations; discussions with 92 advisors engaged in extension work with selected farms and approx. 300 selected farms. Certainly, the largest research effort was to use semi-structured interviews with a sample of approximately 300 selected farms in Vojvodina. The project team considered that the evaluation must try to include all relevant issues related to the work of PSS APV and those were targeted in accordance with the principles of evaluation recommended by the FAO (similar to concept proposed by Blum 2008):

1. *The actors in the advisory system and the characteristics of the extension system*
I. Status of the ext. service, management levels and management authorities
II. Types of advisory services offered
III. Monitoring and evaluation within the system
IV. Comparison of the need for extension services and existing resources of the service.

2. *Coordination of the Service and the links within the system*
I. Coordination mechanisms between extension organizations

II. The strength and intensity of linkages with other organizations – in relation to extension activities (faculties, research institutes, farmers' cooperatives, input suppliers, NGOs etc.).

3. Clients of the extension service
I. Farmers as clients - the types of farms, socio-economic characteristics of farmers, co-operation with associations and other farmer organizations etc.)
II. Access to the farmers in terms of increased efficiency (partly a question of methods, but also means of improving access - the Internet, mass media, mobile phones, fax, etc.).
III. Assessment of participation of farmers in determining the objectives and content of extension work and their needs and expectations ... respectively, mechanisms for this type of planning
IV. Possibilities and importance of innovation by farmers, which are of benefit to the extension system
V. The number, type and membership of farmers in associations, cooperatives (farmer organizations) that cooperate with the service; the percentage of farmers that are covered by the extension service
VI. The role of farmers' organizations in the formulation of policies, objectives, contents, methods of extension work; their representation (as the representatives in some bodies); types of requests for extension service (initiation of cooperation initiatives, the type of cooperation, existing agreements, etc.).

4. The management of the extension service
I. Participation of farmers in management
II. Decision-making in relation to finance, personnel, programs, etc.
III. Characteristics of horizontal and vertical management, teamwork, creativity, innovative approaches, respond to market demands..
IV. Relationships within extension organization
V. Institutional policies and the degree of its real application within the PSS APV
VI. The quality of institutional policies and improvement of the governance system
VII. Information systems in extension (monitoring and evaluation)
VIII. Estimation of the effectiveness and effects of extension agents' work, systems of incentives / stimulations and the like.

5. Human resources in PSS APV
I. Number and professional orientation of extension agents within a certain time period
II. Socio-economic characteristics of extension agents
III. Specialization of extension agents
IV. Existence of contact farmers (the real meaning of the idea of "selected farms")
V. Training of extension personnel (the number and types of training, type of training: personal initiative and (or) organized/institutional trainings)
VI. Characteristics of extension work (awards and incentives for good performance extension agents, assessment of the quality of services by the farmers, their level of satisfaction ...).

6. Extension services and approaches (methods)
I. Extension services, training, education - winter schools, lectures, workshops, field days, promotions ...
II. The essence of the model that has been applied, the dominance of a particular concept/method of extension work
III. Planning methods and content of extension work
IV. The most important methods used
V. Funds for implementation of various extension methods, which are available to the service
VI. Outcome of extension services (number and characteristics of the innovations that have been introduced - if there are indicators; the most common types of problems solved; the degree to which farmers have been empowered and qualified to solve specific problems.

7. Financing and costs of extension services
I. The primary sources of funding for extension
II. Sustainability of funding
III. All types of costs, salaries, financing of specific extension programs
IV. Cost efficiency of extension services (use of IT, mass media, the use of cars and other equipment).

8. Support Systems
I. Pre-employment training of extension workers
II. Training of extension workers during employment and on-job tranings
III. Existence of training centers for extension workers

In our evaluation of PSS APV the basic data set of farms consisted of 4.112 farms, from which we sampled 2.987 farms that had the needed data registered in the official System of information of PSS APV. This was needed in order to hve enough data to make the selection (e.g. farms size, gender, region, type of production etc.). In the analysed period (2007-2012) our sample (proportional and stratification sample) included cca.10% of the basic number of farms that had strong cooperation with extension service, eventually 281 farm, that represented 95,2% of the planned sample. Data were gathered with the help of 17 interviewers who have had detailed training prior to their field work. That sample of farms has covered all extension workers engaged (92), from all of agricultural stations (13), from all production types (crop production, animal husbandry, fruit and viticulture...), and all farm sizes (Table 1).

Table 1. *The sample of the selected farms according to their size and agricultural station in charge in PSS APV*

Organization unit of PSS APV	Total farm size (ha)					Number of farms
	0 – 5	5,01 – 10	10,01 – 25	25,01 – 50	50,01 +	
Bačka Topola	1	1	8	6	5	21
Kikinda	1	1	8	5	5	20
Kovin	1	1	3	3	1	9
Novi Sad	3	5	12	7	4	31
Pančevo	2	5	12	10	8	37
Ruma	2	4	11	3	2	22
Senta	3	5	10	3	2	23
Srem. Mitrovica	4	6	11	5	5	31
Sombor	0	3	10	7	6	26
Subotica	1	1	3	2	3	10
Vrbas	1	2	7	4	7	21
Vršac	1	2	5	5	4	17
Zrenjanin	2	3	8	7	6	26
Total	22	39	108	67	58	294

Source: *System of information of PSS APV; authors' calculation.*

In order to determine *quantitative characteristics* of extension work in PSS PV project team has evaluated the following indicators:

- change in the number of extension workers in PSS APV,
- change in the number of farms that cooperate with PSS APV,
- features of the extension work with selected farms
- structure of the advices to selected farms (crop...animal...fruit production... and specific problematic within those groups)
- methods of extension work PSS APV (individual, group, mass...)
- modes of work of extension agents (individual, team work)

The project team also conducted a series of interviews with extension workers from PSS APV, in total, 20 interviews with advisors who are randomly selected in the sample from four organizational units PSS APV. The most relevant documents and procedures from the Secretary of Agriculture, Water Management and Forestry were also analysed.

Some selected findings from the evaluation of PSS APV

The evaluation process gave us insight to a huge number of valuable data ranging from data from the already mentioned System of information of PSS APV to the empirical survey that has been conducted on 281 farms in Vojvodina, data from interview with extension agents and analysis of document and procedures.

Farmers that more intensively cooperate with PSS APV are above average size (4.5ha): selected and sampled farms have total land holdings of more than 12,100 ha, of which about 47% owned and 53% leased land. The average size of the total area of land holding in the sample is ranged from 25.01 to 50 hectares and is 43.5 hectares. The average size of land holding property ranges of 10.01 to 25 hectares and is 20.4 ha, while the average size of land holding in lease also goes in this range and is 23.1ha. Among the sampled farms there is only1.4% of those who have more than 100.1ha of land property. It is interesting that 62% of sampled farmers wants to use more land and is ready to lease the land and increase their production. It is interesting that among the bigger farms (more than 50.1 ha) six out of ten farms are pure agricultural farms and among the small farms (up to 5ha) almost 70% are pluriactive farms. This goes in line with overall conclusion that mostly better of farmers cooperate more with the extension service and that extension service usually likes to cooperate more with such farmers out of plenty of reasons.

Picture 1. *The structure of the total used land of the selected farms*
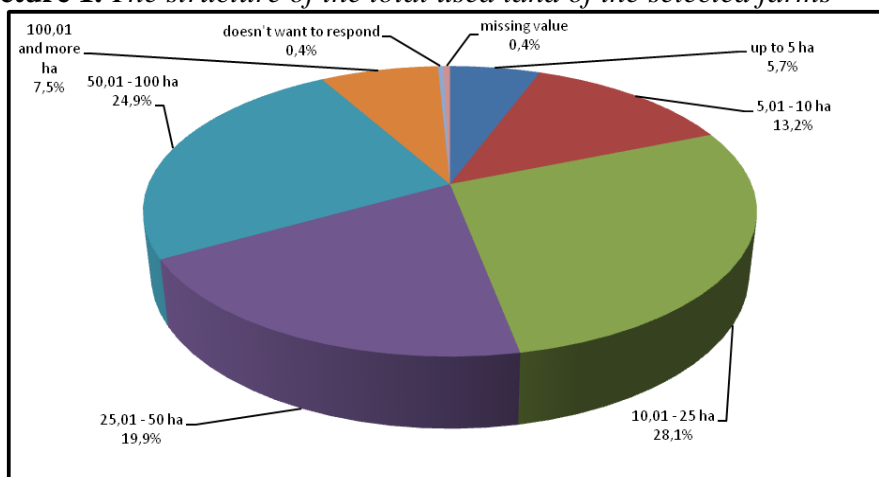
Source: *Evaluation of PSS APV on the selected farms.*

How much do these results differ from Serbian agricultural structure one can see if compared with official Census data: 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.

Sampled farmers are mostly mid level of education (62.3%), with the share of university educated only 10%. Elementary and unfinished elementary education have share of aprox. 20%. All these findings point to much higher level of education of those farms who strongly cooperate with extension service in comparison with the level of education of rural population in Vojvodina in general (according to Census data 2011; see Rodic et al. 2013.)

The results showed that in the majority of households (77.2%) there are no members who have secondary education in agriculture. Among those households that have a member with the agricultural secondary education, those are householders (11%). If we consider university education in

agriculture, only 2.8% have higher agricultural school, but in 16.7% of households there is someone with high agricultural education. Mostly this is householder or his son. The *extension methods* that one service use is very important to consider if we have in mind organization and finance of extension service, target group needs, characteristics and habits and problems (issue) addressed by the extension service. Also, content of the service, knowledge and skills of advisor might also be of importance for the selection of adequate methods of extension work. In regards to the methods of extension work in PSS APV, the evaluation process has showed prevalence of individual methods that can't be regarded as positive result, since this method is, in general, the most expensive and non efficient if we have in mind the range/number of farmers involved. Picture 2 shows this more detail:

Picture 2. *The share of different extension methods in the extension work of PSS APV from 2007-2012*
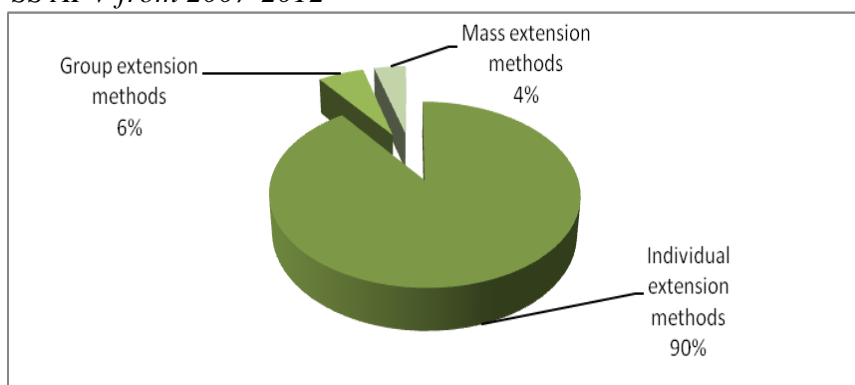
Source: *Evaluation of PSS APV on the selected farms.*

Our research reveals that within the individual extension methods there is a dominant share of farm visits (66%), then extension work within the agricultural station (farmer visiting the station for a consultations; 21.9%) and over the phone (12.2%). Group methods are mostly group meetings, field days and similar (66.5%) and (winter) lectures (33.5%).

Mass extension methods have small share in overall structure, but their importance can be huge having in mind the number of farmers and their characteristics and the overall agricultural structure in Vojvodina/Serbia. Mostly used mass methods are TV as mass media/ (62.2%), press mass media (35.5%) and fax or mail (2%). The process of modernization of agriculture aims to transform traditional agriculture and to deal with the

issues of food production. 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, use of chemicals 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 (see, Jankovic and Novakov 2014). Having in mind the aforementioned, we have investigated the opinion of the farmers on the future needs in extension/advisory service (Table 2).

Table 2. *Future needs of farmers that use extension help of PSS APV*

Areas in which the farmers expect to need extension/advisory help in the next five years	YES	NO
Production/technical problems	61,2	38,8
Application for subsidies (administrative help)	54,0	46,0
Information and advice regarding law, regulations and measures in agriculture	59,8	40,2
Planning the development of the farm, farm investments	27,9	72,1
Marketing of agricultural products	22,1	77,9
Cooperation with other farmers	26,8	73,2
Economical issues (farm management, finance, expenses, economic analysis...)	21,0	79,0

Source: *Evaluation of PSS APV on the selected farms.*

The high share of the first three problem areas indicates that producers generally consider PSS APV as partners in the production-technical extension, as well as information regarding legislation, regulations etc. This means that the PSS APV is mainly seen as an aid in applying the various competitions, registration of holdings and other administrative issues and mostly for the transfer of technology (knowledge regarding the production and technical matters) and information. The relatively low share of responses on planning of production on the farm, marketing, as well as economic issues indicates that they don't' recognize PSS APV as partners in this process, which is essentially an advisory in nature (and less on information and technology transfer). This can lead to the conclusion that farmers considered that no one else should help them with the above issues (on development and the economic effects of production on the farm, sales channels and product prices and the like). Partially this is also result of the work of PSS APV because /due to lack of knowledge, skills or some other factors/ they don't collaborate with producers in terms of planning the development of farms, working with the priorities of development and so on. Actually, PSS APV is mostly extension, and less advisory oriented.

In that sense, it is a very good result that the average grade of mutual cooperation with PSS APV from the side of the farmers is 4.11, and trust in extension agents that is very high 85.4%.

Picture 3. *Farmers judgement of cooperation with extension agents of PSS APV (1/bad, 5/excellent)*
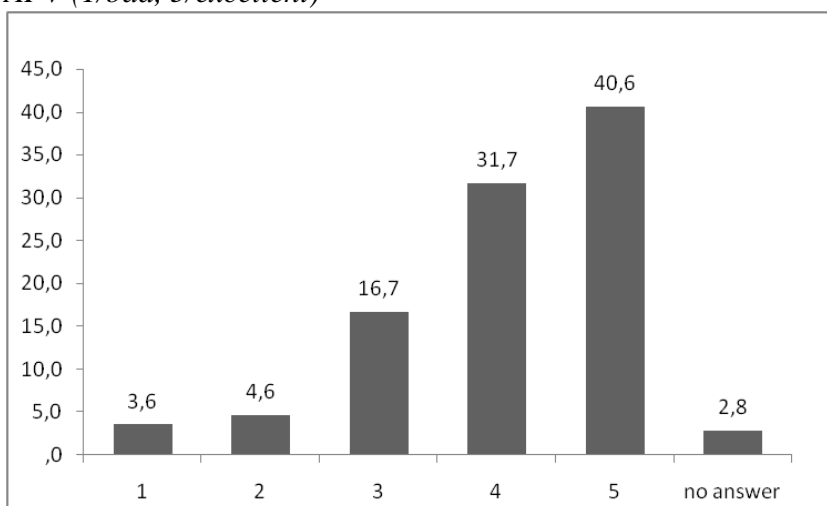
Source: *Evaluation of PSS APV on the selected farms.*

Concluding remarks

Evaluation of extension service is not a usual activity since it is complex, expensive and asks for knowledge and skill on how to conduct it. Also, evaluation might be undervalued due to fear of the results and doubts on principles it is done, advantages and disadvantages of external and/or internal evaluation etc. Results of this (rare) evaluation in Serbia/Vojvodina revealed that better off farmers and extension service meet each other on part of their agenda: farmers need mostly technical advice and information, administrative help and do not consider this service as primary partner in farm development, investments and similar economical issues. This might be due to the crisis and uncertainty of many actions and threats of advance planning, unsecure economic surroundings in the sector, high product and input price fluctuations, high expenses etc. On the other side, qualifications and skills of extension workers orient them mostly to technical advice and transfer of knowledge to farmers. Usage of expensive and, for an socio-economic context, inefficient methods of individual work point to lack of good organization and planning of extension service on the macro and mezzo level but also to lack of knowledge, skills and (maybe) motivation of extension workers to use different methods and expand their actions to other farmers, as well. Anyway, good average grade for mutual cooperation encourage PSS APV that they still have kind of useful contact with farmers who consider their work as "help "and trust them. But, having in mind the share of farmers covered with such approach, one must be very careful in being too satisfied with this grade, especially having in mind a lack of real extension/advisory competition on the ground (not counting input suppliers and food industry).

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AGRI-ENVIRONMENT MEASURES – SYNERGY OF AGRICULTURAL AND ENVIRONMENTAL POLICIES: REVIEW[1]

Jelena Karapandžin, Zoran Njegovan[2]

Abstract

Common Agricultural Policy of the European Union (EU) is one of the first policies which has implemented environmental policy in its goals and activities. The process of integration of environmental policy in Common Agricultural Policy is a long-term project that continues to this day. This work demonstrates the history and the dynamics of the development of these two policies. The main focus is placed on agri-environment measures which, due to the advantages they possess and which are presented in this work, still represent the best synergy of agricultural and environmental policies, despite certain deficiencies. The application of these policies is not territorially conditioned, but is certainly limited by the available funds. This is why it is highly important to increase financial support for these measures in order to achieve a (more) sustainable agricultural production.

Keywords: *agri-environment measures, EU, environmental protection, agriculture, policies*

Introduction

To this day, the environment has been changed to such an extent that it poses a threat to survival of mankind and limits its progress. The state of today's environment poses a threat to the survival of other living beings as well, and the greatest responsibility for this situation lies with people. Through their activities, people have caused numerous changes of the environment. Some of these changes are positive, but the number of the negative ones is much

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more significant. These changes have disrupted environmental balance, drained natural resources, exterminated many plant and animal species or brought them close to extinction, and endangered further development of mankind. Agriculture is one of the human activities that has had negative effects on the environment for hundreds of years. Although we cannot claim that agricultural activity, even in its earliest stages of development, did not have negative effects on the environment, today we can claim with certainty and growing evidence that agricultural activity, in its today's volume and form, has exceptionally negative effects on the state of the environment, which makes it one of the main causes of environmental pollution. The most prominent consequences of agricultural activity can be seen in climate changes, degradation of fertile land, deforestation, air and water pollution, creation of toxic waste, depletion of biodiversity, genetic engineering, etc. These negative consequences represent the most important ecological issues that mankind faces today.

Agri-environment (AE) measures represent a series of activities by which we are striving to mitigate or eliminate the negative effects agricultural production has on the environment. By not relating agri-environment measures to an institution, politics or a program, we can generally say that all the activities that farmers conduct with the intention to better the environment or halt its degradation are AE measures. This means that every farmer can freely implement one or some of these measures, without being obliged to do so by law or a contract. However, having in mind that most AE measures demand additional efforts, higher expenses, additional time, cause lower profits and have other consequences that may demotivate the farmer, implementing AE measures is becoming more and more institutionally and legally regulated. One of the more developed forms of legal and institutional regulation of this field has been established in the Common Agricultural Policy (CAP) of the European Union (EU) and its development and improvement is in progress. In order to understand AE measures, it is necessary to grasp their roots, causes and events that preceded them and which have affected the way AE measures look today. Therefore, this paper presents a historical development of AE measures from the beginning to the present day, as well as policies that are united in AE measures with the aim of highlighting the importance of AE measures for sustainable development of agriculture. Another objective is to create an overview of the most important events and documents relating to the environmental protection and agriculture from the creation of the EU to date, in order to comprehend the development path of AE measure and understand their present forms.

The development of the Common Agricultural Policy of the European Union and the status environmental protection has in it

Common Agricultural Policy of the European Union is one of the oldest EU policies and it has been firmly enrooted in the European Integrative Project (European Commission, 2011). Common Agricultural Policy started being applied on July the 30th, 1962 and since then has become the key mechanism which creates and directs agricultural production of the European Union member countries. However, its effects have a significantly broader, even global character. CAP has undergone numerous reforms over the past 50 years. However, changes and adjustments to the newly-created trends within the EU and the rest of the world are still happening.

Nowadays, CAP has been transformed into a multifunctional policy which supports market-oriented production of agricultural products of the EU member countries, while at the same time being dedicated to the improvement of living conditions and revival of rural areas, with sustainable production which is in accordance with environmental protection (European Commission, 2011). In order to better understand the importance of CAP for the EU member countries (and the world) and to understand the dynamics and variability of the EU agricultural policy, it is necessary to understand its history.

Threatened survival of the population after World War II (caused by destitution and lack of food) was the main cause for the creation of CAP whose initial goal and purpose was the increase in food production, that is, meeting people's needs and ensuring food security. This is how CAP became the first, and for a long time, the only completely integrated policy of the EU (European Commission, 2012).

Initial goals, which have remained unchanged to this day, are providing affordable food to the population of the EU and securing a decent living for farmers. In the first decades of CAP, this goal was achieved through price support, import protection, that is, through mechanisms of market intervention (Božić et al., 2011). With the introduction of price support, that is, guaranteed prices and high levies, member countries created the conditions for a better offer of agricultural products. This enabled self-sufficiency in the population's food supply and secured a relatively high income for the producers.

However, this protectionism led to a huge quantity of surplus agricultural products, which disrupted the balance between supply and demand on the market of agricultural and food products. This problem directed agricultural policies of the EU towards synchronizing the supply with the demand on the market. During the 60s, an effort was made to reform the existing agricultural policies. The focus was on supporting structural measures. Mansholt (European Commission, 2015a) in his Memorandum on the Reform of the Common Agricultural Policy from 1968 introduces a couple of suggestions (Secreteriat General of the European Commission, 1968), among which are: the necessity to modernize agricultural production, restructuring production towards household merging, reducing the total number of those employed in agricultural sector (preterm retirement of older farmers, educating the young and encouraging employment in non-agricultural sector, increasing farm size, educating farmers, developing entrepreneurial skills and managerial capabilities, etc.). During this period, environmental issues were not the priority of the implemented policies. However, that does not mean that AE measures were not applied. One of the Mansholt's suggestions was to decrease the total amount of agricultural areas by 5 million hectares on today's EU territory, that is, to transform them into forests or National Parks (Secretariat General of the European Commission, 1968). However, although this suggestion contributes to environmental protection and could be seen as an AE measure, during this period it was not motivated by concern for environmental protection, but by the intention to decrease the number of agricultural products on offer in order to increase market prices.

The turning point in the field of environmental protection on the global level was The United Nations Conference on the Human Environment held in Stockholm, in 1972. Ever since this conference was held, environmental protection has gone through a rapid legislative regulation on a global, regional, sub-regional and bilateral level. This period is characterized by conclusions of numerous international contracts and adoption of a certain number of acts, many of which, unfortunately, were declarative in nature. On the other hand, a certain number of action plans and similar documents which initiated action were adopted (Jelenković and Jelenković, 2012). The importance of this conference can be seen in the fact that it was a turning point not only for the environmental policies of the EU but also for the attempts to protect the environment on the global level. It set the foundations for further international cooperation and legal regulation in the environmental field. In the same year,

Community environmental policy was established, whose main goals were to prevent, reduce and suppress harming the environment and encourage sensible use of natural resources (Hey, 2005). These events also affected EU policies, so in July 1973 the first Environment Action Program[3] (EAP) was adopted. Although environmental care had been 'instilled' in the previous acts of the EU, this was the first separate environmental policy of the EU. The focus of this program was on the protection of waters and waste, but it also incorporated a sector approach focused on agriculture and physical planning as well as preparatory activities for the control of emission of exhaust gases (Hey, 2005).

The second EAP ensued (1977-1981), and it essentially followed the first one with regards to the approach and goals, with a somewhat broader scope of issues it dealt with. Environmental protection received special attention and numerous directives were introduced during this period. Both programs were especially focused on water and air quality.

The third EAP (1982-1986) and partially the fourth one (1987-1992) contained significant changes in their approach to the policies. The approach to quality was replaced with the emission-oriented approach, which suggested formulating emission limit values for stationary and mobile sources of pollution. Practices of the EU during the 80s were especially directed towards cleaner technologies, noise control and risk in industrial areas (Hey, 2005). During the 70s and the 80s, EU environmental legislation experienced a rapid growth.

In environmental policies of the EU, 1987 is considered to be a turning point, as this field received a special chapter in the European Union Association Agreement. Namely, up to 1986, ecological policies were not explicitly mentioned in the Association Agreement. However, after the Single European Act was signed, economic and ecological goals of the Union were leveled (www.wikipedia.org).

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[3] Environmental Action Programs of the EU represent documents which, in the broadest sense, organize EU policies in this field. They define the basic initial attitudes in evaluating states of certain sectors relevant for the environment and establish objectives, principles, priorities and instruments necessary to accomplish these goals. The content of these action programs illustrates the development of the EU policies in this field, including the development of the issues related to the jurisdiction of this organization regarding the environment, as well as other elements of the EU policies relevant to the environment.

When it comes to the principles and approach, the fourth EAP (1987-1992) was not essentially different from the previous ones, and the intentions to harmonize the standards in environmental protection and balance the goals of maintaining inner market and environmental protection continue. For the first time, environmental protection is not seen as an additional, but as an integrated activity in the whole production process. Furthermore, the application of new tradable incentive instruments such as taxes, subsidies and emission permits was announced. Novelties of the Fourth EAP (integrated approach, sector analysis, new instruments) were further elaborated in the coming years. Sustainable development, that is, simultaneous improvement of the state of the environment, social efficiency and competitiveness, was gradually becoming a universal objective for environmental protection policies.

In the early 90s, radical reforms of the EU agricultural and environmental protection policies begun. During this period, market interventions in agriculture replaced direct payments to farmers, whose purpose was to make up for the loss of revenue due to the reduction of prices. Through direct payment per hectare and livestock, MacSherry reform (1992) redirected production support to farmer support. This reform also gave a new dimension to the structural, that is, rural development measures (Božić et al., 2011). In this way, the costs of export support and guaranteed prices (of grain and cattle) gradually decreased, and the costs of direct payment and rural development support gradually increased.

The United Nations Conference on the Environment & Development (Earth Summit) was held in Rio in 1992 and it strongly emphasized the connection between the environment, development and the need to strengthen the cooperation of developed and developing countries (UN, 1992). During that period, Common Agricultural Policy (CAP) of the EU is also advocating sustainable development and measures which are in accordance with environmental protection (such as reforestation of the less fertile agricultural land, mandatory or optional withdrawal of land from production and other programs of agroenvironmental protection).

In the mid-90s, CAP shifts its focus towards the quality of food through the application of highest quality and production standards and strict control of plant and animal health. During this period, the importance of animal welfare was becoming more and more emphasized and practices that met these demands were introduced (European Commission, 2012). Organic production, traditional and local food were also promoted. This

introduced new duties for farmers – apart from striving to high quality and price efficiency of their production, farmers now had to adjust their production to the sensitive nature, take care of biodiversity, carefully use natural resources and conserve landscapes of particular interest. In order to ensure that this additional function, which benefited both the farmer and the society as a whole, would not threaten producers' competitiveness, farmers were financially supported by EU funds. The threat of climate changes, which had seemed distant before, now was one of the most important ecological issues, which was, to a great extent, caused by agricultural production and affected it at the same time. This is why CAP is especially focused on the fight against climate changes with grants used to reduce the emission of greenhouse gases (through changes in cattle diet, development and application of new technologies for the usage of renewable energy sources, most of all biomass, leftover crops and agricultural waste and such (European Commission, 2012)). The goal of establishing European Environment Agency (EEA) in 1994 was to support sustainable development and achieve a significant and measureable progress in environmental protection in Europe, by providing important and reliable information to the institutions which create policies and make decisions, but also to the general public (Jelenković and Jelenković, 2012).

One of the most interesting and innovative elements of the fifth EAP (1992-1999) were: relying on sector approach which integrates ecological dimension into the majority of polluting sectors (transport, energy, agriculture) and suggesting structural changes in order to encourage public transport, energy efficiency and waste prevention; new instruments, especially market-oriented ones such as fiscal incentives or voluntary instruments which strengthen the interest of producers and consumers in making environmental protection related decisions; consensus-oriented approach in which the main agents are government protagonists and local and regional authorities. From 1997 to 2003, we can see a series of different, contradictory trends with different approaches to environmental protection policies being promoted simultaneously. Although the principle of sustainability was still effective, new ambitious laws and regulations presented a constant attempt of deregulation and broadening of jurisdiction. However, the system of environmental protection program, rights, duties and incentives, made an impressive progress during this period (Hey, 2005).

New CAP reform package was adopted in 1999 as Berlin Agreement on Agenda 2000 and was directed towards further increasing the competitiveness of the agricultural sector, helping small households and improving rural areas. Direct payments were even more closely connected with meeting certain ecological demands.

During the 2000s, EU agriculture gains an additional function – preservation of rural areas, rural population and revitalization of villages (European Commission, 2012). Apart from being a place where agricultural production happens, a village is increasingly seen as a community with a number of functions. It is insisted on diversification of activities, which is supposed to result in the improved standard of living of the rural population, encouraging the young to stay in the village, faster development of entrepreneurship and rural tourism and the preservation of rural landscapes.

The starting point of the sixth EAP (2000-2010) are the so-called constant ecological problems such as: climate changes, loss of biodiversity and excess use of resources, which demand an approach outside the limits of legislation in environmental protection (Hey, 2005). In its essence, the sixth EAP formulates the frame and general principles and goals which will further be specified in detail by the so called thematic strategic key questions, such as pesticides, resources, recycling, land, urban environment, marine world and clean air. This policy supports a very cautious approach, by defining themes and principles. The committee's leading role of the initiator of the legislative changes is replaced with that of a manager of political processes (Hey, 2005).

Basic characteristics of the CAP reforms at the beginning of the 21st century were the introduction of single payment schemes to farmers independent from the output (by which free choice of farmers to produce in accordance with the demands of the market is encouraged) and cross-compliance of the conditions (which obliges farmers to meet certain demands (standards of environmental protection, food safety, animal and plant health, animal welfare, preserving land in a good agricultural and ecological condition)) in order to be entitled to direct payment (Božić et al., 2011).

Current EU policies of rural development can be divided into four axes according to their content. The first axis contains measures which are directed towards the increase of competitiveness, the second axis is

related to the measures for sustainable resource management, the third axis is related to the measures for improving quality of living and diversification of economic activities in rural areas, while the fourth one includes the ways of creating specific programs. As already mentioned, these reforms emphasize the question of environmental protection through the support of measures included in another axis. These measures involve different direct payments with the purpose of compensating for expenses or losses, that is, decreased revenue caused by the care for the environment and natural resources.

The reform of CAP retains the two previously defined pillars of development, but also strengthens the connection between them by offering a holistic and integrative approach to the support policies. Direct payments are better targeted, fairer and "greener" (European Commission, 2013). Sustainable development, that is, caring for the environment, now gains the most importance in the CAP measures ever. Cross-compliance is simplified and better directed. Since 2015, within the first pillar of support, the so called green direct payments have been introduced. These payments oblige farmers to respect certain agricultural practices (maintenance of permanent pastures, ecologically focused areas and crop rotations). A minimum of 30% of the assets intended for the second pillar of support are reserved for voluntary measures for sustainable development and fight against climate changes. This shows how important environmental protection issues are for the EU. These measures include agroecological and climatic measures, organic agriculture, areas of natural constraints, Natura 2000 areas, measures for reforestation and investments beneficial for the environment and climate (European Commission, 2013).

The last in the series, the seventh EAP, which is related to the period from 2013 to 2020, is called 'Living well, within the limits of our planet'. It defines an engaged vision of the future (up to 2050): a society with a low emission of carbon dioxide, circular green economy (nothing is seen as waste) and resilient ecosystems as the basis for the well-being of the population (EEA, 2015). As the previous one, this program also emphasizes the main challenges of the long-term unsustainable systems of production and consumption and the complex and often cumulative influence on the ecosystems and human health.

From the above-mentioned it could be concluded, that, since 1970, the concern for the state of the environment has been increasing continuously,

which resulted in a variety of environmental protection regulations. In the same period, the level of environmental protection in the majority of EU member countries was significantly improved. With over 200 legal instruments, European Commission is the institution which has probably played the leading role in developing and leading environmental policy in the EU (Čavoški, 2015). Although environmental policy is newer than CAP, their reciprocal influence is obvious. Nowadays, the development of legislation in the field of environmental protection is strongly connected with the development of CAP. Ever since CAP was established, agricultural producers in the EU have been facing greater and greater goals and demands. So far, they have been efficiently achieved and met, but it is certain that the demand will become bigger and more complex in the future. Most likely, further development will be based on accomplishing present goals. However, it is also highly likely that new goals will appear, such as increasing CAP efficiency, encouraging employment in rural areas, protection of the agriculturally handicapped areas in order to prevent desertification, fairer, greener and more efficient agricultural production, innovations, research etc.

Agri-environment measures

Agri-environment measures are the key element of integrating environmental care into CAP of the EU (European Commission, 2015b). These measures are created in order to encourage and motivate farmers to protect and improve the environment through paying for environmental protection services. They function on the basis of voluntary commitment of farmers to adopt and apply ecologically responsible agricultural practices (techniques) which go beyond the legally mandatory duties during the period of minimum 5 years (Baldock et al., n.d.). In return, farmers are compensated for additional expenses, that is, the loss or decreased revenue caused by the application of these measures. In other words, agroecological payments encourage farmers to adopt certain levels of production intensity and practices which are beneficial to the environment, regardless of the fact that they would not be farmers' first choice if the criterion was profitability. AE measures are diverse, but, in general, it can be concluded that every measure has at least two broader goals: on one hand, the decrease in environmental risk, and the preservation of nature and cultivation of landscape on the other (European Commission Directorate for Agriculture and Rural Development, 2005). Basic characteristics of AE measures are:

- Optional for farmers – this means that AE measures are not mandatory for farmers, so that farmers can choose which measure(s) they will apply and whether they will apply them.
- They are site-specific (connected to a specific area or site), and can therefore be adjusted to that area or site, with respect to natural, social and economic conditions of that particular area.
- They demand structural and long-term approach to monitoring and evaluation. This is why they demand institutional capacities, developed legislation and consistent application and control of their execution. Having in mind that these measures affect the environment, the effects become visible in the long run; this requires long-term planning, development strategies and continuous monitoring and recording of all significant parameters.
- The level of payment has to be high enough to make producers competitive on the market and motivated for a broader application of these measures.
- They are affected by a broader contextual and institutional frame, attitudes towards the environment, historical development of AE, environmental knowledge, available budget, etc.
- They are not a destabilizing influence on the market (European Commission Directorate for Agriculture and Rural Development, 2005).

Agri-environment measures were first introduced in agricultural policies of the EU during the late 80s. First agri-environment schemes were introduced in Holland, Germany and the United Kingdom as independent national initiatives, mostly directed towards traditional animal husbandry in the areas where the environment had suffered rapid changes (Baldock et al., n.d.). These initial measures were just optional possibilities which could but did not have to be offered to farmers by EU member countries.

The first agreement on European frame for agroecological policies, included in the act 19 of the Regulation 797/85, was signed in 1985. This agreement enabled member countries' governments to offer payments to farmers for adoption and application of specific practices in environmentally sensitive areas, which were to be defined by the member countries themselves. As environmental issues started increasingly affecting CAP, there was a need to "motivate" farmers to accept environmentally responsible practices. This is why in 1987 the Regulation 797 was changed and partial financing of agri-environment schemes from funds of the EU was permitted. Consequently, CAP assets were, for the

first time, available for agri-environment measures, simultaneously covering the goal of restraining excess production and that of environmental protection (Baldock et al., n.d.). According to the same authors, since 1991 EU member countries have gained the possibility to partially fund the expenses of the following schemes from the budget of CAP: environmentally sensitive areas (ESAs), voluntary land retirement and intensification of agricultural production (including organic agriculture).

As member countries' governments were not obliged to offer any of these schemes to farmers, many countries ignored these possibilities. However, the continuous surplus of agricultural products and the concern for CAP budget, as well as the pressure of the international trade agreements, led to the reform of CAP, and since 1992, by the Regulation 2078/92/EEC, the application of agri-environmental programs has become mandatory for all member countries but remained optional for farmers (European Commission, 2015b).

Most agri-environment measures are in fact managerial contracts which enable compensational payments to farmers for their temporary adjustment to the practices that decrease negative influences on the environment (by adjusting rotation crops, decreasing the usage of input, transferring to organic production and such) and/or their contribution to the protection of habitats, endangered bird species and other animals and landscapes (Uthes & Matzdorf, 2013). These contracts are concluded between farmers and state administration, and in return the farmers gain financial assets for increased expenses and/or suffered losses caused by the application of these measures. As participation in agri-environment program alone is enough, payments have to be competitive towards potential revenues from another, more profitable way of land usage or employment (Oljača, 2013).

As financial allotments on the basis of agri-environment measures are given from the budget of the EU member countries, apart from being high enough to be attractive to farmers, they also must not present enormous budget expenditure (Oljača, 2013).

One of the main characteristics of CAP is financing during a 7-year period (the current budget period from 2014 to 2020), with clearly defined amounts of subventions for possible users and purposes on a yearly level. In this way, the stability, predictability and consistency of

agricultural policies for all participants in the production process, food processing and placement is ensured (Chamber of Commerce and Industry of Serbia et al., 2014).

Although there are claims that the hidden motive for the introduction of AE measures is to compensate for the cancelation of price support and retain competitiveness of agricultural products on the global market, that is, that what is in question is a weak repackaging of the CAP protectionism (Bayliss & Rausser, 2004), there is a significant number of people who claim that this is incorrect and that the sole goal of AE payments is to improve the environment and achieve a more sustainable agricultural production.

A complete integration of the demands for environmental preservation into CAP was achieved through the mechanism of cross-compliance. This is a mechanism that connects direct payments with the basic standards related to the environment, food safety, animal and plant health and animal welfare, as well as keeping the land in a good condition (Chamber of Commerce and Industry of Serbia et al., 2014). An important result of this integration is the practical application of one of the basic principles of environmental protection of the EU. This means that pollutants defray the costs of fulfilling environmental preservation standards. On the other hand, CAP instruments became available in order to facilitate the fulfillment of the given standards. In this way, EU accomplishes the synergy of two important policies: Common Agricultural Policy and environmental policy.

For the upcoming budget period of 2014-2020, a minimum of 30% of the total budget funds intended for rural development (the second pillar of support) will be allocated for the measures of environmental protection which include AE measures, reforestation measures, organic production support measures and Areas of Natural Constraints support measures (National Assembly for Wales, 2015). This is an important increase in the allocations given for these purposes in the previous budget period (around 20 billion euros, which makes up 22% of the total expenses intended for rural development of the EU). This shows a clear intention of CAP to support the introduction and more wide-spread application of AE measures. The advantage of AE measures is reflected in the possibility of their creation on a national, regional and local level, depending on the concrete system of agricultural production and on the specific environmental state of each area (European Commission, 2015b). Their

adjustability is certainly one of their advantages. Another advantage is their influence on strengthening environmental awareness and responsibility. According to Voytech (2010) AE measures are often suggestive, persuasive and are intended to alter perception and priorities when it comes to farmers' decision making.

Most AE measures, from the traded permissions and agri-environmental payments to cross-compliance, are mostly focused on encouraging the application of certain agricultural practices and not on measurable ecological effects (Voytech, 2010). This is caused by the fact that the effects of pro-ecological practices (including agricultural practices) are difficult to measure, having in mind the complex spatial specificity of each area but also the time frame in which positive effects become visible. Since their goals are not measurable enough, it is impossible to reliably analyze the cost-efficiency of AE measures. Therefore, it is impossible to determine whether these goals are actually accomplished (Uthes & Matzdorf, 2013).

Conclusion

AE measures in the EU have been developing for decades and this work offers a detailed review of their development, showing that this process was not a simple one. The implementation of environmental policies into CAP lasted for a long time and still continues. Today, almost no agricultural activity can happen without environmental consciousness and care for the environment. It is the EU's aspiration to implement environmental policy into all elements of CAP through legislative regulations in the form of decisions, directives and orders. By introducing legal acts and their application, numerous significant positive effects on the state of the environment are achieved.

AE measures represent one of the mechanisms of the EU policies by which environmental policiy is implemented in agricultural policies. Basic advantage of AE measures is their adjustability to different areas, which enables a better effect of these measures and their creation with respect to natural, social and economic conditions of that particular area. EU member countries are obliged to offer AE measures to their farmers, while farmers do not have to accept them. Because of this, in order to encourage farmers to adopt AE measures, member countries make up for the losses caused by the implementation of AE measures from EU assets and therefore motivate farmers to participate in AE measures. This is why

it is important to increase available financial resources intended for AE measures, which is currently happening according to the adopted budget of the EU for the following period. In this way, EU proves that sustainable agriculture is one of its main goals and that AE measures represent a significant mechanism for achieving that goal.

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TO BE A FARMER OR UNEMPLOYED - DILEMMA OF THE RURAL YOUTH

Marica Petrović[1]

Summary

The work deals with analyzes of the position of young people from the countryside from the position of the activity in agriculture. The agriculture is seen as big potential which can be absorb an unemployed young people from rural enviroment. According to the emphirical bases the analyses has been put through, towards the attitudes of the young people from the countryside about agriculture and farm work as their activity in this line of work.

Key words: *rural youth, farmers, agriculture, social position*

Introduction

„m.,27-29, farmer with completed Agricultural Faculty Degree: I think I can achieve something. I have the energy, strenght and ideas as well as knowledge."

The future of the agriculture depends on young farmers, considering that the agriculture inspite of big and numerous changes is still differentia specifica of the countryside, so to speak, that the future of the countryside depends on them. It is difficult enough to be young in our society, and the special challenge is brought by the choice for this profession.

The youth as the life age brings with itself their own problems, developing, emotional nature. The young are for the first time confronted with various life situations for which it is expected from them to solve them on their own. At one hand there is a will for individuality and

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growth, and on the other hand there is a need for parental safety and protection. In precapitalism society, youngsters as the social group weren't clearly defined, because the children who reach sexual maturity became adults, so to speak, by getting married or forming their own families and childcare, they lived the lives of the adults. The extent maturity was caused by education continuence and the posponing of forming their own families as well as postponing of getting employed and indenpendent living. The education was the basic social mechanism which separeted the young as the social group (Tomanović, 2012). Capitalism of modern society and contemporary market put before the young people, set more demands which consider much more educational preparation for inclusion to the rest of the world. The contemporary society is the society of extended lasting of the education,where is the educational role ambivalent. At one hand, it softness but reproduce the existing system of social inequality (Čikić, Petrović, 2014).

Among other problems which are usually connected to this age category, the youngsters as a social group in our society, lives and tries to get independance in uncertain enviroment. The main problem in our society which affects mostly young people is the lackage of finding work. This problem then causes many other and brings this social group into the position of helplesness, and after many random failures and mischieves most of them give up looking for work and then start drifting living with their parents.

Without active engagement of young people in their local communities, contemporary countryside hasn't got the possibility to survive and to develope further. Considering the fact of clear role of agriculture in rural development, where the agriculture is seen as mechanism for the intergration of economic, ecological and social aims of development (Čikić, Petrović, 2012), the biggest potential for the local community development is actually in young farmers. If by any chanse they could cultivate the land in modern and entreprenual way,and see themselves as leaders in their local community, they wouldn't only have the possibility for personal and profitable achievements but as well as the progress and development of the whole community. Very often the positions they held are underestimated. Among young people the agriculture is not favorable work activity. The characteristics of young people is impatience and the expectation of instant results,but that doesn't exists in agriculture work. But there is a lot of work. For that reason young people need the institutional support which isn't only declarative,otherwise a very small

number of young people would chose this professional orientation. In that case,very sad picture of the farmer remains in our countryside older than 65[2] ,who works on the farm with 4.5 ha with ancestors who aren't interested in agriculture. Considering the fact that family property is still dominant model of agriculture (Bogdanov, Babović, 2014), if these trends continue,there is a danger threatning fall of this line of work according to all parametres.

Method and data resources

Analyses of the attitudes of young people from the countryside towards the agriculture and agricultural work in contemporary serbian society as well as their own activity,is done on the basis of emphirical data received from the research on this project „*The young in the countryside-the needs aspirations and the problems*". The research is done in 10 villages of AP Vojvodina[3] ,within the sample of 500 polled from the age of 18 to 29.Data was collected by surveying on the basis of standard questionarrie[4].

The position of young people from the countryside at the labor market

The position of unemployed young people at the work market is extremely bad since the economic crises in 2008. and through the course of many years didn't get any better[5]. One of the basic reasons of the high rate of unemployed young people in our society,especially long term employment,is actually unadjustment for the needs of labor market with educational system. The average time of unemployment in our country is four years,and it is influenced by mediating of individual and familiy resources because young people with less resources wait longer to find work (Mojić, 2012). Eventhough the bigger number of young people postpone finding work due to schooling reasons or they attend additional schooling while they look for work, in our society there is a big portion of

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[2]According to the last Population Registration,farm holders in R.Serbia are mostly over 65 of age.Situtation is more favorable in Vojvodina where are the farm holders between 55 and 64 of age,and those who are younger than 44 appear as the farm holders in 21.6% of the cases (Bogdanov, Babović, 2014).

[3]Empirical research was conducted in Beška, Vojka, Laćarak, Mol, Veliko Središte, Banatsko Karađorđevo, Jaša Tomić, Nova Gajdobra, Čurug i Donji Tavankut.

[4]Autor Marica Petrović

[5]The rate of unemployed for young from 15 to 24 of age,for the second quartal of 2015.is 43.1 %while the rate of inactivity is 72.4% (APC,2015).

young people who are unemployed and therefore aren't in educational process or additional schooling system. In 2013,there is a record of 19.7% of young people aging from 15-24 who belong to socalled NEET category[6].

The young up to the age of 30,among others[7], belong to more difficult group of finding work as they are defined in *National action plan of employment for the year 2015*. For more difficult individuals, by action plan they are foresighted with special services and measure. On of those measures are subventions for the employers from private sectors who employ young people up to 30 years of age, and the packet of services for young between 15 and 30 years of age. This packet of services includes: the evaluation of employing individuals, the confirmation of individual plan for employmentand the most appropriat measures, the mediating in finding work and inclusion in active measures of the employing policy.

Also as a special sensitive category is considered long term unemployed, the women and rural population. Considering the most difficultis the position of young unemployed women from the countryside but as well as the total rural youth in general. The solution which implies itself onto this problem is actually the direction of young people from the countryside towards the agriculture and farm work. Is farm work that much unfavorable and unpopular for young people even in the condition when they have family property, they rather chose to stay unemployed than to be involved in farm work?

Working activity of the young at the agricultural farm and their interest for farming

Based on the research results which are published in association with the young people from the sample of polled villages, we can notice that the young in the country are mainly not working in farm industry as the basic occupation from which they provide their living resources,they are not farmers by profession. Eventhough the largest number of the young people is actively working, they don't consider themselves as farmers nor they plan to get involved in farming in their future, they have other

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[6]NEET-Not in employment,education or training (National strategy for young people for period of 2015. to 2025.).
[7]Surplus of employed and unemployed people older than 50, unemployed without qualificationand underqualified,individuals with invalidity and Roma population.

occupations or they state themselves as unemployed, eventhough some of them are not actively looking for work. The participation of the young in farming work at the farms doesn't have to be the parameter of their interest in farming, but rather points at the necessity to help their parents. In the graphic 1 it shows the distribution of farm work for the young people taken from the research. All the farm work at the farm[8] is done by 31% of the polled, and a 100, actually 32% of them, are farming only when asked for help. No work at all is done by 67 polled, actually 22% of the young from the polled villages.

Graph 1. *The participation of the young taken from the sample in doing work at the agricultural household*
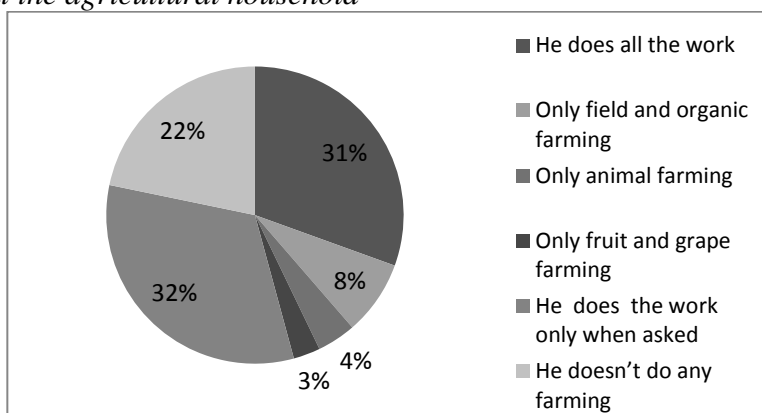
Source: *Own research.*

To the question what is the reason why they don't participate in farming work, 42% actually 129 young people answered that they have not any interest in farm work. Besides this, some of them answered that time is also a big problem and that the elders won't allow them to work[9], as well as a small land property is a massive problem. Besides that they have shown that in a large number of cases farming is being done by the half of the young people covered in this research, they are also participating in desicion making process. Concerning their farms and households 270

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[8] In this analyze only those who have farm, (mixed and household), are included.

[9] Lately, the parental worrying attitude is too much presenttowards their children work, even when „children" are 25 years old. Also, if in the village there still exists an attitude that agriculture comes as a punishment for those who don't want to get an education, there is a question if only uneducated people do the farm work, which should represent a big problem for the agriculture professionalism.

young people are participating in decision making process, actually 54%, while 230, actually 46% isn't. The participation in decision making process is also influenced by birth conditions, concerning that the participants in 61.9% of the cases are males. The decision making which is the main concern of the whole household and the farm is the straight pointer of the power which the young polled have, so this fact shows the birth inequality. That is still very much characterised in the rural enviroments. The polled which are participating in decision making, are mainly involved in every decision which concern their household and farm and also they are deciding about the seeding cultures and the budget. As for the reasons why the young covered in this research, taken from the sampled villages aren't participating in decision making process concerning the households and farm, in large number they answered that their parents are doing it by themselves, firstly the father, as 31% of them answered while 30% isn't interested in taking part in decision making at all. In the distribution of answers with 15.2 % is participating and the reason that points it out, is not only the birth but as well as the generation inequality, actually young people aren't participating in decision making because of their age or sex. The answer distribution like this points us on the perserverance of patriarchal, traditional climate, that is still ruling in our rural enviroment, eventhough it is weake-ning lately. In picture 1, some answeres to this matter can be seen:

Picture 1. *The reasons why they don't participate in decision making*

Parents, (father), they make their own decisions - **31%**	• f., 18-20, faculty student: Father makes the decisions. • f., 18-20, high school student: Because he thinks that I am not mature enough for making the decisions . • m., 24-26, employed: Because the father is the head of the family. • m., 24-26, faculty student: My parents make the decisions. • m., 18-20, high school student: Father is the head of the family and he makes all the decisions. • m., 21-23, faculty student: My parents don't let me interfere.
Not interested -30%	• m., 21-23, farmer with High School Degree in Tourism Industry: No. I am not interested in shallow and empty stories. • m., 24-26, faculty student: I am not interested cause I am not planning on staying and basing my life in contemporary enviroment.
Age or sex - 15.2%	• f., 18-20, high school student : Because I am female. • m., 24-26, unemployed, High School Degree: Because there are older and more experienced people than me. • f., 18-20, high school student: I am too young. • f.,18-20, high school student: Because my father think that I am not mature enough to make the decisions.

To the question asked wether they are planning to do farming production in future,no matter are their parents or themselves are already doing it,the biggest number, 379 in total, actually 75.8% of them isn't planning do do farming work in the future, and almost 1/4 intends to do farming in the future.

The questioned which are not intending to do farming work in the future, as for the main reasons name that their professional interests are not related to farming work, (as 234 of them named,actually 61.7%). Secondly, concerning the constant reason why they aren't planning on doing farming work is the small land property, and in the third place there is inappropriate profit, while the small number of them named the hard work as the main reason. Eventhough the hard work is considered to be rejective to young, given answers point out that in a big number farming isn't the attractive occupation for the young people who live in the country and local villages, and that they have different interests.

In graphic 2, we can see the expectations of the young people from the sample covered villages, concerning the land property of the household. 38% of the polled, intends to do farm work in the future, 28% believes that land will be rented and 23% that the land will be cultivated by other ancestors.

Graph 2. *The expectations of the young concerning the field property in the future*
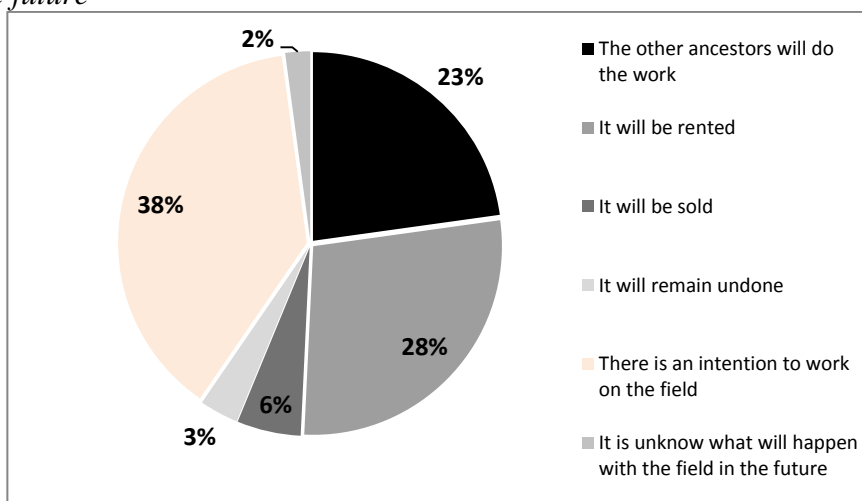
Source: *Own research.*

Young farmers profile

From 500 young people living in the countryside, with whome this research has been done, only 8.8%, actually 44 of themstated that they are farmers, while a large number of them 456, actually 91.2 % think differently about their professions, either they are unemployed or students[10].

To be a farmer is not only the occupation with full time work, after that comes home arrival, free time,to be a farmer is a lifestyle,a whole engagement. For young people farming is insufficiently attractive to chose that profession, non-profitable occupation which considers a lot of hard work.

Who are the young farmers from this research?
They think of themselves as agricultural workers, farmers, firstly males, (88.6% are males), while females no matter their income comes from farm work and they don't have another occupation, are rather considered as housewives or unemployed, no matter the full time engagement in farm work. They 27-29 years old and secondary school degree[11]. In the most cases they didn't want or planned further education, eventhough there are reasons that prevented them to continue schooling.

More than a half, (59,1%) are single and (77.3%) of them live with their parents. As the main reason for mutual farm with their parents in the most cases they state that it is much easier for them, rather then they run the farm by themselves which actually means that mutual life with their parents isn't influenced only by the lack of financial means. Young people lack the need for their own farms, a separate living as the following consequence to take the responsibillity for themselves,as well as they have the need to prolong their childhood and parents support even when they form their own families.

The most of the polled young farmers use the computer[12], but 31.8% of them use computer for work. The most of them have the internet and use

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[10] There are the most unemployed, students, housewives (55.6%), while employed are 35.6%.

[11] One of the polled has Agricultural Faculty Degree.

[12] Seven of them actually 15.9% doesn't use the computer at all.

it mostly for research, e-mails, and fun. Half of them are the subscribers of some social network. Their own residential conditions they mostly rate as good and satisfactory.half of the polled young farmers think that considering the total income and the most necessary needs they can live modestly. They spend the least money on themselves than any other category of the polled (employed outside the agriculture, unemployed, students).

The matter of personal spending gave various answers, but as for the farmers, the most frequent answers were that the costs of investing in agriculture production (8 and 18.2%), going out and personal little things (8, 18.2%), as well as some percentage doesn't spend any money on themselves as 7 (15.9%) answered. At the same time,t heir agers who are employed outside the agriculture, either they are students or unemployed, they mostly answered that they spend their money on going out,personal little things and clothes. Young farmers less than others spend their money on themselves, they are completely dedicated to work and all their money they invest in it or they lack the time to spend it otherwise. One thing points to that ,one young farmer 23 years old answered to this question: *When I think it through,on nothing.I spend my meanson elementary things because I actually haven't got the time for spending,but now you have reminded me,Thanks. Life passes quickly.*

It is interesting how the young farmers rated the financial situtation of their family in comparison of the last five years. Actually ,there is the same number of those who think that the situtation slightly changed for worse and there are those who think that it got better (17,38.6%) answered like this, while ten of them think that the situtation remained the same. Family is the main reason why they are attached to the countryside as well as the land property, as half of the polled answered. In their villages they mostly love the people ,but the most problems they have with small minded people and the primitivism of the individuals. They think that the position of the young people in the countryside is much worse, as 61.4% of the young farmers answered from the sample taken villages. They think that the young farmers are placed in much worse position because they have less possibilities than young people from the cities. As the biggest problems they state that there is the lack of finding work in the agriculture as well as bad material and social position. The most of them isn't satisfied how our society deals wih problems of the young in the countryside (36 of them think like this actually 81.8%). In order to reduce departure of the young from the countryside to the cities,

according to their opinion it is necessery to have better employment possibilities and the stimulation of the agriculture, as 68.2 % of the young farmers answered: It is very simple. Give actually provide a young man from the countryside good living conditions so he can make the living working and then he won't even think about the city.

The attitudes of young farmers in agriculture as their work and profession

More than a half of polled young farmers has registered farm and household under their name, 54.5 and 45.5% of them are those who aren't farm holders. Considering the fact that most of them live with their parents points to the fact parents mostly passed the role of the head of the farm onto their sons,eventhough there isn't a strong indicator what are the actual positions within the relation parent-children, actually wether the sons are just formal or the core "heads" at the farm.

The pension and health care is being paid by 61.4% of young farmers and 38.6% of young farmers doesn't. The proportion of the land property taken from the countryside within this research sample,is estimated approximatelly from 5 to 30 ha. In the biggest number of cases under their property they have 10.01-20 ha, (27.2% of them), while they cultivate 20.01-30 ha (22.7%). Over 100 of ha of land is cultivated by 4.actually 9.1% of them.

What is encouraging fact is that the most young farmers, 88.6% of them thinks that that is their permanent professional orientation. With temporary orientation, actually passing solution to finding new work (6.8%) of them think to cultivate the land,and only two peoplecan't estimate the situtaion. We list some of the answers to this question:

Box 1.

m., 24-26,farmer with Agricultural High School Degree: Yes,if I see any progress at all. If they continue to treat agriculture this way (the only industrial branch with suffict), they will make us farmers to sell everything and buy the apartments in Belgrade and make a living by renting them like gentlemen.
m., 27-29,farmer with Eletrotechnical Hight Shcool Degree: Permanently madam, unfortunately.
m., 18-20,farmer with High School in Catering Industry Degree: Temporary, until he finds better job. I do this because I have to.

Even 90.9 % of young farmers taken from this sample think that the government and their institution don't encourage the land cultivation, and only four of them think that the government does that with their measures. We list some of the answers of the polled in this research:

Box 2.

m., 24-26, farmer with Technical High School Degree: Supportive financial means are unreliable and minimal every year yet with the high standards and demands which must be fulfilled in order to gain the rights.

m., 26-26, farmer with Agricultural Faculty Degree: Corruption, monopoly on the market, only declarative efforts for the agriculture, the small percentage of the budget put aside for agricultureconcerning its participation in BDP, very poorly divided existing means...

m., 27-29, farmer with Agricultural High School Degree: Because they make me lie to register (split) the agricultural household onto all house members who I previously reported in various living locations,addresses. Because they do not pay out the subventions according to the kilogram unit but rather as whoever finds his own way in the paper mess. Because the prices of our products are never known (quarranted)...You want more then these five lines?!!

m., 21-23,farmer (Economic High School Degree): Who cares for the young people in this society?!

m., 27-29., farmer (Mechanical High School): Affordable credits are needed and the support for young people who want to work in agriculture business so that way they can stay in the country and multiply properties. They should be encouraged to set up mini farms but only with existing and formed costs comparison in the animal farming industry.

m., farmer, (Agricultural High School Degree): Because working in farming business is ungrateful work with too much invested efforts , and it is always questionable wether it will be profitable in the long or short run. The government doesn't make it easier for us by all means.

m., 27-29, farmer with Agricultural High School Degree: He doesn't encourage farming because it is difficult for farmers to get mechanisation, there are no affordable credits. The subventions are not that bad.

On the other hand,the most of the young farmers used some of the supportive measures which government offered in previous years, (70.5%) of them, and 22.7% still hasn't but intends to do so,while three of them never used it and they don't intend to do it.

In the distribution of supportive measures and means they complain about the complex procedure and much byrocracy, as well as the measures and means are insufficient and unadequate. In box 3.s of the answers are stated by the farmers with whome this research is done:

m., farmer, Mechanical Faculty student: Because I have to deliver demanding fiscal paper work and report , among other piles of paper, from which 50% are illegal.

m., 21-23, farmer: Minimum of production safety. We can't plan anything ahead. Poor encourgement for young farmers, high interest rates in the banks and etc.

The position of the farmers in our society the young from this research in most cases rate as bad,36, actually 81.8% of them. The rest think that it is the same with other professions. Only one young polled farmer rates his profession as good one. Their bad position is explained with close connection to the bad position of the total agriculture situtation. There is a some answers on this question:

Boks 4.

m., 27-29, farmer,Agricultural Faculty Degree: They think of us as illiteral, left behind, unimportant for the society ...sheep for wooling.

m., 24-26,farmer, Agricultural High School Degree: Because farmers earn the least and those who don't work in agriculture earn the most.

m., 21-23,farmer,Technical High School Degree: We work ourselves out and in return we get 0 or big minus!

m., 27-29,farmer, Mechanical High School Degree: Because we never know the prices of our products. The parametres are questionable and all in all we get nothing.

f., 24-26,farmer, Traffic High School Degree: Uncertain market, incorrect treatment on our behalf from the government.

m., farmer: Because food is very important but still they neglect it,they are placing farmers into dead corner.

m., 24-26,farmer, Agricultural High School: Because farmers are the last hole on the instrument.

m.,2 4-26, farmer, Electrotechnical High School: The rensome prices are never known, it is all big lottery.

m., 27-29, farmer, Mechanical High School: A lot of work,worry.

Young farmers from this sample, about agriculture in large number inform themselves via internet and television documentaries, which makes 63.6% of them. Friends and collegaues are also present as one of the significant channels of informing as 45.5% of the stated.

On the third place is internet as 38.6% of them gets informed, while only 6.8% of them does that through Expert advice agencies, which indicates the bad informingabot their work and function. It is important that the young farmers pay more attention to informing and education, considering that television programmes are the main source of education and information about agriculture, and that the expert literature, seminars and lectures are not substantial.

Graph 3. *The way of means in which they are ususlly informed aboutagriculture*

Expertise documentation, 10
Agriculture magazines, 14
Internet, 17
Parents, 12
TV shows, 28
Friends, collegues, 20
Seminars, presentations, 12
Advice services, 3
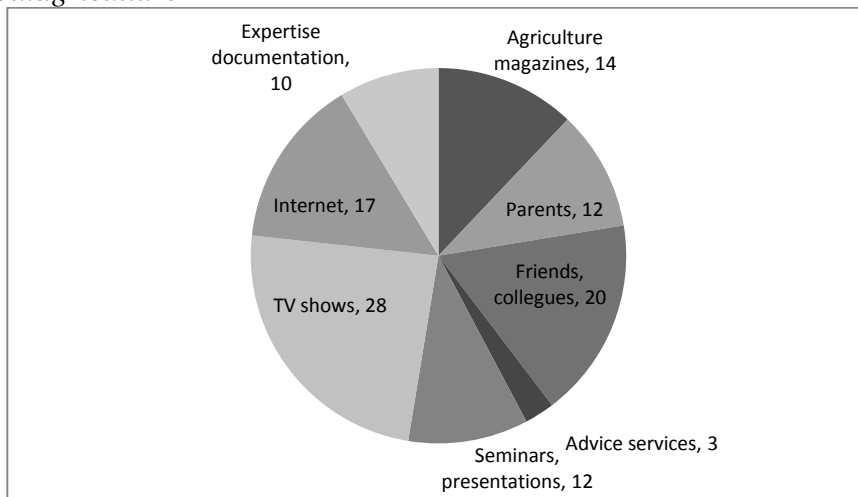
Source: *Own research.*

The main problem that troubles young farmers taken in this sample of research is that they meet is financial nature as well as high prices of repromaterials i low rensome prices as 34.1% of the farmers stated.

In the second place the problem of old and used mechanisation and its lackage as 15.9% of them stated. In the third place appears the problem with unstable prices of the products and their rating (Picture 2). In box 5. some of the answers are stated that young farmers from this sample of research gave.

Picture 2. *The main young farmer's problems at the agriculture household*

34.1% •Finances

15.9% •Agricultural mechanisation

9.1% •Unstable prices and goods rating uncertainty

> m., 27-29, farmer, Agricultural Faculty Degree: Anarchy, theft, repromaterial which doesn't match the declaration, expensive credits, non tranparent rensome, rensome theft, too many mediators ..non existing unions...
>
> m., 24-26, farmer, Mechanical Faculty student: In order to work in farming business I have to pay for everything in cash according to european prices. When I have to sell the product I would rather give it away to the poor.
>
> m., 24-26, farmer, Agricultural High School Degree: I must pay in cash for everything in order to sell my products to some unknown Taycun so it can be storadeg properly, and I have to wait then for him to pay me out if he sells my products. It all depends how long you can wait.
>
> m., farmer: Expensive oil,insufficient farmers merging.
>
> m.,farmer,.Agricultural High School:.Expensive oil, fertilizers and etc. Non existing fertilizers transportation when it is bought in big amounts at some distant point away from my village.

The answers point out to that the young farmers in agriculture production meet with numerous problems, and the most are of the financial nature. That is only one of the reasons why young people from the countryside, rarely decide to do farm work. They think of it as non-profitable, while at the same time it demands a lot of hard work and sacrifice. Also we can notice the unsatisfaction work on behalf of the government institutations and organisations with which the cooperate in products rensome.

Conclusions

The cultural habitat of the young people from the countryside is in constant change which carries enviromental cultural changes within,so the idea about farm work, the inherited land in the sense of tradition continuence lost its valuable worth long time ago.There is a certain lack of motivation among young people for farm work in the sense of economical and cultural way.

There is existing attitude that with hard work and putting a lot of effort, not much can be achieved which is one of the reasons of passive behaviour of the young in each sphere,as well as in being interested in agricultural work. There is an emphasized pragmatism among young people and the materialism and there is more dissapointment and the lack of will due to unfulfilled ambitions when they are not able to find an adequate work in their profession. Despite the fact that it is being worked on this matter, there is still an undesirable image of working in the agriculture industry among young people. It is necessery to put more effort into the transformation of the farmers identity.

To create a modern farmer who can deal with agriculture industry in a modern way,which can be a very profitable business. The decision to work on the farm young people should not make as an option to survive, but they should rather make it with a little more ambition, in order to create modern and profitable farm. Young people from the countryside have to have more potential to know how to recognise economic possibilities of their own farm and to use it in the best possible way. The fact that they live in the village, they understand as their obstacle towards getting employed and yet that they can use it as the part of the solution to their problem. It is essential at the end to point out that with their own will,desire and potential, young people who are interested in agriculture,cannot succeed unless they don't have an adequate institutional support and encouragement. It is indispensable to invest a lot of effort not only for promotion of the agriculture as an activity and work, but also for its professionalism.

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ECONOMIC ACTIVITY OF MANAGERS OF FAMILY FARMS IN POLAND – A SPATIAL PERSPECTIVE

Paweł Chmieliński[1]

Abstract

The optimal use of labour resources is one of the key issues of farm management and includes not only the scope of involvement of the family members in carrying out the agricultural activity, but also the level of involvement of a person managing the farm. The paper discusses, on the basis of IAFE-NRI field study data, the allocation and the level of engagement of farm managers in on-farm and off-farm economic activities. Study shows that in Poland there is a large group of farms, which do not allow for obtaining a satisfactory level of income thus even farm managers are involved in the agricultural activity to a limited degree. At the same time a significant number of managers of relatively large farms decide to combine the farm work with non-agricultural employment. This allows for an increase in the labour saving production techniques.

Key words: *family farms, farm managers, employment, Poland*

Introduction

The importance of socio-demographic characteristics of managers in the development of the economic situation of individual farms and, consequently, the whole sector of production of agricultural raw materials, impels to characterize the changes in the population in terms of selected economic characteristics of managed entities. Determination of these characteristics was guided by the fundamental determinants of the main function of the farm for the holder and his family. This circumstance to a large extent determines the prospects of development of individual entities. In this regard, the divisions by area structure, scale of production and allocation of economic activity were primarily taken into account. At

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the same time due to the large diversity of Polish agriculture, transformations in the socio-economic situation of the population of farm managers are shown in macro-regional terms.

The most optimal use of labour resources is one of the key tasks of farm managers. Given the family character of farms in Poland and the rather strongly fragmented area structure, the decisions of managers concerning the issue include not only the scope of involvement of the family members in carrying out the activity, but also the level of involvement of a person managing the farm. From the perspective of a household and its budget, the scale of involvement in agricultural activity, its complete cessation or a decision on joining it with other forms of earning a living depends on the selected economic strategy which is primarily targeted at economic benefits. Decision on the level of involvement of farm managers and their family members in the agricultural activity are preconditioned by the scale of production of a farm, which under Polish conditions is still largely dependent on the owned acreage of land, the number of technical devices in the workplace and the possibility to find non-agricultural sources of income (Karwat-Wozniak, 2001). The rather good, at the European background, age structure and the improving structure of educational attainment of farm managers results in an increased professional mobility of this group, and causes that the decision on diversification of professional activity of farmers, especially in case of small farms, allows for continuation of the pursued activity, even if the scale of production is relatively small.

The concept of the European model of agriculture assumes duality of its functions, which apart from the objectives related to food production, encompass also social and environmental functions. This model supported by the European Union measures assumed co-existence of large farms able to ensure food security and smaller farms, whose functioning would be related to maintenance of the public goods, including, above all, landscape and cultural assets of the countryside, as well as the status of the natural environment (EESC 2013). The globalisation processes impose a pressure on agriculture to minimise the costs of land use and labour, and thereby to industrialise agriculture (Kowalczyk 2010).

This pressure is a natural consequence of the market processes, but it constitutes a threat to the European model of agriculture, which allows for some decrease in the efficiency (and thus competitiveness) to the benefit of protection of goods recognised as public (COPA-COGECA 2006).

Under such circumstances the diversification of economic activity of agricultural population is considered as one of the key parts of the efforts to maintain the model of agriculture that corresponds to social expectations.

Map 1. *Location of villages in IAFE-NRI surveys by macroregion*
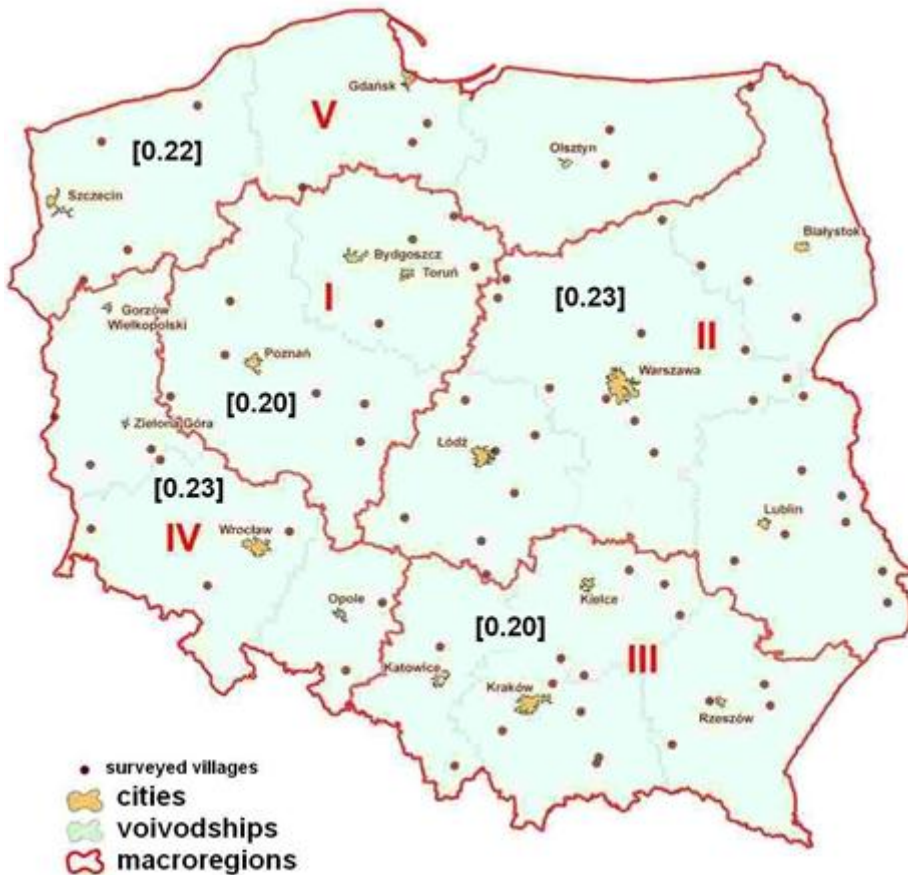
[0.20] - sample size (% of the real number of farms in Poland).
The red line marks the borders of selected macroregions, which include the following voivodships:
I. Central-Western – the Kujawsko-Pomorskie and Wielkopolskie;
II. Central-Eastern – the Łódzkie, Mazowieckie, Lubelskie and Podlaskie;
III. South-Eastern – the Świętokrzyskie, Małopolskie, Podkarpackie and Śląskie;
IV. South-Western – the Opolskie, Lubuskie and Dolnośląskie;
V. Northern – the Zachodniopomorskie, Pomorskie and Warmińsko-Mazurskie.

The paper discusses the allocation and the level of engagement of farm managers in on-farm and off-farm economic activities. The empirical

basis of investigations were the data from IAFE-NRI field studies. These are long-term studies carried out periodically (4-6 years) in the same 76 villages, in all farms with an area of more than 1 ha of agricultural land (AL), used by individuals, i.e. individual farms, which are de facto family farms (Zegar 2003). The villages were selected deliberately, so that the area structure of surveyed units reflected the actual size of the total number of individual (family) farms. However, in individual farming, and this more clearly marks its dominance in the Polish agricultural sector. The data of Agricultural Census 2002 show that at this time individual farms had 87.9% of the total area of agricultural land. For the most part these were the entities of the area exceeding 1 ha of AL. This group had 85.6% of the total land used for agricultural purposes. Data of the census of 2010 confirmed the strengthening of the dominance of individual family agriculture. In 2010, individual holdings had 88.1% of the total agricultural land used for agriculture, which comprised 86.6% of individual farms. Moreover, the acreage of such a farms is closely linked with the level of other components of production assets, socio-demographic characteristics of farmers (Buks and Buks 2005) and the main objectives of agricultural activity (Sikorska 2006). For this reason, it can be concluded that the studied population reflects the socio-economic structure of Polish agriculture.

Employment at Polish individual farms is characterised by significant differentiation of the scope of involvement in work at a farm, as well as considerable spread of methods to earn a living. According to the data from the National Agricultural Census of 2010 (NAC), regardless of the amount of performed work almost 2.4 million family members worked only on individual farms, further 117 thousand joined worked at a family farm with paid employment, while the farm was the main place of their professional activity (Karwat-Wozniak, Chmielinski 2013). Moreover, an increasingly growing number of farms do not generate any income on a permanent basis. This situation preconditions also the level of involvement of the farm manager in the conducted agricultural activity.

Managers according to the involvement in work at a farm

More than two-thirds of managers of individual farms covered by the research in 2011 were involved only in work at their own farm, an only one-third joined this form of work with professional activity on non-agricultural labour market. This share has been on an increase for years.

According to the 2000 data the share of such persons constituted less than one-quarter of the total described group (Buks, Buks, 2004). At the same time, the share of unnecessary persons, among all persons working at an individual farm, is still rather high.

The research also shows that there is an interdependency between the number of people joining work at their own farm with paid employment in non-agricultural sectors and the size of the farm (Table 1).

Table 1. *Managers according to the involvement in work at the farm and size groups*

Share of persons	Total	Size group (ha of UAA)							
		1-2	2-5	5-10	10-15	15-20	20-30	30-50	50 and more
working exclusively on the farm	64.0	50.6	55.8	67.2	75.1	74.8	83.4	84.1	81.1
combining on-farm and off-farm employment	36.0	49.4	44.2	32.8	24.9	25.2	16.6	15.9	18.9

Source: *Compiled on the basis of 2011 IAFE-NRI survey data.*

According to the field research data, in 2011 the share of managers of the smallest farms, i.e. of up to 2 ha of utilized agricultural area (UAA), that were active on the non-agricultural labour market constituted almost half of the respondents in this group.

This share decreases along with the increase in the size of the own farm, while even in case of the largest farms in terms of area, i.e. above 20 ha of UAA, every sixth respondent on average joined the work on a farm that he/she managed with non-agricultural employment.

Among persons working only on a farm, those full-time involved in agricultural activity on a permanent basis represented only two-thirds of the group of managers covered by the research. Simultaneously, in the group of farmers from the smallest farms in terms of area, this share was significantly lower and constituted only 22% in case of units of up to 2 ha of UAA and less than 43% in case of farms of 2-5 ha of UAA. In this group part-time, casual and seasonal involvement in work on a farm was very common (Table 2).

Table 2. *Economic activity of managers of individual farms according to area groups*

Area groups	Working exclusively on the farm				Combining on-farm and off-farm employment		
	total	of which:			total	of which:	
		permanent full time	permanent part time	seasonal occasionally		mainly on-farm	mainly off-farm
TOTAL	100.0	63.5	20.0	16.5	100.0	9.7	90.3
1-2	100.0	22.5	32.2	45.3	100.0	1.6	98.4
2-5	100.0	42.7	33.2	24.0	100.0	2.7	97.3
5-10	100.0	72.7	16.8	10.4	100.0	9.5	90.5
10-15	100.0	84.8	10.3	4.8	100.0	20.8	79.2
15-20	100.0	89.0	9.7	1.3	100.0	30.8	69.2
20-30	100.0	91.6	4.8	3.6	100.0	54.5	45.5
30-50	100.0	93.4	5.7	0.9	100.0	65.0	35.0
> 50	100.0	95.3	2.3	2.3	100.0	80.0	20.0

Source: *Compiled on the basis of 2011 IAFE-NRI survey data.*

Labour input of managers of their own farms increased along with the size of the owned land acreage, hence only in farms of more than 20 ha of UAA the share of managers involved full-time in production activity amounted to over 90%. Similar relations may be observed in case of farm managers, who join this function with non-agricultural employment. Persons deciding for that type of professional activity for the most part worked outside of their own farm. This group amounted to 90% of the total number of persons joining these two forms of employment.

Figure 1. *Economic activity of farm managers according to size of the owned farm*
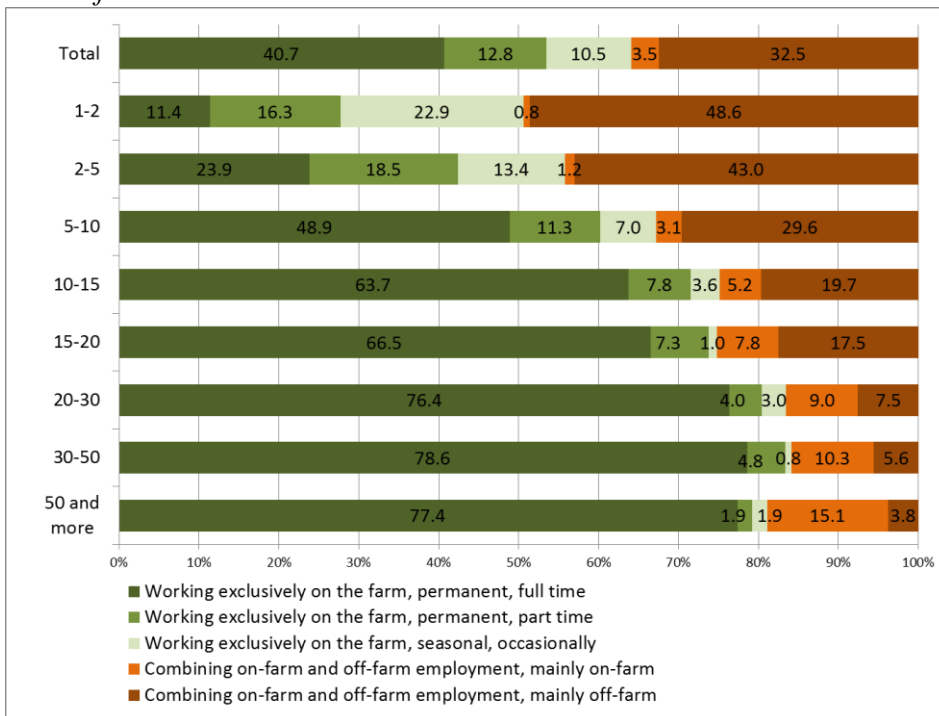
Source: *Own compilation on the basis of 2011 IAFE-NRI survey data.*

When analysing the interdependencies between the area size and economic activity of farm managers, it should be noted that the group of persons working full-time only in the agricultural activity on a permanent basis represents no more than 41% of the entire examined group. Others are not involved in work on a farm because there is no need for it, or they are active also on non-agricultural labour market (Figure 1).

This comparison illustrates low involvement in work on farms of 1-2 ha and 2-5 ha of UAA, where this share amounts to 11 and 24%, respectively, and attests to the high level of involvement in work outside one's own farm.

It should be noted that the improving structure of educational attainment (along with the growing significance of non-agricultural education) and relatively favourable age structure, translate into a significant level of diversification of professional involvement of managers of family farms in Poland.

This is evidenced by the fact that even in the case of the largest farms in terms of area, farmers seek additional possibilities to earn a living, which is possible, for instance, through improvements in work mechanisation in agriculture.

Spatial differentiation of economic activity

When analysing the case of economic activity of farm managers it should be emphasised that in this area significant regional differences are visible. These are linked to a different area structure of farms in different regions of the country, but also with the differences in popularisation of non-agricultural activity among rural population, as well as functions ascribed to a farm.

The research conducted in 2011, shows that the highest share of managers of individual farms involved only in work on their own farm was noted in the central-western and northern macroregion (Figure 2).

Figure 2. *Spatial* differences in involvement of farm managers in engagement in work on the farm*
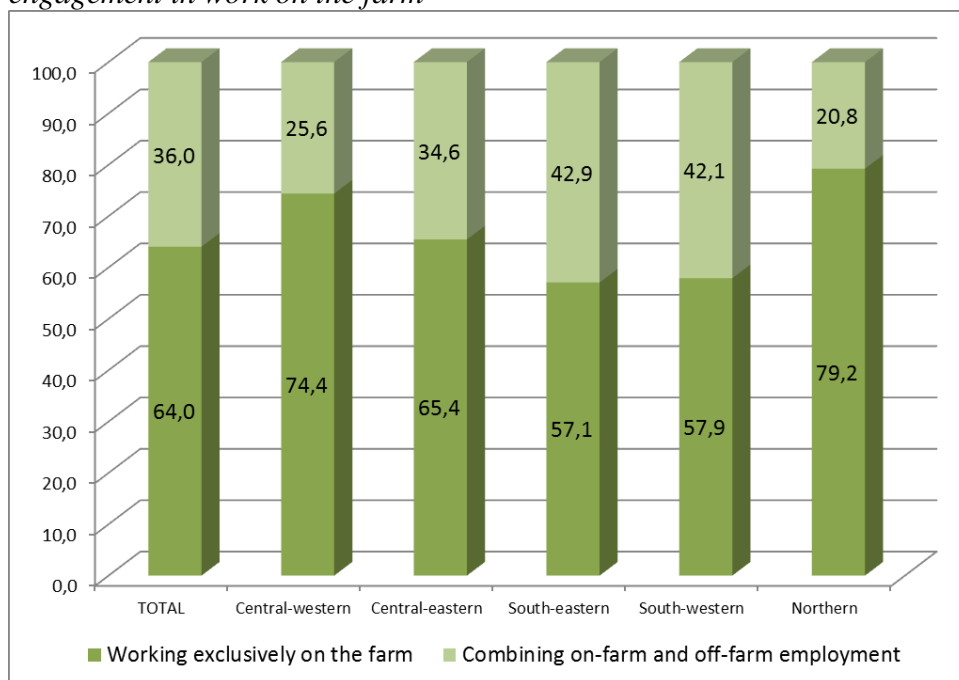
*Respective macroregions as described in map 1.
Source: *Compiled on the basis of 2011 IAFE-NRI survey data.*

This is linked to a relatively favourable area structure of farms in the voivodship falling within the boundaries of these macroregions which predetermines the level of involvement in the conducted agricultural activity. Whereas relatively the highest number of farmers joining work on a farm with other forms of activity was noted in south-eastern and south-western macroregions. These are areas characterised by the most fragmented agrarian structure in the country, where doing two jobs is also a common tradition among farmers and their family members. This situation pertained especially to the south-eastern macroregion, where persons working full-time only on a farm on a permanent basis represented just 42%, and among all farm managers as much as 31% was involved in work in agriculture only on seasonal or casual basis. In the central-eastern macroregion the value of these indicators amounted respectively to 86 and 4% (Table 3).

Table 3. *Managers working only on a farm according to the macroregions*

Macroregions	Working only on a farm			
	total	including		
		permanent full time	permanent part time	seasonal occasionally
TOTAL	100.0	63.5	20.0	16.5
Central-western	100.0	86.0	10.4	3.7
Central-eastern	100.0	67.1	19.5	13.4
South-eastern	100.0	41.8	27.6	30.6
South-western	100.0	67.1	22.4	10.6
Northern	100.0	81.5	9.5	8.9

Source: *Compiled on the basis of 2011 IAFE-NRI survey data.*

The scale of spatial differentiation among famers joining work on their own farm with non-agricultural employment was relatively small. Work outside of a farm predominated in the entire researched group (90% of respondents from the category), while differences between the southern and northern parts of the country were clearly marked. The share of managers working mainly on their own farms among those joining different forms of employment was on average two times lower than in case of south-eastern and south-western macroregions as compared to the remaining macro-regions (Table 4).

Table 4. *Managers working on a farm and outside of it according to the macro-regions*

Macroregions	Share of person combining on-farm and off-farm employment		
	total	including	
		mainly on-farm	mainly
TOTAL	100.0	9.7	90.3
Central-western	100.0	12.6	87.4
Central-eastern	100.0	12.8	87.2
South-eastern	100.0	6.7	93.3
South-western	100.0	6.0	94.0
Northern	100.0	11.4	88.6

Source: *Compiled on the basis of 2011 IAFE-NRI survey data.*

Analysis of the level of involvement of managers in work on their own farm in individual regions of the country points to continuing differences in this respect. This confirms the thesis that the image of contemporary agriculture in individual regions is still influenced by historical conditions of socio-economic development and the area structure of farms. The macro-region with the traditionally highest level of agricultural development is the central-western macro-region, and structural problems are faced mainly by voivodship of the south-eastern macro-region (Sikorska 2001). This is reflected in the level of involvement in work on one's own farm.

Professional and market activity

The decision of farm managers regarding the scale of involvement in work on a farm is closely related to the scale of market activity of the entity, since achievement of a satisfactory level of farm income depends on the fact of having at one's disposal relevant production assets (Karwat-Wozniak, 2009).

The analysis of economic activity of farmers according to their market activity documented the fact that managers of farms pursuing commercial production were relatively more often than others involved in work only on their own farm. The share of such persons amounted to nearly 70% as compared to 51% in the remaining group (Figure 3).

Figure 3. *Professional activity of managers of individual farms according to market activity*
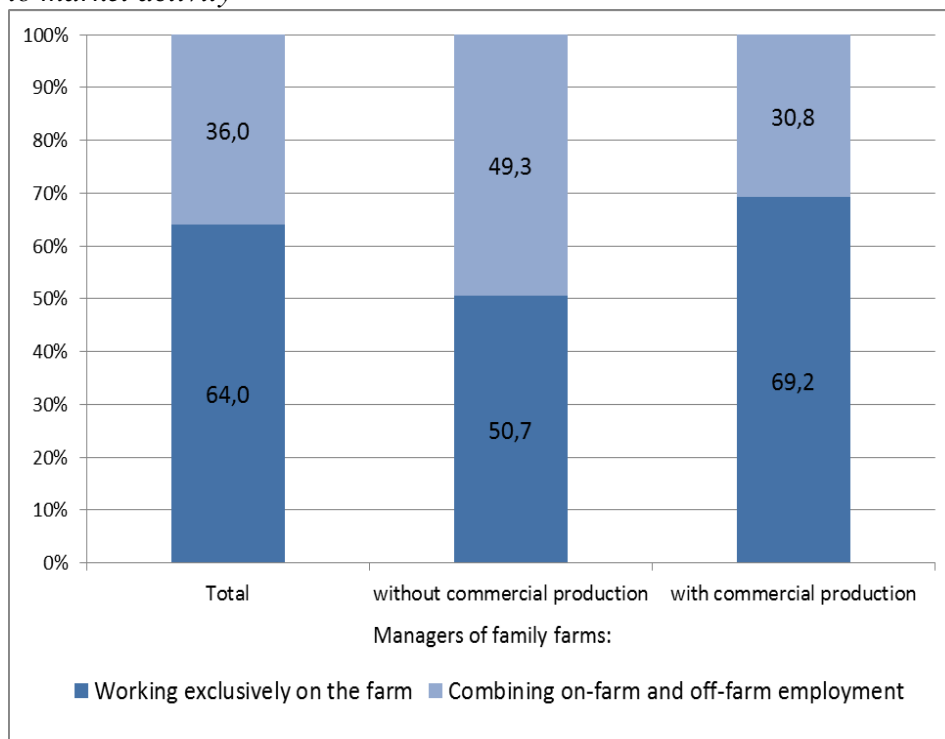
Source: *Compiled on the basis of 2011 IAFE-NRI survey data.*

At the same time, it is still true that there is a significant dependence between professional activity of managers and the size of production to the market generated by the farm. Persons managing a farm without commercial production and declaring that they work only on their own farm were definitely more often involved in part-time work and work on seasonal and casual basis.

Lack of market activity of the farm was related to a very limited working time for nearly three-quarters of the researched group of managers (Table 5). Among farmers from farms pursuing commercial production this ratio was reverse – nearly three-quarters of them worked full-time on a farm on a permanent basis.

When analysing the structure of managers working on farms active on the market, it should be emphasized that their share in full-time work differed depending on the production scale.

Table 5. *Structure of managers working only on an individual farm according to market activity*

Macroregions	Share of persons working exclusively on the farm			
	total	including:		
		permanent full time	permanent part time	seasonal/ occasionally
TOTAL	100.0	63.5	20.0	16.5
without commercial production	100.0	26.6	24.9	48.5
with any commercial production	100.0	73.9	18.6	7.4
with commercial production				
up to PLN 10 thousand	100.0	53.0	31.3	15.7
100 thousand and more	100.0	90.8	6.6	2.6

Source: *Compiled on the basis of 2011 IAFE-NRI survey data.*

In case of farms with production scale amounting up to PLN 10 thousand only about half of managers fulfilled their functions full-time.

Only a relatively significant market activity of a farm guaranteed full involvement of the manager in the decision-making and production process. Such people represented 91% in the analysed group.

Table 6. *Structure of managers joining work on an individual farm with non-agricultural employment according to market activity*

Macroregions	Share of persons combining on-farm and off-farm employment		
	total	of which:	
		mainly on-farm	mainly off-farm
TOTAL	100.0	9.7	90.3
without commercial production	100.0	0.2	99.8
with any commercial production	100.0	15.5	84.5
with commercial production			
up to PLN 10 thousand	100.0	3.8	96.2
PLN 100 thousand and more	100.0	76.6	23.4

Source: *Compiled on the basis of 2011 IAFE-NRI survey data.*

In general, a regularity might be indicated – the greater the scale of commercial production, the higher the share of entities managed by persons involved only in full-time work on their farms.

Whereas the analysis of the structure of managers who combined work on their own farm with non-agricultural employment points to the crucial significance of market activity as a factor influencing the scale of differentiation in this regard (Table 6).

The group of managers of farms not pursuing commercial production, who combine together different forms of earning a living and point that the farm is their the main place of work is insignificant (below 1%).

In 2011, it was also observed that there is a strong differentiation as regards the predominant place of work of managers from the group of farms with commercial production. As far as 76% of farm mangers registering sales above PLN 100 thousand declared that they worked mainly in agriculture, the value of this indicator in case of entities with commercial production at the level below PLN 10 thousand amounted to less than 4%.

It should be also noted that among farm managers registering production at the level above PLN 100 thousand, who combine work in agriculture with non-agricultural employment, nearly one-quarter of respondents indicated work outside a farm as their main source of income.

Conclusion

The presented data from the IAFE-NRI study confirm the interdependency between economic activity of managers of individual farms as regards agrarian structure, and commercial character of agricultural production.

Under the Polish conditions the link between commerciality of farms and their area is still significant, and thus both these features were strongly reflected in the decisions of farm managers concerning the level of involvement in agricultural activity as well as differentiation of professional activity.

In the group of Polish farms there is a large group of entities, which do not allow for obtaining a satisfactory level of income thus people formally acting as managers of such farms are involved in the agricultural activity to an insignificant degree. It should be stressed that a significant number of managers of farms relatively large in terms of area, decide to combine the farm work with non-agricultural employment. This allows for an increase in the labour saving production techniques.

The level of involvement of managers in work on their own farms continues to be considerably differentiated. Historical differences in this regard have not been obliterated which is evidenced by the long-lasting high level of rural residents doing two jobs (including farm managers) on southern areas, where the scale of agrarian fragmentation is high.

At the same time, it might be assumed that the high share of people managing small farms of little value or without commercial production forms a part of family-support strategy which assumes optimization in the structure of income of family members and covers also the decision on economic activity of a farm manager.

The European model of agriculture provides for support to farms whose functioning, from the perspective of roles it fulfils, is significant for the environment and maintenance of natural and cultural heritage. Thus from this point of view, the decisions of small farm managers to diversify economic activity and limit the scope of work on one's own farm may be regarded as a positive phenomenon.

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THE CORRELATION BETWEEN POPULATION EMPLOYED IN AGRICULTURE AND AGRICULTURAL PRODUCTION IN ROMANIA

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Abstract

Romanian agriculture is a traditional sector with important potential of development. Romania has an agricultural area of 14.7million hectares, of which 9.4 million hectares of arable land of the highest quality. According to specialists, Romania could become in the next years an agricultural power in Europe in terms of good absorption of European funds, of significant foreign direct investments and a substantially government support. The purpose of the article is to study the intensity and the direction of the connection between two relevant indicators that characterize the agricultural sector in Romania: the agriculture employees and the agricultural production. The research is based on official data published by the National Institute of Statistics during the period 2005 – 2012. The methodology used is the correlation analysis, the ANOVA method, the testing of the significance of the linear model, of the parameters and correlation coefficient.

Keywords: *agricultural employees, agricultural production, ANOVA method, correlation analysis*

Introduction

Economic indicators, socio-economic phenomena in general, do not evolve independently, being in contact with other economic variables. In many economic decisions it is necessary the study of dependence between variables through statistical methods such as: graphical method, regression method, the correlation report, ANOVA method. Linear

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regression, through the method of least squaresis the most commonly used method. It is termed "regression", "linear regression", "multiple regression" or "least squares" when constructing a model. The purpose of regression method is to emphasize the relationship between a dependent variable (endogenous or resultative variable) and a number of independent variables (exogenous, factorial, explicative variables). This method gives the answer to the following questions: "What is the best prediction for?", "Who is the best predictor for?" Multiple regression method is generalized through the theory of "general linear model" which allow multiple dependent variables simultaneously and also factorial variables which are linearly independent.

Demographic aspects in Romania

The evolution of a country's economy is essential in terms of life quality. It is normal the fact that in a transition period there are difficult obstacles to pass, yet it is a fact that continuous economic decline affects the quality of life and finally leads to low levels of living conditions.

Demographic transition is the process by which population change over from the old demographic regime, where the birth and death rates registered high levels, to the modern demographic regime, in which these phenomena are decreasing. Demographic transition tries to explain the evolution of the population depending on social, economic, educational, medical and psychological and cultural factors.

Demographic transition theory was formulated by Warren Thompson (1929) and Frank Notestein (1954) who stated that with the transition of the pre-industrial economy to modern economy, the rates of birth and deaths began to decline. In traditional agrarian societies, high fertility was offset by high mortality. By finding solutions against diseases and the establishment of prevention methods against pandemics, the mortality rate was reduced.

Jean-Claude Chesnais (1986) claimed that the demographic transition is the transition from the traditional demographic regime with high levels of fertility and mortality to a regime with low fertility and mortality rates. The transition begins with decreased mortality followed by decreased fertility. The speed of changes varies from one country to another, causing large discrepancies, with important repercussions in income distribution.

Thus, if the developed countries have low levels of birth and mortality, but high levels of economic development, the developing countries experienced a reverse situation: high birth and mortality rates, high rate of population growth, relatively young population structure and low levels of economic development.

Table 1. *Romanian population's evolution*

Year	Inhabitants number (million)	Urban inhabitants (%)	Rural inhabitants (%)
2003	21.57	53.0	47.0
2004	21.45	53.9	46.1
2005	21.31	55.0	45.0
2006	21.19	55.4	44.6
2007	20.88	54.9	45.1
2008	20.53	54.1	45.9
2009	20.36	53.9	46.1
2010	20.24	53.9	46.1
2011	20.12	54.0	46.0
2012	20.09	54.0	46.0

Source: *Statistical Yearbook 2013- National Institute of Statistics, available from* http://www.insse.ro/cms/ro/content/anuarul-statistic-2013 *(Accessed at 10 September 2015)*

Studying the data in the table above, it is noticed that the Romanian population had a tendency of continuous decline between 2003 and 2012, due in particular to declining birthrates. The percentage of rural population had an oscillating evolution. Between 2003 and 2006, the share of urban population increased, between 2007 and 2010 registered a downward trend and a slight increase in 2011 and 2012. The figures provided by the National Institute of Statistics confirm Romania's demographic decline, with severe impact on the economy and education. The impact will be seen on the school population, on fertile population, on working age population and so on. If we continue at this rate, in a few years, the number of pupils of school age will require abolition of several posts of teachers, the population of working age will lessen too, which might put great pressure on labor taxation. Since fewer and fewer contributions, state will have to provide more and more pensions. At 1 January 2014, Romania's resident population was 19942.6 thousand inhabitants, of which 9738.4 thousand men (48.8%) and 10204.2 thousand women (51.2%). Negative values of natural increase with

negative balance of external migration contributed to the country's population fall, by 153400 people in the period 1 January 2012- 1 January 2014. The age structure of the population has the characteristic of an aging process, mainly due to declining birth rates, which has reduced the number of young population (0-14 years). In parallel, increasing life expectancy determined an increasing number and share of elderly population (65 years and over). The age pyramid highlights disproportions in the population structure by age and gender. Reducing the number of young population narrowed further the base of pyramid. Demographic and economic effects of this development will be felt over time leading to changes of various subpopulations (the school subpopulation, the fertile population, the working age population). On 1 January 2014, young population (0-14 years) account for 15.5% and those aged 65 and over, accounted for 16.5% of the total resident population. Young people (0-14 years) decreased by 94200 persons compared to 2012 (from 15.8% in 2012 to 15.5% in 2014) and elderly population (65 years and over) increased with 55100 people (from 16.1% in 2012 to 16.5% in 2014). In 2014, people aged 85 and over accounted 1.5% of the total resident population. It decreased by 114300 persons compared to 2012, reducing the percentage from 68.1% (2012) to 68.0% (2014).Population structure, by age group and area of residence confirms that aging process is more pronounced in rural areas. Thus, in 2014, the share of elderly population (65 years and over) is higher in rural areas (19.4%) than urban areas (14.1%). Index of demographic aging and age-dependency ratio were directly influenced by decreasing number of children (mainly) and rising elderly population.

In Romania, the transformation after the Second World War determined an intermediate phase of demographic transition, with a gap of several decades with the countries of Western Europe. Social and economic changes have strongly influenced the structure of population as well as the evolution of birth and mortality rates. In the last six decades, birth rates had various trends that give certain specificity in relation to other European countries. Birth rates increased from 23.4 alive newborns per 1000 inhabitants (1947) to 25.6 alive newborns per 1000 inhabitants (1955) without reaching the rates before the war (30-35 births per 1000 inhabitants). Since 1956, the birth rate registered a rapid downward trend, from 24.2‰ (1956) to 14.3‰ (1966), influenced social and economic causes such as wide access to education, the participation of women in economic activity, the social mobility generated by industrialization and urbanization.

The measures of demographic policy on banning abortions adopted at the end of 1966, had the effect of strong recovery in the birth rate, especially in the early years of the decree, when there were born on average more than 526000 children annually, recording rates as 27.4‰ in 1967 and 26.7‰ in 1968. After 1980 there was a decrease in the number of alive newborns, on average less than 400000 children annually, and during the period 1980-1983 the birth rate fluctuated between 14‰ and 18‰. Pronatalist coercive factors had only short-term effect.

The reproductive model formed in Western European countries in the 70s influenced the reproductive pattern of Romania in the last three decades, namely couples wanting a small number of children brought into the world at a higher age and an increasing proportion of unmarried mothers. This model became more widespread since 1989, after the fall of communism. The revolution of 1989 brought the initial steps to repeal laws like banning abortion and contraception. The 1990-2012 periodregistered an accelerated drop in the birth rate from 13.6 ‰ (1990) to 10.7 ‰ (2012). The main reason of this situation is the change of Romanian family model determined by delaying in marriage and fi rst childbirth. (Vasile, Dobre 2015). By declining birth rates, Romania has aligned with the general trend in Europe. However, many Western countries have a better situation, given the political support of families with children. So, in Romania, from 1992, taking in consideration the determinants presented abose and the the intensive phenomenon of international migration caused by economic conditios, we observe a significant decrease of Romanian population significant.

Analysis by residence areas reveals that the birth rate was lower in urban areas compared to rural areas, except for the period 1979-1985, 2009 and 2010 when the birth rates were higher than in rural areas. In urban areas there is a lower proportion of families with many children, a large number of couples limiting to one child or two. The discrepancy between the birth rates of two residence environments is based on differences of age structure of the population, the activity of women in the household or outside the household and the internal migration of the two areas. At territorial level, in the group of counties with a high birth rate stand those counties that have o lower degree of urbanization and a greater share of young population. These factors have led to significant changes in the birth rates in each county.

For three decades, nearly one in three people of working age are classified as "agricultural employee" and most of the 2.6 million Romanian bearing this title in statistics live in poverty.

While most European countries have developed through industrialization and creating jobs in services, according to statistics registered in 2012, Romania stands at the level of one third of the population employed in agriculture, sector which contributes to GDP with a rate of only 6%. In the UK, only 1.2% of the employees perform agricultural activities, in Norway 2.2% and in Ukraine 17.2%.The situation in Romania is similar to that of countries like Ecuador, the Philippines, Kazakhstan or Guatemala. The low productivity of this sector is given by the small contribution to GDP compared with the large number of people employed in agriculture: 29% of the employed population in Romania produced 6% of the GDP in 2012. In recent decades, the dynamic of urban development has been slow. The lack of jobs in the cities as well as jobs in non-agricultural activities in villages, made the percentage of the population in subsistence agriculture freeze at 29%. The problem is that most people from agricultural field don't work in the profitable capitalist agriculture, but in subsistence farming.

Table 2. *Employment in agriculture (% of total employment)*

Country	1980	1990	2012
UK	2.6	2.1	1.2
Norway	8.3	6.4	2.2
France	8.4	5.6	2.9
Italy	14.0	8.8	3.7
Finland	13.3	8.8	4.1
Spain	19.3	11.8	4.4
Hungary	22.1	18.2	5.2
Bulgaria	24.4	18.5	6.4
Portugal	27.3	17.9	10.5
Malaysia	37.2	26.0	12.6
Costa Rica	27.4	25.9	13.4
Romania	29.8	29.1	29.0
Philippines	51.8	45.2	32.2
Indonesia	56.4	55.9	35.9

Source: *Eurostat, available from http://ec.europa.eu/eurostat (Accessed at 5 September 2015)*

Studies realized by Romanian specialists like Burja (2014) reveal Romania is the country with the largest population employed in agriculture among countries from European Union and the labour productivity in agriculture has one of the lowest level in Europe because the subsistance agriculture is widely practiced. Compared with developed countries from the EU - Germany, France, Italy and Spain - which have the largest agricultural areas and that are the main agricultural producers, the situation is even sadder: the level of Romanian farming population is closed to population of these four countries in the same sector.

Figure 1. *The evolution of Romania's employment in agriculture*
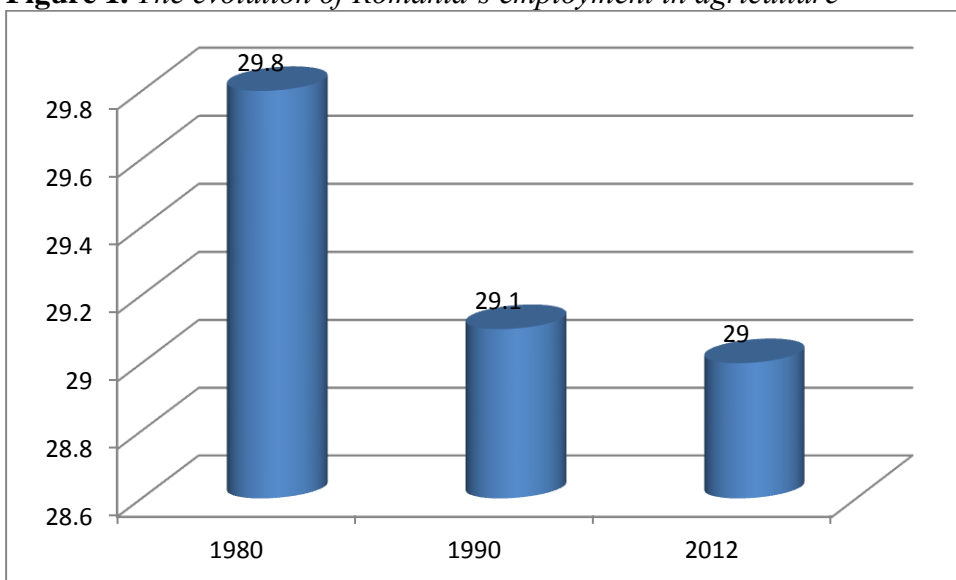
Source: *made by the authors*

In 1950, the Romanian labor force was employed in agricultural activities in a proportion of 74%. After the Second World War, this rate has decreased significantly with the policy of forced and accelerated industrialization that transferred part of the workforce to industrial centers. Thus, in 1980, the Romanian population employed in agriculture reached a share of 29%, which had fallen to 28% in 1989.

The lack of investment and industrialization during the last 20 years made this percentage to freeze at the value of 29%, despite massive population migration abroad and despite the fact that the Romanian economy has been modernized after the entry of multinational companies in the market.

The fact that Romania reach to compare in terms of occupancy in agriculture with poor countries from Asia or Africa has historical reasons. After the fall of communism, the properties were restituted, which conducted to the division of the agricultural properties. The lack of efficient irrigation is another important problem. In addition to that, the farmers can't sell their products because potential customers in urban areas do not have enough income to buy their goods or simply choose imported products. Another reason why employment in agriculture has stagnated is the fact that not all of the people that haven't found employment in the city have gone to work abroad. Due to the higher cost of city life, in 2012, for example, 118000 people moved from cities to villages, exceeding the number of the people who moved from villages to cities (74000 people).

Table3. *Romanian workforce employed in agriculture, forestry and fishing*

Year	Employees in agriculture (million)	% of the employed population
1950	6.23	74
1960	6.25	65
1970	4.87	49
1980	3.09	29
1989	3.06	28
1992	3.44	33
2000	3.57	41
2012	2.68	29

Source: Eurostat*available from* <u>http://ec.europa.eu/eurostat</u> *(Accessed at 5 September 2015)*

So, this situation have many economic, social, demografic explanations that may consist of changes that occurred in the Romanian economy after 1989 when it recorded a massive restructuring of industry, characterized by extensive layoffs which caused stopping the youngsters to leave the villages but also leaving cities by redundant workers, which turned to their native village without the financial funds and bind to practice the subsistence agriculture.

In addition, the retirement policy based on anticipated retirement (applied between 1990-2000) determined masive movment of early retired people to rural area. The subsistence farming that brings low income determines

the increasing age to work in agriculture because the seniors people, being in retirement, want to supplement their incomes or agriculture is their way to make a living.

Maybe the figures regarding the Romania's employment in agriculture would be even greater if the rural population was no affected by another phenomenon that occurred following the collapse of Communism: international labor migration to countries in the European Union, Israel and Turkey.

In fact, this phenomenon is called circulatory migration because is about "come-and-go" or seasonal movements (Dumitru, Diminescu, Lazea, 2004).

Figure 2.*The evolution of Romanian workforce employed in agriculture*
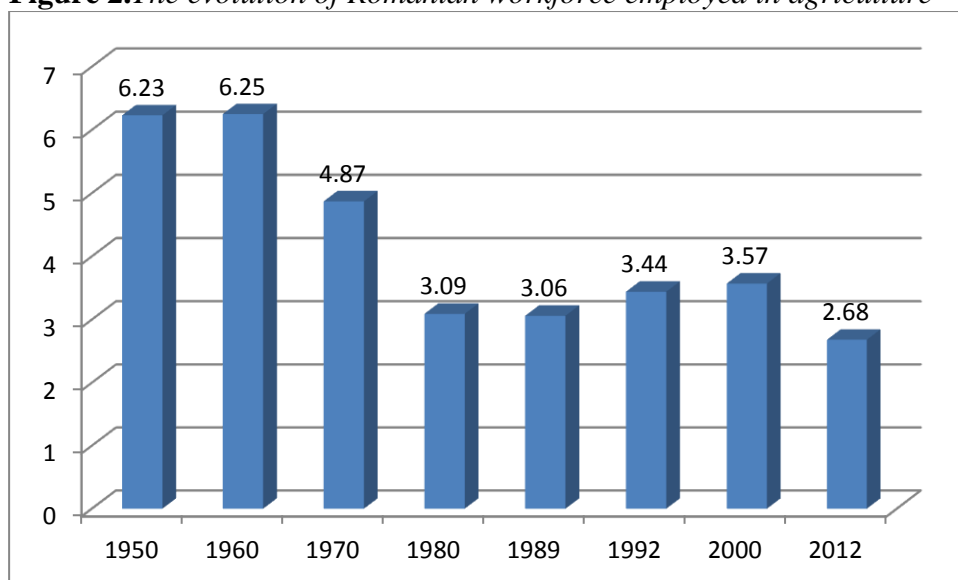
Source: *made by the authors*

Currently, Romania has the most fragmented agricultural market in the European Union, with 3.7 million agricultural holdings, operating an average of 3.5 hectares per farm.

The situation improved in recent years, so the market has two distinct universes: that of subsistence farms, a few hectares each, covering a total of 4 million hectares and the area of tens of thousands of factory farms, which operates another 4 million hectares of land.

453

The correlation analysis between the population employed in agriculture and agricultural production

Statistics has a large number of methods to study the dependencies between two or more variables. Among them, those methods contained in "correlation and regression analysis" have a significant role.

Regression (the analytical form) indicates how a variable is dependent on other variable and correlation indicates the degree to which a variable is dependent on another variable (or other variables).

The forms of interdependences are varied and sometimes difficult to explain. According to Isaic-Maniu (2004) is necessary to classify statistic correlations according to certain criteria.
   a) By the number of independent features studied:
      - Single correlation whens tudying the correlation of a dependent characteristic (y) and an independentone (x), for example the relationship between the number of sales (x) and the volume of sales of goods (y);
      - Multiple correlation when studying the correlation of a dependent characteristic (y) and two or more independent features $(x_1, x_2, ..., x_n)$ such dependence of the volume of sales of goods(y), the number of sales (x_1) and commercial area (x_2);
   b) By the direction of the link:
      - Direct correlation when both characteristics change accordingly;
      - Reverse correlation when dependent feature change opposite the independent one;
   c) By the analytical expression of the connection:
      - Linear correlation which can be expressed by the function of grade 1;
      - Nonlinear (curved) correlation which can be expressedusing non linear functions (parabola, hyperbola, exponential function, etc.);

To highlight statistic connections and measure their trend, are used equations of estimation corresponding to analytic functions.

These functions are called regression and their graphical representations are done by regression curve.

For the right choice of regression function, the series of distribution are represented through a correlation graph based on which it can be appreciated if the link is linear or curvilinear.

As a tool for verifying the accuracy of the estimation function there are used also the methods of dispersion analysis.

Regression function expresses how the result feature (Y) changes if the values of the factorial feature vary (X) and the other factors have a constant action. Other features are considered nonessential and are synthesized into a single value with average character.

If the graphical representation indicates a linear trend, the regression equation expressing this connection is:

$$\hat{y}_i = a + b \cdot x_i \qquad (1)$$

Parameter "a" is the intercept and indicates the level that would have reached characteristic Y if all factors, except the registered one, had constant action on it. Parameter "b" is the regression coefficient and it geometrically represents the slope of the regression.

This parameter is positive for a direct connection or negative for a reverse connection and shows how changes in average variable Y if X changes by one unit. When b=0 the two variables are independent.

The determination of the parameters "a" and "b" is made using the method of least squares, which determines the minimum of the function:

$$f(a,b) = \sum (y_i - \hat{y}_i)^2 \qquad (2)$$

Gauss-Markov assumptions of linear regression are:
1) all independent variables are quantitative or dichotomous; the variables are measured without error;
2) all independent variables have nonzero variance;
3) the average value of the variable ε (error) is zero for any set of values of the independent variables;
4) each independent variable is uncorrelated with ε;
5) for any two observations, errors are uncorrelated;
6) for any values of the independent variables, ε is normally distributed.

Table 4. *Statistics on agricultural sector in Romania between 2005-2012*

Year	Population employed in agriculture, forestry, fishing (thousand people)	Agricultural production (billion lei current prices)	The dynamic rate of the population employed in agriculture, forestry, fishing compared to the previous year (%)	The dynamic rate of the agricultural production compared to the previous year (%)
2005	2939	46.5	-2.12	-15.91
2006	2840	50.6	-3.36	8.81
2007	2757	47.7	-2.92	-5.73
2008	2690	67.0	-2.43	40.46
2009	2689	59.9	-0.03	-10.59
2010	2780	64.4	3.38	7.51
2011	2612	76.5	-6.04	18.78
2012	2682	64.2	2.67	-16.07

The agricultural production is a key economic indicator if we take in account the importance of this sector for national and international economy: the ensure of food security of population, the contribution to export of agricultural goods and service, the supply of different material for industry and the impact on environment and population health (Zaman 2012), the ensure of income for a large part of rural population and the modeling of rural spaces.(Vasile, Dorel& Mihai 2015).

Figure 3. *The graphical representation of the connection between the population employed in agriculture and agricultural production*
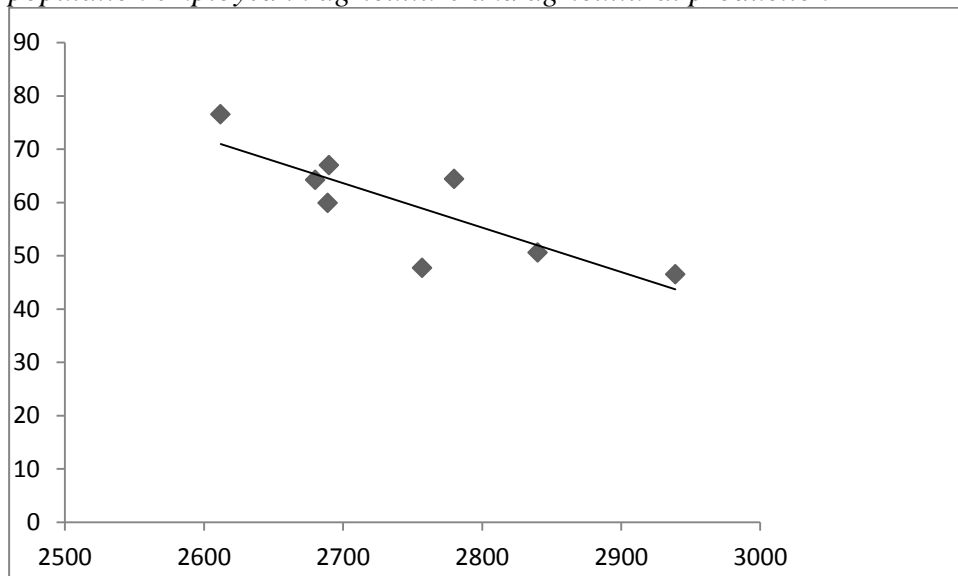
Source: *made by the authors*

The equation characterizing the linear regression is:

$$\hat{y}_i = a + b \cdot x_i \quad (3)$$

The normal equation system is:

$$\begin{cases} n \cdot a + b \sum x_i = \sum y_i \\ a \cdot \sum x_i + b \cdot \sum x_i^2 = \sum x_i \cdot y_i \end{cases} \quad (4)$$

Considering the causal variable (X) as the population employed in agriculture, forestry, fishing and the resultative variable (Y) as the agricultural production, the graphical representation indicates a reverse linear connection between these variables. This assumption will be demonstrated further through econometric methods.

The ANOVA method

Dispersion analysis, also known as variance analysis - ANOVA, is one of the methods of statistical processing data of observation. The method was invented by Fisher at about 1920. After a few years,he has developed a series of principles and methods, not only for the interpretation of results, but programming methodologies, conducting experiments and statistical interpretation of the results.

Fisher's work results materialized in two reference works that consecrated him: "Statistical Methodsfor Research; Workers" in 1925 and "The Design of Experiments" in 1935.

Studying the links between economic phenomena and processes include dispersion analysis application before or after using correlation and regression method, enabling the verification link assertions concerning the existence and validity testing regression model. Analysis of variance calculation includes several steps in achieving the set target, which requires clarifying two specific terms used as follows:
- the dependent variable- is the outcome variable, binding mandatory quantitative;
- independent variable- is expressed by factors affecting in a particular extent the dependent variable.

Depending on the number of factors, dispersion analysis can be unifactorial, bifactorial or multifactorial. In the application of the method it is important to notify the factors that are involved in the realization the phenomenon and to be able to discern and separate those determined by other factors with little influence. Essentially dispersion analysis, derived from its textual elements, consists in studying the influence of the independent variable on the dependent variable. The degree of influence is represented by the deviation of actual values of the characteristic from the theoretical study, coupled with the result of measuring the level of dependence of variations with grouping factors.

Variance analysis method, through its components enables determining the representativeness of a sample in the relation to the hypothesis that the average or dispersion does not differ significantly from one sample to another. Establishing the representativeness of the sample is actually the result of testing the significance of the difference between averages or dispersions of the groups and the general collectivity.

The coefficients estimation of a linear model by least squares method and calculating the required indicators associated with statistical tests are performed through Regression procedure, one of the most complex statistical processing of Excel package. The procedure allows the construction of graphs needed to assess visual matching linear model. Applying this method to study the relationship between the population employed in agriculture, forestry, fishing and the agricultural production, there are obtained date presented in the following tables

Table 5. *The variables' value synthesis*

Regression Statistics	
Multiple R	0.824453493
R Square	0.679723563
Adjusted R Square	0.626344157
Standard Error	6.447957187
Observations	8

Source: *made by the authors*

The value of correlation coefficient (0.82) indicates a strong connection between the two variables. The determination coefficient (0.6797) indicates the proportion of the dependent variable variance caused by the independent variable variance (67.97% of the variance of the agricultural production is caused by population employed in agriculture, forestry and fishing). Adjusted R Square (0.62) represents the corrected value of the determination coefficient (it is introduced to counter the effect of the mechanical increase of the determination coefficient along with the number of independent variables). Standard error of the estimation (6.44) is calculated as the standard deviation of residues (for the degrees of freedom used, refer to the following ANOVA table) and standard deviation estimation error Ɛ (assuming their normality).

Table 6. *The ANOVA method*

Source of variation	df	SS	MS	F	Significance F
Regression	1	529.4230887	529.4231	12.73382	0.011806257
Residual	6	249.4569113	41.57615		
Total	7	778.88			

Source: *made by the authors*

Source of variation indicates the decomposing of total variation in variation caused by regression (explained) and residual variation (unexplained). The "df" column indicates the number of degrees of freedom, "SS" represents the sums of squares according the following decomposition: the global sum of squares=sum of squares caused by regression+the residual sum of squares. The "MS" column indicates the mean sums of squares (sum of squares divided to number of freedom degrees).

The computed value of the F test is 12.73382 and its theoretical value is 0.011 which is smaller than 0.05 (the materiality threshold) meaning that the linear model is valid.

The following panel contains the estimated values for the coefficients' model and statistics needed to verify the usual assumptions on coefficients. It is worth mentioning that, unlike F-test, the coefficients are tested individually.

Table 7.*The variables' value synthesis*

Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
289.3963738	64.43707825	4.491147	0.004143	131.7245234	447.0682242
-0.08360412	0.02342871	-3.56845	0.011806	-0.140932109	-0.02627613

Source: *made by the authors*

Table lines refer to the variables of the model, including the constant term. The table columns are:
1) first column: the displaying names from the dashboard existing or automatically created for independent variables involved; intercept is the name for the free term (constant) model;
2) coefficients column contains the estimated values of coefficients.; the values show that the equation for the linear model is : $y_i=289.3963738-0.08360412·x_i;$ in the distributional assumption of the linear model, the calculated values of coefficients derived from normal distribution, making possible statistical verification of the coefficients;
3) standard error represents the standard deviation of the distribution coefficient;
4) t stat and p-value columns represents the statistic to verify the validity of "a" and "b" parameters; the hypothesis for testing their validity are: The value 0.011806 is smaller than 0.05 which means that parameter "b" is statistically significant.
5) Lower 95% and upper 95% indicates the inferior and superior limits for "a" and "b" parameters. The limits of the 0.05 threshold are calculated automatically, regardless the initialization of Regression procedure. Therefore, it can be interpreted as the linear model parameters are included in the following intervals:
$$131.7245234<a<447.0682242$$
$$-0.140932109<b<-0.02627613$$

Conclusions

Using statistical and econometrical methods, it is confirmed that there is a strong, reverse, linear correlation between the population employed in agriculture, forestry, fishing and the agricultural production from Romania. Therefore, by knowing the number of agricultural employees at a certain moment in time, it can be predicted the agricultural production.

This analyze could be extended if we take in account the characteristics of the agricultural sector and agricultural employment:
- the agriculture is dominated by family farms;
- the farmers and farm workers could have additional sources of income;
- agriculture has seasonal labour peaks.

At EU 27 level, around 11,5 millions of persons are employed in agriculture and Romania is on the first place (25%) followed by Poland (15%). If we take in account the share of agriculture in total employment, our country is on the first place (31,4%), that determined a high dependence of labour force to this sensitive sector. In addition, Romanian economy is dependent on this sector if we consider the share of agriculture in GDP which is around 7% compared with European average of 1.7%. The major problems of these dependeces are the extensive character of agriculture, low productivity in the sector, dependence on weather conditions that becomes a serious problem in the context of climate change that affects the entire planet; the deagriculturalisation that affects arable lands, depopulation of villages, severe poverty and the aging of rural population.

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TRADE ANALYSIS OF SERBIAN AGRI-FOOD PRODUCTS[*]

Stanislav Zekić, Bojan Matkovski[**]

Abstract

In the last decade, the significance of liberalization of foreign trade market of Serbian agri-food products can be seen in the surplus that Serbia has been continually achieving since 2005. Under the influence of the free trade agreements, there was a partial change in the orientation of export of agricultural and food products of Serbia, as well as in the intensification of foreign trade trends with the countries of the European Union (EU) and the CEFTA Agreement. The question of foreign trade of agri-food products is especially interesting because of the high level of importance of these products in the structure of import and export. Accordingly, an increase of competitiveness of domestic agricultural production and processing industry, through an increase of productivity, will represent a base for improvement of positive balance of agri-food trade.

Key words: *foreign trade, agri-food products, foreign trade liberalization*

Introductory notes

In accordance with the current international economic integrations, i.e. a period of pre-accession negotiaton of Serbia for the membership in the EU, as well as in the World Trade Organization (WTO), there is a necessity for liberalization of the market of agri-food products. Through the Autonomus Trade Measurements (ATM), duty-free export of agri-food products in the EU countries is enabled, and in the transitional period until 2014, the Stabilization and Association Agreement (SAA)

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has been gradually establishing a free trade zone with these countries. With the aim of integration of market of the Western Balkan countries, the CEFTA Agreement was signed in 2006, and it created the zone of free trade in the region.

In this paper, the analysis of foreign trade of agri-food products of Serbia from 2004 to 2013 is realized, primarily based on development characteristics. In order to identify opportunities of these products in foreign trade, export and import are perceived by sections and divisions. Also, a geographical structure of export and import is analyzed. In that context, potentials for further development of the export of agri-food products of Serbia are identified.

A database of the Statistical Office of the Republic of Serbia (SORS) was used for necessary empirical basis of research, and these information are concerned with foreign trade of agri-food products from 2004 to 2013 (data for Montenegro is from 2006, from when it is an independent country). The term agri-food products includes following divisions and groups, which are classified according to the Standard International Trade Classification (SITC) – Revision 4: 00 – Live animals; 01 – Meat and meat preparations, 02 – Dairy products and birds' eggs; 03 - Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof; 04 – Cereals and cereal preparations; 05 – Vegetables and fruit; 06 – Sugars, sugar preparations and honey; 07 – Coffee, tea, cocoa, spices and manufactures thereof; 08 – Feeding stuff for animals (not including unmilled cereals); 09 – Miscellaneous edible products and preparations; 11 – Beverages; 12 – Tobacco and tobacco manufactures, 21 – Hides, skins, furskins, raw; 22 – Oil-seeds and oil fruits; 261 – Silk; 236 – Cotton; 264 – Jute and other textile bast fibres, n.e.s., raw or processed but not spun; tow and waste of these fibres (including yarn waste and garnetted stock); 265 - Vegetable textile fibres (other than cotton and jute), raw or processed but not spun; waste of these fibres; 268 - Wool and other animal hair (including wool tops); 29 – Crude animal and vegetable materials; 41 – Animal oils and fats; 42 – Fixed vegetable fats and oils, crude, refined, fractioned; 43 – Animal or vegetable fats and oils, processed; waxes of animal or vegetable origin; inedible mixtures or preparations of animal or vegetable fats or oils, n.e.s. For the analysis of main trends and characteristics of foreign trade, as well as its significance in the overall trade with these Serbian products in period from 2004 to 2013, there were used standard mathematical and statistical methods.

Export of Agri-Food Products

At the world market of agri-food products, Serbia participates with only 0.10%, whereas its European share accounts for 0.20% (FAOstat, 2015). As a result of such a small participation of Serbia at both world and European market, there is an appearance of a small impact on trends and characteristics of the exchange, as well as the need of its adjustment to the terms of the international market. However, in the last decade, significant results were achieved in the export of agri-food products from Serbia, primarily because of the preferential status of products at the market of the EU, but also because of the achieved liberalization with the CEFTA countries and agreements with Russia, Belorussia, Turkey and the EFTA countries.

Graph 1. *Trends in the export of agri-food trade from Serbia*

The share of export of agri-food products in the overall export (right side)

The value of export of agri-food products in million US dollars (left side)
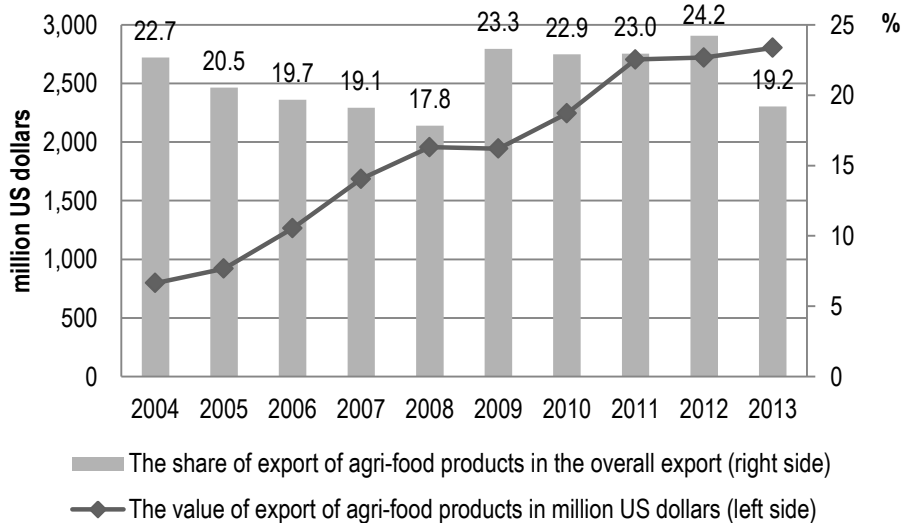
Source: *Authors' calculations based on the evidence of the SORS, 2015*

The analyzed period from 2004 to 2013 is characterized by a permanent increase of exchange of agri-food products of Serbia, and from 2005, a constantly increasing trade surplus was also present. The export of agri-food products, with the share of 21.1%, represents a very significant part of the overall export of Serbia. The share of export of these products in the total export was the highest in 2012, when it amounted to rate of 24.2%, whereas in 2013, the share of export of agri-food products in the total export was 19.2% (Graph 1). From 2009, an increase in the value of

the export of agri-food products was constantly present, and the value of export in 2013, when compared with 2004, was nominally more than tripled, so the global economic crisis did not have any negative effects on the exports of agri-food products.

Analyzing geographic allocation of the export of agri-food products of Serbia (Graph 2), it was founded that, from 2004 to 2013, the largest percentage of these products was exported to the market of the EU countries, respectively 48% of the total export of agri-food products, so right because of that the market of the EU presents the most important market for the export of agri-food products. On this market, fruit and vegetables were exported the most, followed by cereals, and then sugars. According to the ATM, the export on the market of the EU is not subjected to barriers, except for baby-beef, sugars, wine, and trout, for which the export quotas are specified.

Graph 2. *Export of agri-food trade of Serbia*
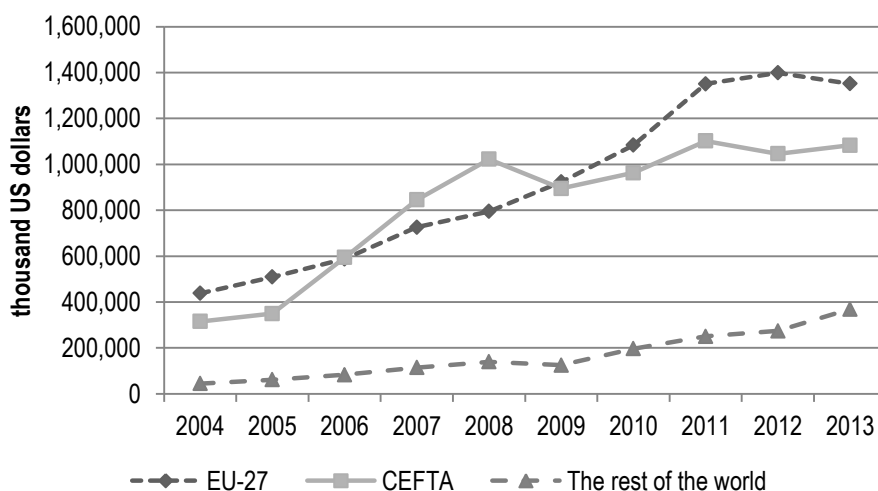
Source: *Authors' calculations based on the evidence of the SORS, 2015*

Shortly after the ATM's approval, a significant increase of the export of agri-food products from Serbia to the market of the EU countries took place, and in 2004 around 55% of the total export was realized to the European market. In the beginning, the largest percentage of the export of these products was directed to the older member states, but after the accession of the new member states in the EU, and after the signing of the CEFTA Agreement, the better part of the export was directed to these

countries. After their accession to the EU in 2007, a higher percentage of the export of agri-food products is especially noticeable in the analysis of the export to Bulgaria and Romania. In the analyzed period, the export of agri-food products to the CEFTA countries also significantly increased, and it had a share of 43% (Table 1). In the countries that have signed the CEFTA Agreement, the largest share belonged to the cereals, which were followed by beverages, vegetables and fruit.

Table 1. *The share of certain markets in the total export of agri-food products of Serbia*

	EU-27	**CEFTA**	**THE REST OF THE WORLD**
2004	54.89	39.48	5.63
2005	55.33	37.97	6.70
2006	46.46	46.96	6.58
2007	43.08	50.13	6.78
2008	40.62	52.25	7.13
2009	47.52	46.03	6.45
2010	48.30	42.94	8.76
2011	49.98	40.76	9.26
2012	51.44	38.47	10.09
2013	48.21	38.63	13.15

Source: *Authors' calculations based on the evidence of the SORS, 2015*

In the structure of the export of agri-food products (Table 2), the section of food and live animals (section "0") is the dominant one and it amounts to 78% of the total export of agri-food products. The division of vegetables and fruit, as well as cereals and cereal preparations, are the most significant within this section, with almost the same share of 24%. Within the section "0" the export of sugars, with the share of 10%, is also notable.

The export of cereals is very important, especially of corn. Oil-seeds also have large potentials for export and more efficient processing of them would probably lead to the advancement of competitiveness. Sugars are exported in the EU within the predicted quotas, while meat is exported the most in the countries of the region. Berry fruit also has great potentials for export, especially because of its high quality. Specified divisions: fruit and vegetables, cereals, sugars and meat together constitute more than 61% of the total export of agri-food products.

Table 2. *Commodity structure of the export of agri-food products from Serbia (2004-2013)*

section/division/group	share in total export of agri-food products		
	world	**EU-27**	**CEFTA**
FOOD AND LIVE ANIMALS	**78.23**	**84.65**	**70.62**
Live animals	2.03	0.06	4.45
Meat and meat preparations	3.33	0.81	6.46
Dairy products and birds' eggs	3.09	0.11	6.48
Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof	0.20	0.01	0.46
Cereals and cereal preparations	24.01	25.96	24.58
Vegetables and fruit	24.27	34.45	7.08
Sugars, sugar preparations and honey	9.54	17.51	2.51
Coffee, tea, cocoa, spices, and manufactures thereof	3.74	1.28	6.82
Feeding stuff for animals (not including unmilled cereals)	3.64	2.59	5.20
Miscellaneous edible products and preparations	4.36	1.87	6.59
BEVERAGES AND TOBACCO	**10.57**	**3.46**	**18.63**
Beverages	8.21	1.66	16.43
Tobacco and tobacco manufactures	2.36	1.80	2.21
CRUDE MATERIALS, EXCEPT FUELS	**4.79**	**4.81**	**3.82**
Hides, skins and furskins, raw	1.39	1.11	1.70
Oil-seeds and oleaginous fruits	1.88	2.43	0.85
Crude animal and vegetable materials, n.e.s.	1.38	1.03	1.25
Silk, cotton, jute, vegetable textile fibres, wool and other animal hair	0.13	0.24	0.02
ANIMAL AND VEGETABLE OILS, FATS AND WAXES	**6.42**	**7.07**	**6.93**
Animal oils and fats	0.10	0.09	0.12
Fixed vegetable fats and oils, crude, refined, or fractioned	6.05	6.96	6.20
Animal or vegetable fats and oils, processed	0.27	0.02	0.61

Source: *Authors' calculations based on the evidence of the SORS, 2015*

According to the share in the total export of agri-food products of Serbia, the section of food and live animals is followed by the section of beverages and tobacco (section "1"). From 2004 to 2013, the share of this section was around 11% in the total export of agri-food products. Within the section "1" the export of beverages had a larger share – 8%, while the export of tobacco was around 2%.

The next section, as far as the share in the export of agri-food products in the overall export is concerned, is the section of animal and vegetable oils, fats and waxes (section "4"). From 2004 to 2013, the share of this section was a slightly more than 6%, the export of fixed vegetable fats and oils, crude, refined or fractioned had the dominant role. The rest of the divisions from this section hardly had any significance, since their share was less than 1%.

From 2004 to 2013, the least important section in the export of agri-food products was the section of crude materials, except fuels (section "2"), with the share of around 5%. Averagely, all the divisions within this section had almost the same significance in the export.

Only oil-seeds and oleaginous fruits can be singled out because of the slightly bigger share of 1.88%. The groups referring to silk, cotton, jute, vegetable textile fibres, and wool, together amount to only 0.13% of the overall export of agri-food products.

Import of Agri-Food Products

The import of agri-food products in Serbia is characterized by a high level of liberalization because of the low level of protection of agriculture and processing industry.

When Serbia decided to apply for membership of the WTO, the protection of the import had to be adapted to the regulations of this organization, which involved additional liberalization. By reducing barriers on the import, the assortment of agri-food products at domestic market, but also a number of foreign competitors, increased.

The import of agri-food products represents very important segment in the overall import of Serbia, and in the last decade it had a share of 6.8%. The highest share of 8% was realized in 2004, while the lowest share of import of agri-food products of Serbia amounted to 4.4% and it was realized in 2007 (Graph 3).

From 2009, an increase of the value of the import of agri-food products was constantly present, and the value of the import in 2013, when compared with the value of the import in 2004, was nominally almost doubled.

Graph 3. *Trends in the import of agri-food products of Serbia*
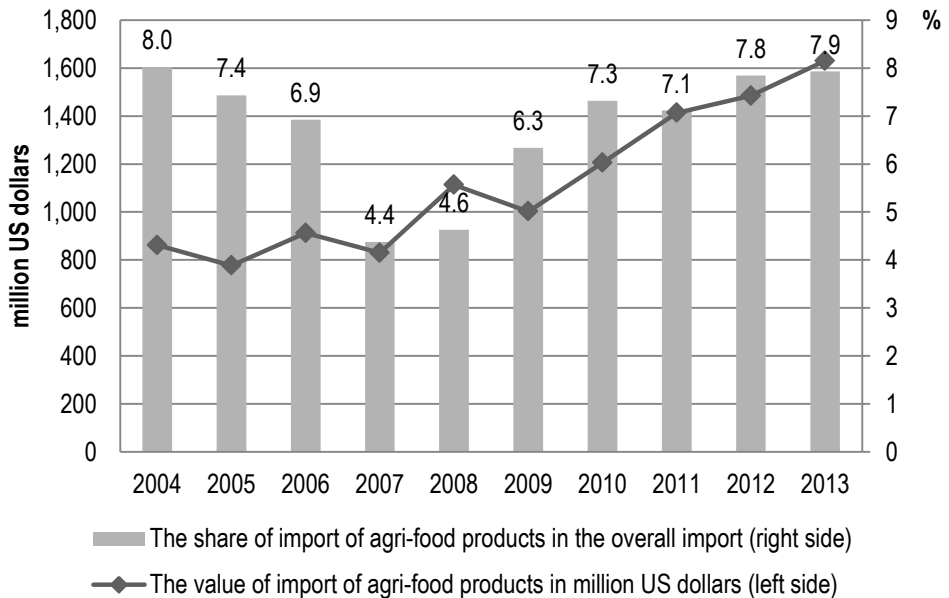
The analysis of the sources of the import of agri-food products shows that the largest percentage of agri-food products, around 46%, was imported from the EU countries, so the EU market represents the most significant import market of agri-food products (Graph 4).

From the EU, fruit and vegetables were imported the most, out of which the most important are citruses and apples, coffee, tea, cocoa, and spices. Beverages and tobacco are also imported from the EU to a significant extent.

According to the signed SAA, the import of agri-food products from the EU is liberalized during the term of the agreement, which means that Serbia has committed itself on a gradual recession of the majority of custom taxes for the import of goods from the EU.

That led to the easier access of foreign goods at domestic market, and also to the increase of the import of agri-food products.

Graph 4. *Import of agri-food products of Serbia*
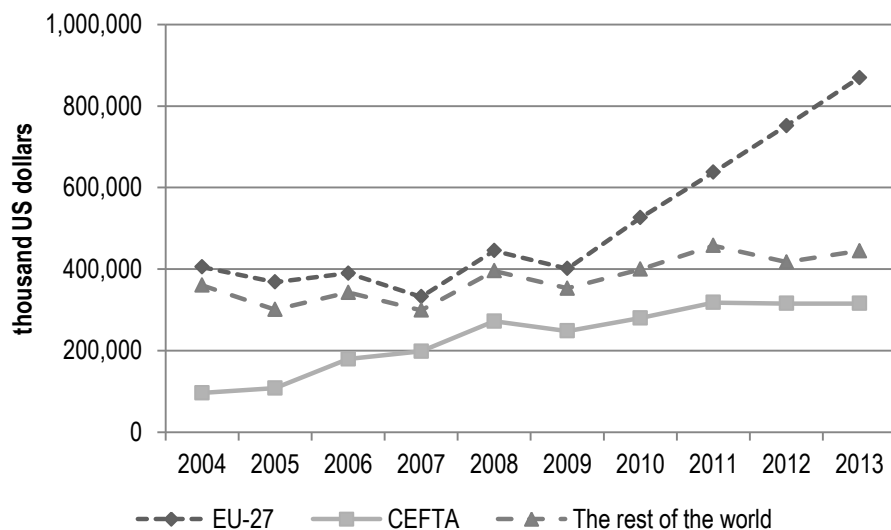
From 2004 to 2013, the import from the CEFTA countries also significantly increased (Table 3), and its share was around 21%. Fruit and vegetables, followed by beverages, cereals and cereal preparations, were imported the most from these countries.

Table 3. *The share of certain markets in the total import of agri-food products of Serbia*

	EU-27	CEFTA	THE REST OF THE WORLD
2004	47.03	11.16	41.82
2005	47.38	13.91	38.71
2006	42.76	19.67	37.57
2007	40.00	23.92	36.07
2008	40.00	24.44	35.56
2009	40.04	24.76	35.21
2010	43.64	23.22	33.14
2011	45.11	22.50	32.39
2012	50.63	21.27	28.10
2013	53.35	19.36	27.29

In the structure of the import of agri-food products (Table 4) the dominant section is the section of food and live animals (section "0"), which presented 74% of the overall import of agri-food products in the period from 2004 to 2013. Within this section, vegetables and fruit had the largest share of 21%. They are followed by coffee, tea, cocoa, spices, and manufactures thereof, which amounted to 15% of the total import of agri-food products.

Table 4. *Commodity structure of the import of agri-food products of Serbia from 2004 to 2013*

section/division/group	share in the total import of agri-food products		
	world	EU-27	CEFTA
FOOD AND LIVE ANIMALS	**74.17**	**72.00**	**69.42**
Live animals	1.22	1.87	1.68
Meat and meat preparations	3.80	5.23	6.61
Dairy products and birds' eggs	2.97	4.29	4.54
Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof	6.35	3.55	4.97
Cereals and cereal preparations	6.00	6.95	7.30
Vegetables and fruit	21.48	16.33	24.60
Sugars, sugar preparations and honey	3.43	4.54	2.84
Coffee, tea, cocoa, spices, and manufactures thereof	14.63	8.87	5.96
Feeding stuff for animals (not including unmilled cereals)	5.17	5.86	3.53
Miscellaneous edible products and preparations	9.12	14.51	7.39
BEVERAGES AND TOBACCO	**13.56**	**12.61**	**22.37**
Beverages	5.58	5.12	14.54
Tobacco and tobacco manufactures	7.98	7.49	7.83
CRUDE MATERIALS, EXCEPT FUELS	**8.77**	**10.62**	**6.74**
Hides, skins and furskins, raw	1.22	2.00	1.44
Oil-seeds and oleaginous fruits	3.48	1.83	4.63
Crude animal and vegetable materials, n.e.s	3.48	6.13	0.59
Silk, cotton, jute, vegetable textile fibres, wool and other animal hair	0.59	0.66	0.08
ANIMAL AND VEGETABLE OILS, FATS AND WAXES	**3.50**	**4.76**	**1.46**
Animal oils and fats	0.30	0.52	0.06
Fixed vegetable fats and oils, crude, refined or fractioned	2.83	3.70	1.38
Animal or vegetable fats and oils, processed	0.37	0.55	0.03

Source: *Authors' calculations based on the evidence of the SORS, 2015*

According to the share in the total import from 2004 to 2013, the section of food and live animals is followed by the section of beverages and tobacco (section "1"). In the analyzed period, this section had a share of 14% in the overall import of agri-food products. Within the section "1" the import of tobacco and tobacco manufactures had a larger share – 8%, whereas the import of beverages was around 6%.

The next section is the section of crude materials except fuels ("section 2"), with the share of around 9%. The divisions of hides, skins and furskins, raw, and oil-seeds and oleaginous fruits have the largest significance within this section. Their communion in the overall import of agri-food products was around 7%.

From 2004 to 2013, the least significant section in the total import of agri-food products was the section of animal and vegetable oils, fats and waxes ("section 4"). The share of the import of this section in the total import of agri-food products was slightly more than 3%. The import of fixed vegetable fats and oils, crude, refined or fractioned was dominant within this section. The import of the other products from this section, with the share of less than 1%, was minor.

Balance of Agri-Food Trade

From 2005, Serbia has been achieving a positive balance of agri-food trade, and that is a result of the enhancing of its trade position through the bilateral negotiations with the regional countries (CEFTA), trade liberalization with the EU and significant increase of the export on the Russian market. Serbia continuously increases its net-export of agri-food products, and in the recent years it exceeded 1.1 billion USD (Graph 5).

The export structure of agri-food products of Serbia was not favourable, since vegetable products, such as: cereals, fruit, vegetable and sugars, constitute more than 50% of export of these products. On the other side, there was the share of livestock products - meat and meat preparations, dairy products and birds' eggs, of only 10%. Within preparations, beverages and tobacco manufactures had a slightly larger share, which was less than 10% for all together. Positive net-export shows that import was covered by the export of agri-food products. In recent years, the level of coverage significantly increased and in certain years it reached more than 150%.

Graph 5. *Balance of agri-food products of Serbia*
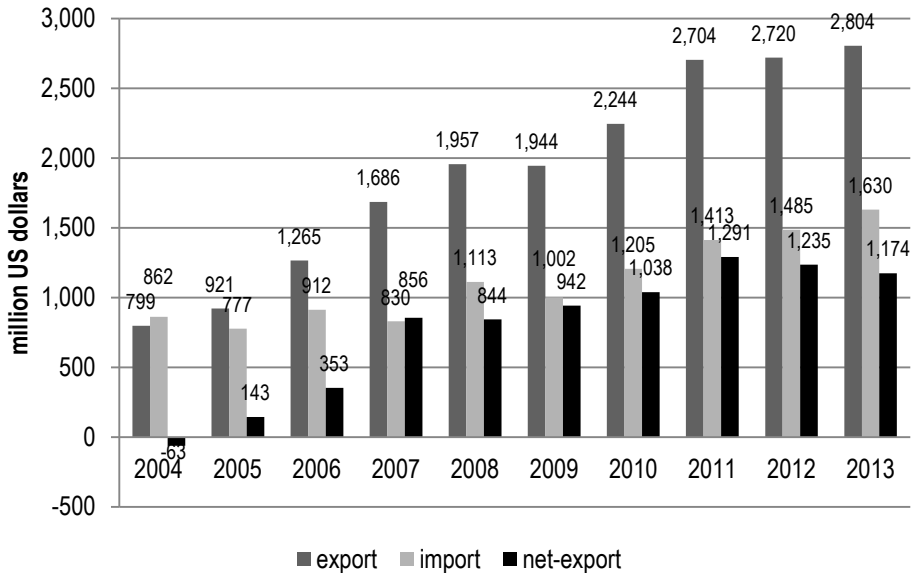
Source: *Authors' calculations based on the evidence of the SORS, 2015*

During the analyzed period, changes in the import and export of agri-food products by groups of countries led to the changes in dynamics of balance of agri-food trade (Graph 6). In this period, the largest surplus was realized in the trade with the CEFTA countries, and the permanent increase of surplus in trade with agri-food products was stopped in 2009, primarily because of the decline in the export of these products. Surplus in foreign trade exchange of agri-food products was realized with the EU countries, as well.

After 2012, decline of the surplus in trade with the EU countries is evident and it was a result of the increase of import of agri-food products from the EU countries. All that was a consequence of the lower import barriers in Serbia due to the liberalization of the market.

The exchange of agri-food products between Serbia and other countries which are not member states of the EU or the CEFTA Agreement is realized with the obvious deficit, which has been being reduced in the recent years. It mostly refers to agri-food products which cannot be produced in Serbia because of the natural conditions.

Graph 6. *Balance of agri-food products of Serbia*
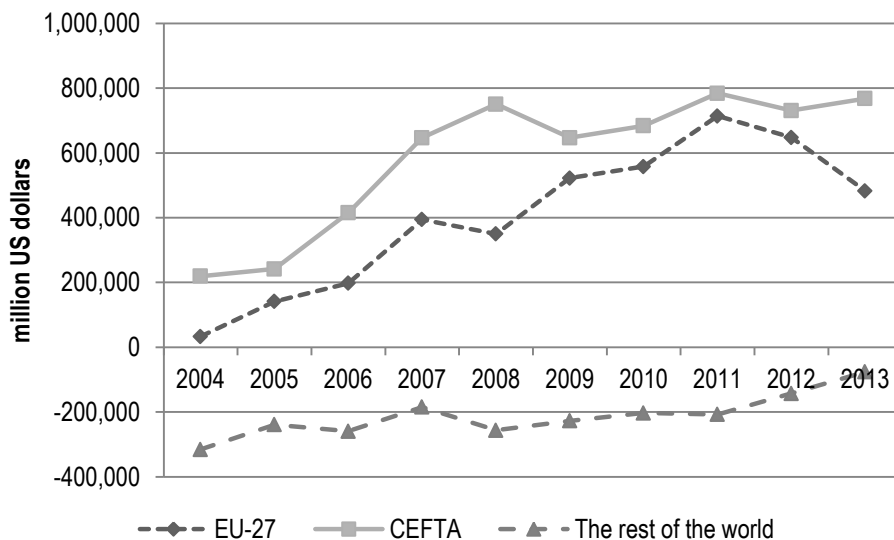
Source: *Authors' calculations based on the evidence of the SORS, 2015*

Potentials for Development of Foreign Trade Exchange of Agri-Food Products of Serbia

According to Dragutinović Mitrović and Popović Petrović, foreign trade liberalization, which was created using the ATM at first, then the SAA and the CEFTA Agreement, had positive effects on the export and bilateral trade exchange of agri-food products. Also, these agreements led to partial change in the orientation of the export (pp. 460). The opportunities for a further development of the export of agri-food products can be realized through the ratio value of the export of these products and basic production resources – labor and land. Considering the export of agri-food products per active farmer, it can be realized that Serbia does not achieve impressive results within the region and the situation is even worse in comparison with the EU countries, which averagely export almost 14 times more agricultural products per active farmer. When the export of agricultural products is represented in relation to the available agricultural land, the situation is slightly better. However, backwardness of Serbia is here evident, too, especially in comparison with the EU countries. Such indicators are the consequence of extensiveness of Serbian agriculture, which is concentrated on a crop

production and on extensive production methods. This production structure conditions the structure of the agricultural export of Serbia, in which crop products of a lower level of processing, i.e. products with the low added value, are dominant (Zekić, Gajić, 2013, pp. 82-83). Namely, in comparison with the available agricultural resources, Serbia has a relatively underdeveloped livestock production, so the allowed contingent for the export of beef in the EU of 8,700 tons annually is used marginally. On the other side, difficulties in fulfilling of rigorous standards set by the Union are the limitations for the export of pork and poultry meat in the EU (Zekić, Tošin, Kresoja, 2010, pp. 98).

According to Božić and Nikolić (2013) it is very difficult to achieve high demands of the European market in terms of quality, quantity and stability of supply, so in the process of integration, the realization of these demands will increase the costs of adaptation, especially for the products which have a low level of competitiveness – livestock products, meat and meat preparations, milk and dairy products (pp. 97). Rigorous veterinary and hygienic standards of the European market require a technological adjustment, in order to freely send products on the EU market. The European market requires achieving and adjusting to the high demands imposed by processing industry, which is under the growing pressure of a retail trade. In Serbia, small individual agricultural households prevail and on these households a rational usage of modern technical systems is difficult. As a result, profitability of agricultural production is, in comparison with the EU countries, significantly lower and that limits the possibility of modernization of the agricultural production. The low technological level of agri-food sector in Serbia is also a result of an under-innovated productive structure. An assortment and a racial composition of livestock are outdated and they have to be advanced. The productions of the high value products at low stages of processing on the agricultural households, as well as of the value-added products are low represented. According to Popović and Grujić (2014), in the following years it is necessary to strengthen phytosanitary control, to promote integral and organic production, to modernize processing capacities, as well as to encourage strong associations of producers that would bring together and improve the supply and performance to purchasers and processors (pp. 9).

In accordance to the necessity of advancement of competitiveness of Serbia in the domain of agri-food products, the pre-accession funds will be of a great importance in the next period, primarily the Instrument for

Pre-Accession Assistance for Rural Development (IPARD) funds. These funds are intended to the agriculture and rural development. According to Matkovski and Kleut (2014), the experiences of other countries show that the aim of the candidate countries was to direct funds to the projects which will raise competitiveness, whether investments in agricultural households, or in processing and marketing of agri-food products.

During the pre-accession negotiations, according to Zekić, Matkovski (2014), Serbia should try to provide the best possible position for its agricultural producers, and to do everything necessary in order to raise the level of competitiveness on the future common market of the EU. This is not a simple task and it includes series of measures and coordinated activities, from transfer of knowledge to changes in the structure of agricultural households. Basically, this task would be concentrated on development of productive agricultural performances (pp. 1109).

Conclusion

In foreign trade, a great significance of agri-food products of Serbia is the result of their share in the overall import and export. In certain years, the export of these products makes one-fifth of the total export. From 2004 to 2013 it has a share of 21% in the total export. The coverage of import by export is notable, so the positive foreign trade balance of agri-food products and food industry has been permanently achieved since 2005.

As a result of the reduction of barriers on the national border, there is an increase in the import of agri-food products. That expanded the range of products at domestic market and thus, domestic producers got new competitors. The most significant import markets are the EU and the CEFTA countries. In the analyzed period, 67% of agri-food products were imported from these markets. In the structure of import, the most common products are those one which are insufficiently produced in Serbia or which are not produced at all. Products like fruit and vegetables, coffee, tea, cocoa, spices and products thereof had the largest share in the total import.

The most significant market for the export of agri-food products from Serbia is the European market, where in the analyzed period it was exported 48% of all agri-food products. In the same period, 43% of these products were exported on the market of the CEFTA countries. Dominant products of the primary phase of procession are fruit and vegetables,

cereals, sugars and meat. The structure of export of agri-food products of Serbia is not particularly favourable, due to the fact that crop products make a large percentage of export of these products. The share of livestock products in the export of Serbia is not on the appropriate level, so in order to reach the standards, it is necessary to follow the rules of a technological adaptation, and of a higher level of efficiency in production. An improvement of export performances, through the increase in competitiveness of the agri-food sector of Serbia in the international market, represents an imperative due to the current international economic integrations.

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HEDGING – POSSIBILITIES OF RISK MANAGEMENT IN AGRICULTURE[1]

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

Abstract

The scope of agricultural production is to a great extent affected by volatile risks. This paper presents possibilities that financial markets provide to manage such risks. It minutely describes basic derivatives, futures and options, with a special focus on their use on agricultural commodities. The paper further describes probably the most popular futures – weather futures. Furthermore, the authors deal with complex and cross-hedging strategies. The last section brings the analysis of possibilities of establishing a derivatives market in Serbia. The first step towards this goal is to set up a commodity market and adopt related legislation, but also to meet other preconditions, such as to establish a licensing system, simplify trade with foreign entities, establish a system of clearing, develop a framework for extra-judicial settlement and to work on internationalisation of trade. Once these preconditions are met, it would be possible to establish an agricultural commodity derivatives trading system.

Key words: *futures, options, business risk, agriculture, hedging strategies, Serbia.*

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Introduction

Modern business entities operate in a quite dynamic and increasingly uncertain business environment, which has been particularly evident over the past few decades. Business results and cash flows are affected by numerous factors, such as: changes in price for inputs, end-products and services, and changes in interest rates, tax rates and exchange rates. In regard to agriculture, one should also take into account an adverse impact of environmental factors. Such environment requires a proper risk management mechanism, one of which is the use of derivatives.

On developed financial markets, derivative markets have been operative since 1970s. Futures emerged first, followed by options. Farmers immediately recognised and started to use the benefits these financial instruments provided in terms of risk management. Weather futures, however, appeared much later. The first weather futures trade took place in 1997 in an OTC (over-the-counter) market. Only two years later, the Chicago Mercantile Exchange introduced these instruments.

In this paper, the authors present derivatives and the main principles these financial instruments are based on. Moreover, the authors also minutely explain futures and options, and introduce the reader with tendencies present on basic derivatives markets, focusing on agricultural commodity derivatives. The central part of the paper is dedicated to risk management on derivative markets, namely hedging strategies. The paper presents weather futures and agricultural commodity futures and options, as well as complex hedging strategies. The final section of the paper puts a focus on perspectives and preconditions for establishing an agricultural derivatives market in Serbia.

Derivatives – commodity and financial market instruments

Derivatives i.e. derived securities are financial instruments that are dependent upon underlying assets or occurrence of an event, being based upon commodities, stocks, bonds, interest rates, indices or weather data. The reason for investing in these instruments lies in benefits that one would have if they successfully forecast the price of the underlying asset or the occurrence. The value of such securities is derived from the price of other assets, such as commodities or interest rates. Hence, a change in the price of the underlying asset affects the price of the derivative.

Derivatives exchange is also known as derivatives trading. Unlike spot trading, where transactions are carried out immediately (T+0) or within five days (T+5), derivatives trading implies a delayed delivery. These instruments are also known as derivatives contracts. At the time of contracting, e.g. a commodity, the parties define the price, quantity, quality, date and time of the delivery, and the delivery and payment are made later in the future. Moreover, there is a difference between these two types of trade in terms of physical delivery of the underlying asset – spot transactions end with delivery, whereas derivatives transactions do not necessarily end with delivery but with an offset.

Derivatives, by their nature, enable hedgers[4] to transfer a volatility risk (caused by change in the price of the underlying asset) to speculators[5], who accept the risk hoping to gain profits. A possibility to manage the risk and gain a speculative profit at the same time has led to strong development of derivatives markets, enabling business entities in developed market economies to use diverse hedging strategies.

Derivatives comprised financial derivatives and commodity derivatives. Financial derivatives are based on currency rates, interest rates, other securities and market indices, whereas commodity derivatives are based on the price for metal, agricultural commodities, electrical power, industrial inputs, oil and natural gas, ore, rubber, commodity indices, etc.

The main idea behind derivatives trading is to forecast price trends. Contracted parties have opposite expectations. If not, they would not have any interest in contracting such trade. On the one hand, sellers expect prices to fall, and on the other, buyers rely on forecasts on price rise.

The main derivatives contracts are forwards. Forwards are considered to be the only contract of this kind that has all the characteristics of derivatives contracts, comprising all the necessary elements. However, these financial instruments cannot be traded on a centralised market, since they are concluded individually, having a high flexibility and thus being difficult to standardise. Hence, futures and options contracts are basic derivative contracts traded on derivatives markets.

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[4] The term "hedger" refers to a person who manages some risk, i.e. a person who sells or buys securities to reduce financial risks.
[5] The term "speculator" refers to a person who takes a risk in order to make a profit.

Futures

Futures are highly standardised contracts for purchasing/selling of a certain asset at a future point in time. In other words, futures are obligations to purchase or sell a certain commodity or a financial instrument on a predetermined date and at a predetermined price. In the broadest sense, futures are focused on a future price estimated at the present moment (e.g. livestock price in October, or next year's US dollar to Euro exchange rate). This instrument is a subject of trade only on regulated exchange markets.

The most traded are futures contracts on precious metals, energy, agricultural commodities, metals, and weather conditions (data on amounts of precipitation, temperatures, etc.).

The central part in futures trading has clearing houses, granting to both parties that clauses from the futures contract will be respected. Clearing houses act as a buyer to every futures seller and a seller to every futures buyer. Practically, clearing houses grant the fulfilment of the obligations from futures contracts. Thereby, there is no need for direct communication between sellers and buyers, and personal trust cedes its place to institutional trust.

One of the basic functions of futures contracts is to enable participants either to use hedging strategies or to speculate on the future price of a product [Belozertsev et al., 2012].

Options

Options give the buyer the right but not the obligation to buy (*call*) or sell (*put*) a certain basic instrument (asset, commodity, security, etc.) at a pre-determined price *(strike – exercise price)*, before a pre-determined date. Options can be defined as derived securities, with a certain right for the buyer (*holder*). Obligations between the parties are regulated with *option contracts*. From a legal aspect, option contracts are incomplete contracts, giving one party the right to call or put a certain asset at a set price but not obliging them to do so. The reason why the option seller (*writer*) has a responsibility towards the buyer (*holder*) is because the option seller at the moment of contacting is paid the *premium*, which is the price of the option.

Option contracts generally expire on a certain date in the month prior to the expiration of futures contacts. Option holders are obligated to use the options by that time. Hence, option holders can use the option right (*in the money*), sell the option right to a third party or leave the option to expire (*out the money*).

Option writers also have several alternatives to the moment they are called to exercise the option. One of the most important alternatives for option writers is to close their position by buying the same type of option. This can be exercised at any moment until the clearing house informs option writers to fulfil the obligation from the contract.

The beginnings of modern options trading, as we know it today, dated back to 1973, when the first options exchange was founded in Chicago. Despite some theorists perceive options trading as "gambling", the volume of these derivatives is increasing year-on-year.

The key elements of an option contract are:
1. *Pre-determined price of an asset (strike price)*, based on which option holders can exercise the right to call or put the underlying asset.
2. *Premium – the price of the option*. A premium price is formed on the market by the interaction of the forces of demand and supply

One should differentiate a strike price from a premium. The strike price is pre-determined by the option contract, whereas the premium is a price of the option contract and it is subjected to daily changes. Option writers keep the premium, no matter the option right has been exercised or not.

When options are out of the money or in the money[6], the premium paid is just a reflection of the time value of money. On the option's due date, the premium equals the actual value of the option, which is normal, since the time component has been expired.

There are two basic types of option contracts:
- *call options* and
- *put options*.

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[6] Term "in-the-money-option" refers to a situation where the value of an option equals the sum of the strike price plus premium paid. In such case, the option holder covers the cost of the premium and does not make any profit.

Calls and puts are separate options, since there are the holder and the writer for each of them. Call options are contracts that allow the holder to call a certain asset at a pre-determined price before a pre-determined date. The holder can exercise this right but is not obligated to do so. On the other hand, the writer has to fulfil the obligation from the option contract [Kolb and Overdahl, 2007].

Options can also be categorised by the underlying asset. According to this criterion, options can be based on:
- currency,
- shares,
- financial and other indices,
- commodity (including agricultural commodity) and
- weather data (precipitation amount, temperature sums, etc.).

Regarding the way of functioning, options can be categorised as American and European-style options. European-style options may be exercised only on a due date, unlike American-style options that may be exercised at any time before the due date.

The authors recommend European-style options to be included into the Serbian legislation, since American-type options are more complex and require a developed institutional framework [Allgood et al., 2010]. The names of these two types of options do not imply that those options are strictly a subject of trade in the USA or Europe. Both types are subjects of trade at a global level.

Table 1. *Global futures and options volume*

Type of derivatives	2012	2013	2014
Futures	11,072,105,368	12,217,755,153	12,165,484,775
Options	10,118,012,082	10,425,664,621	10,707,129,486

Source: *FIA (2013, 2014), Annual Volume Survey*

The global futures and options volume is large and comprises billions of contracts. Table 1 shows the number of contracts traded worldwide in the last three years. As one can see, the volume of these derivatives has been increasing year-on-year.

Table 2 shows global futures and options volume given by categories. The largest portion of contracts is based on equities, whereas the volume of agricultural derivatives has increased by a rather high rate of 15.7% over the past two years.

Table 2. *Global futures and options volume by category*

Category	2013	2014	Change
Individual equity	6,390,404,778	6,439,177,097	1.6%
Equity index	5,381,657,190	5,827,913,937	8.3%
Interest	3,330,904,991	3,268,154,625	-1.9%
Currency	2,496,423,691	2,119,023,131	-15.1%
Agriculture	1,209,776,849	1,400,153,550	15.7%
Energy	1,315,276,356	1,160,317,682	-11.8%
Non-precious metals	646,349,077	872,601,162	35.0%
Precious metals	433,546,140	370,872,772	-14.5%
Other	347,412,764	355,224,591	2.2%
Total	21,551,751,836	21,867,438,547	1.5%

Source: *FIA (2014), Annual Volume Survey*

Graph 1 illustrates how popular these financial instruments are, giving an overview of global commodity derivatives volume in the period 2004-2013.

Graph 1. *Global commodity derivatives volume in the period 2004-2013*
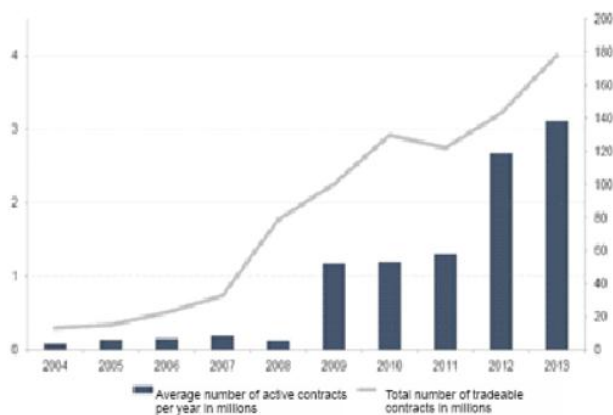
Source: *World Federation of Exchanges*

This paper puts a focus on agriculture, since farmers in Serbia have a lot of potential to use financial derivatives and thereby manage possible risks. Hence, the authors present global futures and options volume for ten agricultural commodities that had the highest volume rate in the period 2008-2013.

Table 3. *Global agricultural commodity futures and options volume in the period 2008-2013*

	Contract	2008	2013	Change
1	Palm Oil Ft	6,302,478	82,495,230	1,208.9%
2	Soy Mean Ft	81,265,439	265,357,592	226.5%
3	Soy Oil Ft	44,695,993	96,334,673	115.5%
4	Rubber Ft	46,461,103	72,438,058	55.9%
5	Soybean Meal Ft	13,354,174	20,237,181	51.5%
6	Soybean Opt	9,806,935	14,760,704	50.5%
7	Soybean Oil Ft	16,928,361	23,805,912	40.6%
8	Lean Hogs Ft	8,505,138	11,277,038	32.6%
9	Wheat Ft	19,011,928	24,993,158	31.5%
10	Soybean Ft	36,373,096	46,721,081	28.4%

Source: *FIA (2013), Annual Volume Survey*

The data imply that this market is very liquid and growing.

Risk management on derivatives markets (hedging strategies)

As it was previously mentioned, the main motive of futures trading is to manage the risk of change in the price of an underlying asset. To illustrate this mechanism the further text gives an example of hedging strategies by using a financial future and a commodity future.

Weather derivatives

Weather derivatives are novel securities emerged in the mid-1990s. The most traded weather derivatives are those based on precipitation amount and temperature sums. Climate change and an increased risk of lower yields due to drought or high temperatures have led to a larger volume of weather derivatives. Hedging strategies that use weather derivatives comprise the trading of forwards, swaps, futures and options.

These hedging strategies are used by business entities that have temperature-related costs in winter (cost of heating) or in summer (cost of air conditioning, impact of temperatures on agricultural production, etc.).

The most commonly used strategies are the use of the heat index (*heating degree days*) in winter and the cool index (*cooling degree days*) in summer. When it comes to risk management in agriculture, people mostly use *growing degree days*, with temperature ranges for optimal crop growth (maximum and minimum value). Weather derivatives can be created on all measurable weather conditions, i.e. values in a stable time series.

The amount of precipitation can considerably affect crop yields, so precipitation derivatives are very important for farmers' hedging strategies. It is necessary to define a *strike level* for a weather parameter, the amount upwards of which the option can be exercised if the parameter performs differently than the strike level.

Unlike commodity derivatives, weather derivatives are not based on the asset whose price changes on markets. Hence, the price of this underlying asset (one weather parameters or more) has to be determined beforehand.

The second difference between weather derivatives and the other types of derivatives is that the latter have a quite clear monetary value of the underlying asset. In case of weather derivatives, the change in the value of the asset (weather parameter) is in fact the change in precipitation amount (millimetres) or temperature (degrees Centigrade), so such value should be converted in a monetary value, by using the minimum value of a weather parameter (*tick size*).

A tick size in standardised weather derivatives contracts is often 1 mm = 20 US dollars. Accordingly, to calculate the value of a weather derivative it is necessary to multiply the *tick size* with the real differentiation from the *strike level*.

Temperature derivatives are commonly traded in the winter period (November – March) and in the summer period (April – October).

As in some other types of derivatives, it is also important for weather derivatives to define the methodology for calculating the value of the underlying asset, in this case – temperature sums or precipitation

amounts. People mostly use data from the respective weather station or the average value of the same weather parameter recorded by several weather stations.

Weather derivatives allow limiting of the maximum amount of the pay-out. For instance, if the maximum amount per option is €1,500 further deviations from a strike level cannot increase that amount.

Agricultural commodity futures

Agricultural commodity futures are standardised derivatives, based on a certain commodity. In 2013 the volume of commodity futures ranked second after the volume of shares futures. The most traded futures are energy futures, followed by futures on agricultural commodities, metals, chemical and industrial commodities.

Over the last couple of decades, commodity derivatives markets have developed due to markedly volatile commodity prices and an increased need for future price-risk management.

Futures hedging strategies are based on buying (a long hedging position) or selling (a short hedging position) futures. Thereby farmers or other commodity holders can ensure the price of their commodity.

If spot market prices at the due date are lower than futures prices, they will be compensated by pre-determined prices and vice versa – if spot market prices are higher, they will be decreased by the loss on the futures. Hence, in both cases, pre-determined prices are exercised.

Experience has shown that hedgers often decide not to pursue expected prices due to change in the underlying asset, resulting in a discrepancy between spot prices at which hedgers actually sell their commodities and prices at which futures values are calculated.

It is especially characteristic for commodity futures, where the exchange can calculate the futures value on one spot market that can be thousands of kilometres away from the market hedgers actually sell their commodity on.

Example 1: A maize farmer sells a future in May for November, at a price of 15,000 RSD/t. Table 4 shows possible scenarios:

Table 4. *Short hedging position (no change in the underlying asset)*

Expected price for maize in November, at the option's due date (in RSD per tonne)	Actual maize price at a spot market in November (in RSD per tonne)	Total price achieved Spot price +/- profit/loss on a futures market (in RSD per tonne)
12,000	12,000	12,000 + 3,000 = 15,000
14,000	14,000	14,000 + 1,000 =15,000
15,000	15,000	15,000
16,000	16,000	16,000 – 1,000 =15,000
17,000	17,000	17,000 – 2,000 = 15,000

Source: *Authors' calculation*

A farmer expects that maize price in November will be 15,000 RSD/t and therefore sells a maize futures contract at that price. If the price at the end of the future period is below 15,000 RSD/t the farmer will gain profits on the futures contract, but at the same time the profits will be annulated by the loss in the same amount, since the farmer actually sells the maize at the price of the futures contract. Contrariwise, if the futures price is above 15,000 RSD/t farmer's loss will be completely annulated by a higher spot price at which maize is sold. Hence, in both cases by having a futures contract the farmer ensures the price of 15,000 RSD/t.

To simplify the above mentioned – as much as the farmer loses from falling prices on a spot market from April to November, he will gain from falling prices on a derivatives market.

Agricultural commodity options

This kind of options is based on agricultural commodities. Option hedging lies on *put* or *call* options trading. *Put* options give commodity holders the right to sell their commodities at a certain price in the future. With *call* options, holders hedge the risk of changes in input prices and have the right to buy a certain commodity at a certain price in the future.

The advantage of hedging strategies is flexibility – the option holder choses whether to use the option or to let it expire. Having paid the premium, the option holder cannot have an extra loss, unlike in futures hedging. The downfall of this option and other options hedging lies in a high premium price that needs to be paid when buying the option right. Example 2: A livestock farmer buys a call option on maize for May at a strike price of 16,000 RSD/t and pays the premium of 1,000 RSD/t.

Depending on change in maize price, several scenarios are possible, as shown in Table 5.

Table 5. *Buying a call options strategies – possible outcomes*

Maize price on a spot market (in RSD per tonne)	Actual option price (in RSD per tonne)	Profit/loss (in RSD per tonne)
12,000	0	-1,000
14,000	0	-1,000
16,000	0	-1,000
18,000	2,000	1,000
20,000	4,000	3,000

Source: *Authors' calculation*

Table 5 shows that the farmer will suffer a loss in the amount of the premium paid (1,000 RSD/t) if the maize price is lower than 16,000 RSD/t. If the price is higher than 16,000 RSD/t, the option will be "*in the money*", namely the farmer will exercise the option since its strike price is 16,000 RSD/t, being below the market price.

Complex hedging strategies

Complex hedging strategies implies buying and selling several different derivatives. Complex strategies are used in speculative purposes to make profits but they are also used as hedging strategies to secure the price/asset in the future period. There are a number of combinations of hedging strategies that can be used, depending on one's expectations in terms of prices movements and intensity in a certain period of time.

Cross hedging strategies

Cross hedging implies hedging strategies on assets on which no derivatives are based. For this purpose, one can use futures and options contracts (options give more flexibility but require paying a premium). Such strategies can be important on derivatives markets due to a small number of assets on which derivatives are formed.

Perspectives and preconditions for establishing an agricultural derivatives market in Serbia

To be successful, a derivatives market should meet two sets of preconditions: preconditions needed for establishing a derivatives market

and preconditions for improving the business environment of such market. Hence, most important is to:

- Establish a system of licencing and control of derivatives markets and their participants;
- Establish a system of clearing and balancing;
- Establish a system of arbitrage;
- Establish hedge funds;
- Develop a reporting system on all the factors that affect pricing of commodity-exchange instruments, etc.

Some of the preconditions for the establishment of a derivatives market refer to the improvement of the overall business environment [Acharya et al., 2013], such as:

- A secure system of commodity storing and delivery in commodity derivatives trading;
- A clearly defined fiscal policy that regulates taxing of exchange transactions. Inappropriate taxing policies on security deposits and margins can negatively affect commodity-exchange trading;
- The environment in which the price of an asset is formed by market forces. Quite often the government sells and buys agricultural commodity abruptly and insufficiently transparent, which pose an obstacle to growth of a standardised derivatives market. Ensuring the minimum selling prices, the European Union intervenes in the market and negatively affects agricultural commodities trading volume. Doing so, it decreases the volatility of prices for agricultural commodities, and consequently decreases the interest of agricultural commodity sellers to use derivatives exchange and hedge the potential risk [Kovačević, 2002].

The existence of clearing houses is as one of the main preconditions for establishing of derivatives markets and their successful operation. The task of clearing houses is to ensure the exercising of financial part of transactions. In commodity derivatives markets, clearing houses act as a third party that ensures fulfilling all contracts. For that reason, both buyers and sellers can make valid contracts only through clearing houses [National Futures Association, 2010].

Agriculture is one of the key branches of Serbian industry. The introduction of risk management mechanisms can reduce potential losses of farmers significantly. In that respect, it is important to compile all the necessary elements that can affect the establishment and growth of

derivatives markets. In the first place, a country should have a developed commodity market. In Serbia, there is the Commodity Exchange in Novi Sad, but it is not organised according to the Law on capital markets ["Sl. glasnik" RS, br. 31/2011]. There are two sets of preconditions that to need to be fulfilled before a commodity market could develop enough to become a derivatives market:

1) Setting the legislation and other preconditions for establishing a commodity market with all the characteristics of commodity-exchange systems. If the development of such system is measured by "services" offered to business subjects and other participants, then the current system lacks the following:
    a. Standardised mechanisms of exchange arbitrage,
    b. Hedge funds that enable extra-judicial compensation of loss made on a commodity market and
    c. A system of clearing and balancing, etc.
2) Institutional preconditions, in terms of overall business environment. A commodity market is not an isolated system. Besides its internal organisation, it also depends on the business environment. This set of preconditions comprises:
    a. A fair share of warehouse receipts offered by a commodity market,
    b. An adequate policy of central banks when it comes to foreign currency payments,
    c. An adequate tax policy,
    d. An established and regulated system of commodity storage,
    e. Complete liberalisation of commodity markets,
    f. More efficient legal procedures,
    g. A developed system of market information provided by state authorities, etc.

The commission is more important on commodity markets than on capital markets. On commodity markets, supply and demand "meet more easily" and if the commission is too high, commodity trading shifts to OTC markets. On the other hand, shares and bonds are difficult to trade with on OTC markets, so traders are in most cases forced to make transactions on exchange markets. Accordingly, trading on financial markets is less sensitive to commissions than trading on commodity markets.

Due to the entire above-mentioned, it is important for the established commodity-exchange system to be cost-effective, with minimum

obligations so that it could work with lower commissions. On the other hand, commodity markets themselves should organise to follow the principle of cost-efficiency and to have minimum administrative costs.

Institutional preconditions can further be categorised into two groups:

1) Preconditions related to establishing the institution of the commodity market and

2) Preconditions related to improvement of overall business environment necessary for work of commodity markets.

A developed derivatives trading does not exist in Serbia, mostly due to the lack of legislation [Zakić and Vasiljević, 2013]. The Law on capital markets ["Sl. glasnik" RS, br. 31/2011] regulates issues of establishing standardised commodity derivatives, whereas spot trading is left to be regulated by the Law on commodity markets, currently in a draft. Albeit there is a legal framework for derivatives trading, as well as the need of legal entities to hedge the risk from changes in currency rats, interest rates, shares and other assets, such market has not been established yet. This is mainly due to the fact that the establishing of "in the house clearing" or independent clearing houses that the exchange engages for clearing and balancing has not been enabled.

Regarding commodity derivatives markets, the Draft law on commodity markets is expected to be adopted, to create environment for safe daily trading and establishment of an agricultural commodity derivatives market. Currently there is not a one element that enables derivative securities trading in Serbia, which primarily reflects in a lack of any authority that regulates and licenses commodity markets and their participants [Zakić and Kovačević, 2012].

Commodity markets are not isolated systems. Apart from an optimal legal regulation, it is also necessary to improve the overall business conditions through:

- Establishing a system of licensing and control of commodity markets. Considering the size of the agricultural commodity market, the draft law foresees that the system will rely on the existing institutions – Security Market Commission and financial markets that conduct such activities in other, more developed commodity exchange systems. This would simplify the whole commodity-exchange system and make it more cost-efficient (without establishing new institutions);

- Measures of the National Bank of Serbia and the Ministry of Finances, which would simplify the procedures of foreign trade on Serbian commodity exchange markets;
- Establishing an efficient "in-the-house" clearing or independent clearing houses;
- Mechanisms for extra-juridical settlement of disputes;
- Trading currency futures, interest rate futures, etc., besides commodity and financial derivatives. Not only would it help traders to make all transactions at one place, but it would also enable Serbian commodity markets to trade the same instruments as competitive markets in the region and worldwide;
- The procedure of asking for a positive opinion from the European Securities Market Commission (ESMA) on the Law on commodity markets that enables all traders from the EU to make transactions on non-EU exchange markets.

Conclusion

Hedging is one of the mostly used risk management measures in countries with developed derivatives markets. Positive experiences from developed countries show that improvement in this segment is a direct result of hedging strategies and an indirect result of the effect developed commodity derivatives markets have on macro-economic stability, primarily reflecting as a more stable demand/supply ratio, lower inflationary pressure, smaller oscillations in prices, a more favourable situation on markets, etc. Financial and commodity derivatives' trading has not been operative in Serbia, albeit the need for such type of organised market. Establishing "in-the-house clearing" or independent clearing houses, which do the clearing and balancing on all developed derivatives markets worldwide, would favour development of derivatives markets. Adopting the law on commodity markets will regulate and improve spot trading in Serbia; whereas amendments on the Law on capital markets will help spot trading harmonise with EU regulations and introduce commodity and financial derivatives.

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ASSOCIATION AND COMMON INTEREST GROUPS IN AGRICULTURE – A MODEL OF THE TOWN SMEDEREVO[1]

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Abstract

Different association forms of agricultural producers (producer groups, cooperative societies and clusters) were considered in this paper, as well as the status of the Republic of Serbia and the town of Smederevo as a model in this field were analyzed. The authors pointed out to necessity of joining of interest in agriculture, which provides series of advantages to agricultural holdings, first of all, competitiveness in agro-food supply chain, as well as adding a new value in the value chain of agricultural products. The answer to the question what forms of association are the most adequate for agricultural producers of a certain town/region has to be given by producers perceiving numerous factors (which are the association goals, who associates oneself with who, etc.), as well as advantages and imperfections of every form of association.

Keywords: *producer groups, cooperative societies, clusters, supply chain, value chain.*

Introduction

The subject of this paper is associating and joining of interest of agricultural producers in Serbia, bringing in focus networking of market actors in agriculture of the town Smederevo. Selection of a topic for this paper was determined by a fact that in condition of dynamic market, climatic and technological changes, associating and networking of agricultural producers is one of key methods to overcome difficulties, especially: 1) survival of small-sized agricultural holdings, with small and divided property and fragmentized and unstable market supply, 2) extensive production, 3) production of a high risk (climate changes,

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volatility of prices of agricultural products/inputs). In the Strategy of Agricultural Development of Serbia in 2005 (Official Gazette of the Republic of Serbia, No. 78/05, page 50) was emphasized that „cooperative societies and associations are extraordinarily important organizational units from production improvement, marketability and rural development point of view. Hence, while setting aside the grants for rural development, as well as the other subsidies, they have to be supported and have priority".

The European Union establishes common organization of the markets in agricultural products by regulation No.1308/2013, and according to that document of EC (No.1308/2013, page 682) "producer organisations and their associations can play useful roles in concentrating supply, in improving the marketing, planning and adjusting of production to demand, optimising production costs and stabilising producer prices, carrying out research, promoting best practices and providing technical assistance, managing by-products and risk management tools available to their members, thereby contributing to strengthening the position of producers in the food chain".

Also, the Regulation (EU) No 1305/2013 (page 491) on support for rural development highlights the following "producer groups and organisations help farmers to face together the challenges posed by increased competition and consolidation of downstream markets in relation to the marketing of their products including in local markets. Setting up of the producer groups and organisations should therefore be encouraged". Support to the processes of association and networking in agriculture is responsible for the third EU priority for rural development (Ibidem, page 500): „Promoting food chain organisation, including processing and marketing of agricultural products, animal welfare and risk management in agriculture, with a focus on the following areas: (a) improving competitiveness of primary producers by better integration into the agro-food chain through quality schemes, adding value to agricultural products, promotion in local markets and short supply circuits, producer groups and organisations and inter-branch organisations; (b) supporting farm risk prevention and management".

Related to farm risk prevention and management, it should emphasize that risk management instruments in Serbia are poorly developed, mainly due to the fact that Serbian agricultural sector was developed in the system that had the elements of planned economy for decades (Vasiljevic,

Kovacevic, Zakic, 2014, page 345). So, it is essential to develop tools for the risk management in agriculture, and association of agricultural producers can facilitate those processes.

Methodology

Analysis of different forms of association of agricultural producers (producer groups, cooperative societies and clusters) in Serbia and Smederevo is based on the secondary and primary research. Desk research included the analysis of official statistical data, planning and strategic documents, studying and quoting a number of scientific papers, communications and policy documents of the European Commission (EC) and the Government of the Republic of Serbia. In the primary research was using an interview method in order to found out whether association of agricultural producers in Smederevo existed and up to what point it was developed. Through the primary research the agricultural producer groups and cooperative societies in Smederevo are identified in a qualitative and quantitative way (their number, capacities, membership, area of activity, level of development, problems in functioning). The primary research was carried out through a survey, i.e. through direct interviews with the president or a member of producer group and cooperative society. The base for the survey was the prepared questionnaire, which contained all the issues relevant for functioning of a producer group/cooperative society. The market research was carried out during November 2015 and the interview was conducted by the telephone interview which lasted for approximately 30 minutes.

The policy and strategic background of agricultural associations

Most of the European and national strategic documents recognize the significance and role of association in agriculture and development of rural communities.

The role of agricultural producer groups and the system of cooperative societies are emphasized in *the Strategy of Agricultural and Rural Development of the Republic of Serbia for the period 2014-2020* as very important for realization of the following priority areas (Official Gazette of RS, No. 85/14, pages 70-78):
- The priority area 5 "Improvement of the system of knowledge transfer and development of human resources" (counselling with the groups, cooperative societies and associations);

501

- The priority area 7 "Technological development and modernization of agricultural production and processing" (operational objective 7.7 "Technical-technological improvement of storing and processing facilities of cooperatives, aiming to produce the recognizable cooperative products of standard quality"),
- The priority area 8 "Development of market chains and logistics in the sector of agriculture" (operational objectives: 8.3. Enhancing motivation of producers for the different forms of association, 8.4. Strengthening the cooperative's capacities in order to make them the financial, market and the extension service of agricultural producers, 8.7. Strengthening horizontal and vertical connections in the production chain, based on the market principles);
- The priority area 12 "Improvement of the social structure and reinforcement of the social capital" (operational objective 12.3. "Promotion of cooperative organization and their inclusion into the local action groups).

Serbia will be able to use financial resources of the pre-accession EU fund for rural development (IPARD II 2014 – 2020) (after accreditation of IPARD II operation structure), by obtaining the status of the EU candidate-member, and in accordance with the EU regulatory rules in this field and the national document „*Republic of Serbia IPARD Programme for 2014-2020*". The largest percentage of support from this EU fund is meant for the measures of improvement productivity and competitiveness of the agro-food sector, as well as adjusting to the EU standards (Republic of Serbia IPARD Programme for 2014-2020, pages 87, 88-90, 93-94, 98). The Republic of Serbia IPARD II Programme will *mainly support viable agricultural holding and private recipients* (farmers, SMEs from agro-food sectors etc.), while other national measures are mainly addressed to help smaller agricultural holdings (Ibidem, page 167). Taking into consideration the prospective users of IPARD Programme and the principle of co-financing measures, there can expect that interest in using these funds in the following period could motivate augmentation and association of the local producers in agro-food sector.

The significance of cooperation and association in agricultural sector of the Danube district was recognized in the *European Union Strategy for the Danube Region* and in accompanying *Action Plan*. The third pillar of the EUSDR is worked out via priority area 8 "To support the

competitiveness of enterprises, including cluster development" (EUSDR, Action plan, 2010, page 54-73). One of the activities which contribute to realization of the stated 8th priority field is: "To improve the competitiveness of rural areas and in particular of the agricultural sector" by facilitating rural entrepreneurship, supporting innovation and cooperation in the agricultural industry (Ibidem, pages 67-68).

By the *Regulation No 1305/2013* on support for rural development for the programming period 2014-2020 (Regulation No 1305/201, pages 487, 499, 500) the EU provides support to the processes of association and networking in the sectors of agriculture, forestry and in the food supply chain, through following measures:

- *Article 16* „Quality schemes for agricultural products, and foodstuffs" (Ibidem, page 505);
- *Article 17* „Investments in physical assets". Support to improve the overall performance and sustainability of the agricultural holding shall be granted to farmers or groups of farmers (Ibidem, pages 506-507);
- *Article 27* „Setting-up of producer groups and organisations". Support under this measure shall be granted in order to facilitate setting up of the producer groups and organisations in the agriculture and forestry sectors for the purpose of: (a) adapting the production and output of producers who are members of such groups or organisations to market requirements; (b) jointly placing goods on the market, including preparation for sale, centralisation of sales and supply to bulk buyers; (c) establishing common rules on production information, with particular regard to harvesting and availability; and (d) other activities (Ibidem, page 511).
- *Article 35* „Co-operation". Support under this measure shall be granted in order to promote forms of co-operation involving at least two entities and in particular (Ibidem, page 516): (a) co-operation approaches among different actors in the Union agriculture sector, forestry sector and food chain and other actors that contribute to achieving the objectives and priorities of rural development policy, including producer groups, cooperatives and inter-branch organisations; (b) the creation of clusters and networks, etc. Co-operation shall relate, in particular, to the following (Ibidem, page 516): (a) the development of new products, practices, processes and technologies; (b) co-operation among small operators in organising joint work processes and

sharing facilities and resources and for the development and/or marketing of tourism services relating to rural tourism; (c) horizontal and vertical co-operation among supply chain actors for establishment and development of the short supply chains[4] and local markets; (d) promotion activities in a local context relating to the development of short supply chains and local markets, etc.

Main characteristics of cooperatives, associations of agricultural producers and clusters in agriculture of Serbia

The authors in this section provided a short description of the existing forms of association in Serbian agriculture: farmers' cooperatives, associations of agricultural producers and clusters.

Agricultural cooperatives. External study of cooperative societies in EU financed by EC (Support for Farmers' Cooperatives, 2012, page 110) summarises derived implications for facilitating and supporting farmers to organise themselves in cooperatives as a mean of improving their market position and thus generate a solid market income, particularly given the observed imbalances in bargaining power between the contracting parties along the food supply chain. Authors of that study emphasize the following (Ibidem, page 110): (a) cooperatives are typically hybrid governance structures, and this means that cooperatives combine elements of markets (like the price) and hierarchy (like the ownership relationship between members and the cooperative firm); (b) joint ownership and joint control of farmers over firms downstream in the food chain is not limited to cooperatives (other companies with other legal forms may also be owned and controlled by farmers, often through producer organisations or farmer unions).

According to the Law of cooperatives in Serbia (Official Gazette of SRY, No. 41/96 and 12/98 and Official Gazette of the Republic of Serbia, No. 101/2005 – the other law and 34/2006), cooperative is a form of physical persons organization in which they make their economic, social and cultural interests, by doing business at cooperative principles (Clause 1). Farmer cooperative can establish at least ten farmers and other physical

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[4] Short supply chain means a supply chain involving a limited number of economic operators, committed to co- operation, local economic development, and close geographical and social relations between producers, processors and consumers (Regulation EU No 1305/2013, page 499).

persons who have their own land, facilities or working tools in agriculture or use them on other grounds (Clause 9). In almost all national documents the attention is paid to major problems in the cooperative sector. For example, in the Agriculture Development Strategy of Serbia in 2005 was pointed out to (Official Gazette of the Republic of Serbia, No. 78/05, page 49): "main problem in the system of cooperative societies of Serbia is that the most cooperative societies do not observe of cooperative regulations, i.e. they are not managed by their members, but employees in cooperatives or directors in so called "private cooperatives", as well as unsolved ownership over the cooperative property". Current Strategy of Agricultural and Rural Development of the Republic of Serbia for the period 2014-2020 (Official Gazette of the Republic of Serbia No. 85/14, page 32), accentuates that: "unsolved problem of property-rights relations (and cooperative property as the collective form of private property), unequal approach to capital market, the grey economy effect, lack of storing and processing facilities have an effect on a fact that an identity of cooperative property and trust in the system of cooperative society are lost."

According to (Parausic, Cvijanovic, 2014, page 209-210), a large number of cooperative societies in Serbia does not operate after the cooperative principles, do not have necessary facilities and equipment for production, processing and sale of agricultural products, they have major financial problems, as well as the problems in demarcation of assets.

Associations of agricultural producers. Legal basis in establishing the agricultural producer association is the Law of Associations (Official Gazette of RS, No. 51/09) and according to it, an association is voluntarily, non-government, non-profit organization based on free joining of more physical persons or legal entities (Clause 2). This law has created a stimulating environment for development of civil sector in Serbia, first of all, because it has provided correlation of physical persons and legal entities.

Besides, the agricultural associations are not developed or they are not sufficiently active (especially associations of producers in a particular line of production). They are unrecognizable in the market and they don't have the projects that support the agricultural producers to make their better position in the market (especially in the sales market and/or processing of agricultural products) and they mostly have only the educational-promotional role.

In the Strategy of Agricultural and Rural Development of the Republic of Serbia for the period 2014-2020 (Official Gazette of the Republic of Serbia No. 85/14, page 33) emphasizes that "a number of the existing producer associations of all types is large, especially in primary agricultural production. The producer associations are poorly developed, and their role and activities are minor. Most of the producers' associations are at the low level of organization which primarily means the low level of professionalism and a lack of management personnel. In recent years, the associations have been increasingly noticeable, first of all, in situations when problems in the market appear, but their negotiating power has been mostly weak, due to a high dependence on processing industry."

Limitations for more significant development of association are both linked to agricultural producers and the state. The most important limitations for the associations development affecting the agricultural producers are (Parausic, Cvijanovic, 2014, page 209): a) mentality of agricultural producers (distrust in the state, other agricultural producers; domination of personal and short-term interests over long-term and common) and b) negative experiences in the functioning of the associations/cooperatives. At the same time, the limitations for development of the associations affecting the state are (Ibidem, page 209): a) lack of financial, legal and consulting support of the government in establishment and work of the existing associations, b) undeveloped business environment for engaging in agriculture, processing of agricultural products and in non-agricultural activities.

Clusters. In numerous studies and scientific works which have clusters as topic, researchers start from Porter's definition of clusters. According to this author (Porter, 1998, page 78) "clusters are geographic concentrations of interconnected companies and institutions in a particular field" or "critical masses in one place, of unusual competitive success in particular fields". In addition, Porter (2008, pages 2013-214) defines clusters as "geographic concentration of interconnected companies, specialized suppliers, service providers, companies in related industries and associated institutions (universities, agencies, chambers of commerce) in a particular field of activity that compete but also cooperate". Regulation (EU) No 1305/2013 on support for rural development (page 499) defines cluster as a „grouping of independent undertakings, including start-ups, small, medium and large undertakings as well as advisory bodies and/or research organisations - designed to stimulate economic/innovative

activity by promoting intensive interactions, the sharing of facilities and the exchange of knowledge and expertise, as well as contributing effectively to knowledge transfer, networking and information dissemination among the undertakings in the cluster".

According to (Parausic, Cvijanovic, Mihailovic, pages 724-725), clusters in Serbian agribusiness are still without visible results and effects on the growth of production, employment, export, productivity, innovation and competitiveness at the level of enterprises (cluster members), or at community level. Also, clusters do not have critical mass of participants, since there is no membership of big and strong market companies/producers, and very often the membership of some companies and institutions is only formal (Ibidem, pages 718-719). The market analysis showed that clusters in agribusiness are still new, unrecognized, underdeveloped, not operative, and they are very much similar to associations or cooperatives. The main reasons for underdeveloped clusters are external ones (unfavourable macroeconomic and microeconomic business environment), but the reasons also lie in the nature of clusters, or in their small financial strength, low production capacity, inbuilt trust and cooperation among cluster members.

Development of association in agriculture of the town Smederevo

Smederevo is a port town on the river Danube, which belongs to the region of South and East Serbia and the Danube District (with the municipalities Velika Plana and Smederevska Palanka). The total number of population is 108,209, of which in the urban settlement live 64,175 inhabitants, and in the rural settlements (totally 27 rural settlements) 44,013 inhabitants (Population by age and sex in settlements, 2012).

In the spatial plan of Serbia (Law on Spatial Plan of the Republic of Serbia from 2010 to 2020, pages 46-47), the town of Smederevo belongs to the Danube developmental zone and it represents one of key points (the Danube Gate), together with the cities Novi Sad, Belgrade and Pancevo. The spatial plan of the town Smederevo 2010-2015-2020 (page 69) points out that the most significant advantage of Smederevo is extremely favourable in regard to neighbouring towns, in fact, strategically the most favourable geographical-traffic location.

Smederevo is one of the richest towns in Serbia (Spatial Plan of the Town of Smederevo 2010-2015-2020 page 19), by its agricultural resources. In

the town agriculture is a dominant economic activity, and rural area is the largest social and natural wealth, whereby it is indicative that the current organization of agricultural production and use of the available resources have not been adjusted to a significant competitive advantage (vicinity of the biggest consumer centre, the city of Belgrade) (Ibidem, page 39). The most common agricultural productions in Smederevo, which contribute to significant market surpluses are: a) crop production (maize, wheat), b) fruit-viticulture production and c) milk production (production of meat and eggs is of local significance, while more significant market surpluses are not expressed) (Programme of support measures for the implementation of agricultural policy and the rural development policy on the territory of Smederevo for the year 2015, pages 7, 11). In the field of processing industry, after the "Godomin" bankruptcy, processing industry had considerable losses in grapes processing and production of wine and rakia (brandy), fruit processing and warehouse and crops finishing (Agricultural Development Strategy on the territory of the town of Smederevo for the period 2008-2013, page 8).

Smederevo is the town of a long cooperative tradition, regarding that in the village Vranovo, in vicinity of Smederevo, was established the first credit farmer cooperative society in Serbia in 1894. Lately, the system of cooperative societies in Smederevo was characterized by separation of the cooperative societies from the combine "Godomin" (1989), when the cooperative "Smederevo" was founded. This cooperative had stop working after only several years, and out of it were founded five new cooperative societies, of which only one continued to work successfully (cooperative "Mihajlovac").

Insufficient association and correlation in agriculture of Smederevo reflects negatively on the condition in agriculture, and this primarily refer to supply of inputs and sale of agricultural products" (Programme of support measures for the implementation of agricultural policy and the rural development policy on the territory of Smederevo for the year 2015, page11).

In this moment, according to data of the City Hall Smederevo, Department of Economy, Entrepreneurship, Local Economic Development and Public Procurement of the Town Smederevo (Questionnaire, November 2015) on the territory of the town operate successfully only two cooperatives (high turnover and/or a large number of subcontractors): (1) "Mihajlovac" and (2) "Zelena bašta" ("Green

Garden"). Some of the cooperative societies do not work, due to the liquidity problem, as: "Sloga", Lugavcina; "Pomoravlje" Smederevo; "Podunavlje", Smederevo (Enforced collection of Claims, National Bank of Serbia, November 2015).

In the following items, according to the interview with the cooperative members or directors of cooperatives (Survey of farmers' cooperatives on the territory of the town Smederevo, November 2015) the basic characteristics of the farmers' cooperatives in Smederevo were given:

- Cooperative "Mihajlovac", Mihajlovac. The cooperative society was established in 1992; it has 27 members (the cooperative society-members assembly) and over 1,000 subcontractors. It has 40 ha of agricultural land, of which 11 ha is registered in the cadastre land registry as the cooperative ownership, and 29 ha of land is public property and it is in the process of cooperative ownership argumentation. A basic activity of the cooperative society is to negotiate on production and purchase of crops (wheat, maize, sunflower, rape) and raw milk from the primary agricultural producers. Since the cooperative society neither have adequate storage capacities for crops, nor the processing capacities for milk, the value chain of agricultural products is short and there is no new value added (reselling of crops directly after purchase, without drying, processing; reselling of raw milk). As one of the business problems are the collection problems from some primary agricultural producers.

- Cooperative "Green Garden" Saraoci is the cooperative of vegetable growers and the example in what way joint producers can survive in the market, along with the production modernization, knowledge and experience. The cooperative society has 10 cooperative members. It was established in 2007, and the cooperative society members are specialized for vegetable production (tomato, cucumber, paprika) in plastic foil houses, which realizes in strictly controlled conditions (integral production), in modern plastic foil houses, with application of all necessary agro-technical measures, standards (the GlobalGap was introduced in 2015), as well as respecting the demands of the market. The total area of the plastic foil house is about 10-12 ha, which provides the cooperative society to realize the negotiated sale of vegetables into a large retail chain. As a big problem the cooperative society members see strong price competition of

import vegetables from Macedonia, Albania, Turkey, as well as the unfavourable credit lines for cooperative societies and the agricultural sector in general.

- Cooperative "Ralja", Ralja. The cooperative society was founded in 2005 and it had taken possession on the administrative building and warehouses of the previous FCS "Vranovo" from Vranovo. It deals with negotiations of crop production, repurchase and sale of crops.
- Cooperative "Suvodol", Suvodol was founded in 2009. It has no cooperative property. It deals with service measuring and repurchase and reselling of crops for industrial processing.
- Cooperative "Agrozdravlje", Ralja, was founded in 2008. The cooperative society deals with negotiations of production, repurchase and sale of crops. There is no cooperative property, and as the biggest problem appears difficulties in collection from some primary agricultural producers (subcontractors).

On the territory of Smederevo operate also several associations: fruit growers and vine growers, livestock producers, flower growers and bee-keepers. In accordance to the interview with the representatives/presidents of these associations (Survey of the associations in the field of agriculture of Smederevo, November 2015), their basic characteristics can be seen below:

- The association of livestock producers "Kapija Šumadije" ("The Gate of Sumadija"), Mihajlovac. The association was registered in 2015. It has around thirty members, of which a half is active. The goal of the association is to preserve heads of Simmental breed of domestic production. The association organizes traditionally the "Festival of milk and dairy products", and at the festival exhibit dairies in the country and from abroad, as well as the agricultural producers of small handicrafts businesses, which deal with production of dairy products. Besides, the association organizes seminars, education of agricultural producers, etc.

- The association of fruit and vine growers "Zlatno brdo" Udovice. The association was founded in 2005, by 14 members (family agricultural holdings). During 2012, the association had got to use a dryer for fruits from the EU IPA funds (capacity is 100-130 kg of a finished product per a day. The dryer still doesn't use sufficiently, because there is no interest of agricultural producers

(uncertainty of sale and unknown market are main constraints for more fruit drying). The association has, as we can freely say, just an inactive membership.

- "The association of bee-keeper – Smederevo" was founded in 1952. It has about 120 members and works on educational-promotional activities: seminars organization, professional business trips, visits to fairs, etc.
- The association of flower producers and flower lovers "Smederevo lily of the valley" was founded in 2008. It gathers 19 producers of flowers and young plants and about twenty members of lovers of flowers. The association aims to improve horticulture and nursery production of flowers. The members of the association have numerous mutual activities: joint ventures; they purchase the production material together; take part in donations; organize education, seminars; take part in many manifestations in the country, etc.

Conclusion and recommendations

Underdevelopment of association in agriculture of Serbia (and the town Smederevo) leads to exclusion of a high percentage of the primary agricultural producers from commercially-oriented agro-food chain, and this affects unfavourably on their negotiating position in regard to purchasers and processors, reduces their lobbying capacity, etc.

In agriculture of the town Smederevo, a small number of cooperative societies work successfully, while the system of cooperative societies has been characterized by many problems: a) cooperatives look substantially like enterprises (considering that the cooperative members play a small role in the cooperatives management, disrespect of the cooperative principles, etc.); (b) unsolved property-rights relations (especially of agricultural land used by so called "old cooperatives"); (c) cooperatives do not own the necessary storing and processing capacities, by which misses a new value added in the value chain of agricultural products.

The associations of agricultural producers have also been underdeveloped. Although Smederevo has four associations (fruit and vine growers, livestock producers, flower growers and bee-keepers), they are: a) inactive (have a passive membership) and/or b) their work doesn't contribute to the competitive position strengthening of individual

producers in the market (members often don't find any interest for membership).

What forms of association are the most favourable for the agricultural producers in Smederevo and how they should work? The agricultural producers have to answer to this question according to recognition of many factors (what are the goals of association, who teams up, etc.), as well as the advantages and imperfections of every form of association.

Producer groups. The current Law on Associations ("Official Gazette of the Republic of Serbia", No. 51/09, Clause 2) states precisely that the association is a non-profit organization and it cannot perform an activity aiming to gain profit, which significantly limits the associations business and investments in physical assets for agricultural production (equipment, facilities, storage capacities, agricultural mechanization) and processing and marketing of the agricultural products (plants for milk processing, construction and supply with equipment the slaughterhouses, the facilities and equipment for the fruit and vegetable processing, etc.). On the other hand, the Regulation of EC on support for rural development (Regulation EU, No 1305/2013, page 491) points out the following: "(a) only producer groups and organisations that qualify as *SMEs* should benefit from financial support; (b) in order to ensure that the producer group or organisation becomes a viable entity, a *business plan* should be submitted to the Member States, as a condition for granting support to a producer group or organisation".

Taking into consideration everything previously mentioned, there can conclude that success of the agricultural producers' associations will considerably depend on two factors:
   (1) Creating the favourable business environment for work and business of all subjects in the sector of agriculture and processing of agricultural products,
   (2) Possibilities of association of agricultural producers with similar economic power "who speak the same language", which will, through the confidence and foundation of SMEs and/or cooperatives, invest in physical assets (building the storage and processing facilities, purchase of equipment, mechanization, etc.)

Farmers' cooperatives. Associating in cooperatives (with respect of the cooperative values and principles) might bring the competitive advantage

to agricultural producers and adding a new value in the value chain of agricultural products, only through fulfilment of many preconditions:

(1) Enactment of the new Law on Cooperative Societies, by which would define more convenient many questions important for work of cooperative societies: a mode and rights of a cooperative society management, the status changes (in order that a legal entity with the private capital could get a status of a cooperative society member; In order that a cooperative society could be a founder, i.e. a member of an economic entity and similar); solving the property-rights relations (especially the status of public/cooperative property),

(2) Association of several specialized cooperative societies in the region (dairy cooperatives, fruits cooperative societies), by which reduces the production costs through economy of scale and strengthens negotiating power of cooperative societies in the market,

(3) Strengthening the cooperative societies through investments in physical assets for agricultural production and processing and marketing of agricultural products, and along with support of the fiscal policy measures (lower burden of taxation), credit policy (lower interests), the measures of productivity strengthening and agricultural production competitiveness (subsidies, incentives, etc.).

Clusters. Agricultural producers, considering the fruit production development in Smederevo, with support of the Department for the Local Economic Development of the Town Smederevo and agricultural extension service "Smederevo", could form a cluster of fruit growers, which could have as a members: (1) registered agricultural holdings, SMEs, entrepreneurs, farmers' cooperatives and farmers' associations in the area of production and trade of fruit, 2) suppliers of production materials (chemicals, packing etc.), 3) supporting institutions, such as: schools and universities, scientific research institutes, certification bodies, agricultural extension services, regional development agency, experts of various profiles and the like. As a cluster could be successful and provide a better competitive position of producers in the market, the next assumptions are important:

(1) Government activities in order to eliminate limitations for development of agricultural holdings and SMEs, which are located in the macroeconomic policy and unfavourable microeconomic/business environment (agricultural policy

incentives, stimulating fiscal measures, measures to support employment and investment, efficient legislative and judicial framework etc.);

(2) Success of clusters will also depend of internal cluster capacities (building trust, reconciliation of interests of different participants and forces, cooperation development between cluster members, increase the critical mass of clusters, increase production, innovation and export capacities) and entrepreneurial initiatives of business entities (farmers) in order to increase association and implement joint projects and activities. However, the most important requirement for cluster development and sustainability in the future will be solving the issue of cluster financing.

In general, Serbia will have an obligation to establish the producer organizations (associations of agricultural producers within one production line) in the process of EU accession, and the function of licensing and work control will perform the ministry authorized for the activities in agriculture. For development of all forms of association is inevitable:

- Improvement of the legal framework (especially the Law on Cooperatives). These improvements should concern: clear regulation of property relations in cooperative societies, establishment of possibilities that the legal entities could be the members of cooperative societies, creation of a mandatory guarantee fund, establishment of turnover of the cooperative allotments among the cooperative members, establishment of possibilities for re-registration of a cooperative society in some other form of a legal entity, etc.

- Advancement of the general business environment that is connected to cooperatives and agricultural associations business (stimulating fiscal policy and the support system in foundation and management of agricultural associations through reform of a professional extension service, etc.).

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QUALITY MANAGEMENT AS ELEMENT OF COMPETITIVENESS IN AGRIBUSINESS ENTERPRISES[1]

Zorica Vasiljević[2], Bojan Savić[3]

Abstract

Modern economy in general and agribusiness sector in particular, is characterized by the struggle for customers using a variety of instruments, among which the product quality certainly occupies a key place. The relationship between quality and price is an important parameter for making decision on purchasing by all fastidious customers. This suggests the conclusion that in order to gain competitive advantages, enterprises need to offer the high quality products at an affordable price. If we bear in mind that production costs are an important price component, the price competitiveness could be realized only if the enterprise achieves the cost leadership. The costs caused by activities that are associated with the quality management have a significant share in the total costs, which directly affect the ability to achieve competitiveness through the cost leadership, i.e. through optimizing and reduction of the total enterprise costs. The aim of the paper is to highlight the importance of the quality cost management in the agribusiness sector aiming at acquiring and maintaining the competitive advantages.

Key words: *quality management, competitiveness**, agribusiness, cost leadership, value added.*

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Introduction

The high level of competition that features contemporary economy requires that companies continually seek new sources of competitive advantage. Consequently, the struggle between companies for the increasingly choosy customers has been led by using various instruments. When it comes to the food industry and agribusiness sector, the product quality without any doubt represents an important factor that determines the purchasing decisions and at the same time it contributes to the customers' loyalty for particular product brand. In addition to quality, another important element that affects the decisions of buyers is the price. More specifically, the measurement of the relationship between product quality and price serves to the customers as the basis for the ranking of products in terms of their attractiveness. Previous suggests that in order to achieve competitive advantage, the enterprise should produce under an affordable price together with high quality of products' supply. In other words, a specific product will be attractive to buyers if at the same price it is characterized by a greater degree of quality compared to the product of the competing enterprises, or if the same quality customer can get at a price lower than the price of a rival enterprise. If we bear in mind that production costs have significant implications for the price policy of an enterprise, the competitiveness achieving and maintaining is possible only if the enterprise implements the cost leadership strategy.

Optimization of total operating costs assumed management of the particular cost components. The costs caused by the activities undertaken in an enterprise aiming at the quality management have a significant share in total operating costs, which directly affect the ability in achievement of the leadership in costs, i.e. the overall competitiveness of an enterprise. The high-quality implementation of processes and operations, as a condition of product quality, implies the rational and efficient use of resources, thus confirming the fact that quality is an important determinant of operating costs.

Quality is a complex phenomenon and may be included, inter alia, through the satisfaction of customers. The quality costs arise due to the appearance of poor quality, i.e. the need to be eliminated caused deviations from the defined standards (an appearance of scrap, residues from the production, the need for the products' finishing, cancellation of orders, etc.). In addition to the interest of buyers or consumers, complexity and importance of the products' and services' quality results

from the fact that it touches the investors' decisions, then the regulations whose demands in terms of prescribed quality standards are necessary to be met, as well as the reaction of the general public. All above mentioned actors are an integral part of the environment in which the enterprise operates, and as such they affect the success of an enterprise.

In the paper it has been pointed at an importance of quality management in the agribusiness sector by applying modern concepts such as *Total Quality Management*, *Six Sigma* and *Lean Concept*. The goal we should strive to is to contribute to the total costs' reduction onto the optimal level through the quality improvement and the quality costs' management, thus enabling the realization of the cost leadership strategy, which is in addition to the profitability improvement focused on gaining and maintaining the overall competitiveness of enterprises.

Modern Concepts of Quality Management

The quality represents a complex and multidimensional concept. Thus, some authors tend to define quality in the context of product specifications, other authors derive quality from the suitability of the product for use i.e. consumption. The third group of authors looks at the quality from the perspective of customers' satisfaction. The concept of quality is also often used to denote the excellence. In addition, the quality can be viewed through the prism of product reliability. The key limitation of different approaches in the quality assessment is a high degree of subjectivity, i.e. the fact that what is well for one group of customers may be unsatisfactory from the perspective of demanding customers. In order to mitigate this problem, the quality has been defined according to the ISO standard 8402 as a set of features and characteristics of the product or service that affect the ability to meet explicitly expressed needs or implicit needs, which means they have been implied, i.e. which customers reasonably expected for a given product category (Suganthi, Samuel, 2004). Quality is at the same time viewed in relation to the customers, i.e. their satisfaction arising from the use or consumption of a particular product or service.

Total Quality Management

Total Quality Management (TQM) concept was developed in the Japanese industry on the basis of idea that quality is one of the key factors of business success. In this sense, quality should permeate the entire

519

organization - the manner in which it has been managed, the employees, their training, evaluation, rewarding. Quality is defined by the characteristics such as: speed of delivery, the ability of the products' adaptation to the customers' requirements, reliability of products etc.

TQM represents a comprehensive approach which in systematic and long-term basis contributes to an improvement of the products' and services' quality. This concept implies commitment to quality, as well as the orientation of all resources towards quality improvement. TQM concept is based on the following principles (Mandal, 2008):

- Satisfaction of customers is the main priority and all activities of the enterprise should be directed to its achievement;
- The changes have become an integral part of the business, hence the strategic and systematic approach represents the prerequisite for successful management and adaptation to business changes;
- The enterprise strives to the continuous improvements and learning, while the performances are evaluated in relation to external benchmarking;
- Focus on empowerment and teamwork.

Since the customers' satisfaction is a top priority, the cited idea should be incorporated into the vision, mission and goals of the enterprise. The buyer is the one who determines whether a specific product is the quality one or not. This further assumes that first it should be identified the customers, and then it should be realized their needs and finally they should be reframed into specifications of products and services, in order to ensure a high level of customers' satisfaction.

Once the enterprise identifies the customers as direct sources of enterprise income, it is necessary to identify 20% of the largest customers which generate 80% of total sales. This is because the focus is just on meeting the needs of the mentioned strategically important customers, which further assumes an understanding of their needs, the careful planning of the customers' management process (e.g. through regular visiting of customers), a detailed consideration of the proposals and feedback information received from customers in terms of the future shopping patterns, suggestions for the products' improvement etc. (Mukherjee, 2006). In addition to identifying customers' needs, focus on customers also means that the internal system and processes should be designed in a

way that will allow the interests and needs of the customers should be included into all enterprise activities. Ultimately this should result in the creation of value for customers.

The strategic planning and leadership in the field of quality is the competence of top management. It is a process that involves a long-term time horizon and touches all sides that determine the business operations and influence the enterprise success. Those are the key stakeholders such as customers, employees, suppliers and wider social community. The strategic planning should allow the promotion and protection of the mentioned stakeholders' interests through the integration of customers' interests into the enterprise plans and processes. This assumes that the top management actively participates in the planning of the target quality level and continuously reviews the achieved results in this particular area. This further implies creating of an environment in which every individual in the company should provide its best in overall quality.

Continuous improvement and learning are important instruments of the TQM system. These processes are not limited only to the level of product quality, but to the level of all system components and processes in the enterprise. Learning, creativity and innovation are the key components of continuous performances' improvement and advancement. These improvements can be recognized as an increase in the quality level of products and services, reduction of the cycle time, decrease of waste, errors and defects in production, efficient use of resources, development of new opportunities, markets and business lines, differentiation of products and services and, consequently, an increase of the value for customers.

Empowerment and teamwork as elements of the TQM system are based on efficiency and effectiveness of employees. Hence, it is important to take steps to improve the knowledge, skills and motivation system of employees in order to enable them to prevent the occurrence of problems and contribute to the solving the problems. When it comes to the team work, in addition to the vertical and horizontal teamwork, a special importance has an inter-organizational teamwork which involves cooperation between employees of different organizations with groups of customers, as well as with suppliers and external institutions, governmental bodies and other participants. The quality costs are the subject of a management decision. In this sense, TQM is initiated by top management. It is important to note that this is not a one-time act, but a

process that requires time for implementation, monitoring and support from the moment of introduction onwards (Rawlins, 2008). Implementation of TQM concept should enable the following (Mandal, 2008):

- Continuous improvement of processes in the enterprise and outputs that are superior or at least equal to those offered by competing enterprises;
- Continuously adding of value to products and services while reducing the costs;
- Support to the efforts aiming at permanent improvement of processes, products and services;
- Creating of the organizational culture that will enable to all employees in an enterprise to participate actively in creation of the value for customers and to improve their satisfaction.

The aforementioned effects undoubtedly contribute to the realization of the superior business performances of an enterprise.

The potential application of TQM concept in the agrarian sector domain is significant. Numerous examples of successful application of this concept in practice confirm the imposed statement. Thus, for example, some countries have organized the national programs for farmers' participation. In this regard, an interesting case of 248 dairy plants which was implemented in 30 USA states during the 1990ies (so-called *National Dairy Total Quality Management Program*). The goal was to be improved the milk quality and thus to be improved the food safety as well. The results of research conducted after the program implementation indicated that the TQM system improved not only the health of farm animals, but also the quality of milk and products obtained by further processing of milk (Kirk et al., 1999). What is particularly important is that the significant benefits have been observed in the area of communication between management and employees, then in the higher accuracy in defining of responsibility for specific activities, thereby enabling the employees clearly understand what management expects of them. Furthermore, it has been noticed a significant progress in the field of the staff education, which is indubitably a key presumption for achieving an excellence in business. As already pointed out, quality management and striving for continuous improvement have been based both on innovations in organization and management, as well as in innovations of processes

and products. Since in the agribusiness sector the effects of mentioned improvements are not limited only to the level of an entity already having an impact on the so-called *upstream* sector, primarily through the provision of inputs, it can be concluded that the improvements contribute to meet the growing demands in terms of quality throughout the supply chain (Galizzi, Venturini, 2012). In subsequent parts of the paper there have been analyzed some of the contemporary quality management concepts which represent an upgrading of the TQM concept.

The Six Sigma Concept

Six Sigma concept was originally developed by *Motorola* in the mid 1980ies and it represents an approach of continuous improvement of processes and at the same time it represents a methodology for the TQM concept implementation. Some authors define the *Six Sigma* concept as an evolution of the TQM system. Therefore all the elements typical for the TQM concept are at the same time inherent in the *Six Sigma* concept. The key characteristic of the *Six Sigma* concept is that for the resulting problems in the quality concept enables finding a solution through linking of quality and costs. From the standpoint of the mentioned concept, the quality costs can be classified as the low quality costs and good quality costs. *Six Sigma* connects quality with profitability of an enterprise. The philosophy that lies at the basis of this concept is so-called "zero defects" which is only possible if the processes in an enterprise are fully harmonized. Although the "zero defects" is almost impossible achievable in the practice, this idea means the effort to be prevented as much as possible the occurrence of defects on all products, processes and transactions (Desai, Shrivastava, 2008).

Through the substantial process improvement there have been reduced some individual components of the quality costs. As it is known, inadequate quality increases the costs and reduces value for customers (i.e. it minimizes their satisfaction). Thereby it has been further eroded the reputation of an enterprise as well as the product brand value. Hence the importance of the Six Sigma concept results from the continuous effort to be defined the solutions for elimination of the main troublemakers, and according to past experience this is mostly the personnel structure (Madalina, 2009). The goal of Six Sigma concept is to allow the reduction in deviations of characteristics and quality from the customers' demands. Achieving the VI level of quality (derives from the name of Six Sigma) means that the low level costs are less than 1% of

total costs, more precisely that there are 3 or 4 defect product on every million products, thus significantly improve the performance of an enterprise. In contrast, the II or III quality level suggests that the costs of poor quality are quite high (approximately accounting for around 40% of total costs) (www.sixsigmaonline.org). The Six Sigma concept has been successfully used even in agriculture. What is important is that farmers truly engage and dedicate themselves to the process of quality improvement.

The Lean Concept

The *Lean* concept represents an approach that adds value for customers, which represents one of the key factors for attracting and retaining them. It is also a necessary condition for the acquisition and increase of the market share. Hence, it is important to identify what it is (resources and activities) that add value to the products and makes them more attractive to the buyers. Through identifying and eliminating inefficiencies as well as the occurrence of waste in production at the enterprise level but also in the entire supply chain, the enterprise aims to achieve more with less (George, 2010). In other words, the *Lean* goal is realized by eliminating all factors that consume resources, the efforts of employees as well as the time, while at the same time they do not add value to the products. It further requires continuous reviewing and achieving improvements, which finally should result in growth of productivity, an increase of efficiency and profitability. On the importance of the *Lean* concept testify the effects that have been achieved by its implementation and which according to the researching results conducted by Ransom in 2012, include the following (Huckabee, 2014):

- Reduction of waste by more than 80%;
- Reduction of production costs by 50%;
- Processing cycle is reduced by 50%;
- Inventories' reduction by 80%;
- Growth of quality, profit, flexibility.

Historically the *Lean* concept was originally implemented in the conditions of mass production (e.g. car industry). This type of production is typical for the agribusiness sector as well, why the Lean concept could be also successfully implemented in this sector. Experience shows that the introduction and application of the Lean concept, the production volume

can be increased up to 50% with other unchanged conditions. In addition, there could be significantly improved the product quality, the costs could be halved, the inventory turnover could be increased, delivery time can be reduced and finally the high profitability could be achieved (Black, 2008).

How to implement the Lean concept in agribusiness sector? The key thing is to define a vision - what the enterprise wants to achieve? What must not be an empty phrase, but something that can be measured. It is important that employees and management believe in the vision and contribute to its achievement. When the vision has been defined, it is necessary to choose adequate instruments of the *Lean* concept that are appropriate to the vision and specific characteristics of the enterprise. One possibility is the use of so-called **t-card**, which ensures that assignments should be marked visibly, both those that were made and ones that should be done. The above-mentioned method was successfully applied on farms in Sweden, while the operationalization of this technique has been performed by using billboard and posting on a daily basis all assignments according to the priority of their implementation. In addition, each individual obligation or task was highlighted on individual cards. On the red side of the card there are listed the tasks, and after their implementation the employees are turning back of the card that is green, which signals that the task has been completed and that they can keep on with fulfillment of other obligations. The assignments are displayed in several rows (the morning duties, obligations that need to be completed during the day, the evening duties), and when all duties have been completed, only green cards can be seen on the billboard (Pejstrup, 2015).

The possibilities of applying the *Lean* concept techniques in agriculture include the following (Wilson, 2013):

- Improved dryer utilization through the use of field storage bags
- Reduced grain loss and input costs by straightening and cleaning the storage and fertilizer areas every night
- Efficient equipment utilization by refilling seed with a bobcat
- Better management of switchover from crop to crop.

In the last few years it has been developed in practice the Lean Six Sigma concept as an innovative concept of quality management which represents combination of the previous two concepts. This concept will be discussed in the following chapter.

The Lean Six Sigma Concept

This concept is the result of combining a commitment of the Lean production system with the efficiency of the Six Sigma methodology. The Six Sigma seeks to reduce deviations from the planned quality standards through the statistical methodology, while Lean philosophy aims to eliminate waste and to reduce the time of delivery. It is a business strategy, but also the methodology that is focused on improving the costs, speed, quality and satisfaction of customers. A key focus of this concept is on the activities that cause delays in the process implementation and affect customers' dissatisfaction. This will reduce all activities that do not contribute to the creation of value (such as various deviations and errors in business operations), which significantly reduces waste (Drohomeretski et al, 2014). Waste is not just waste in the classical sense, but defects, overproduction, waiting, excessive inventories, etc. (Asefeso, 2012). As such, this concept leads to the continuous improvement of product quality as well as the process reliability and it contributes to the stability of the system. All this improves the business results.

The described effects are certainly interesting for the agricultural enterprises as well. Namely, all aspects that affect customers' satisfaction are strategically important for gaining and maintaining competitiveness and improving the business operations. When it comes to waste, agriculture is often accused of being a major polluter of the environment. In this sense, reducing of waste will contribute to an improvement of ecological performances and the business sustainability. Realization of all benefits of the Lean Six Sigma concept assumes the following (Sunder, 2013):

- Top management involvement and support;
- Structured evaluation and right selection of projects;
- End-end perspective of organization metrics and
- Ownership of sustaining the results.

The Quality Management as Support to the Strategy of Cost Leadership

In practice, a longer period of time it was present the conviction that efforts towards improving quality have resulted in an increase in costs and decrease in the business profitability. Today, the prevailing view is that quality is an important factor in the competitiveness of enterprises and in

this sense the quality management has a significant role in modern business conditions. Quality emerges as a key driver of productivity and overall business performances. As such, it represents the foundation of numerous production strategies, concepts and techniques, such as *Just in time*, *Lean, Total Productive Maintenance, TQM,* etc. Given that the quality inter alia means that the things on the first attempt have been done so effectively, imperative of the quality means that an enterprise will avoid many costs. In this sense, between quality and costs there is a direct correlation – an increase of quality reduces the costs. Thus, by increasing the quality it is possible to optimize the total operating costs and to implement a strategy of cost leadership.

The world famous author in the field of quality Juran emphasizes that quality management includes three segments - quality planning, quality control and quality improvement. These processes (so-called *The Juran Trilogy*) are associated with the management of financial processes: the quality planning is equivalent to the budgeting, the quality control is equivalent to the cost control, while the quality improvement is equivalent to the cost reducing.

Picture 1. *The Quality Trilogy*
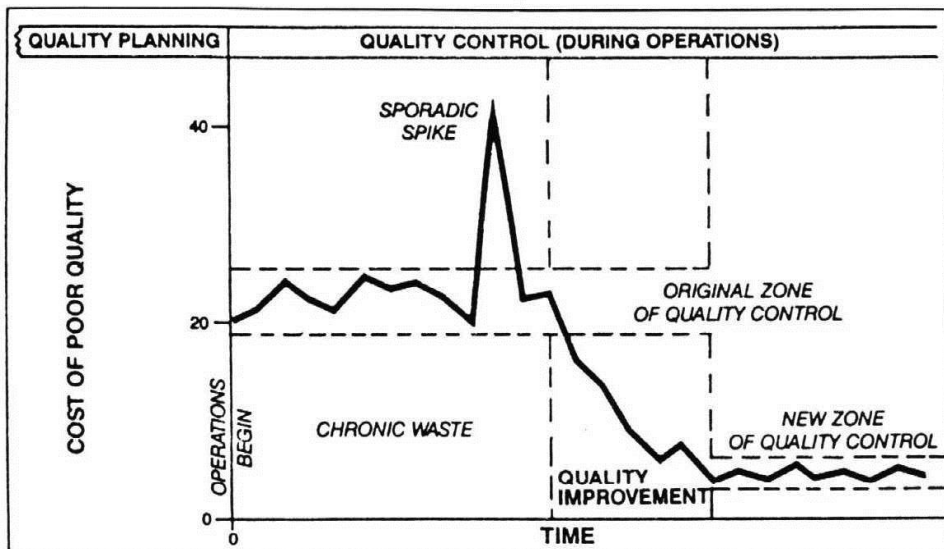
Source: *Juran J., The Quality Trilogy: A Universal Approach to Managing for Quality, 40th Annual Quality Congress in Anaheim, California, May 20, 1986.*

The quality planning refers to the creation of a process that will allow you to achieve established objectives in the field of quality. The subject of planning are all processes from the processing of production documentation, through the product design and manufacturing process, up to the sales and after-sales processes. Once you identify the customers and their needs, the next step is developing of the products' features that will enable a high level of customers' satisfaction. *Quality control* refers to the choosing of the control subject, measure units, setting of standards of performances, measuring of ongoing performance, analysis of observed deviations between the actual and standard performances and taking over the activities to overcome them and to achieve a defined level of quality. Finally, the *quality improvement* efforts start from the perceived needs to carry out improvements (e.g. the existence of drastic deviation between actual and standard performances). This further means identifying and undertaking a series of projects to improve the quality. It is important to identify the cause of deviations and to take over the corrective actions that are appropriate in the existing circumstances. The quality improvement should enable the business operations in a way that will allow the achievement of superior performances (Juran, 1986).

Information about the costs of quality is important for two reasons. Firstly, it is the basis for making decisions about the prices of products that the enterprise produces and sells, since the customers' value the quality-price ratio when they are purchasing. Secondly, knowledge of the level of those costs makes it possible to apply the cost-volume-profit analysis, which is the basis for managing the profitability of an enterprise, then for making decisions about the introduction of new product lines, as well as whether certain components of the product should be purchased or produced by the enterprise itself, etc.

The four pillars of quality management include systematization, statistical quality control, costs, training and motivation of employees. The key operations are measurement, assessment, analysis and comparison of quality. If the quality is not measured, there is no way to identify the level of quality. Therefore, for each business process it is necessary to assess the quality level and compare it with the planned level. It is important to determine whether the enterprise is ready for the global market, whether it is in a position to create value and build a business culture in response to the development of competition and fast changing of customers' needs and desires, if selected quality management system is adequate, hazard analysis critical control point HACCAP, which in this moment the basis

for constant quality improvement, and finally, whether the enterprise is ready to accept the philosophy of continuous quality improvement (Mitreva et al, 2009).

In order to establish a quality management system in agribusiness, it is necessary to consider the specific characteristics of the raw materials, the structure of production lines and products. Because supply chains compete with each other, it is important to ensure quality throughout the chain by an integrated approach. The high quality of products generates a greater value for customers, contributes to the efficient use of resources, optimization and reduction of costs.

It is important to understand that in practice it cannot be copied the model of quality management applied by competing enterprises. Such an approach would not lead to optimal results. On the contrary, in the middle of this process there is a program of continuous improvement and learning. On one side, this process is focused on the process control in order to ensure consistency and efficiency of the business operations, while on the other side it is emphasized the research practice that explores the unknown items and tries to find new solutions. The researches have shown that not all improving quality programs result in an improvement of performances. Therefore, achieving maximum effects arising from the implementation of quality improvement strategy requires to be understood the different goals of this process. Theoretically speaking, there are two types of quality management activities - quality control and quality learning. The first approach is in the basis of so-called *exploitative-oriented practice* that is focused on eliminating waste and reducing discrepancies. However, *the explorative-oriented practice* utilizes resources in order to investigate new areas and in this regard demands that the system tolerates differences in order to encourage employees to learn on the basis of trials and errors (Wu, Zhang, 2013).

In order to be improved the performance of an enterprise on the basis of quality management, it is important that the TQM and other quality management systems chosen by the management should be successfully implemented in all aspects of business - research and development, material management, production, maintenance, marketing and sales, finance and other functions.

Numerous studies have proved a positive correlation between the quality i.e. the practice of quality management and financial performances (return

on assets - ROA and net profit). In addition, the positive correlation is clearly proved in large enterprises, while the existence of such correlation is difficult to be noticed in small enterprises, which are usually relatively young and have not yet reached full capacity. Fynes and Voss (2001) point to the existence of a positive correlation between customers' satisfaction and quality. Bearing in mind that customers' satisfaction represents the impulse for buying, the quality directly contributes to maintaining and increasing the market share, and thus of the enterprise revenue and profitability as well (O'Neill et al, 2015). Improvement of quality has a direct impact on the productivity and profitability of an enterprise. This can be explained by reduction of uncertainty and changes that are introduced into the production process (Pignanelli A., Csillag J., 2008).

Conclusion

Quality is one of the key success factors of modern enterprises. The fight for customers requires that enterprises are trying to improve the quality of their products. As the product is a result of different processes, quality improvement is focused on process improvement. The quality improvement contributes to an increase in market share of an enterprise. In this sense, a higher quality means a higher satisfaction and loyalty of customers. At the same time, an increase of quality contributes to the reduction of operating costs, ultimately resulting in an improvement of the enterprise profitability.

Although it is valid in the business circles the maxim that "every commodity has its own customer", i.e. the market accepts the products of different quality, the long-term oriented enterprises strive to maintain the adequate level of quality, i.e. to prevent its oscillations. This is because if the customers are disappointed with the quality of certain product, they will surely give up the next purchases, and it takes considerable time to win over new customers. In addition, the product quality decrease will almost never be followed by reduction in selling prices.

In modern conditions of business the managers from the agribusiness sector must strategically address the question of quality. This is not only because of the increasingly complex business conditions (globalization of the economy, liberalization of trade, an appearance of the financial crisis, the high degree of uncertainty, growing competition, expressed dynamics of the economic environment, as well as discerning consumers), but also due to changes in the agriculture and agribusiness sector in terms of

discontinuity national agrarian policy, expressed climate changes, appearance of the agribusiness supply chains that mutually compete at the global level. The described changes in agribusiness require a somewhat different approach to the business operations, in the sense that special attention must be paid to the needs of customers i.e. consumers. In a given environment the quality management can provide significant support to the improvement of product quality. In practice there are numerous proven quality management systems like TQM, Lean, Six Sigma and others. All of them can be successfully applied in the field of agribusiness sector.

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IV SECTION

SUSTAINABLE TOURISM IN FUNCTION OF RURAL DEVELOPMENT - REGIONAL SPECIFICITIES

INDICATORS FOR SUSTAINABLE TOURISM DEVELOPMENT NP "ĐERDAP"[1]

Dragan Momirović[2], Zoran Simonović[3]

Abstract

The according to indicators of sustainable development established by the EU experts, tourism in the National Park "Đerdap" not done on the principles of sustainable development. Economic, social and environmental status indicators show worrisome state and the red zone. Cultural and tourist satisfaction indicators show the green zone. Specifics and attractiveness of infrastructural equipment and accessibility, with the construction of hotels, marinas, sports facilities, hunting grounds, restaurants, fishing content and other supra-structural capacity, would enable NP. "Đerdap" becomes the exclusive model of sustainable tourism. In parallel, it is necessary to constantly affirm and promote the benefits of this development, with an increase in tourist traffic, better use of existing resources and other touristic potentials. On the other hand, elemental development of tourism can cause great damages to protected areas. For this reason, it is necessary to efficiently and careful planning, management and a strict monitoring in order tourism in the National Park "Đerdap" was really successful and sustainable, respecting the natural, social and cultural components of the environment.

Keywords: *sustainable development, environment, sustainable development indicators, tourism, nature required*

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Introduction

The concept of sustainable development should be the basic guidelines on the management of tourist activity. It allows the realization of economic, social and aesthetic goals. At the same time the concept of sustainable development affects the protection for cultural and historical values, social integrity and key ecological processes.

The interaction and mutual conditionality between tourism and environmental protection is particularly characteristic, complex and complementary. In the natural environment affect tourism in two ways. First, with the increasing use of natural resources that cannot regenerate naturally or economic increase, the quantity existing resources will decrease with tendency of limiting factors for future tourism development. Second, the quality of the remaining natural resources declines, with a direct negative impact on the effects of tourism, due to inferior quality of their tourism product and the available quantity of natural resources of high quality (which was an initial condition for the development of tourism) that is constantly decreasing.

The interdependence and conditionality between tourism and environmental protection is a causal, very complex occurrence, the effects of which can be the incentive or destructive.

The aim for which continuously is pursued and maximums support the sustainable development of tourism. Sustainable tourism does not jeopardize the present, but does not question the possibilities and development prospects for future generations. It is a new philosophy of thinking is based on an integrated and complex development. That philosophy includes five basic pillars: environmental protection, the promotion of social integrity, the affirmation of the cultural identity of the local population, ensuring optimal tourism needs and realization of economic prosperity.

National parks are a special form for protection of natural and anthropogenic values of certain territorial units. Those in most cases represent a significant tourist value and are characterized by existing and potential possibilities for the development of many types of tourism. One of the best known and most attractive tourists on the territory of Serbia, the "Đerdap", which, according to a number of tourism potential presents an independent, complex tourist motive not only Serbian, but European

535

and world values. National park "Đerdap" is located in the northeastern part of the Timok region. It was established in year 1974. It covers an area of 63,680 h.

Tourism potential of NP "Đerdap"

Natural touristic value NP "Đerdap" makes the geomorphologic and hydrographic characteristics, climate, flora and fauna. Geomorphologic tourist values of the National Park "Đerdap", and the most valuable tourist value and motive has "Đerdap", with hilly and mountainous elevations along the right bank of the Danube, which represent a powerful bulwark of the river to the south. Diversity, and the tourist attraction of Đerdap gorge, the attractiveness of certain of its special location and panoramic foster development of tourism.

The National Park is significant "less forms and objects to relief from fluvial and karts forms."[1] Then a phenomenon in karts terrain (relief, which belong 17.8% of the territory) of sinkholes, caves, dry valleys, caves the most famous Rajkot's Cave, Ravništarka, Ceremošnja Dubočka caves and Vratanjske outgrow or gates, which are treated as outstanding karts rarity .

Đerdap Lake originated damming the river Danube 1.5 km. downstream from the village Sip. The color and transparency of water Đerdap Lake from the viewpoint of tourism development does not meet the necessary requirements in full. The greatest significance of the tourist movement has a path that leads directly along the Đerdap Lake, which are rightly points out that the tourist value of Serbian and European contractive zone.[2]

Climate National park "Đerdap" is temperate continentals. The terrain configuration directly affects the difference in the weather and climate of a relatively short distance.[3]

National park "Đerdap" is distinguished by great complexity and diversity of the forest and associated shrub vegetation.[1] Forest and coastal areas

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[1] Milojevic, S. (1933)) Reljef Timočkog basena, Spomenica stogodišnjice Timočke krajine, Beograd, str 5
[2] Stankovic, S. (2002) Turističke vrednosti Nacionalnog parka Đerdap ,Turizam Srbije, Beograd.
[3] Rakićević, T. (1976) Klima Istočne Srbije, Zbornik Srpskog geografskog društva, Beograd, str 9

and their environment are known as a habitat for large number of different animal species. This diverse and widespread wealth of wildlife of the National Park "Đerdap" enables the development of hunting tourism.

National park "Đerdap" is rich in cultural and historical monuments to Neolithic origin of the modern. Of particular importance is the archaeological site Lepenski whirlpool, followed by cultural and historical monuments from the Roman period Trajan's Bridge, road and tabula Traiana, etc.

National park "Đerdap" disposes receptive capacity for its territory and the immediate environment. From tourist accommodation facilities in its territory are significant: Hotel Lepenski whirlpool with 460 beds in Donji Milanovac, Karatas village with 870 beds, and Tekke motel with 10 beds. For hunting tourism, is equipped motel Oman with 6 apartments and three smaller hunting facilities in the National Park.

Comparative indicators of sustainable tourism development

Within the park are determined by three zones with different regimes of protection, natural resources, cultural monuments, fauna and vegetation relict species as follows:
- The first level of protection-strict protection of special natural and cultural values (area of 2664.25 h or 4.20%);
- The second level of protection-protection zones around the first degree of protection, the protection for particularly valuable parts of nature (characteristic ecosystems, landscapes and other valuables) and natural spaces around cultural heritage;
- The third level of protection-protecting parts of areas outside the protection zone and second degree to the activities of tourism, sport and recreation, forestry and agriculture with animal husbandry, non-polluting industry, small business, an extremely and exploitation of mineral resources, water, energy, transport, development and management village hamlets and area specific purposes.[2]

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[1] Kojic, M. (1995): Prirodne livade i pašnjaci i njihov privredni i zdravstveno-rekreativni značaj, Zbornik radova, Banjska i klimatska mesta Jugoslavije, Vrnjačka banja
[2] Radakovic, N. (2002) NP „Đerdap" Donji Milanovac, str 56

In the following presentation, we will try to using comparative indicators of sustainable tourism, the World Tourism Organization on the basis of the collected data available point of the actual impact on tourism on the environment, by measuring those physical and socio-cultural performance that originate exclusively from tourism.

I. Economic Indicators

Economic indicators show the economic effects of the tourist business in particular tourist destination.[1]

a) Seasonal character of tourism turnover

Summer tourism makes the basic tourist supply, after which the National Park "Đerdap" gained a reputation as a tourist.

Table 1. *Tourist turnover*

Years	Number of tourists	Number of nights
2001	53.464	133.909
2003	60.681	126.263
2005	58.564	157.428
2008	69.754	153.848
2009	63.572	148.952
2010	67.958	167.387
2011	68.408	141.971
2012[1]	68.552	140.686
2013[1]	57.857	133.456

Source: *Republic Statistical Office of Serbia, Statistical Yearbook of the municipalities in those years, [1]Turist organizations of Donji Milanovac*

Seasonal character of business and disproportional distribution of annual turnover indicates a worrying trend of tourism development according to EU criteria. Nonetheless, in recent years, aiming at enriching summer supplied, certain efforts were made, such as schools in nature, walking paths, hiking, rafting on the lake, picking up medicinal herbs and forest fruits, events, conferences and the like.

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[1]Jovičić, D., Ilić., Indikatori održivog razvoja, Glasnik Srpskog geografskog društva, godina 2010. Sveska XC-Br.1

And besides, the fact remains that Đerdap, at least for now, has not managed to build an image of a successful and attractive summer tourist center, to become Serbian sea.

Promotion summer supplied with the tourist market has not yielded the expected results. Tourist supplied should favor spring and autumn months (hunting tourism, rallies, conferences, etc.) as well as winter sports content (sports and recreational tourism, conferences, seminars, hunting).

Problem solving seasonal concentration tourism turnover opens up possibilities for greater inflow of investment and improvement integral-structured tourism supply to different market segments.

b) The ratio of the number of overnight stays and accommodation capacities

The ratio of the number of overnight stays and accommodation capacities represents the indicator economic turnaround which is realized in a tourist destination.

It is estimated that that the relations between the mentioned factors must not be below 120 overnights per bed per year; if it is between 120 and 150 overnights per bed, capacity utilization is acceptable but not at an optimal level; while the sustainable use of capacity are realized in case the value of this indicator is 150 or more overnights per bed per year.[1]

According to data onto the table the relationship between the number of overnight stays and accommodation capacities shows that one bed, during the 2001 year used 90 days, 73 days in 2009, and 49 days during the year 2013. Data show that, according to the indicator of economic turnaround in the observed period, the National Park "Đerdap" has a low level of utilization of accommodation capacities for a tendency further decrease. Number of nights per bed, is below 120 in each reporting year.

Actual results point of a worrying low level of utilization of accommodation capacities, which by interpretation of EU experts is in the red zone.

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[1] Jovicic, D. Ilic, ibid., p. 283.

Table 2. *Relationship between the number of overnight stays and the number of beds*

Years	Number of nights	Number of accommodation capacities (beds)	% between the number of overnight stays and beds
1	2	3	4 (3:2)
2001	133909	1.475	0,90:1
2009	148.952	2.035	0,73:1
2013[1]	133.456	2.719	0,49:1

Source: *Republic Statistical Office of Serbia, Statistical Yearbook by municipalities 2001, 2009, 1Turisti organizations Donji Milanovac*

c) The coefficient of local tourism increase

Coefficient of local tourism increases sublimates all direct and indirect impacts of tourism consumption and employment have on the local economy.[1]

Coefficient of local tourism increases can be analyzed from the standpoint of the impact on tourism on other economic sectors and the involvement in these industries in the tourist supply.

This indicator will analyze indirectly by way of the relationship between tourism and complementary business activity that can be included in the tourist supply of the National Park "Đerdap". Development orientation with emphasis on the development of tourism in the NP "Đerdap" initiated the development of a number of other business actives from general interest, which constitute a unique component of the overall tourism supply, thus increasing its complementarily and functionality.
Except mining all other business activities are in function tourism development, some more some less. Mining and industry has no place in national parks and in direct conflict with the goals of development of tourism and protection of nature.

In the first place in terms of equipping the park should be put road connection, which is also elements of tourist movements. Be especially emphasized and traffic functionally well connected inside of the park in the long asphalt road, I and II category, 268.2 km in length, soft forest roads

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[1] Jovičić, D. Ilic, ibid., p. 283.

length 306.3 km. and hard forest roads to 93.2 km, with a total length of 560.8 km, which enables internal and external connectivity with close and distant environment. Particular requirements of tourism initiated the building different transport infrastructure, walkways, parking lots, telecommunications and radio communications, marinas, piers and the like.

Impoundment sources of water supply tourist objects and complementary contents, removal and disposal of rubbish, cleaning of trails and many other activities are representing the basics, which provide a necessary infrastructure for tourism development. One should point out one crucial problem to be solved first of all, and that is that wastewater purification, but not directly emitted mainly into the Danube, which is unsustainable in perspective for the further development of the park as a whole. Complementary activities whose integration into tourist supplies are of special importance of national parks and which significantly affect the ratio of the local tourism increase as agriculture, animal husbandry and forestry.

Area of the municipality of Kladovo for its pedological composition of the land has outstanding conditions for intensive development of agriculture and more solid linking with tourism. Agricultural production of 38,000 h. arable land and gardens, 9,600 h. meadows, vineyards 1,000 h and 300 h orchards in the fertile Key and slopes of the mountain Miroč, with modern agro-technical measures, makes it possible to link tourism with agriculture in order to supply the tourist restaurants, ecologically healthy food of domestic origins. Large grass surfaces to allow cultivation of a large number of cattle's without jeopardizing the natural environment. These benefits are not to a great extent exploited and are functional and spatial relationships, animal husbandry and tourism minimized. You should also activate the agricultural potential for Majdanpek, in which the land is owned by 99% of the private sector without an organized market production. Special development plans should stimulate the development of this branch of production that meets the requirements of the tourism industry.

Forestry is one of the oldest activities that thrived on today the National Park due to its natural resource-famous endemorelict community forests of mixed type. (70%) Previously, forests are unselectively cut off and exploited as fallen timber and firewood. Thanks to the National Park exploitative role of forestry has been significantly reduced, while increasing its landscape - aesthetic and recreational- health functions. The

advancement of multiple-use forest functions can significantly increase the level of tourist attractions, and the spatial plan needs to increase and fix degraded and sparse forest habitats.

II. The satisfaction of tourists

The satisfaction of tourists implies a degree of satisfaction of tourists the quality of services provided and their opinion on the attractiveness of motives, state of the environment and socio-cultural characteristics of receptive places.[1] Analysis satisfies tourists encompasses extensively survey research of tourists on quality and other parameters important to assessing and planning the future development of the National Park in a more realistic frameworks.   In this context, for the project CRDA conducted its survey in 2005 the National Park which included 900 respondents. The survey gave the following results:

Table 3. *The survey tourists*

The purpose of the stay of tourists					
42% holiday	23% business	13% friends-relatives	13% events	7% fan	2% other
Used accommodation capacities					
54% hotels	34% resorts		12% private accommodation		

Assessment of the quality of the tourism supply				
53% satisfactory	20% above the expected	15% god	8% below the expected	4% bed

Suggestions for improving the current situation					
47% services	19% hygiene	16% hotels	10% road	6% information's	2% kindness

The commitment of tourists for re-entry		
52% probably	44% yes	4% no

Source: *Stokić V. (2001) The position of lower Danube Serbia in the tourism market, Master Thesis, University Singidunum, pp 26-27*

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[1] Jovičić, D. Ilic, ibid., p 284

a) Repeated visit

Preference to tourists for a repeat visits presents an indicator satisfaction with tourists is measured by the percentage of tourists that have visited this certain tourist destination. According to EU experts is best to take the percentage of repeated visits in the last five years. If this percentage is between 30-50% for the observed tourist destination, it is the degree of satisfaction with tourist's high quality.

The motives of tourists arrival in NP "Đerdap" according to the above survey is holiday to 44%, manifestations and entertainment 20%, visits to relatives and business trips 34% other 2%. The research results show that natural motives, events and entertainment are based tourism values and the most important motivational incentives for tourists to spend their holidays in the National Park "Đerdap". However, it is characteristic that a small number of tourists, as the reason for his visit, said visiting cultural and historical monuments. Of the total number of respondents, 44% indicated they would again come to rest in the National Park "Đerdap", 4% do not and 52% likely. According to the criteria of the EU this percentage of re-arrival belongs to the yellow zone.

III. Cultural indicators

Cultural indicators include degree preservation of the cultural identity of the local population affected by the tourists that come from different midfield with different cultural characteristics.

a) The relationship of accommodation capacities and the number of local peoples

This indicator show "how cultural impact in terms of architectural appearance of the tourist area thus and the request for the provision of the necessary infrastructure, which burdens the budget of local communities."[1] If the number of beds in accommodation capacities larger than the number people for 1, 6 times situation is assessed as unfavorable. In this case, the local people are endangered extensive building the tourism industry. The proportion of 1, 5: 1 or less is favorable for local community.

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[1] Jovičić, D. Ilic, ibid., p 285

Table 4. *The relationship of accommodation capitates and of local population*

Year	Number of people	Number of accommodation capacities (beds)	Proportions
1	3	2	4 (3:2)
2001	9.142	1.475	0,16:1 green zone
2009	7.383	2.035	0,27:1 green zone
2013[1]	6.004	2.719	0,45:1 green zone

Source: *Republic Statistical Office of Serbia, Statistical Yearbook by municipalities 2001, 2009, [1]Tourism organizations Donji Milanovac*

According to available data onto the settlements of National Park "Đerdap" permanently inhabited people in 2001 year was about 9,142, in 2009 year it was estimated that there were 7,383 inhabitants and year 2013year 6,004 inhabitants. Decrease a population that permanently lives in the National Park "Đerdap" is consistent with the declining birth rates, which is reveals some worrying and dramatic tendencies in the whole Timok region. Increasing the accommodation capacity is a result of privatization and activities of entrepreneurs.

In 2001, year the proportion of the relationship between the number of accommodation capacities (beds), and the number of permanent inhabitants are 0, 16: 1. In 2009 year, based on the assessment, the relationship between these two elements has improved and amounts to 0, 27:1. However, the improvement is not the result of a large increase in capacity. The absolute amount of increase accommodation capacity for eight years is only 560 beds. The number of inhabitants in the same period, based on estimates, decreased drastically, in absolute amount, a total of 1,759 inhabitants. Certainly, increasing capacities and a drastic reduction in the number of inhabitants has affected the improvement relationship between the proportions of these two elements.

Trend certain increase in the number of accommodation capacities and a drastic reduction of inhabitants continued throughout the entire the period analyzed with a tendency of further deterioration. In 2013 year a proportional relationship between the number of accommodation capacities and the number of permanently inhabited an inhabitant is 0.45:1. These relationships indicate a sustainable proportion, according to EU standards, so-called green zone, which talks about a slight impact on

tourists on the cultural identity of the local community. Development plans on NP "Đerdap" identified the lack accommodation capacities whose building future will probably come to the saturation of space, which can lead to enormous levels of risk and vulnerability of the environment. Due to the potential adverse environmental and cultural consequences, it is necessary to original plans of tourism development reduced to the optimum level while increasing the degree of utilization of existing capacity, in order to achieve more effective results.

b) The intensity of tourism

The intensity of tourism is an indicator showing the degree cultural saturation of the local community. The high degree of cultural saturation indicates a negative impact on the local community and disturbance of its identity and impact on reducing the experience. The intensity of Tourism will present the relationship between the number of nights expressed in thousands and the number of local inhabitants expressed in the hundreds.

Table 5. *The ratio of the number of overnight stays and the number of local population*

Tourist overnights by years	Number of people	Number of accommodation capacities (beds)	% Between the number of overnight stays and beds
1	3	2	4 (3:2)
2001	9.142	133.909	0,06:1
2009	7.383	148.952	0,04:1
2013	6.004	133.456	0,04:1

Source: *Republic Statistical Office of Serbia, Statistical Yearbook by municipalities 2001, 2009, [1]Tourisam organizations Donji Milanovac*

By comparing the number of nights expressed in thousands permanently inhabited and hundreds of faces obtained the proportions for 2001 year 0.06: 1, for 2009 year 0.04: 1 and 0.04 for 2013 years. According to the criteria of EU experts on the cultural identity of the local community was not influenced by the tourist industry. This means that these proportions belonging to the green zone. However, in applying this indicator needs to be careful. In particular, the ratio of the proportion between the number of overnight stays and the number of local populations may show

considerable fluctuations. These oscillations depend on the type and specificity of tourist destinations.

IV Social Indicators

a) Involved of tourism in the local net domestic product

Most of the tourist capacities of NP "Đerdap" are located on the territory of three municipalities Golubac, Majdanpek and Kladovo. This dispersion of accommodation capacities, contributes to the development and appreciable filling in of the municipal budget, material strengthening of the economic sector, increasing local employment and the like. According to available data municipalities of Golubac belongs to underdeveloped communities, which uses funds of the Fund for Development of Underdeveloped Regions in which the tourism participation in the net domestic product of 2.7%, Majdanpek 10.5% and Kladovo 5.3%. The unfavorable trend is a result of low capacity utilization, low of visitors and aggravated and unfavorable economic conditions.

IV. Indicators of environmental condition

a) Using and land occupation

National park "Đerdap" is distinguished a low level of urbanization and most tourist and other capacities of the territorial unevenly distributed and built outside the core of the park.

b) The percentage of tourists who do not come by own car

According To the survey, 48% of tourists in the National Park "Đerdap" come with their own car. By bus comes 28% of a tourist transport 8% while the rest rent car and train. A high percentage arrival owns car brings a number of negative consequences of the national park: the increased exhaust emissions, endangering the green area, the higher the level of noise and the like.

c) Other indicators on the state of the environment

Although, due to the lack of relevant data in this analysis are not analyzed all the other indicators of state of the environment laid down by the EU experts, the most important characteristics of state of the environment on

the territory of the National Park "Đerdap" consist of the following: the park ecosystems that make up the basic natural values are under strong antropoozoogeonog influence that is reflected in the increased degradation of forest ecosystems and forest communities, the level of communal hygiene is unsatisfactory, especially purification and drainage of waste water directly into the Danube and other rivers and exploitation of copper ore, large-scale, produced in Majdanpek a large amount of waste that cannot manage in an adequate manner.

Sustainable development and rural tourism

NP "Đerdap" is characterized by favorable natural and anthropogenic conditions for the development of rural tourism. The basis of developing this type of tourism consists of landscape and environmental values are well preserved rural areas. In the villages of the national park, there are very interesting and attractive natural objects and cultural and historical monuments. Also, there are industrial buildings as sources of air pollution and water resources.

Supply in rural areas of the national park, the content can be very rich and diverse, from the authentic rural landscapes, folk architecture and handicrafts, folklore, healthy food and beverage, hunting and fishing and recreational involvement in agricultural work and rural affairs.
The lowland villages, are compact type and very urbanized, where one house abuts the other and where the courtyard (the courtyard) small, and their estate uniform and under agrarian cultures. A plains settlement does not constitute a distinct motive value of tourists.

Hill and mountain villages by their physiognomy belong of the old-vlach type of rural settlements. This group of settlements has the best potential for developing rural tourism. Particularly attractive areas as development of this type of tourism are located in rural settlements on the slopes on mountain Stol, Dubašnica, and other places.
 Rural tourism is an important segment of the program of revitalization of villages and overcoming rural underdevelopment, especially the hilly and mountainous settlements of the national park. We draw attention to the environmental and social-cultural dimension in accordance with the concept of sustainable development.

Selective supply this type of tourism implies appropriate standardization of quality services and adequate housing conditions, investment in

infrastructure, health services, environmental protection, prevention of uncontrolled urbanization, and education of the rural population. An important segment of the tourism product of rural tourism is the tourism in the framework of the agricultural holding. The specificity of the tourism product and the needs for a guest is not just silent observers but also users, material and cultural values of the villages.

Traditions and literature, original folk songs and costume, naive painting, old buildings and the like directly affecting tourists to know more about the culture and lifestyle of the rural population

In NP "Đerdap" has no organized tourist rural households. The supply of rural tourism, for now a small but perspective, the nucleus maximum should strengthen the material basis of rural tourism. Then, devise a more offensive performance in the markets, with the application of marketing concepts, with special emphasis on ecological components and content, with the inclusion the wider social community.

Conclusion

Analysis of sustainable development of tourism in the National Park "Đerdap" could not be done completely. The main reason is the lack of data. Professional services do not record data that are important for determining indicators for sustainable development.

Economic indicators suggest that the NP "Đerdap" does not satisfy prescribed criteria. Tourist turnover has seasonal concentration of the summer. The consequences of are negative economic effects. Therefore, it is necessary to extend the summer season and promote the supply of the autumn and spring months by organizing various events, seminars, teaching in nature, hunting and fishing tourism. It is necessary to improve the integral-structured tourism supply of various forms of tourism. At the same time, it is necessary to conceive quality tourism promotion at the local and international tourism market.

The surveying, tourists who have stayed in the National Park "Đerdap" it was found that over 80% were satisfied with the quality of services provided. Even 44% of the surveyed said they would come again to rest and recreation in the national park. However, the indicator tourist satisfaction, insisting on the number of repeated visits. No lack of data, we cannot say with certainty that there is continuity in repeated visits. We are

currently working a new survey (which is not yet completed) which will be used safely; see the degree of satisfaction with tourists to the EU criteria. Cultural indicators show sustainable relationship, according to EU standards, so-called green zone, which talks about the insignificant impact of tourists on the cultural identity of the local community.

Social indicators, in particular, participation in net domestic product of the total local domestic product is worrying and very low. The unfavorable trend is a result of low capacity utilization, low of visitors and difficult and unfavorable economic conditions.

Indicators of environmental worrying trend, in particular, as the largest number of tourists come in their own cars. Arrival of tourists a large number of cars jeopardizes and harms the environment. The habits of tourists that come by public transport are difficult to change. It should affect special incentives to make more use of public transport.

In addition, the state of the environment seems strong influence of anthropogenic factors of the natural ecosystems of the park. Then, the low level of communal hygiene and treatment and the drain of waste water directly into the Danube. The problem is the inadequate management of waste comes from households and mining industries.

On the basis of indicators of sustainable development of tourism in protected zones, as defined by the European Union and on the basis of available data, we can conclude that with the NP. "Đerdap" tourism is not developed on the principles of sustainable development. Tourism in the national park is not developed. Therefore, in the near future is not threatened by a great danger that could affect endangering ecological and socio-cultural factors. But that does not mean you should not take the measures necessary for sustainable development. The increase in tourist traffic, could lead to jeopardizing existing environmental conditions, which, already having problems.

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MOTIVATION OF ECO AND ETHNO TOURISTS AS A FACTOR OF SUSTAINABLE DEVELOPMENT OF RURAL AREAS[1]

Dunja Demirović[2], Nikola Njegovan[3]

Abstract

Recognizing the experience of the European Union and its accomplishment of significant positive economic effects through development of rural tourism, this paper is analyzing the possibilities and perspectives of organizing eco and ethno-tourism in AP Vojvodina as well as the motivation factors on the side of potential tourist demand. Also authors of the paper are trying to suggest that eco and ethno tourism could represent a factor and needed possibility for rural development using local i.e. endogenous factors. In connection with that there are presented the main motivational factors of potential tourists for the choice of rural tourism activities in their touristic orientation and potential tourist opinion concerning the rural tourism activities and assessment of urban population behavior that are working in stressful and in conditions that are not environmentally friendly.

Key words: *motivation, rural tourism, eco-tourism, ethno-tourism, AP Vojvodina.*

Introduction

At the beginning of the 21st century, in accordance with the specific demands of tourist services users, new forms of tourism are beginning to develop and rural tourism occupies an important place among them. The increase in demand for rural tourism is evident in all countries, and it is the

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result of two motives: the need for a better environment and authenticity. Among other factors, the increase of education and knowledge of population viewed globally stands out; then the raise of incomes and the availability of funds to meet tourist needs; and finally, an increase in leisure time and the division of the annual leave in a few short trips (trips are no longer concentrated only in summer and winter), as well as the advantage of travel for short distances (Beus, 2008; Gogonea at al., 2009).

The tourism has reached a contour through the practicing of rural tourism, this new type, being adequate to the current modern age, and implicitly to the process of globalization. The rural tourism takes place in an environment that is relatively unpolluted, undisturbed and inhabited by traditional communities, satisfying multiple needs:
- the need of "escape" for the diminishing of the tension estate, this being accompanied by the active or passive participation at different touristy activities,
- the need to maintain and rebuild the health,
- the need of belonging and love,
- the need of knowing/learning and education,
- the need connected to the desire to visit relatives and friends,
- the need of beautiful and new, etc.

Rural tourism is a type of tourism that includes the tourist activities that can take place in rural areas and that may be included in the tourist offer of these areas. This type of tourism reflects the need of tourists for authentic experiences, including interaction with the local population, and therefore rural tourism is characterized as "real" – rewarding, enriching the spirit, offers adventure and the possibility of learning (OECD, 1994). According to the motives for which tourists come to rural areas various forms of rural tourism could be defined.

The most common among them is agro tourism, but on the tourist market there is a notable demand for eco-rural tourism and ethno-tourism, which include culinary, wine, farm, events, educational, children, bio-tourism, but there are also hunting, ornithological, health and recreational, spa, wellness and other forms of tourism, if in the rural areas there are sports and recreation centres and spas.

In terms of preferences of tourists after conducting research and testing criteria for the selection of forms of tourism and destination as a link

between the reason – the motive and possible alternatives, performed in Vojvodina, it can be concluded that for the participation of potential tourists in rural tourism, in particular, eco and ethno tourism, crucially important are age and gender structure of participants (Bosković, Njegovan, Subić, 2011).

During last several decades, Europe became one of the world leaders in rural tourism. Existing trends suggest it will keep that position in the next decade. In the very beginning of the process the rural development in EU was directed toward village renewal (in 1970's), environmental protection programs (1980's), changes in eco systems and building of recreational areas in rural communities.

After the concept of integral rural development, actual EU rural development policy, started to be defined in Agenda 2000, is based on:
- multifunctional agriculture,
- multi sector and integral approach to rural economy, and
- diversification of activities, creating new sources of income in rural areas, new job possibilities, protection of rural resources, decentralization, partnerships on local and regional levels and transparency in creating and running of development programs.

The similar tendencies have been sown in the Republic of Serbia. Since the year 2006, besides the Ministry of Commerce and Tourism, the Ministry of Agriculture, Forestry and Water Management has been also encouraging development of rural tourism. It supports the diversification of economic activities in rural areas through different measures, like:
- Building and adaptation of objects resembling authentic country houses: ranches and all additional objects.
- Restoration of authentic country buildings – mills, wine cellars, fulleries...
- Acquiring equipment for enriching the content of rural tourism offers, promotion of rural tourism, manifestation cultivated by women associations in rural areas, as well as activities directed towards employing women in rural areas.
- Acquiring materials, resources and necessary equipment for preservation of old, traditional crafts, skills, handiworks, and activities.

That way the Ministry has been supporting the individuals – owners of agricultural estates, entrepreneurs, agricultural collectives, churches and monasteries, citizens associations, and professional agricultural services providers.

Due to importance of the touristic values and the level of its preservation, Autonomous Province of Vojvodina as a consistent part of the Republic of Serbia has a significant potential in rural tourism development. This type of tourism should be based on experience in rural areas along with a full affirmation of activities such as: nature-based activities, eco-tourism and ethno-tourism, and other combined types of tourism interesting in particular on the side of the local authorities.

Development priority of the tourism in AP Vojvodina should be the increase in its turnover and profitability by adding quantitative (building new, modern and diverse accommodations and a better use of existing ones) and qualitative variables (further development of eco and ethno tourism by selective affirmation of natural, anthropogenic and cultural content) (Protected Natural Assets and Ecotourism in Vojvodina, 2008).

The activity of the State in supporting rural eco and ethno tourism is not a steady activity. It is rather random activity that happens in concrete accassions like promotion of Rural Development Programs. In 2009 the Province of Vojvodina supported around 50 projects (out of 249 applicants) with a total budget of 35 million dinars, in order to stimulate agricultural, environmental and ethno tourism activities as well as other similar types of sustainable tourism.

Resources were used for renewal of traditional rural households, renovation of ranches, building and adaptation of objects for use in tourism, and acquiring equipment for rural tourism. That way it was enabled diversification of activities at the agricultural estates and their vicinity in order to generate additional income. It is realistic having in mind geographical position - relative good connection with other regions in the country and abroad.

AP of Vojvodina is even more becoming a part of Corridor 10 and Corridor 7 which is a water traffic route on Danube, natural beauty, possibilities for various types of recreation, cuisine, folklore, rich cultural heritage, etc.

The tourist potential of protected natural areas

Eco-tourism and rural tourism in general, can hardly develop without the preserved nature, and nature can be most efficiently preserved in protected areas. Therefore, those destinations with protected areas are of special importance for eco-tourists (and rural tourists). Tourism in protected areas causes benefits and damages, and these effects interact with each other in different ways.

Potential benefits of tourism in protected areas are: increasing jobs for the local population, increasing income, diversification of local economy, stimulating local production, contribution to the preservation of natural and cultural heritage, support to the research and development of good environmental habits, etc. Negative effects result from tourist visits, but with proper management, their negative impact can be reduced (Petrić, 2008).

To develop sustainable tourism in protected areas, it is necessary to connect the tourist offer of the region to accommodation in rural tourist households, which are in their immediate environment, and thus to provide more comprehensive tourist offer. Also, in order to develop rural tourism it is necessary to build educational centres for visitors in these areas, whose main function would be the promotion of protected areas, education, and exchange of information and experiences.

Also, tourists could obtain information in centres on accommodation in rural households in the immediate environment (Radović, Njegovan, Cvijanović, 2011). For the implementation of the proposed concept it is certainly necessary both logistical and technical support of local economic communities, as well as relevant provincial and national institutions.

Vojvodina region is rich in various natural resources that could be included in the tourist offer, and it is certain that primarily tourist potential of protected areas should be valorised. Protected areas of nature have been defined by the Provincial Secretariat for Environmental Protection and Sustainable Development, such as special reserves, parks and natural monuments. Due to its geographical position, natural beauty, possibilities for various types of recreation, cuisine, folklore, rich cultural heritage, etc, Vojvodina has favorable conditions for development of rural tourism. In the last decade ecotourism in AP Vojvodina became very

popular type of vacation for the certain gropes of tourists i.e. those who are fond of visiting the National Park of Fruška Gora, town of Vršac and its surroundings, Deliblato desert and Subotica sands, special natural reservates Ludaš Lake, Obedska bara, old river Begej – Carska Bara, reservat Zasavica neer river of Sava, Karađorđevo, etc., than national parks (Palić, Jegrička, Tikvara, Zobnatica, Panonija, etc.) are representing natural and environmental centers which are perfect for development of ecotourism (Table 1).

Those eco-centers which can help turn ecotourism into one of the leading industrial sectors, economically, socially, and culturally. Compared with the countries that have developed its economy and raise high living standards, ecotourism destinations of AP Vojvodina still are not representing a real challenge.

Tourism is basically a modern, widespread, socio-economic occurrence and more tied to educated and wealthy people. Its development is basically connected with following conditions: sparing the time: used for travelling; financial means: excess of money is used for travelling; and infrastructure: objects for accommodation and providing services for tourists.

And while tourism oriented towards natural-based destinations is basically a simple trip with a goal of enjoying in natural beauty, ecotourism provides ecological, cultural, and economic support for local population. As a part of an industry, ecotourism is considered an intensely growing market. According to reports of World Tourism Organization, it has a global growth rate of 5% and it represents 6% of the world's gross product, as well as 11,14% of global expenditures.

Table 1. Potential Eco-tourism destinations

Protected natural resources	Number	Size (ha)
National parks	5	158,986
Nature parks	16	48,950
Areas of outstanding natural beauty	15	30, 026
Nature reserves	70	83,829
Natural monuments	284	7,780
TOTAL	428	531,571 6,2 % of territory of Serbia

Source: *Ministry of Environment and Spatial Planning of Serbia.*

On the other side, ethno-tourism in AP Vojvodina and its development have its basis in its multicultural environment, rich historical heritage and ethnological findings. From the ethno-sociological point of view, tourism motives are complementary with natural and cultural motives. They enrich tourist offers and contribute to economic and non-economic effects of rural tourism. 'Tourist ethno-social motives are presented on festivals, concerts, and through manufacturing of souvenirs and objects for every day use.

This group of tourist motives consists of: folk art, traditional garments, customs, celebrations, gastronomy (Veselinović, Njegovan, Pejanović, 2011). Up to now, ethno tourism in Vojvodina was mostly based on promoting cultural heritage.

Bearing all that in mind one can say that relatively good potential for eco and ethno touris compared with other countries, is still not well researched. There are missing suptile economic and social studies that could support rural tourism and its particular aspects. More often there are analysis of supply than analysis of demand and motivation of the potential tourists. In that sence, the results of the market analysis aren't still the determinants for formulating of management decisions and relativization of the business risks. It also makes the process of rural tourism development relatively slow. The implemented measures are with slow pace and inefficient.

Consequently, this paper presents the results of research that was conducted in order to analyze the motivational factors that determine the behaviour of tourists from urban areas in the direction of choice of activities that are characteristic for rural tourism. Research points to the facts of importance for the evaluation and assessment of potential service user preferences and so enable a proper decision.

Touristic potential of ethno tourism

On the territory of Vojvodina there are conditions for the development of agro tourism, and the offer of agro tourism could be developed the most successfully, and placed on the tourist market by developing rural tourism, as form of ethno rural tourism in the Province. Farms (salas) are a record of the former way of life and work of farmers in Vojvodina. Farms (salas) are quite peculiar social phenomenon in the Pannonian Plain and symbolize the former struggle of the peasant with a vast

wasteland. Three basic elements determine the essence of farms: work, housing and the field. The term "farm" (salas) includes dwelling house with outbuildings and garden, where people regularly or occasionally stay, and their existence is based on their own agricultural production. (Demirović, 2012).

Farms (salaš) in Vojvodina are grouped depending on the city, near which they are located:
- Sombor farms – in the tourist offer, in addition to fully equipped houses, there are farms without water, electricity and equipped with old, traditional furniture;
- Čenej farms – rich and developed agriculture in this area has been very important throughout history for both Čenej farms, and for the population of Novi Sad, a city near which these farms are located;
- Bečej farms – until now there have been no significant attempts of farms activation in the municipality of Bečej, but these farms could become tourist attractive if adequate tourist product was formed;
- Subotica farms – farms in the northern part of Bačka were formed on the site of former medieval villages (Demirović, Njegovan, 2014).

In the previous period the development of farm tourism has been encouraged, i.e. financially supported by funds which were granted in order to develop this kind of tourist offer, from the provincial budget. Bearing in mind that in the development of tourism a major part has a country, it is necessary to have the missing strategic documents, define priorities in terms of development of farm tourism and continuously invest in the development of this tourism product, which is authentic for Vojvodina (Košić, 2009).

Methodology – basic elements of importance to motivate tourists

The starting point is the need to set up research so as to provide clear answers to the questions which would be investigated. Such approach even in the first step requires the provision of adequate baseline data. Selective application of the mentioned research was conducted in Novi Sad, whether it is residents or those who are passing through Novi Sad.

Among the goals in the process of identification of the main aspects is the identification of the reasons that motivate tourists to use certain services of rural tourism. The survey was conducted at various points in the city in 2014. The survey was preceded by a pilot research study in order to assess the quality of the questionnaire and formulated questions. The survey was conducted using a random sample of 350 respondents, and data was analyzed using χ^2 test of adaptation and test of independence.

Motivational factors of rural tourists

Statistical analysis of motivational factors on the behaviour of potential service users in rural tourism represents the basis of analysis of structural reasons that people who were interviewed mentioned after using some of the possible services. Therefore, the number of responses related to the use of the services of rural tourism represents the starting point for a more consistent interpretation of the obtained results (Table 2).

The main reason for choosing the appropriate type of rural tourism is customs and traditions (Figure 1), and the next category is natural unpolluted environment. Crossing a long way to enjoy the landscape and natural beauty, as well as rest and recreation are of secondary importance from the aspect of this type of tourism, considering the fact that something like this can be found also in other types of tourism. Finally, the religious reasons for rural tourism are practically minor, but certainly not negligible.

Table 2. *Structure of respondents by type of motivation*

Motivation	Number of people	Structure in %
Landscape and natural beauty	46	13,14
Natural unpolluted environment	70	20,00
Rest and recreation	64	18,29
Customs and traditions	127	36,29
Religion	43	12,29
Total	350	100,00

Source: *Survey and author's calculations*

With χ^2 test of adaptation it was examined whether there is a statistically significant link in frequencies between obtained (realized) and expected frequencies while defining specific hypotheses. The frequencies obtained

by the experiment or empirical research are called the realized frequencies (O) (Anderesen, 1997). Expected frequencies (E) have theoretical character and represent expected frequencies if H_0 is correct. The expected frequency is obtained as: $E=np$ where n is the sample size, and p the probability that element belongs to certain category (modality) if H_0 is true (Bošković, 1997a; Bošković, 1997b).

Graph 1. *Structure of respondents by type of motivation (in %)*
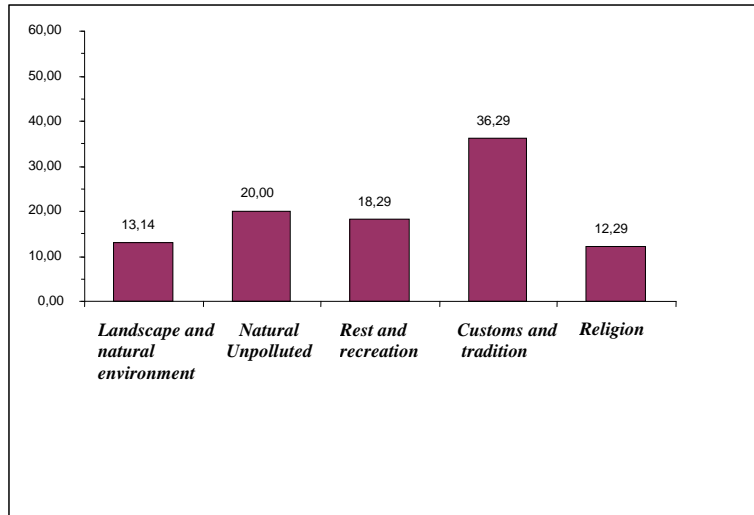
Source: *Author's calculations based on interviews*

Statistics of the test of adaptation is obtained as:

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

And it follows χ^2 distribution with *df=k-1* degrees of freedom, where *k* is the number of possible outcomes (or categories) in the conducted poll (Bošković, 2003). For the data obtained in the survey, statistics of χ^2 test is $\chi^2 = 65.57$.

As the survey covered five motivational targets, if there is no difference between them, it is expected that for categories (motivational targets), the proportion of respondents who chose those categories, would be the same for each of these five categories, i.e. that it would be 1/5 (or 20%) (Everit, 2000). We will calculate H_0 and H_1. H_0: $p_1 = p_2 = p_3 = p_4 = p_5 = 0.20$

showing that the proportion of respondents does not differ according to the choice of motivational goal. On the other hand, H_1 shows that the portion of respondents varies by choice of motivational goal, because at least two of the five proportions are not equal to 0.20.

If k=number of categories=5, then the number of degrees of freedom is df $=k$-1= 5-1= 4, and the critical value of χ^2 test for df=4 and an area on the right side of the curve takes the value - hi-square distribution for α=0.05, amounts 9,488. As the realized value if the test statistic χ^2=65.57 is higher than the critical value χ^2=9,488 and it falls in the area of rejection, we reject H_0 and claim that the proportion of respondents according to the choice of motivational categories, are statistically different. Reasons for this have been largely conditioned by gender and age of the respondents. Therefore, the data obtained by the survey have been analyzed taking into account the structure of the respondents according to age (Table 3) and by gender.

Table 3. *Number of respondents by the age structure*

Age	Number of respodentns	Structure in %
≥ 25	30	8,57
25-35	46	13,14
35-45	85	24,29
45-55	128	36,57
55-65	41	11,71
Over 65	20	5,71
Total	350	100

Source: *Survey and author's calculations*

Analysis by age structure shows that people in the age group of 45 – 55 years and 33 – 45 years choose most often the rural tourism, therefore, mature people who obviously like this type of tourism the best. They are usually motivated by customs and traditions. Further on, there are somewhat younger, i.e. slightly older age groups. The age groups below 25 years, as well as those older than 65, are practically not largely oriented towards this type of tourism. These allegations were confirmed by the analysis of data collected by testing - χ^2 test. It was used to analyze whether there is a statistically significant difference between the age groups of respondents opting for rural tourism. As our survey covered six age groups, if there is no difference between them, it is expected that for certain categories (age groups), the proportion of respondents who said they were interested in rural tourism would be the same for each of the categories, i.e. that it would be approximately 1/6 (or 16.66%). We will

formulate new H_0: Proportion of respondents opting for rural tourism, which does not differ by age, and H_1: Proportion of respondents opting for rural tourism and varies by age. In both cases, the result shows that H_0: $p_1= p_2= p_3= p_4= p_5 = p_6 =0.1666$ and H_1: that at least two of the six proportions are not equal to 0.1666. If k=number of categories, then the number of degrees of freedom $df =k-1= 6-1= 5$, so critical value of χ^2 test for $df=5$ and an area on the right side of the curve - hi-square distribution of $\alpha=0.05$, amounts 11,070. Since the realized value of the test statistics $\chi^2 = 142.10$ is higher than the critical value $\chi^2 =11,070$ and is declining in the area of rejection, we reject H_0 and argue that the proportion of respondents by age structure significantly differ.

Testing the independence of characteristics and types of motivation

As for each unit of observation it was possible to collect information relating to more than one variable, the data were summarized and analyzed using contingency tables (table of cross-classification). The test of independence of the observed characteristics of gender and age structure was conducted. H_0 was applied that two characteristics (features, variables) of element observed in basic set are independent, and H_1, that two characteristics are dependent. Number of degrees of freedom for the χ^2 test of independence is $df = (r - 1)(k - 1)$ where r and k are number of rows and colons, respectively, in the given table of contingency. The value of statistics χ^2 test, for test of independence is obtained using the formula:

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

Where O and E are realized and expected frequencies observed respectively for fields of contingency tables. In doing so, the expected frequencies for the test of independence for each field of contingency table are obtained by the formula:

$$E = \frac{(\text{Sum of a row}) (\text{Sum of a column})}{\text{Sample size}}$$

To highlight the impact of motivational factors on the behaviour of the surveyed tourists in Novi Sad, two characteristics were taken as reference: gender (Table 4) and age (Table 5), in order to establish the existence of dependence between these characteristics and motivation for the choice of rural tourism activities.

Gender structure provides a significant participation in deciding motives for using the time available for leisure and participation in rural tourism. This analysis therefore can point to their combination and intensity of the relationship.

Formulating research hypothesis and calculating the statistics χ^2 test it was determined that there is dependence between the gender structure and motivation for participation in rural tourism. It starts from the basic hypothesis H_0 – motivation for participation in rural tourism not depending on the gender structure, and H_1 – motivation for participation in rural tourism depends on the gender structure.

According to the data shown in Table 4, it was determined that statistics of χ^2 test is $\chi^2 = 43.52$. The critical value for statistics of χ^2 test for $df = (r - 1)(k - 1) = (5-1)(2-1) = 4$ and for $\alpha = 0.05$, is 9,488. Realized statistics of test $\chi^2 = 43.52$ is higher than the critical value $\chi^2 = 9,488$ and it falls in the area of rejection. We therefore reject H_0 and conclude that the motivation for participation in rural tourism depends on the gender structure. So, considering the fact that we have rejected H_0 and determined that there was enough evidence from the sample, we conclude that the two characteristics, gender and type of motivation of rural tourism are dependent for all respondents.

Table 4. *Structure of respodents by gender and type of motivation*

	Man	Woman	Total
Landscape and natural beauty	30	53	83
Natural unpolluted environment	25	40	65
Rest and recreation	63	43	106
Customs and traditions	68	16	84
Religion	8	4	12
Total	194	156	350

Source: *Survey and author's calculations*

The next step in the analysis of the collected data was to examine the effect of age of respondents on the choice of basic forms of rural tourism (Table 5), first of all traditions and customs as motifs, while the youth chose more the category of natural unpolluted. That is why in this case were also formulated hypotheses H_0 – motivation for participation in rural tourism independent of age, and H_1 – motivation for participation in rural tourism which depends on the age.

Table 5. *Structure of respodents by age and type of motivation*

	Age structure						
	≥ 25	25-35	35-45	45-55	55-65	65	Total
Landscape and natural beauty	9	5	6	7	5	6	38
Natural unpolluted environment	16	11	12	20	6	7	72
Rest and recreation	23	28	16	24	12	5	108
Customs and traditions	3	13	14	16	20	27	93
Religion	5	5	6	6	8	9	39
Total	56	62	54	73	51	54	350

Source: *Survey and author's calculations*

According to the data presented in Table 5, it was determined that statistics of χ^2 test is $\chi^2 = 53.15$. The critical value for the statistics of χ^2 test for $df = (r - 1)(k - 1) = (5-1)(6-1) = 20$ and for $\alpha = 0{,}05$, is 31.41. Realized test statistics $\chi^2 = 53.15$ is higher than the critical value $\chi^2 = 31.41$ and falls in the area of rejection. We therefore reject H_0 and conclude that the motivation for participation in rural tourism depends on the age structure. So, considering the fact that we have rejected H_0 and determined that there is enough evidence from the sample, we conclude that the two characteristics, age and type of motivation for rural tourism dependent for all respondents.

Testing the independence of the observed characteristics, the null hypothesis was rejected for data in Tables 4 and 5, i.e. it was concluded that between the two characteristics there is a connection. Therefore a logical question arises what is the strength of that connection? The strength of the connection cannot be determined according to the value χ^2 of the statistics because its high value does not mean at the same time that the connection is strong, but only that we have rejected with little risk of error of the first kind. With the help of the test the strength between the features cannot be determined, but only the probability of connection. When using tests the hypothesis of independence of the observed characteristics H_0 is rejected and it is proven that there is a statistically significant result, it is possible to determine the strength of that connection using Pearson's contingency coefficient (C). It can be obtained on the basis of values of calculated χ^2 statistics and sample size *n*:

$$C = \sqrt{\frac{\chi^2}{\chi^2 + n}}$$

Application of the coefficient of contingency, however, has certain limitations significant for interpretation:

- It takes values from the interval from 0 to 1. In the complete absence of links the correlation coefficient is 0, i.e. variables are statistically independent, but the value of 1 is not reached even in complete dependency, because of *n* in denominator.
- In various studies, C can be compared only is the contingency tables are of the same size (*rxk*).
- Interpretation C requires also additional information on the maximum value that the observed number of modality of characteristics shown in the contingency table can reach. When the observed characteristics have an equal number of modalities (r=k), then C can reach maximum value:

$$C_{max} = \sqrt{\frac{k-1}{k}}, \qquad \text{i.e.,} \qquad C_{max} = \sqrt{\frac{r-1}{r}}.$$

The closer C is to 1, the connection between modalities of the observed features is firmer. It cannot be negative, and it cannot be used to examine the direction of the connection. The maximum value of the coefficient of contingency depends on the number of rows and columns in contingency tables, i.e. the number of observed modalities. It is considerably smaller than one, when the number of modalities is small.

Benefits of using C are that it can be quickly calculated; it can be calculated even when the arrangement is asymmetric; it is easy to interpret because it always ranges from 0 to 1. The value of this coefficient depends on the size of the sample, so that with the increase of the sample it decreases. It should be noted that it is not comparable to other correlation coefficients. In addition, its implementation is significant because it represents supplement to the information obtained by χ^2 test.

Based on the data from Table 4 and Table 5 calculated coefficients of contingency are:

$$C = \sqrt{\frac{43,52}{43,52 + 350}} = 0,33, \quad \text{i.e.,} \quad C = \sqrt{\frac{53,15}{53,15 + 350}} = 0,36.$$

The obtained values C=0.33 for the Table 4 and C=0.36 for the Table 5 show that although between the observed characteristics there is connection, its intensity is weaker (C<0.5).

Conclusion

The motivational factors are of great importance for the allocation of tourism types that potential users of tourism services would practice. This is because tourist services, their nature, non-transferability and the fact that they are being consumed at the same time they are created condition that. Also, they include consumer who is mobile, often crossing great distances. Significant is also the image of services consumed by tourists which has a significant impact on their behaviour as well as the behaviour of future – potential tourists. Their journey thus becomes the means of satisfying their needs and desires.

As motives are provoked by desire, then the tourist needs to create the final tourist demand, it is necessary to use different methods to stimulate each of the identified segments of potential tourists. Thus age and gender structure of tourists, their education, and so on, should form the basis of segmentation. So, motivation occurs when an individual wants to meet his/her needs.

After conducting research and testing criteria for the selection of forms of tourism and destination as a link between the reason – motif and possible alternatives, it may be concluded that for the participation of potential tourists in rural tourism, the crucial influence have age and gender structure of participants. Taking this into account, among other factors, it is necessary to emphasize that for the motivation of potential tourists it is necessary to conduct continuous statistical and econometric research in order to increase the reliability of decision making and to decrease the potential risk.

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FOREIGN CO-FINANCING SOURCES AS A FACTOR OF DEVELOPMENT OF RURAL TOURISM IN THE REPUBLIC OF SERBIA

Gordana Radović, Radovan Pejanović[1]

Abstract

Financial resources are one of the major constraints for the development of rural tourism in the Republic of Serbia, in terms of: the insufficiency – in quantitative terms and lack of financial resources. Sources of financing for rural tourism, in the previous period, were: self-financing, state budget, bank loans, foreign donations, as well as IPA cross-border cooperation programs. The aim of the paper is to present the importance of foreign funds in co-financing the development of rural tourism in the Republic of Serbia in the previous period. The affirmation of the development of rural tourism in Serbia is supported when the resource availability is observed, as well as the possibility for rural development based on multi-sector approach. The paper used analytical – empirical, comparative method, and the method of synthesis. Through the development of rural tourism an additional source of income for rural population would be provided. Development of rural tourism would initiate rural and economic development, which is of particular importance given the fact that in Republic of Serbia there are huge regional disparities in economic development.

Key words: *co-financing, rural tourism, foreign donations, IPA cross-border cooperation programs, Republic of Serbia*

Introduction

Rural tourism includes all tourist activities that can be implemented in rural areas. Characteristics of rural tourism in terms of its economic importance are: (a) the impact on the raise in prosperity or economic

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prosperity of the local economic community and the region; (b) the impact on the growth of living standards of the local population; (c) the impact on social change in the daily life of local population. [1] According to the position of the World Tourism Organization the greatest economic importance of rural tourism is that this activity helps eliminate poverty ("tourism helps poverty elimination").[2]

Outside economy field, tourism is a factor of stopping migration, influences the raise in educational and cultural level in the countryside, the urbanization and politicization of farmers.[3] Rural tourism is mainly developed in areas that have limited financial, but extraordinary natural resources which could be a platform of economic development.[4]

Rural tourism in the Republic of Serbia began to develop spontaneously in the 70s of the 20th century. The first guests were received by households in the village Devici in Ivanjica municipality. This was the beginning of practicing rural tourism not only in Serbia but in the entire former Yugoslavia. [5] The Republic of Serbia has comparative advantages for the development of rural tourism, considering the fact that 85% of the territory, according to the categorization of the Organization for Economic Cooperation and Development (OECD), make rural areas. The Republic of Serbia has a favourable geographical position, rich historical and cultural heritage, preserved traditional rural architecture and attractive ethnic characteristics. In rural areas there are numerous ethnographic and culinary events, and the population is characterized by the traditional hospitality.

The Republic of Serbia has not development of rural tourism that is adequate to resources at its disposal. The reason for this are lack of a

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[1] Boyne S. (2005): *New Directions in Rural Tourism Impact Research,* in *New Directions in Rural Tourism*, Hall D., Roberts L. and Mitchell M. (eds), Ashgate Publishing Limited, Aldershot, England, pp. 19–37.

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[5] Marković S., Ostojić M. (2012): *Četiri decenije seoskog turizma u Moravičkom kraju*, Zbornik radova, Prvi stručni skup o ruralnom turizmu i održivom razvoju, Kragujevac, str.29.

defined and clear strategic direction of development, inadequate evaluation of resources, and insufficient financial investment in the development of this activity. Problems in the development of rural tourism in the Republic of Serbia are: (a) the absence of Register of rural tourism and defined standards of rural tourism; (b) insufficient association of service providers in rural tourism, as well as their education; (c) insufficient supply of tourist facilities; (d) infrastructure and tourist signs are not developed; (e) incompatibility of rural tourism facilities required by the legal solution to the current situation in practice; (f) the underdevelopment of tourist brokerage or insufficient involvement of travel agencies in the promotion and marketing of rural tourism products. [1]

Financing is usually the hardest part of the developmental path of rural tourism due to the fact that some studies show that finding ways of funding requires the most time (resources) for making (implementation) projects of rural tourism.[2] Financing, i.e. financial resources are one of the major constraints for the development of rural tourism in Serbia. Financial resources represent a constraint on the development in terms of: the insufficiency – in quantitative terms and a lack of quality financial resources. [3] Sources of funding for rural tourism, in the previous period, were: self-financing, funds from the state budget (republic, provincial, local), bank loans, foreign donations, as well as IPA cross-border cooperation programs. The aim of this paper is to present the importance of foreign funds in co-financing the development of rural tourism in the Republic of Serbia in the previous period. Analytical-empirical, comparative method, and the method of synthesis have been used in the paper.

The development of rural tourism in Serbia

According to data from the Census of Agriculture in 2012 in the Republic of Serbia, 78 301 households or 12.4% of the total 631 552 agricultural households were engaged in other profitable activities related to

[1] Radović G. (2013): *Problemi u razvoju ruralnog turizma u Republici Srbiji*, Agroekonomika broj 59-60, Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Novi Sad, str.121.
[2] Svržnjak K., Kantar S., Jerčinović S., Kamenjak D. (2014): *Ruralni turizam - uvod u destinacijski menadžment*, Visoko gospodarsko učilište, Križevci, str.89.
[3] Radović G. (2015*): Modaliteti finansiranja ruralnog turizma u Republici Srbiji*, Doktorska disertacija, Univerzitet u Novom Sadu, Poljoprivredni fakultet, str. 20.

agriculture. [1] Only 514 or 0.66% of these households were engaged in rural tourism, i.e. agricultural tourism. Most of agricultural households involved in agricultural tourism were in Vojvodina, 1.11%, then in Sumadija and Western Serbia 0.67%, and in the region of Southern and Eastern Serbia only 0.48%. Observed in districts, most facilities engaged in agricultural tourism were in Srem (1.54%), Northern Backa (1.43%), Bor (1.42%), Western Backa (1.35%) and Pirot district, where 1.16% of households were engaged in agricultural tourism. [2]

According to research, agricultural tourism is the most common current form of rural tourism in the Republic of Serbia. [3] Agricultural tourism involves the stay of tourists in agricultural household in order to rest, but also to get acquainted with the way of life and work, as well as culture, history and other characteristics of the rural area. In addition to agricultural tourism, other forms of tourism have also been developed, such as sightseeing, spa, hunting, and eco-tourism and similar. Due to the fact that in the Republic of Serbia there is no Register of rural tourism it is not possible to definitely determine the number of participants involved in this type of tourism.

According to the National Association "Rural tourism of Serbia", which on its website has the most comprehensive database of service providers in rural tourism in the Republic of Serbia by the end of 2012 a total of 950 households were categorized to provide services in rural tourism. Households were distributed in 67 municipalities. In the observed year active rural households achieved on average from 750 to 1500 overnight stays per year, while some accomplished annual tourist traffic of up to 3000 overnight stays. According to the same source [4], rural tourism was by the end of 2013 spread in the territory of 78 municipalities, 955 categorized households were involved. In the structure of accomplished tourist traffic 58% of subjects achieved an average of 100-200 overnight stays, about 16% of households achieved between 500 and 1000 overnight stays, and only a small number of entities had more than 1 000

[1] Bogdanov N., Babović M (2014): *Radna snaga i aktivnosti poljoprivrednih gazdinstava*, Popis poljoprivrede 2012, Republički zavod za statistiku, Beograd, str. 62. Dostupno na: htpp: www.popispoljoprivrede.stat.rs (sajtu pristupljeno: septembar 2015.)

[2] Republički zavod za statistiku (2013): Popis poljoprivrede 2012 - Poljoprivreda u Republici Srbiji, Sveska 2, Beograd, str.190-197.

[3] Radović G. (2015*): Modaliteti finansiranja ruralnog turizma u Republici Srbiji*, Doktorska disertacija, Univerzitet u Novom Sadu, Poljoprivredni fakultet, str.79.

[4] Podaci dobijeni od direktora Nacionalne asocijacije „Seoski turizam Srbije".

overnight stays in 2013. Rural tourism was, by the end of 2014, present in 89 municipalities, which had a total of 877 categorized households, and only 28% of them had accomplished tourist turnover of over 700 overnight stays. National Association "Rural tourism of Serbia" estimates that it has data and monitors the work of over 80% of rural households in Serbia, which in 2013 generated about 200 thousand, and in 2014 about 180 thousand overnight stays.

The development of rural tourism in the Republic of Serbia, if it was observed only from quantitative aspect, i.e. the number of categorized service providers and the volume of tourist traffic, could be assessed as satisfactory. However, if we compare the data related to the number of entities dealing with rural tourism in 2012 and 2014, we can see a decline of 8%. Also, we can see a significant reduction in accomplished tourist traffic in the period from 2012 to 2014.

The development of rural tourism in Serbia, seen from a qualitative point of view, could not be assessed as satisfactory. The reasons for this are: the lack of defined standards of rural tourism, the underdevelopment of tourism facilities, rural infrastructure (utilities and transportation), tourist signs, promotions and sales channels of rural tourism, as well as insufficient education of staff in rural tourism. Assessment of the inadequate development can be found in the reports of international experts, who believe that there are opportunities for greater development of rural tourism in Serbia. [1]

Co-financing the development of rural tourism from foreign funds

The development of rural tourism in the Republic of Serbia in the past period was co-financed from foreign donations and IPA cross-border cooperation programs. Foreign grants were used to co-finance important development projects in rural tourism. These donations include: (a) Donation of the Fund for achieving the Millennium Goals of the Government of the Kingdom of Spain within the project "Sustainable tourism for rural development"; (b) the donation of the Global Environmental Fund (GEF); (c) the donation of Sweden in cooperation with International Management Group (IMG); (d) donation from the US

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[1] Bartlet T. (2006): *Rural Tourism development in Europa, International Forum on Rural Tourism,* China, 4.-6- September 2006., Final Report World Tourism Organization.

Agency for International Development (USAID). The cross-border cooperation programs, IPA CBC (Cross-Border Cooperation), are the financial instruments of the European Union to support the institutions and civil society to cooperate in cross-border areas. These programs are an important part of EU regional policy and its purpose is to alleviate economic and social disparities of cross-border areas. Funds are granted to countries that are candidates for EU membership, and are distributed on the basis of a public competition. These are non-refundable grants, and the obligation of users of the beneficiary funds is to co-finance at least 15% value of the project (investment). The Republic of Serbia has on March 1st, 2012, after obtaining the candidate status for membership in the European Union, gained right for applying for these funds of IPA pre-accession assistance. Office for European Integration of the Republic of Serbia is the national body, or the operating structure responsible for the implementation of IPA program. [1]

Donations Fund for achieving the Millennium goals of the Government of the Kingdom of Spain

Donations Fund for achieving the Millennium goals of the Government of the Kingdom of Spain, with the total value of four million US dollars, represents a significant support for the development of rural tourism in Serbia. The project "Sustainable Tourism for Rural Development" has been co-financed with funds from this donation. In the realization of the project were included: the Ministry of Agriculture, Trade, Forestry and Water Management, the Ministry of Economy and Regional Development, Tourist Organization of Serbia and five UN agencies: the Food and Agriculture Organization (FAO), the World Tourism Organization (UNWTO), the Fund for Children (UNICEF) and the United Nations Development Programme (UNDP).

Results of the project "Sustainable Tourism for Rural Development" have been adopted by the Government of the Republic of Serbia within the National Master Plan for sustainable development of rural tourism and as Program of development of sustainable rural tourism. [2]

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[1] http://www.evropa.gov.rs/CBS/PublicSite/Default/aspx (sajtu pristupljeno: januar 2014.)

[2] Program razvoja održivog ruralnog turizma u Republici Srbiji, Službeni glasnik Republike Srbije br.85/2011.

The project "Sustainable Tourism for Rural Development" was implemented in the period from December 2009 to May 2012 on the territory of four groups of municipalities, i.e. in the area of:

(a) Central Serbia (Ljig, Valjevo, Kosjeric, Mionica, Gornji Milanovac);
(b) Eastern Serbia (Golubac, Kladovo, Majdanpek, Pozarevac, Veliko Gradiste);
(c) Southern Banat (Alibunar, Vrsac, Kovin);
(d) Lower Podunavlje (Knjazevac, Zajecar, Dimitrovgrad, Negotin).

Table 1. *Overview of projects co-financed by donations Fund for achieving the Millennium goals of the Government of the Kingdom of Spain*

Agency UN	Supported projects	REGION			
		Central Serbia	Eastern Serbia	Lower Podunavlje	Southern Banat
FAO	15	5	5	3	2
UNDP	10	3	2	3	2
UNICEF	6	3	1	1	1
UNWTO	37	11	12	7	7
Total:	**68**	**22**	**20**	**14**	**12**

Source: *The Ministry of Economy and Regional Development (2013): Data of donations: the Ministry of Economy and Regional Development the Government of the Kingdom of Spain; E-mail of 14.02.2013. i 09.04.2013.*

Within the project "Sustainable Tourism for Rural Development" non-refundable grants were awarded for rural tourism development in the Republic of Serbia in the total amount of 600 000 dollars (USD). Non-refundable grants were awarded according to the competition, in 2010 and 2011, on the territory of 19 municipalities, and 68 projects were co-financed with incentive funds. (table 1) This donation supported the formation of four local action groups in order to provide support to local communities to apply for national and EU funds that are meant for rural development.

The project "Sustainable Tourism for Rural Development" was among the first to promote the use of Leader methodology for the purpose of rural development in the Republic of Serbia.

The objectives of the project "Sustainable Tourism for Rural Development" have been to develop at national level a legal and political framework to support the diversification of the rural economy through the development of rural tourism in order to contribute to the achievement of the Millennium Development Goals of the United Nations.

Also, the aim was to at the local level achieve better integration and organization of local rural tourism and economic activities which accompany it, as well as harmonization of the capacity of interested parties from local communities to provide these services and the production of goods in accordance with national development strategies [1]

Competition for non-refundable grants within the thematic area "Diversification of the rural economy through tourism" supported two groups of projects:

(1) The production of food and non-food products and activities for the needs of the local/regional market;
(2) Support to projects of environmentally sustainable tourism.

The total value of donations from the Fund for the Achievement of the Millennium Goals of the Government of the Kingdom of Spain for the projects, which have been c0-financed with the aim of producing food and other products and activities for the needs of the local/regional tourism market in the Republic of Serbia, was 102.000 US dollars.

In this group of projects have been implemented: (1) The project "Scents and tastes of Banat wine and cheese", (2) The project "Stimulating traditional crafts"; (3) The project "Fruits of the Serbian store". (table 2)

The total value of donations of the Fund for achieving Millennium Goals of the Government of the Kingdom of Spain for projects that were co-financed with the aim of developing environmentally sustainable tourism in the Republic of Serbia was 63500 US dollars.

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[1] Izgradnja lokalnih kapaciteta za ruralni razvoj usmerena na unapređenje turizma (2012): Program Ujedinjenih nacija za razvoj (UNDP) u okviru Zajedničkog programa Ujedinjenih nacija „Održivi turizam u funkciji ruralnog razvoja", Beograd.

In this group were realized projects: (1) "Silver eco"; (2) "Improvement of infrastructure for the development of rural tourism in the municipality Kladovo; (3) "The Internet as a tool for the development of rural tourism". (table 3)

Table 2. *The list of projects co-financed with the aim of producing food and other products and activities for the needs of the tourist market*

The name of the project	The aim of the project	Project holders	Value of the project
"Scents and tastes of Banat wine and cheese"	Improving the production of traditional wines and cheeses in order to develop rural tourism.	Civil society organization "Agroznanje" from Vrsac and agricultural households from Gudurican and Bela Crkva that are engaged in the food production and the service provision in rural tourism.	**30 000 USD**
"Stimulating traditional crafts"	Completion of the tourist offer and strengthening of common identity through the development of production of pottery objects for the purpose of delling souvenirs, but also the use of these objects in rural tourist households.	Representatives of public, private and civil sectors in the municipalities of Kladovo, Majdanpek, Pozarevac and Veliko Gradiste.	**32 000 USD**
The fruits of "The Serbian store"	Sale of products (food and souvenirs) of small rural tourist households in the local tourist, but also the national market.	Association of citizens and representatives of public and private sector in the municipality of Subotica.	**40 000 USD**

Source: *Building local capacity for rural development directed at the promotion of tourism (2012): Program of the United Nations for the development (UNDP) within the Common Program of the United Nations "Sustainable tourism in function of rural development", Belgrade, pp. 51-52.*

The project "Silver eco" was implemented in the municipalities of Veliko Gradiste, Golubac and Pozarevac with the aim of integrating and promoting tourism offer in order to ensure a seven day rural tourism facilities.

Table 3. *The list of projects that were co-financed with the aim of supporting the development of environmentally sustainable tourism*

The name of the project	The aim of the project	Project holders	Value of the project
"Silver-eco"	The compilation and promotion of tourist offer in order to provide a seven-day tourist program.	Association "Affirmation" from Veliko Gradiste and other local partners from the territory of the municipality, as well as the municipalities of Golubac and Pozarevac.	21 000 USD (non-refundable funds 19 000 USD participation of project promoters 2000 USD)
"Improving infrastructure in the development of rural tourism in the municipality of Kladovo"	Improvement of infrastructure for storage (separation) of garbage in rural tourism.	"Association for the development of Kladovo" and representatives of the public and civil sector from the municipality Kladovo.	22 500 USD
"The Internet as a tool for the development of rural tourism"	Creating the website www.selo.co.rs in order to promote integrated rural tourism in the Republic of Serbia.	Association "Rural tourism of Serbia", with headquarters in Ljig.	32500 USD (non-refundable funds 22 000 USD, participation of project promoters 10 500 USD)

Source: *Building of local capacity for rural development directed at the promotion of tourism (2012): Program of United Nations for the development (UNDP) within the Common program of United Nations "Sustainable tourism for rural tourism", Belgrade, pp. 52-60.*

The project "Improvement of infrastructure for the development of rural tourism in the municipality Kladovo" was implemented on the territory of municipality Kladovo with the aim of developing utility infrastructure for the development of rural tourism. The project "Internet as a tool for the development of rural tourism" was implemented by the Association "Rural tourism of Serbia", with headquarters in Ljig. With the support of donor funds website www.selo.co.rs was created for the purpose of integrated promotion of rural tourist offer in the Republic of Serbia. Donation of the Fund for the achievement of Millennium Goals of the Government of the Kingdom of Spain through the realization of the project "Sustainable tourism for Rural Development", contributed to the

development of rural tourism in Serbia. With the funds of this donation the development of catering services, rural and municipal infrastructure, the development of tourist facilities and the promotion of rural tourism were co-financed. Also, using these funds the revitalization of old traditional crafts was co-financed in order to create tourist souvenirs.

The donation of the Global Fund for Environmental Protection

The Republic of Serbia has received a donation of 4.5 million US dollars from the Global Fund for Environment Protection (GEF) and received a loan in the amount of EUR 12.5 million from the International Bank for Reconstruction and Development (IBRD) for the realization of Serbian Transitional Agriculture Reform Project (STAR Project – Serbian Transitional Agriculture Reform Project). The project was implemented in the period from June 2007 to September 2012. The main objective of the "Star Project" was to improve the competitiveness of agriculture of the Republic of Serbia. The global environmental objective was to preserve important ecosystems in the mountainous region of Stara Planina. The project was realized through a series of strategically important investments that had the purpose to promote rural development and preserve the biodiversity of Nature Park "Stara Planina", in order to develop rural tourism in this area.

The third component of the "Star Project" was carried out on the territory of Stara Planina Nature Park with the aim of improving the management of this park and the development of rural tourism on a sustainable basis. Budget of the third component of "Star Project" was 4.5 million US dollars, and it was funded through a donation from the Global Fund for the Environment.

Financing was conducted on the basis of the Law on Ratification of the Agreement on a donation from the Global Fund for Environmental Protection ("Agriculture Reform Project Transition") between the Republic of Serbia and the International Bank for Reconstruction and Development acting as the agency for implementation of donation of Global Fund for Environmental Protection. The holder of the realization of the project was the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia. [1]

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[1] Zakon o potvrđivanju sporazuma o donaciji iz Globalnog fonda za zaštitu životne sredine (Sl. glasnik br RS 83/2008).

During the implementation of the "Star Project" co-financed were:

(a) the infrastructure works: roads were paved in two villages on Stara Planina in Pirot municipality and in one village of Dimitrovgrad municipality, a bridge was made in the village of Gostusa, playground, public toilet and garbage containers in the village Dojkinci, as well as the road to the village Senokos, and the total value of investment is over EUR 1 million;

(b) reconstruction of village houses in order to practice rural tourism in the pilot villages of the Nature Park Stara Planina (Gostusa, Dojkinci and Senokos), and the total value is about EUR 130 000;

(c) reconstruction of Visitor Centre of the Nature Park "Stara Planina" in the village Vrelo, and the value of the work that was co-funded by Star Project was EUR 330 000;

(d) marking zone under the regime of the first level of protection of the Nature Park "Stara Planina", the value of the work that was co-funded by Star Project was EUR 18 290;

(e) reconstruction of mountain lodge in the village Senokos in order to create conditions for a more serious development of rural tourism in this village;

(f) asphalting the road Kamenica – Senokos, in order to develop rural tourism in this village. [1]

Each contest participant, whose construction or reconstruction, renovation or decoration was co-financed with incentive fund "Star Projekt", had to meet the following conditions: (a) to construct waterproof septic tank with drainage for future connection to sewage network; (b) at the end of the project each household was obligated to have at least two categorized rooms and four beds; (c) that each construction project or renovation of the building was in the style of folk architecture from Stara Planina. Stara Planina is the largest protected natural area in the Republic of Serbia, and the implemented project has contributed significantly to the development of rural tourism in this area.

Donation of Sweden for the economic empowerment of women through the development of rural tourism

Gender Equality Directorate of the Ministry of Labour, Employment and Social Policy in the Republic of Serbia in cooperation with the

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[1] Podaci dobijeni od Tošev S., člana tima za implementaciju STAR projekta.

International Management Group (IMG) and with financial support from Sweden announced in December of 2011 a public call for proposals in order to improve the rural tourism offer. The main objective of the project was the economic empowerment of women in rural areas as one of the segments of the National Action Plan for the Advancement of Position of Women (NAP). According to the propositions, the funds intended for a single project could not be less than EUR 5 000 (in dinars) and not greater than EUR 15 000. Applicants, in a public competition for non-refundable (incentive) funds, could be: all female entrepreneurs and all companies involved in the development of rural tourism, but which are exclusive or majority owned by women, as well as economic entities that are registered at the Agency for Business Registers, in which the majority of employees are female.

The Commission for evaluation of project proposals has after the evaluation of all proposals which arrived on time, decided to support the following projects:
(1) "The reconstruction and renovation of the barn 150 years old within the cultural and tourist complex – Ethno village Latkovac in Aleksandrovac municipality";
(2) "Open Doors of Banstol", Indjija municipality;
(3) "Improvement of the tourist-catering offer in SUR Sedlar", Knjazevac municipality;
(4) "Promotion of women in the municipality Beocin in order to encourage rural tourism development, production and marketing of homemade products."

Implementing the competition for the women's economic empowerment in order to develop rural tourism in the Republic of Serbia four listed projects were supported, and the total value of the donation was EUR 52 972.

Donations of the United States Agency for International Development (USAID)

The United States Agency for International Development (USAID) donated funds for the development of rural tourism in the Republic of Serbia. The total value of the donation was 95 000 US dollars. Rural tourist households were able to take advantage of the funds for equipping tourist facilities, but also to acquire the necessary knowledge through training and study tours. For example, the donation of the US Agency for International Development provided the opportunity to develop

complementary tourist accommodation capacities in rural tourism in Prijepolje municipality due to the fact that the municipality did not have a hotel or motel. In the municipality Prijepolje in November of 2012, there were 37 categorized rural households that had 187 beds.

Cross-border cooperation of the Republic of Croatia and the Republic of Serbia

The European Commission adopted on December 20th, 2007 the program document of IPA II Cross-border program Croatia-Serbia for the period from 2007 to 2013. The aim of the Program was to encourage cross-border cooperation for diversification and improvement of regional economy in a socially and environmentally sustainable manner with the permanent improvement of good neighbourly relations. The development of rural tourism was ranked within the most significant specific objectives of cross-border cooperation program of the Republic of Croatia and the Republic of Serbia in the period. .[1]

The Project "Tradition for the Future – Rural Tourism without Borders" received in December 2010 assistance within the IPA program of the European Union. The project sponsors were: Municipality of Apatin, the association "Sombor farms", "Royal Historical Society", Centre for Entrepreneurship in Osijek, municipalities Bilje and Jagodnjak, as well as the city of Osijek. The project was implemented for 18 months, its total value was EUR 226 000, and EUR 190 000 was co-financed by IPA II. The Project "Tradition for the Future – Rural Tourism without Borders" was aimed at the rural population in Osijek-Baranja County and Western Backa District that had the potential and interest to engage in rural tourism. The main objective of the project was to contribute to the development of local economy and creation of new employment opportunities with the development and promotion of rural tourism and organic agriculture on both sides of the Danube.

Within the program of cross-border cooperation of the Republic of Croatia and the Republic of Serbia for the period from 2007 to 2013 the project "Forming the centre for the advancement of knowledge in the rural tourism" was co-financed. Holders of the project were the Municipality of Backi Petrovac, Tourist organization Backi Petrovac, Tourist Organization of Serbia, the city of Vukovar, Vukovar Tourist

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[1]http://www.europski-fondovi.eu/content/prekograni-ni-program-hrvatska-srbija-0
(sajtu pristupljeno: januar 2014.)

Board and the Tourist Board of Zupanja. The total project cost was EUR 378 000, in co-financing 15% participation of the Republic of Serbia; the Provincial Secretariat for Regional Development was also involved with 974 000 dinars.

Conclusion

The funds from foreign sources have been used, in the previous period, for co-financing researches that aimed to analyze the current level of development of rural tourism in the Republic of Serbia, as well as to define opportunities and constraints for future development. The result of these activities is the Program of development of sustainable rural tourism, which the Government of the Republic of Serbia adopted in 2011. Also, from foreign grants and cross-border projects the education of people involved in rural tourism, the development of associations, as well as the formation of local-action groups were co-financed. It that segment particularly important is the project "Sustainable Tourism for Rural Development", which was among the first to promote the use of the Leader methodology for the purpose of rural development in the Republic of Serbia.

The funds from foreign sources were used for co-financing also the development of tourist and catering services, rural and municipal infrastructure, development of tourist attractions, as well as enhancing the promotion of rural tourism. The projects implemented by foreign donations have contributed to the creation of new jobs in rural areas, economic empowerment of women, as well as cluster development in organic farming and rural tourism. Using funds of foreign grants the revitalization of old traditional crafts were co-financed in order to make tourist souvenirs. Through the "Star Project" a series of strategically important investments were implemented that had the purpose to promote rural development and biodiversity preservation in the Nature Park "Stara Planina", in order to develop rural tourism on a sustainable basis.

Foreign sources of co-funding have, in the past, greatly contributed to initiating development of rural tourism in Serbia. Their value cannot be judged only from the quantitative aspect, but also through the quality orientation of the development of rural tourism. For that reason it is necessary that in the future foreign sources of co-financing would be the financing modality of rural tourism in the Republic of Serbia.

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TOURISM IN THE FUNCTION OF RURAL DEVELOPMENT

Jelena Birovljev[1], Biljana Ćetković[2]

Abstract

The closest word for determining modern touristic industry is change, and it is justified to conclude that all variables in tourism are changeable but only change is constant. Upcoming challenges from both the macro and the microenvironment, which are numerous, varied, and often unpredictable and the volatility in the tourist market require fast and adequate reactions, otherwise, competitors, whether existing or new, will take their place on the market. These changes cause the need for a new approach in tourism development, which is based on the protection and conservation of natural and cultural resources, and highlighting the problem of social costs of tourism development. Applying the concept of sustainable tourism development with an emphasis on rural areas, and nature, with expressed individualization of touristic demand and its significant concentration on non-standard tourism products, is a response to modern requirements of consumers and also the basis for the survival and development of future generations.

Key words: *rural tourism, rural areas, sustainable tourism, gastronomy, organic production.*

Introduction

It is becoming increasingly clear in recent years that the era of mass-scale tourism is nearing its end, and that modern-day tourists find appeal in attractive destinations easily accessible to everyone owing to their infrastructural communication. The optimism prevailing in relation to the development of rural tourism is supported by the increasingly present habit of guests to take shorter holidays, mostly focussed on nature and health.

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The tourist sector provides conditions for attracting tourists and fully meets their requirements. As a highly dynamic phenomenon, tourism must increasingly adapt to changes in the demands of potential consumers, who are becoming increasingly sophisticated, and are not satisfied by the mere offer of accommodation and transportation. Changes in the behaviour and lifestyle, demographic changes and increased demands of consumers are only some of the causes of fragmentation that has made the consumption patterns unpredictable (Thomas, 1997).

According to Quan and Wang (2003), as tourist demand a higher level of quality service with increasing frequency, especially in terms of food and hospitality, these secondary experiences attract an increasing interest of the tourist sector and impose a need to research it. It can be freely concluded that, in essence, food production is the only production activity in hospitality (Jones & Lockwood, 2002). Tourism features as a great potential in development, as it supports the agricultural production of food, industry and service activities through back coupling (Torres, 2002).

Any organization that seeks to operate effectively in a business or nonprofit sector must always anticipate the future and the changes that will follow. It is useful to prepare the organization in advance to be flexible for changes in the future, in other words, good management in the present provides an excellent basis for effective action in the future (Štavljanin et all, 2011).

The previous requirement is hardly attainable, especially in complex economic and other fields. Tourism is an area through which economic, cultural, political, demographic, environmental and numerous other components are manifested. The interrelation of these components further more complicate the relations and trends in tourism and refract them through the tourist market and its performance. Therefore, the management of tourism activities whether at the level of enterprises, institutions or other organizations is always very complex and based on a planning approach which includes the extreme volatility of these components. Strategic planning as an initial phase of management process is the assumption of adequate market behavior.

The Republic of Serbia has the chance to raise its competitive strategy for growth, independently or with the support from the international community, by defining the development objectives and determining the

economic structure. In this context, tourism represents an essential complex with untapped growth potential. Tourism is an economic sector of exceptional business opportunities. Because of that, the majority of countries involve tourism into their development policies as a mean of economic diversification, employment growth, urban regeneration and social welfare incensement.

The conditions of tourism in Serbia

Based on extensive research and current practice it is estimated that it is unrealistic to expect that tourism without strategy, economic or social revival will quickly and easily transform into a promising economic sector.

Numerous natural and anthropogenic attraction, favorable geographical position, historical monuments and authentic folklore, represent an opportunity for development of Serbia. These elements are not enough, unless an appropriate strategy for tourism development is set. For the realization of strategic tourism-related projects there is a need for huge financial resources and extensive investment in offer facilities, basic infrastructure, marketing, transportation, and other complementary activities, which at this moment Serbia does not have or does not allocate adequately.

On the global tourism map of offers, Serbia as a tourist destination has not taken its place based on all the potential and resources it has. Especially due to the fact that the country still has no national touristic brand, no formulated and commercialized internationally recognized touristic products and has a very low budget for tourism promotion.

The strategy of tourism development in Serbia should be a project that would offer rational and credible answers to the questions of organization and growth of Serbian tourism and its effective involvement in international markets.

Rural tourism in Serbia

Potentials for the development of rural tourism are reflected in the wealth of well-preserved tradition of life and work in the countryside, the appearance of landscape, and people's customs and folklore as well. In addition to basic satisfaction of the tourists' various needs for peace, clean air and unpolluted nature, special tourist experiences also include

unique gastronomic offer – genuine domestic food, produced from indigenous ingredients following traditional recipes.

Nowadays, as an essential factor in the total offer of tourist facilities, food represents an existential need and is of vital importance for the development of hospitality and tourist industries. The conditions of life have always determined the dietary habits, and therefore the variety of the conditions of life and work create different needs and habits. The basic goal of gastronomy and tourism in general, is to meet these.

The period of developing tourism in rural areas did not see a substantial development until after the World War II, and in the form that it is interpreted today (as a factor of renewal and development of countryside, integral part of tourist product) it has been developing in the European countries and the USA since mid-1960s (Lukić, 2005). Although this period cannot be referred to as one of highly developed environmental awareness and effort for active and diversified forms of tourism, it is implied that they represent factors which, nowadays, alongside the economic ones, form the worldwide tourist trends and are directly related to rural areas.

The attitude to the rural environment has changed completely; isolation, danger and risk increasingly attract people who find it easy to cope with the rugged natural landscape (Bušelić et al., 2004). The complexity of rural tourism as an economic and social activity also conditions planning and management that require special organisation at all levels and segments of development, and also entail the existence of balance between numerous factors of rural development.

In order to create as high-quality tourist offer as possible, it is necessary to analyse the specificities of offer in the rural area, mostly in terms of the marketing aspect of preparing the product and service for the market, and yet in compliance with the principles of rural resource management. Properly planned formation and interpretation of landmarks and distinguishing features, rural resources become tourist values and the basic motives of tourism-based travel.

With the appearance of new destinations and constant innovation of the already existing ones, the competition between tourist destinations is becoming increasingly intensive, so that the actors comprising a region's tourist offer are forced to find an optimal way of interconnecting with the

aim of joint raising of competitiveness levels by providing consumer value added. The positions of these regions, as tourist destinations, can be improved by the establishment of clusters, as the key role in addition to research and development when creating competitive advantages belongs to knowledge, technologies, finance and experts, which are most simply gathered within clusters.

Rural environment is an ideal location for developing tourism providing the visitors with the feeling of tranquillity and simplicity, introducing them to the tradition of rural life, which is, at the same time, the antithesis to modern urban life from which people strive to escape nowadays (Page & Getz, 1997; Sharpley, 2002; Frochot, 2005). Tourism is determined by a large number of factors, to be simply perceived as an industry or travelling away from the place of residence (Hunziker & Krapf, 1942; Pirjavec & Keser, 2002).

Due to the variety of perspectives of tourist activities and operating in rural environments, literature uses different terms such as rural tourism, village tourism or agrarian tourism without the sign of uniformity (Frochot, 2005). According to Busby & Rendle (2000), there are several definitions of tourism in rural areas (Wilson et al., 2001; McGehee & Kim, 2004). This multitude points to the fact that it is necessary for researchers to coordinate. Within the research in this paper, tourism will be treated as rural tourism including various forms of tourist activities in an agricultural setting.

The decline in economic activity, restructuring of the agricultural sector and migration of highly educated young population have resulted in adopting tourism as an alternative strategy of development and a factor of economic and social renewal of rural areas (Briedenhann & Wickens, 2004). In Eastern Europe, where the developments of the past decade have been causing a dramatic growth in unemployment in rural areas, tourism has been identified as a catalyst for stimulating economic growth, increasing sustainability of underdeveloped areas and improving the living standards of local communities (Briedenhann & Wickens, 2004).

Rural tourism has different meanings in different countries. For example:
- In Finland, for instance, it usually denotes renting holiday homes to visitors or provision of hospitality services in the countryside.
- In Hungary, there is a specific term – village tourism – which determines that only activities and services provided in villages

are included in this type of tourism. This usually entails inexpensive accommodation; participation in agricultural or other local activities is not usual.

- In Slovenia, the most important form of village tourism is tourism on family farms, where the guests stay either with the farmers' family or in a guest house. Meals with the hosts and exploring the farm are also popular among tourists (Batler, 1998).
- In the Netherlands, rural tourism includes camping on farms and activities like cycling, walking, or horse-riding (Murdoch & Miele, 1999).
- In Greece, the main feature of rural tourism is bed and breakfast, accommodation in traditionally furnished rooms with traditional breakfast, usually based on home cuisine. Complementary activities are offered in a limited range and include restaurants and cafes, or organisation of cultural and recreational activities (Arce & Marsden, 1993).

Limited by distance and underdevelopment, rural areas have limited opportunities for economic development. Many economists such as Hjalager (1996), Nickerson, Black, & McCool (2001), and Sharpley & Vass (2006) argue that in addition to agricultural production as the traditional method or earning basic sources of income in villages, tourism features as a source of additional income.

Development of rural tourism creates potential solutions to numerous problems in rural environments (Sharpley, 2002), such as opening new jobs, new markets for sale of agricultural product and promotion of local crafts, which would broaden the regional economic basis and activate competitiveness among local entrepreneurs (Page, Forer & Lavton, 1999; Fleischer & Felsenstein, 2000; Getz & Karlsen, 2005; Frochot, 2005; Tchetchik, 2005).

In order to stimulate rural economies, it has become inevitable for rural areas to seek alternative ways of using local resources (Liu, 2006). Selective forms of tourism encourage the sustainable development of tourism in all its aspects and are compatible with the regional strategic development concept (Luković, 2008). Rural tourism includes the aspect of sustainable tourism – tourism which is not harmful for the environment, and, as a rule, includes environmentally friendly agricultural production.

The advantages of rural in comparison with mass tourism are the most significant characteristics, calm setting, preserved nature, communication with the hosts, consumption of healthy homemade food and learning about traditional rural chores (Lazić, 2007). Expansion of the food offer with biologically beneficial food is an integral element of transforming rural tourism into a sustainable system (Đekić, 2002).

In the future, rural tourism will be regarded as serious business based on entrepreneurial principles. Such a model of development of rural tourism will require the inclusion of a large number of institutions and organizations in providing expertise and education of rural households as a special aspect of managing the development of rural tourism (Pajić, 1999).

The tourist and cultural offer of rural areas does not represent an offer intended only for tourists, but also for local population who should precede others in getting to know the cultural potentials of the area they are living in, so as to understand them better and appreciate them more. So, on the one hand, a new framework is obtained for a dynamic cultural life of the local population, and on the other, attractive tourist offer of the town and village that have qualities to appeal to tourists so as to get to know specific cultural potentials better (Dojčinović, 2005).

Competition in tourism is increasingly fierce, both on the local and on the global markets. The rich and varied offer provides tourists with opportunities of various choices. Word-of-mouth and exchange of experiences and information is the easiest to transmit through web pages, forums and social networks (Sharples, Mitchell, Macionis, Cambourne, Mitchell & Johnson, 2000). Modern technology enables travellers to check the quality of service providers very easily. The quality of products and services features as an imperative and comparative advantage, for it is often the key factor of choice, especially within the same price range. Bad publicity very quickly destroys the reputation, and it is therefore essential to realise that the cost of attracting a new tourist is much higher than the cost of retaining an old one.

The development of rural tourism in selecting regions is attaining increasing proportions. Numerous facilities are opened on family farms in rural settings, offering hospitality services with a varied offer of typical food – dishes and drinks. Contemporary consumers are educated and want to know what they are eating. Nutritionist research has discovered that resistance to illness, body weight, and even life expectancy, are closely

related to nutritional regimen. Various research is conducted nowadays related to dietary habits, as well as the new psychological concept of a healthy meal (Chen, 2006), consisting of three key elements: nutritional value, organic composition and gastronomic enjoyment. Tourists are possessed of a common characteristic of new nutritional habits stemming from modern trends in human food consumption. Nowadays, man strives to resist the globalization of tastes, and, when ordering food, more and more often insists on health food, comprising (Dropulić, Ružić, 2009):

- functional food,
- vegetarian products,
- environmentally friendly produced food and beverages,
- traditional cuisine,
- production without conservatives,
- products without the addition of GMOs.

The above points to the fact that it is not simple to shape the gastronomic offer, because, above all, the main goal is to meet the needs and demands of consumers, i.e. tourists. The key question is how and to what extent gastronomy is included in shaping the tourist the tourist offer of the chosen regions. How important is it for the food to be organic? And how much does the tourism encourage the development of agricultural production in rural areas? In other words, to investigate and prove the unbreakable bond between agriculture and tourism (Figure 1).

Figure 1. *The synergetic effect of combined factors*
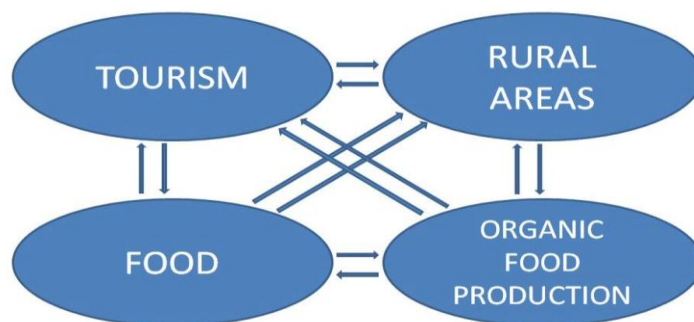
Source: *Authors' research*

Raising the level of competitiveness of selected regions as tourist destinations requires the formation of tourist clusters. The regions can

raise competitive advantage using the synergetic effect of combined experiences. Porter (1990) refers to clusters as geographically oriented groups of interconnected businesses and institutions in a given sector, bound by commonality and complementarity. From the aspect of competitiveness, the cluster-based approach gives a special opportunity to small and medium-sized businesses, which is especially convenient and necessary in the segment of rural tourism, for cluster-based approach does not imply branding individual businesses, but rather the entire sector or space. Therefore, inclusion into a tourist cluster provides the opportunity for selected regions with appropriate gastronomic offer and developed rural tourism to become globally competitive tourist destinations.

For the purpose of preserving biodiversity, indigenous species and varieties in certain regions, a new economic activity is encouraged – agro-eco-tourism, which should preserve natural areas and national parks through organic agriculture on the one hand, and preserve them from rural deterioration due to migration on the other (Birovljev, Štavljanin, 2011).

Raising the competitiveness of rural tourism by the cluster model

There are more and more polemics on the concept of competitiveness in tourism. Significant changes in economic, social and institutional environment, require a new, market and business perspective. In the mid 90's the issues of competition and competitive advantages have gained in importance because there has been a noticeable saturation at the global market of tourism. According to some researches, many countries have increasingly included tourism in their development policies because there was a trend of growth in travelling.

The main goal of competitive development is to enable the increasement of the welfare of individuals and countries as well. In this context, rural tourism should contribute to the quality of life of residents and also enable the economic growth with minimal social and environmental costs. The competitiveness represents a business opportunity that contributes to economic, social and ecological stability of the rural economy.

The success of a competitive tourist destination depends on the efforts made in the realization of tourism activities, and the ability of tourism organizations to offer a higher market value than their competitors.

The ability of providing higher quality allows the tourist destinations to achieve higher prices and for their organizations to operate more effectively in the market with strong competition.

The ability of creating new touristic products which will provide better service and offer more diverse experiences will keep the locality of existing customers and attract new ones.

Therefore the conclusion is that the one way of maintaining long-term prosperity of tourism is being competitive (Jordanović, 2007). Highlighting current high prices and profits in the tourist sector in the short term, without providing the quality is a bad effect of strategic marketing, which threatens the long-term business and stability.

The fact is that the holders of the international competitive advantages are often located in narrow regions of certain countries. Existing clusters should be linked with organizational efforts and adequate programs in order to make the touristic offer more attractive and competitive at a global level.

Cluster in its content and character can develop one or more business opportunities, which provide different keys for success, business rules and relations with competitors.

The cluster includes companies directly associated with tourism, but also with tourist attractions, infrastructure, services, amenities that complement the activities of tourism operations, and finally, with elements of socio-economic environment which directly affect the experiences of tourists. Tourist business, as a specific destination is a three-dimensional concept determined by a combination of market, products and technologies.

Tourism business is not a job but a sublimation of jobs that are based on their diversity.

Those jobs are related and caused by the development of human needs in the field of leisure time and travel, on one hand, and are dependent on the competitive forces that determine the quality of tourism jobs and the internal conditions for raising competitiveness, on the other hand.

For the touristic offer the most important is the competitiveness of touristic clusters as business entities. The competitiveness is being achieved at the local level with the ability to constantly create new, to innovate the existing and to effectively use the available resources. There are four touristic clusters in the Republic of Serbia: Vojvodina, Belgrade region, South-Eastern Serbia and South-Western Serbia.

Table 2. *Marketing positioning of Serbia*

Central positioning	Serbia			
Cluster positioning	**Vojvodina,** Water treasure, panonian pleasure	**Belgrade,** Seductive and exciting, city of good vibrations	**South-eastern Serbia,** Still intact, still undiscovered	**South-western Serbia,** Describing the life throguh the tradition and nature
Main advantages	Experiencing water	Live city	Activities in open	Termal and health centers
	Panonian way of living	Communication	Peace and silence	Mountains
	Small, romantic destinations	To be modern	Mineral sources	Live atmosphere
		To be discovered		Medieval culture and monasteries
Image	Multicultar	Fun	Nature	Fun atmosphere
	Panonian plain	Business	Health	"Joie de vivre"
	Life around water	Cosmopolit	Sport and relaxation	Inovations

Source: *The Development Strategy of tourism in the Republic of Serbia, Faculty of Economics, Belgrade and Horwath Consulting Zagreb, 2005.*

Based on the characteristics of touristic products, market, financial and development conditions in the country, the emphasis should be on the products that provide the highest profit in the shortest time (city breaks, business tourism + MICE, events, special interest cruises). Using the strategy of differentiation, touristic clusters have the opportunity to

present Serbia as a country that offers a variety of experiences. There are countless destinations in the world that offer a natural environment, beautiful cities and diverse experiences, it is necessary to differentiate the offer from the competition in order to succeed. If the clusters do not emphasize their specificity, Serbia will lose its differential advantage which would lead to the emergence of competition within each cluster rather than the competition with other destinations.

For the improvement of the effectiveness of touristic clusters, clusters select the target markets based on the evaluation of their structure, their attractiveness and on the intensity of the competition. The most common dilemma that arises among decision makers within the cluster is where to compete and how to compete.

It is essential for the business orientation of the cluster to recognize the competitors of the particular cluster. The competitors could be: competitors with the same position, or the competitors which are seeking their place on the same market. The most common mistake in practice is the identification of clusters within a close geographical area as the main competitors, while ignoring the competitors outside the region.

Competitive-oriented entities have focused their attention on achieving a differential advantage over their competitors, or on the realization of their own superiority. While the superiority to consumers is being achieved through high quality business offers, the superiority to the competition is being achieved with higher realized value.

The advantage of positioning is the essence of the competitive advantage. In order to build a stable market position, the primary goal of the cluster is to differentiate its offer (products) from the competition, on the basis of the high value for consumers with minimal realized costs. Porter's generic strategies (Porter, 1985) are very useful for the purpose of creating a good market position which is based on market segmentation and product differentiation.

Those strategies are the basics for gaining competitive advantage. On the basis of market coverage (narrow / wide) and the basis of competitive advantage (based on low cost or differentiation), there are three available generic strategies:

1. Strategy of leadership in the field of material;
2. A strategy of differentiation and;
3. The strategy of market focusing - focusing on costs and focusing through differentiation.

Table 3. *Combining generic strategies*

COMPETITIVE ADVENTAGES		
Market coverage	**Low costs**	**Differentiation**
	Strategy of leadership in costs	**Strategy of differentiation**
	Strategy of focusing on costs	**Focusing through differentiation**

Source: *Porter, 1990.*

Conclusion

The correlation between tourism and agriculture can be viewed through the conceptual organisation of tourism development system based on new structural foundations in accordance with the postulates of sustainable development. Tourism creates conditions for diversification of rural areas and earning additional income for the rural population, and therefore greatly contributes to the development of underdeveloped areas. In this sense, tourism becomes a stimulating factor of the development of agricultural production, enables growth in employment in rural areas, but also an increase in the volume and structure of agricultural production and adequate utilisation of unproductive plots in rural areas.

In the setting of recognisable local characteristics, with expressed gastronomic specificities, hospitality is an integral part of the tourist industry and one of the significant comparative activities of tourism. Defining the development concept of this form of production could influence a more adequate direction and strategy of development of agriculture in the function of development of tourism.

Achieving a new and so far unused interconnection between tourism and agriculture can influence a higher degree of the utilisation of tourist values to a great extent, through the creation of far higher-quality and more attractive tourist offer, given that contemporary tourists have adventurist spirit and show an increasing interest in holidays based on

natural cultural, but also gastronomic activities. Viewed from the aspect of agricultural production, improving the financial effects (sale of certain agricultural products on the tourist market) would also result in a significant advance in economic and organisational production process, which must adapt to a new market setting.

The source of structural and economic changes of rural tourism is in the education of employees involved in this industry, and the need to introduce entrepreneurship into rural business (Birovljev, Štavljanin 2011).

This article is an attempt to prove the significance of rural tourism which is undoubtedly undeniable, for the reason that the development and integration of tourism into the rural area results in achieving numerous economic and non-economic effects which affect not only the development of farms themselves, but also the development of the entire local community.

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IMPACT OF RURAL TOURISM ON RURAL DEVELOPMENT: ATTITUDES OF RURAL HOSTS IN VOJVODINA

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Abstract

Relationship between rural tourism and rural development is multifaceted and multidimensional. Due to this, the impact of rural tourism development on rural communities is more and more a subject of scientific inquiry. This impact depends on numerous factors, such as attitudes of the recipient population. Likewise, rural tourism practices shape the population attitudes about its impacts on the local rural community. So, in this paper, attitudes about rural tourism of rural hosts in Vojvodina are analysed using tourism impact attitude scale (TIAS). The main goal of the research is to explore which factors contribute in shaping the rural hosts' attitudes about contributions and failings of rural tourism on the development of local rural communities.

Key words: *rural tourism, rural development, TIAS, Vojvodina*

Introduction

There are several important reasons why we deal with rural tourism. First, tourism in general is one of the largest world industries. According to *World Travel & Tourism Council* (2015: 1), tourism revenues in 2014 made $^{1}/_{10}$ of total global GDP. For the last few years, tourism is recovering from the negative impact of the global economic crisis. It records gradual

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increase in the number of tourists, overnight stays, revenues, etc[1]. Second, there is great diversity of manifestations or types of tourism which strive to fulfil complex contemporary tourists' needs. Third, changes in working time - leisure time relations (if we can still think in these categories!) and increase in living standard caused more frequent, shorter travels and vacations in non-remote destinations. In addition, there is a need for escape from urban bustle and congestion, romantic vision of rural idyll, new gastronomic trends, etc. All mentioned above induced market niches for rural tourism, as well as theoretical space for its research. Rural tourism is regarded as possible answer to transformed social conditions within rural communities and global societies.

Rural tourism: is it so simple?

One of the inevitable questions in researching rural tourism considers its recent intensive development. The question is: why intensive development and rising interest in rural tourism analysis occur in contemporary societies? Does it mean that rural tourism did not exist in pre-modern societies? Does it imply on changes in the structure of contemporary societies, especially in rural communities? Does it mean that rural tourism is functional answer for the contemporary rural communities' needs? Have motives and needs of tourists changed? Have personal aspirations and expectations of both tourists and hosts been transformed?

Rural tourism is not exclusively contemporary social phenomenon. Nevertheless, what profoundly differs contemporary rural tourism from the traditional one is tourist` profile and scope of the phenomenon. The roots of general interest in rural tourism can be found in: a) changes of rurality and rural space, b) changes in tourism itself and c) changes in global society – rural society relations.

In the first case, we think of transformation of rurality and rural space due to the demise of relative self-sufficiency of traditional rural society. Rurality (hereby understood as a way of life and specific type of social relations!) loses its collectivistic character. The homogenous rural structure erodes. At the same time, rural space is no longer exclusively private. In contemporary societies, it is more than place of extraction (of

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[1] There are, of course, regional differences in significance and tourism industry development. Thus, we can notice traditionally attractive tourist destinations (such as France), buy also brand new ones (Asian and South American developing societies).

resources, people and money), it becomes place of consumption. Rural space is nowadays treated as multifunctional resource. Accordingly, in the context of general commodification, rural economy changes. Rural economy`s vitality depends on its possibilities to adapt on constantly changing conditions of global market. It depends on development of complementary industries, based on local available resources. Above mentioned commodification means that landscapes, culture/tradition and local (mostly collective) identities are considered as tradable goods/commodities. This significantly transforms the way that rural communities function because „*a consumer value system supersedes a community value system*"(George, Mair, Reid, 2009: 36). Commodification of rurality, accompanied with the new social actors on rural scene, inevitably leads to its redefining. Postmodern understanding of rurality overcomes narrow boundaries of the apparent and invades the sphere of social constructs, experiences. This is crucial for understanding rural tourism development in contemporary societies.

Besides rurality and rural space, tourism has changed, as well. Contemporary economy focuses on experience and primary economic value. That means that contemporary consumer do not aspire only for specific product (goods/service) – his/her objective is an experience of the product (Čikić, Jovanović, 2015: 20) and evaluation of the ratio between fulfilled expectations and experience costs. According to Gentile, Spiller, Noci (2007: 397), experience is *"strictly personal and it involves and engages a customer at different levels (rational, emotional, sensorial, physical and also ''spiritual'')"*. Thus, it is obvious why Pullman and Gross (2004) advocate for the customer experience design as a crucial momentum in experience economy.

In its very core, tourism is creation and provision of experience. Without arguing whether tourism implies authentic (MacCanell, 1973; according to: Cohen, 2001: 98) or staged experience (Sternberg, 1997: 952), it certainly differs from the tourist`s everyday life[1]. In order to be significant and attractive for the tourist, experience has to be personalized. Thus, its design has to be flexible to address segmented

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[1] We think of new social relations of tourist and recipient population, other tourists, even though population from tourist`s everyday life experience. We also think of new space, both physical and social.

demand[1]. This opens up the space for the market niches and the development of alternative forms of tourism. Rurality is one of the important and very attractive macro areas in rising niche tourism[2]. Magnetism of rural tourism arises from the elements of cultural patterns which become part of tourist offer (Cabrini, 2004: 9), characteristics of rural space as one of the key resources and from the "*unique patterns of the rural environment, economy, history and location*" (Lane, 1994; according to: Fotiadis, 2009: 14).

Third reason for the increase of general interest in rural tourism relates to the changes in global society – rural community relations. Those imply changes in both theoretical and practical (!) concepts of rural development and the role of state in the process[3]. Specifically, transformation of rural space (recognition of its multifunctionality, hybridism and networking) induced new drivers for the rural development. Moreover, one of the maxims of neoliberal[4] rural development policy is strengthening the participation of local/rural population, *community capacity building*[5] and support of public-private partnerships with numerous stakeholders[6]. Rural tourism is regarded as a driver for the rural economy reconstruction (LEADER, Strategy of

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[1] According to Todorović and Štetić (2009: 12) contemporary tourism implies „*the search for the new tourism products, active participation in generation of tourism products, segmentation of demand for the specific products, direct communication with the potential consumer*.“

[2] Roberts and Hall (2004) spoke of characteristics and terms of market niches in tourism with special insight in rural context.

[3] Sotte (2003: 4) wrote of three main models of rurality/rural development. In agrarian model, key industry is agriculture. State support includes measures of agricultural policy for the market and production intensification. In the model of industrial rurality, secondary sector has the primacy. State support also relates to the agricultural market, substitution of the labour force in agriculture, due to the increasing demographic issues. Post-modern rurality is based on services. State focused its policy on rural, not only agricultural development. Support measures are direct towards environmental protection, rural heritage preservation, rural economy diversification etc.

[4] In neoliberalism „*government involvement in the workings of the market is deemed inefficient and the responsibility of the individual for self-reliance are paramaount*“ (George, Mair, Reid, 2009: 21).

[5] Role of state consists of assistance for the communities to identify available resources, evaluate them, adequately connect them with the development goals and realization plans and also to connect local development goals with regional ones (Weiler, 2007: 32).

[6] Hall and Jenkins (1995; according to: George, Mair, Reid, 2009: 29) think that idea of tourism as development driver begins with the withdrawal of state from economic processes. In rural context, rural tourism is understood as a mechanism for replacement of the increase or lost of traditional economic base.

development of agriculture and rural areas in the Republic of Serbia) and blocker of rural depopulation. In short, rural tourism should contribute biological, economic and social reproduction of rurality. Rural human capital has an important role in tourism development. Its socio-demographic characteristics, value system, social, financial, cultural capital, power relations... are elements of overall potential for rural tourism development. In addition, positive or negative attitudes of local population on rural development are considered as stimulating or limiting development factors. Ultimately, it reflects on the overall effects of rural tourism on rural community wellbeing.

Impact of rural tourism on rural development and rural population attitudes and its measurement

The relation between rural tourism and rural development can be regarded at several levels: from the identification of the need for the rural tourism as rural development driver, through the analysis of quality and quantity of available local resources, then research of the benefits from the rural tourism to the analysis of rural industries to rural tourism development and *vice versa* (Čikić, Jovanović, 2015: 30). Hereby, we are interested in the third level – impact of rural tourism on rural development.

Discussion on the impact of rural tourism on rural development implies identification of its positive and negative effects on the rural community and local population. Positive effects comprise creation of new jobs and linking rural tourism with other (traditional or new) industries in rural economy (agriculture, processing industries and services). Consequently, this leads to decrease in rural unemployment and poverty. Also, rural economy development has positive influence on decrease of rural aging and rural depopulation. Rural tourism development protects traditional rural way of life and rural landscapes. Besides, it contributes to the infrastructure improvement and development of local social institutions and organizations.

On the other hand, recently, the "dark side of the moon" has been recognized. Tourism development in rural areas can caused: a) the emergence and/or increase of environmental problems, b) the emergence and/or increase of socio-pathological issues, c) negative changes in the labour market (immigration of cheap labour, decrease of local employment and wages) and rural economy in general (functional incompatibility of

tourism and other rural industries, uneven distribution of profits from the tourism), d) increase of rural living costs, e) disruption of rurality due to its adaptation to tourists` needs (Čikić, Jovanović, 2015: 31). Recognition of these and similar both positive and negative effects of rural tourism generates the need for measuring its impact on rural development.

Character of the consequences as well as intensity of the rural tourism impact on rural development depends on several factors: characteristics of rural social structure, existing features and/or potentials for tourism development (characteristics of rural space as tourist destination), measures of state (and other) support to rural development, demand for rural tourism and recipient population`s attitudes on rural tourism. The last is the subject of numerous researches (Wang, Pfister, 2008; Látková, Vogt, 2012; Mcgehee, Andereck, 2004). The idea of measurement of tourism impact on social communities evolved in 1970`s, accompanied with the intense interest in research of local population as a tourism development factor. For the purpose, TIAS (*Tourism Impact Attitude Scale*) has been developed and frequently used[1]. Its development caused great deal of positive and negative attention. In spite of the critics (Preglau, 1994; Ap, Crompton, 2001), TIAS has found its use in many scientific and professional papers (Schneider, Lankford, Oguchi, 1997; Lankford, 1994; Wang, Pfister, 2008).

Thus, we use TIAS to analyze the attitudes of rural hosts on rural tourism impact in Vojvodina. There are two main reasons for selecting this particular scale. First, insight in Serbian references on rural tourism reveals focus mostly on positive tourism impact, usually without any critical appreciation (Đurović, Cvejić, 2011; Đorđević-Milošević, Milovanović, 2013; Мухи, 2010; Радовановић, 2010). Second, as the authors are aware, TIAS has been applied only couple of time in domestic research of rural tourism (Blešić et al., 2014; Петровић, 2014), but not on hereby selected population. There are two main theoretical backgrounds for the research

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[1] Lankford and Howard (1994: 127-130) have constructed Likert type scale in four steps: a) defining 72 items based on literature and panel discussion with four tourism researchers, b) pretesting the scale on intentional sample, 22 items dismissed, c) verification of the scale on the random sample of 2,583 in two independent samples and d) defining the scale of 27 items. Among items, 18 of them regard first factor (support of local and regional tourism development). Other nine items regard second factor (personal and community benefits for tourism development on local and regional level). TIAS is not the only instrument for measuring tourism impact on local community (Akis, Peristianis, Warner, 1996; Gursoy et al., 2015; Koa, Stewart, 2002; Pizam, 1978; Perdue, Long, Allen, 1990; Akis, Peristianis, Warner, 1996; Thompson, 2007).

and application of TIAS: theory of social exchange (Abdollahzadeh, Sharifzadeh, 2014; Ap, 1992; Choi, Murray, 2010; Chuang, 2010; Wang, Chen, 2015) and sociological, psychological and tourism research on host – tourist relation. According to the theory of social exchange, people behave in order to enable fulfilment of their interest. Social relations are mean of interest`s realization. In our context, that implies that attitudes on rural tourism development are influenced by estimation of ratio between invested resources (costs) and potential benefits (rewards). Those who have (direct) benefit from the tourism development are more inclined to the idea.

Based on the model proposed by Látková and Vogt (2012: 52-53), we have selected socio/demographic variables[1] and characteristics of rural tourism facilities[2] as factors of the local population`s perception of rural tourism impact on rural community. Thereby, we have started with three hypotheses:

h1: rural hosts have positive attitude towards rural tourism development; also, they consider benefits for rural tourism development to be more prominent than potential negative impacts;

h2: among socio-demographic variables, education in tourism has the greatest influence on rural hosts` attitudes, especially on those related to the benefits from rural tourism;

h3: among characteristics of rural tourism facilities, profit, investments plans and cooperation with the extension service have the greatest influence on rural hosts` attitudes, especially on those related to the benefits from rural tourism and support for the local tourism development.

Method and data resources

The research of the rural tourism impact on rural development is based on the results of the empirical research with rural hosts (owners/employees of rural tourism establishments) in Vojvodina[3]. 41% of total rural hosts

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[1] Gender, age, education level and education in tourism.

[2] Type of the tourism establishment, development of tourism offer, ratio of tourism income, fluctuation of the income, investment plans, cooperation with the Agricultural Extension Service of Vojvodina (in Serbian abbreviation PSS).

[3] Project *Agricultural Extension Service of Vojvodina and rural tourism development: the analysis from the potential clients` perspective* is implemented by the end of 2014 and in the beginning of the 2015. Data was collected by three types of survey: electronic, postal and personal.

participated[1]. We have used survey to collect data. The original questionnaire consists of 59 questions classified into six groups (Čikić, Jovanović, 2015: 54-55). Last group of questions is TIAS[2]. Using exploratory factor analysis, Petrović (2014) established four dimensions of tourism impact of rural hosts` attitudes: 1) personal and community benefits from the rural tourism development, 2) negative impacts of the rural tourism development, 3) support for local tourism development and 4) general opinion on tourism development. More detailed analyses are based on average values four subscales/dimensions. All analyses were conducted in SPSS 17.0.

Research results and discussion

Analysis of the acquired data showed that rural hosts in Vojvodina agree the most with items that are about *General opinion on the tourism development* and agree the least with items that are about *Negative impact of the tourism development*. Considering the items that describe the first above mentioned dimension, we could conclude that for rural hosts in Vojvodina systematic state support in developing tourism is very important (from local to provincial level). Minimizing the negative effects of tourism development is, we believe, the consequence of immediate personal gain tourism offers to rural hosts. The major variation of responses (SD) is in the case of items that describe *Benefits from the tourism development* (Tab. 1) which might be due to the socio-demographic characteristics of rural hosts, characteristics of rural tourism establishments and their business success (Tab. 2 and 3).

Table 1. *Descriptive statistics of the dimensions of tourism impact on rural hosts` attitudes*

Total sample	Min	Max	M	SD
Benefits from the tourism development	1.00	5.00	3.1679	1.01128
Negative impact of the tourism development	1.56	4.00	2.3645	.42712
Support for the local tourism development	1.83	4.83	3.9327	.48167
General opinion on the tourism development	2.00	5.00	4.3421	.78010

Source: *Authors research*

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[1] More on basic characteristics of the research sample, used methods and instruments in: Čikić, Jovanović (2015).
[2] In previous research, TIAS has been translated to Serbian (Blešić et al., 2014; Петровић, 2014). It showed satisfactory psychometric characteristics (α=0.8).

In order to determine the effect of rural hosts` socio-demographic characteristics, characteristics of rural tourism establishments and their business success on TIAS dimensions, general linear modelling (GLM) was used. Indicator of model adequacy R^2 is 0.609 which shows that the model is adequate since chosen predictors explain over 60% of criteria variance. In Tables 2 and 3, the effects of these predictors are presented.

Based on the results (Tab. 2), gender and age have no significant impact on TIAS dimensions. On the other hand, education level and education in tourism have significant effect on dependent variables.

Education level influences the perception of *Benefits from the tourism development* and *Negative impact of the tourism development*, while education in tourism significantly affects only the perception of *Benefits from the tourism development* (Tab. 2; Graphs 1, 2 and 3).

Rural hosts with elementary education have the highest degree of agreement with the items related to *Benefits from the tourism development*, while those with high school and college education have the lowest degree of agreement. The effect of the lower education could be interpreted in two ways. Lower level of education could mean insufficient information about the characteristics and effects of rural tourism which could lead to the overestimation of its positive effects.

On the other hand, higher degree of agreement with *Benefits from the tourism development* of the rural hosts with lower education could be interpreted as a consequence of their lower social chances, thus firmer bond with rural community and greater devotement to rural tourism. Similar could be concluded about *Negative impact of the tourism development*, only for this dimension, rural hosts with university education have higher degree of agreement than in the case of previous.

This could be explained by their better awareness about the consequences of rural tourism. This claim is supported by the findings that higher level of education of rural hosts positively and significantly correlates with the frequency of using several important sources of information about rural tourism: expert literature (r=0,269, p<0,05), specialized internet pages about rural tourism (r=0,274, p<0,05), and cooperation with Agricultural Extension Service (r=0,369, p<0,01). Having more information creates greater criticism towards the effects of rural tourism.

Table No 2. *Results of general linear modelling (N=57) - socio-demographic characteristics of rural hosts*

Independent variable	Dependant variable	Type III Sum of Squares	df	Mean Square	F	p
Sex	Benefits from the tourism development	1.662	1	1.662	2.675	.111
	Negative impact of the tourism development	.006	1	.006	.040	.842
	Support for the local tourism development	.189	1	.189	.982	.328
	General opinion on the tourism development	.519	1	.519	.758	.390
Age	Benefits from the tourism development	.141	1	.141	.227	.637
	Negative impact of the tourism development	.043	1	.043	.274	.604
	Support for the local tourism development	.101	1	.101	.527	.473
	General opinion on the tourism development	.003	1	.003	.005	.943
Education	**Benefits from the tourism development**	**8.168**	**4**	**2.042**	**3.287**	**.021**
	Negative impact of the tourism development	**2.079**	**4**	**.520**	**3.325**	**.020**
	Support for the local tourism development	.798	4	.200	1.038	.401
	General opinion on the tourism development	1.219	4	.305	.445	.775
Education in tourism	**Benefits from the tourism development**	**8.858**	**3**	**2.953**	**4.752**	**.007**
	Negative impact of the tourism development	.214	3	.071	.455	.715
	Support for the local tourism development	.627	3	.209	1.087	.367
	General opinion on the tourism development	1.164	3	.388	.567	.640

Concerning education in tourism, hosts of rural tourism facilities with fewer employees educated in tourism have the highest degree of agreement with *Benefits from the tourism development* dimension.

There is also a significant difference in the degree of agreement between those who had any kind of education in tourism and those that didn't (which had the lowest degree of agreement).

This difference could be explained with the degree of informedness[1], therefore developed awareness about the consequences of rural tourism development.

Charts No. 1&2. *Education (1- elementary school, 2 - high school, 3 - college, 4 - university, 5 - MSc/PhD) impact on dimensions of tourism impact on rural hosts` attitudes (F1 - Benefits from the tourism development, F2 - Negative impacts)*

Chart No. 3. *Education in tourism (1- we all have education in tourism, 2 - most of us have education in tourism, 3 - few of us have education in tourism, 4 - no one have education in tourism) impact on dimension of tourism impact on rural hosts` attitudes (F1 - Benefits from the tourism development)*

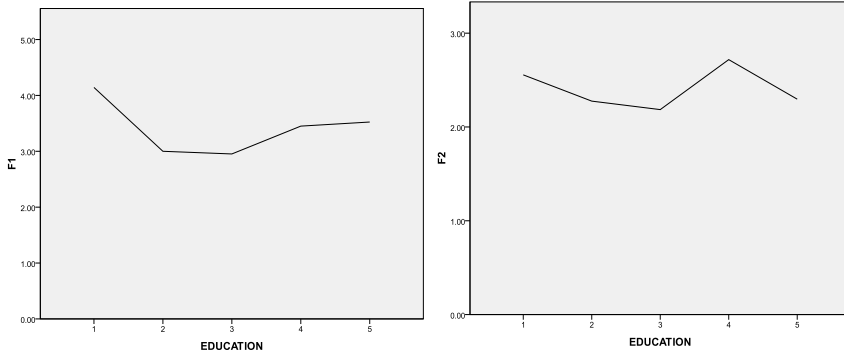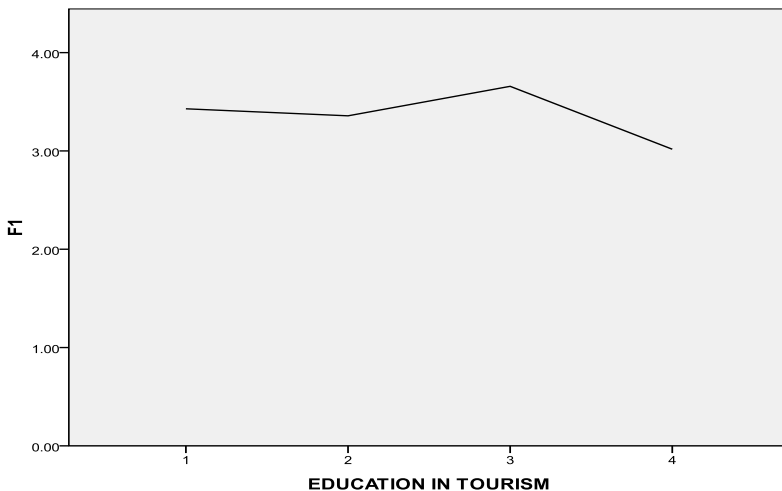[1] Research results indicate that hosts of rural establishments with more employees educated in tourism are more likely to use professional literature as a source of information and professional education in rural tourism (r=-0,387, p<0,01).

Table No 3. *Results of general linear modelling (N=57) - characteristics of rural tourism establishments and their business*

Independent variable	Dependant variable	Type III Sum of Squares	df	Mean Square	F	p
Type of the establishment	Benefits from the tourism development	2.287	3	.762	1.227	.314
	Negative impact of the tourism development	.450	3	.150	.959	.423
	Support for the local tourism development	.896	3	.299	1.553	.218
	General opinion on the tourism development	2.059	3	.686	1.003	.403
Development of tourism offer	Benefits from the tourism development	.411	1	.411	.661	.421
	Negative impact of the tourism development	.135	1	.135	.866	.358
	Support for the local tourism development	.020	1	.020	.103	.750
	General opinion on the tourism development	.015	1	.015	.021	.885
Rural tourism revenue in overall budget	**Benefits from the tourism development**	**13.848**	**1**	**13.848**	**22.288**	**.000**
	Negative impact of the tourism development	.486	1	.486	3.107	.086
	Support for the local tourism development	**1.860**	**1**	**1.860**	**9.670**	**.004**
	General opinion on the tourism development	.419	1	.419	.613	.439
Change in rural tourism revenue	Benefits from the tourism development	1.732	1	1.732	2.787	.104
	Negative impact of the tourism development	.013	1	.013	.086	.771
	Support for the local tourism development	.182	1	.182	.944	.338
	General opinion on the tourism development	.010	1	.010	.015	.904
Investment plans	Benefits from the tourism development	1.494	1	1.494	2.405	.130
	Negative impact of the tourism development	.512	1	.512	3.273	.079
	Support for the local tourism development	.085	1	.085	.444	.509
	General opinion on the tourism development	.629	1	.629	.920	.344
Cooperation with the Agricultural Extension Service of Vojvodina	**Benefits from the tourism development**	**8.334**	**4**	**2.083**	**3.353**	**.020**
	Negative impact of the tourism development	.384	4	.096	.614	.656
	Support for the local tourism development	.425	4	.106	.552	.699
	General opinion on the tourism development	2.487	4	.622	.909	.469

Results (Tab. 3) indicate that variables such as type of the establishment, development of tourism offer, change in rural tourism revenue and

investment plans have no significant influence on TIAS dimensions. However, results of the analysis show that variables "rural tourism revenue in overall budget" and "cooperation with the extension service" have significant influence on the dimensions of the impact of tourism on attitudes of rural hosts. Out of measured characteristics of rural tourism establishments and their business, rural tourism revenue in overall budget and cooperation with the extension service affect the perception of attitudes related to the *Benefits from the tourism development* (Tab. 3 and Graf. 4). Also, rural tourism revenue influences the *Support for the local tourism development* as well. Higher the rural tourism revenue, greater the degree of agreement on both dimensions. Higher revenue leads to a greater emphasis of benefits of tourism development and greater concern for the development of tourism, since tourism for them is probably the main source of income.

Chart No. 4. *Cooperation with the Extension Service (PSS) (1- we cooperate, 2 - we have been cooperation, 3 - we have been cooperating, but not regarding rural tourism, 4 - we have never been cooperating, 5 - never heard of Agricultural Extension Service of APV) impact on dimension of tourism impact on rural hosts` attitudes (F1 - Benefits from the tourism development)*
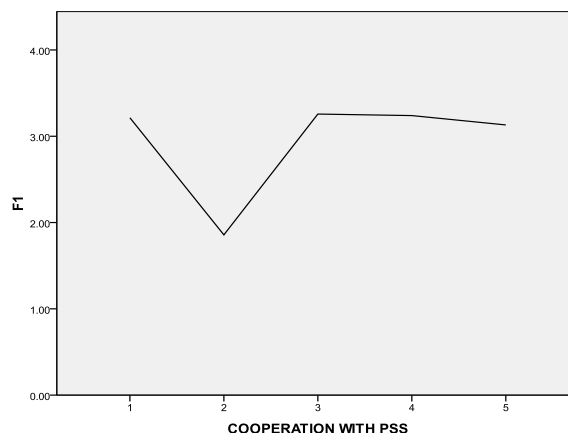
Those who have cooperated earlier with the extension service have the lowest degree of agreement with items from the dimension *Benefits from the tourism development* while other groups of rural hosts have uniform and above average degree of agreement. This might be because of the inadequate cooperation of rural hosts with the extension service. Such cooperation resulted in unfulfilled expectations of rural hosts that eventually led to the cessation of cooperation and negative attitudes towards the benefits of the rural tourism development.

616

Conclusion

Results of the research have confirmed first and second hypothesis while the third has been partially confirmed since the attitude towards the investment (as an expression of the long-term commitment towards rural tourism) has no effect on either of TIAS dimensions. Revenue and cooperation with the extension service were shown to be relevant predictors of respondents' attitudes so it is important to further develop these segments of business management. Level of education and education in tourism shape hosts' attitudes which additionally confirms initial authors' assumptions (Čikić, Jovanović, 2015: 110-118) about the importance of diffusion of knowledge as a key factor of the rural tourism development.

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SUSTAINABLE TOURISM AND FOREST FIRES

Mihailo Ratknić, Sonja Braunović[1]

Abstract

The increasing frequency and number of fires and destroyed hectares of land have had continuous negative economic effects on the economy and society. Large-scale fires which have recently affected large areas of protected natural resources in the National Park Tara, Stara Planina Nature Park, Special Nature Reserve Deliblato Sands, Kamena Gora, etc. have undoubtedly decreased the number of visitors and indirectly hindered the economic progress of the local communities. The inflicted damage takes a lot of time to be repaired, while it can take more than 300 years for a complete revitalization of natural ecosystems. This paper represents the first attempt to harmonize sustainable development of tourism with the risk management in the protection of forests against fires on the case study of the town of Knjaževac and the Stara Planina Nature Park in it.

Key words: *forest fire, sustainable tourism, risk management*

Introduction

Tourism and tourism related sectors employ one in eleven people worldwide, and one out of 10 dollars is earned in these sectors. In 2013, the tourism and travel industry generated approximately 7,000 billion dollars in revenue (The World Travel and Tourism Council, WTTC). In Serbia, the tourism generated revenue in 2013 amounted to 71.9 billion dinars (800 million dollars), which is 1.9% of GDP and well below the world average of 2.9% (according to the estimates of The World Travel and Tourism Council). Tourism employed 34,800 people in Serbia in 2013, but if we take into account indirect benefits of tourism, this industry provided jobs for 86,400 people. International arrivals, which are taken as export revenues, generated 1.2 billion dollars, which ranks Serbia 96th country.

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Serbia is a country rich in resources for eco and rural tourism. However, these resources haven't been managed properly. Consequently, natural disasters in general can have long-term adverse effects on the economy and tourism development. Forest fires and floods are a constant threat. In the last two decades, fires have had substantial negative effects on the tourism industry as a whole. For instance, only one fire in Florida reduced the revenue generated by the provision of holiday accommodation by 61 million dollars, while other economic branches suffered a loss of about 77.2 million dollars and thus endangered the most important tourist regions of this area (Mercer, D. et al., 2007; Diaz, M., 2012).

This paper represents the first attempt to harmonize sustainable development of tourism with the risk management in the protection of forests against fires (as one of natural disasters) on the case study of the town of Knjaževac.

Knjaževac is the fourth largest municipality in Serbia and covers an area of 1,202 square kilometers. It occupies mostly hilly and hilly-mountainous areas. The highest mountain peak is Midžor (2169 meters) on Stara Planina and the lowest point is at 176 meters above sea level. According to the 2011 census, the total population of the municipality is 31.491.

The town population is 18.404, while the rest of inhabitants live in 85 villages and hamlets. The town has a highly valuable multipurpose and diverse resource - *Stare Planning Nature Park* with its attractions, such as Babin Zub, Midžor and Banjica. Its agricultural land, forests, water, and favorable climate conditions have both quantitative and qualitative significance and make permanent and renewable resources for diverse mass usages.

Knjaževac has rich natural resources and favourable conditions for crop cultivation, animal husbandry, fruit and vine crop production, production of medicinal herbs, mushrooms, berries and game and their conversion into organic products. Along with its cultural and traditional values (cottage industry, traditional events, architecture ...) they make the basis for sustainable tourism development (Figure 1). Excessive exploitation of natural resources, scarce rainfall and the ongoing climate change along with the increasing number of tourists on Stara Planina in the last 15 years have led to a tenfold increase in the number of areas affected by fires.

623

Forest fires in Serbia

Although fires can occur at any time of the year, the primary fire season coincides with the peak tourist season and can become a major problem for the sector of supply and demand in tourism.

Table 1. *Damage caused by fires in private and state forests in Serbia*

year	Total						State sector					
	Burnt area (ha)			Damaged wood volume (m³)			Burnt area (ha)			Damaged wood volume (m³)		
	Ground	High	Total	Ground	High	Total	Ground	High	Total	Ground	High	Total
2003	1202	200	1402	-	-	37521	239	197	418	31196	4791	35987
2004	201	1	202	1502	-	1502	115	-	115	310	-	310
2005	47	5	52	-	-	528	26	4	30	40	390	430
2006	494	474	20	936	144	1080	328	20	348	929	144	1073
2007	20778	1383	22161	5671	147	5818	7064	737	7801	3085	72	3157
2008	497	78	575	3215	3934	7149	376	47	423	2477	3519	5996
2009	1010	200	1210	249	1683	1932	235	18	253	214	1683	1897
2010	488	15	503	57	-	57	266	14	280	16	-	16
2011	1570	466	2036	4360	20210	24570	476	231	707	2136	19604	21740
2012	2820	4640	7460	5689	57429	63118	1337	3771	5108	2599	27778	30377
2013	-	-	850	-	-	7343	-	-	703	-	-	7178
2014	-	-	1086	-	-	10256	-	-	601	-	-	9606
Total			37557			160874			16787			117767

Source: *Statistical Office* of the *Republic* of *Serbia*

Tourist destinations that have been affected by fires are mostly related to the National Parks of Kopaonik, Tara and Fruska Gora, as well as nature parks and mountainous regions of Serbia in general. These are popular destinations visited by thousands of tourists every year. Furthermore, 2012 for instance saw 5102 fires, 1337 ground fires in the state sector and 1483 in the private sector, as well as 3771 high fires in the state and 869 in the private sector. About 7,500 hectares were burnt (Statistical Office of the Republic of Serbia, 2013). The number of fires, the size of burnt areas and the volume of damaged wood have been increasing since 2003. A total of 22,161 hectares was burnt in 2007, while in 2012 fires affected a far smaller surface area, but they damaged as much as 63,118 m³ of wood volume on it (Table 1).

The threat to rural development

Multifunctional benefits of villages and sustainable rural tourism are considered to be key components of rural development (Milenković, Utvić, 2013). In terms of rural development, a village provides multipurpose benefits and it is intended not only to produce food, but also to maintain rural landscapes, protect biodiversity, create employment

opportunities and contribute to the sustainability of rural areas. With the rise of rural tourism, the role of villages in providing healthy food and places for relaxation and recreation has become increasingly important. If we want to overcome the existing disadvantages in the concept of rural areas, we must put the emphasis on the potentials that they offer instead of underlying their different needs (Štetić, Šimičević, 2013).

In addition to the potentials of rural areas, attention should be paid to the risks that the development is faced with, primarily to forest fires. According to the European Commission "increased investments, innovations and value added products and services, both within and beyond the agricultural sector are indispensable in order to promote integrated and sustainable rural development" (Commission of the European Communities, 2005). Multifunctional production and consumption go hand in hand and the village, as a public good, provides environmental and aesthetic comfort and space for relaxation and recreation, which were previously largely ignored. Frequent dry spells have caused the occurrence of fires that have threatened large areas of the territory of Serbia, primarily through firestorms, loss of soil fertility, deterioration of air quality, or destruction of cultural and natural values (Figure 1).

Figure 1. *Map of natural and cultural values of Knjaževac*
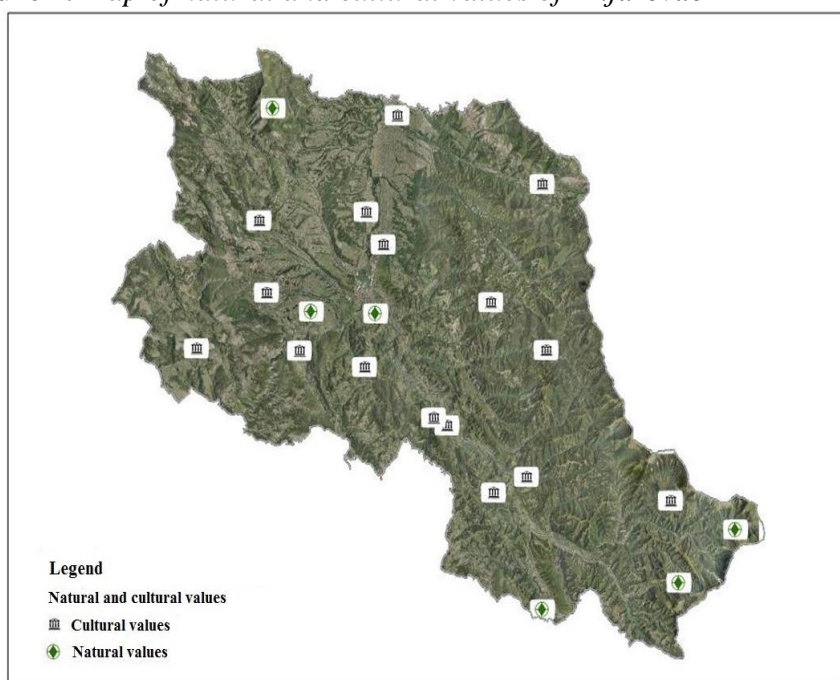
These factors are becoming increasingly dangerous for visitors and tourist organizations. Large-scale fires which have recently affected large areas of protected natural resources in the National Park Tara, Stara Planina Nature Park, Special Nature Reserve Deliblato Sands, Kamena Gora, etc. have undoubtedly decreased the number of visitors and indirectly hindered the economic progress of the local communities. The inflicted damage takes a lot of time to be repaired, while it can take more than 300 years for a complete revitalization of natural ecosystems. (Ratknić, M. et al., 2014).

Fires pose a serious threat to the tourism industry, which points to a necessity to carry out a thorough study of all related. Tourism products are subject to external risks which can affect the choice of destination. The magnitude of the impact depends on the extent and size of the fire, but it generally leads to a voluntary or a mandatory evacuation, problems with smoke on the roads and their temporary closure, closure of vulnerable destinations and unfavorable media coverage. In such cases, potential visitors of vulnerable tourist destinations are given three options:
- they can continue the planned trip without any modifications;
- they can continue the planned trip, with some modifications (shortening the length of stay, choosing a safer destination with similar attractions);
- they can cancel the trip or requests additional information related to the continuation of the planned trip (Reisinger, Crotts, 2010).

Forest Fire Risk Management

Risk management comprises a set of measures and methods of prevention, preparedness and response to the event, as well as mitigation of harmful effects to reduce damage and to create conditions under which the risk may be acceptable. The risk of forest fire is defined as a function of the probability of the unwanted events and its potential consequences.
There is a constant probability of forest fire occurrence, but if we implement relevant preventive and organizational measures, these adverse events can be predicted and avoided.

The Regulation on classification of buildings, activities and land into a fire threat category (Official Gazette of RS No. 76/2010) stipulates classification of land, that is, certain plan-covered areas, into the following fire threat categories:
- Category 1.7. Areas with protected and high-quality forests, over 10 000 ha in size.

- Category 1.8. Areas with protected and high-quality forests, 5000 to 10 000 ha in size.
- Category 2.1. Areas with protected and high-quality forests, 800 to 5 000 ha in size.
- Category 2.2. Areas with protected and high-quality forests, 800 ha in size.

Land categorization requires the development of plans for the protection of forests against fire, which must be in line with the rulebook for making fire protection plans. It is necessary to develop a methodology for risk assessment, since previous methodology used to take vegetation as the only fire threatening factor, which does not give a true picture.

Different forests are subject to different forest fire risks and the degree of the risk depends on many factors that define the individual degree of vulnerability. There has been an increasing number of forest fires and burnt areas lately. They have been caused by a number of different factors, the most important of which are the frequency and the length of dry periods, increased human presence in forests (with the development of rural and mountain tourism) and the like.

Therefore it is necessary to develop a methodology of forest fire risk assessment which will include other parameters such as tourist facilities and destinations as potential forest fire sources or areas that require protection in terms sustainable rural development (Ratknić et al, 2014).

Assessment of forests from fire

If forest fire protection measures are implemented timely, professionally, and in an organised manner, it can be expected that a number of burnt areas becomes lower, fire and dangers are timely foreseen and their number reduced, and the damage caused by forest fires is significantly decreased. The main objective of a forest fire threat assessment is:

1. To present an accurate picture of a level of forest fire threat to the institutions involved in forest fire protection.
2. To determine and classify dangers arising from forest fires in a monitored area.
3. To point out to possibility of forest fire protection in a particular area and application of additional protection measures.
4. To point out to specificities and fire dangers in a monitored area to

specialised agencies involved in fire protection and fire suppression.
5. To find models of additional protection measures and more effective fire suppression when a fire occurs in a particular area.
6. To present a methodology for performance of a fire threat assessment as the most important element in creation of planning acts such are forest fire protection plans, adjusted to the climate and characteristics of the area.

Parameters used in a forest fire threat assessment

Parameters that produce an impact on forest fire threat are numerous, but for the purpose of practical application of the threat assessment method, it will include only the parameters considered the most important and producing the strongest impact on forest fire threat. The key parameters used in forest fire threat assessment are:

a) vegetation and combustive material
b) natural phenomena producing an impact on fire occurrence
c) anthropogenic factor (human-induced risk)
d) climate characteristics
e) length of drought period
f) geological layer and pedological characteristics
g) orographic characteristics
h) openness of forest complex
i) a development level of an area for tourist and outing activities
j) other biotechnical protection measures
k) Fire record in the monitored area

a) Vegetation and combustible material. Vegetation, which consists of represented tree species and various types of combustible material in forest, represents the basis that is subject to direct or indirect impact of all other factors that create different levels of fire threat. The main vegetation parameters used for determination of a forest fire threat level are presented in the Table 2 and 3.

Forests can be classified according to different criteria (types of trees, silvicultural method, age, function, etc); however, they are most commonly divided into: coniferous forests, deciduous forests and mixed forests. Furthermore, specific forms, such as thicket, scrub, maquis, garrigue, degraded forests are also taken into account due to their specificity in terms of fire sensibility. Under further vegetation

classification, cultures in artificially established plantations are singled out as a specific category, regardless of their age, since the age does not affect a level of forest fire threat (in natural forests, as the age increases, the level of forest fire threat decreases), while in case of cultures, that difference is negligible.

Table 2. *Vegetation parameters*

Forest type	Number of points
Category I	
Xerothermal and mesothermal coniferous forests (natural and artificial) type with a high resin content	200
Natural and artificially established black pine forests	200
Natural and artificially established white pine forests	200
Category II	
IIa – Xerothermal broadleaf forests	180
Downy oak forests; Flowering ash forests; Oriental hornbeam forests; Turkish oak forests	180
IIb – Mesothermal broadleaf forests in warmer exposures	180
Hop hornbeam forests; Sessile oak forests; Dalechampii oak forests	180
Category III	160
Mesophilic and frigoriphilic forests (natural and artificial); type with a lower resin content	160
Fir forests; Spruce forests ; Serbian spruce forests ; Macedonian pine forests; Artificially established larch stands; Artificially established *Douglas-fir* stands; Artificially established eastern white pine stands; Artificially established *abies grandis* stands; Artificially established stands of other species of the same characteristics	160
Category IV	140
IVa – Broadleaf and coniferous mesophilic and frigoriphilic mixed forests (natural and artificial)	140
Fir forests; Spruce forests ; Beech forests	140
IVb – Mesophilic and mesothermal broadleaf mixed forests	140
Common hornbeam and sessile oak forests	140
Category V	120
Forests dominated by mesophilic deciduous species	120
Beech forests; Common hornbeam forests; Birch forests; Aspen forests	120

Source: *Ratknic et al., 2014.*

A further division of natural coniferous, mixed and deciduous forests was conducted according to a forest's need for light and its age, although certain other properties of specific forest types also affect their fire threat level (content of resin, tannin, etheric oils, forest canopy, ground vegetation).

b) Natural phenomena that have an impact on forest fire occurrence.
Although natural phenomena that cause forest fires account for only 1%
of the total fire causing agents in forests, this occurrence requires a
particular attention. There are areas exposed to activity of certain natural
phenomena, which can become frequent causing agents of forest fire
occurrence in a particular period. The most common natural phenomena
causing forest fires are atmospheric discharge and thunderbolt, along with
the effect of sun heat, when the heat acquires certain focus and leads to
ignition of combustive material, most frequently in form of dry grass.

Tabela 3. *Vegetation parameters*

Stand condition based on a degradation level	Number of points
Degraded stands	100
Thickets	160
Scrubs	160
Stand age	
Under 30 years of age	80
31 to 60 years of age	60
Above 60 years of age	40
Barren land condition	
Category II	
Barren land in warmer exposures, thickly covered with ground vegetation	180
Category III	
Barren land on shady side, thickly covered with ground vegetation	140
Barren land on sunny side, sparsely covered with ground vegetation	
Category IV	
Barren land thickly covered with ground vegetation, dominated by *Vaccinium myrtilis*, *Vaccinium vitis-ideus*, *Vaccinium uliginosum*, *Arictostaphillos uva-ursi* and similar perennial plants	120
Category V	
Barren land mainly without ground vegetation	40
Barren land in ground vegetation dominated by moss (particularly *Sphagnum* sp. and *Hylocomium* sp.) or ferns Equisetum sp.	20
Marshy smaller areas regardless of a coverage level and vegetation composition	10

Source: *Ratknic et al., 2014.*

An increasing attention has been given to a theory that many forest fires
occur by the agency of 'sun winds'; however, this theory has not been
scientifically proved yet, therefore it will not be considered in the
framework of this methodology. Atmospheric discharge is more common
in higher than in lower mountain regions, as the tree height increases with
an altitude. Discharges into high broadleaf trees are more frequent than

discharges into coniferous trees. Parameters identified on the basis of observation and the relation between danger and atmospheric discharge traces on trees are presented in Table 4.

Table 4. *Parameters used for determination of forest fire threat caused by atmospheric discharge*

Number of atmospheric discharge traces on trees within a 5 km^2 surface area	Danger of tree and forest fire occurrence	Number of points
above 10	considerable danger	20
under 5	danger exists	10
under 2	low danger	0

Source: *Ratknic et al., 2014*

c) Anthropogenic factor – human-induced risk. Nearly 98% of forest fires are directly or indirectly related to human activity. The presence of man in forests as a shepherd, tourist, forest fruit collector or hunter increases a specific forest fire threat. A particular threat arises from a man's activity related to fire ignition: burning of stubble or plant litter and use of fire in forests for any other type of purpose. Therefore, the anthropogenic threat occupies an important position among the forest fire threat factors. Some of the indicators of anthropogenic impact on the forest fire threat level are presented in Table 5.

Table 5. *Parameters of anthropogenic impact on forest fire occurrence*

Category 1	Number of points
Tourist and recreation forests; forests in the vicinity of agricultural land and waste disposal sites	60
Category 2	
Forests intersected by public roads, long-distance power lines or forests used as pasture	40
Category 3	
Forests in which forest fruit collection takes place, forests used for hunting and fishing and forests in which silvicultural works are performed	20

Source: *Ratknic et al., 2014*

If it is possible to classify forests into several categories according to a human-induced risk, than the impact of these factors on forest fire threat will be expressed by a total number of points.

d) Climate and climate impact on forest fire threat. Climate produces a joint effect with all other factors that have an impact on forest fire threat. Despite the fact that numerous climatic parameters have an impact on desiccation of combustible material (air temperature, relative air humidity, precipitations, wind, cloud cover, drought periods, etc.), only the tree most important parameters are used in a forest fire threat assessment: mean annual air temperature, mean annual amount of precipitation and mean annual relative humidity. When using these parameters, it is also necessary to include the duration of drought periods and their distribution in the course of a year into the assessment of climate impact on forest fire threat. Some of the parameters used for assessment of climate impact on forest fire threat are presented in Table 6.

Table 6. *Parameters used for determination of the impact of climatic elements on forest fire*

Climate characteristics	Number of points
Mean annual air temperature	
above 12°C	30
9,1-12,0°C	20
below 9,0°C	10
Mean annual amount of precipitation	
below 800 mm	30
801-1200 mm	20
above 1200 mm	10
Mean annual relative air humidity	
below 70%	30
71-80%	20
above 80%	10

Source: *Ratknic et al., 2014*

e) Drought period and its impact on forest threat. A drought period and duration of drought period are also important in the assessment of level of forest fire threat. Duration of drought period, expressed by a number of days, is one of the most important elements used for determination of a level of forest fire threat. In order to identify the real danger and threat of forest fire, a classification into four three-month periods according to a corresponding level of danger, has been conducted, since the threat level is not the same in January or February, for instance, as it is July or August, when that danger is higher as a result of high air temperature.

Furthermore, a number of dry days is also important for determination of a level of forest fire threat, since the length of duration of drought period

is a relevant factor – it is natural that the danger is higher when a drought period is longer, particularly in months when the air temperature is extremely high - July, August and September, and when that danger is most serious. Classification and division of drought periods based on months and number of days, along with a drought period impact on forest fire threat level expressed by points, are presented in Table 7.

Table 7. *Drought period parameters used for determination of a level of forest fire threat*

Number of dry days as per months	Number of points
FIRST PERIOD - January, February, March	
under 10 days	10
10 - 20 days	20
more than 20 days	30
SECOND PERIOD - April, May, June	
under 10 days	40
10 - 20 days	50
more than 20 days	60
THIRD PERIOD - July, August, September	
under 10 days	70
10 - 20 days	80
more than 20 days	90
FOURTH PERIOD - October, November, December	
under 10 days	10
10 - 20 days	20
more than 20 days	30

Source: *Ratknic et al., 2014*

f) A layer (parent substrate and soil type) and its impact on forest fire threat. A layer, i.e., parent substrate and soil type, also has an impact on forest fire threat. The moisture content in combustible material (needles, leaves, twigs), along with a soil type, has an impact on condition and retention of water in ground and inner layers, which affects combustibility and the threat arising from combustible material in forests. Classification of soil into categories and the corresponding fire threat level are presented in Tables 8 and 9.

g) Orographic characteristics. Among orographic characteristic, an altitude, inclination and terrain exposure have a pervasive impact. On terrains with a different altitude, exposure and inclination, the duration and intensity of sunrays are different and, consequently, so are the conditions for drying of combustive material (Table 10).

Table 8. *Type of soil and its impact on a level of forest fire threat*

Soil type	Subtype	Number of points
A. Automorphic soils		
I – (A)-C or (A)-R undeveloped		
Stone field (Lithosol)	all subtypes	80
Sierozem on loose substrate (Regosol)		
Eolic 'quicksand' (Arenosol)		
Colluvial soils (Colluvium)		
II – A-C or A-R (Humus-accumulative)		
Limestone – dolomite black soil (Calcomelanosol)		60
Rendzina		80
Humus-siliceous (Ranker)	Eutric	80
	Dystric	60
Chernozem	On loess and loess-like sediments	80
	On carobonate eolic sand	80
	On alluvial deposits	60
Smonitza (Vertisol)	Calcareous; Non-calcareous; Brownish	60
III – A-(B)-C or A-(B)-R (Cambic)		
Eutric brown (Eutric cambisol)	all subtypes	40
Distric brown or acidic brown (Distric cambisol)	Deep	40
	Very deep	20
Brown on limestone and dolomite (Calcomelanosol)	Shallow and medium deep	60
	Deep	40
Red soil (Terra rossa)		60
IV – A-E-B-C or A-E-B-R (Fluvial illuvial)		
Ilimerised or loess affected (Luvisol)	On limestone	40
	On siliceous rocks	40
Podzol		40
Brown podzolic (Brunipodzol)	all subtypes	20
V – P-C (Anthropogenic)		
Rigolano soil (Rigosol)		
Garden soil (Hortisol)		
VI – Technogenic I, II, III		
Disposal site soil (Deposol)		
Flotation material (wastewater deposits – Flotisol)		
Air precipitates (Aeroprecipitate)		

Source: *Ratknić et al., 2014*

h) Forest complex openness. Openness of a forest complex for roads is the basis for a successful prevention of forest fire occurrence.

Table 9. *Type of soil and its impact on a level of forest fire threat*

Soil type	Subtype	Number of points
B. Hydromorphic soils		
I – A-E/g-Bg-C – (Pseudogley)		
Pseudogley		40
II – Layers or (A)-G ili (A) – C (Undeveloped)		
Fluvial or alluvial (Fluvisol)	all subtypes	20
III – A-C-G – (Semi-gley)		
Fluvial meadow (Humofluvisol)		20
IV – A-G – (Gley)		
Pseudogley		40
Marsh black soil (Humogley)		20
Marsh gley (Eugley)		20
V – T-G – (Peat)		
High peat		40
Combined high and low peat		20
Low peat (Planohistosol)		20
VI – P-G – (Anthropogenic)		
Rigolano peat		0
Rice field soils		0
Hydromeliorated		0
C. Halomorphic soils		
I – Asa-G or Asa- CG – (Saline)		
Solonchak		40
II – A/E-Asa-BT,na-C (Solonetzs)		
Solonetz		40

Source: *Ratknić et al., 2014*

Table 10. *Orographic parameters*

Orographic characteristics	Number of points
Exposure	
South and level land	20
East and West	10
North	5
Altitude	
below 500 m	15
501-800 m	10
above 800 m	5
Inclination	
above 45%	15
31-45%	10
15-30%	5

Source: *Ratknic et al., 2014*

That includes a proper maintenance of fire prevention clearance area, where twig removal and twig pruning are carried out, as well as thinning and reduction of combustible material (Table 11).

Table 11. *Forest complex openness*

Forest complex openness	Number of points
Forest complex is open (a large area of forest complex is accessible through a developed road network, fire prevention rail tracks are regularly maintained)	5
Forest complex is partially open (larger areas of forest complex are poorly accessible, or accessible by forest roads unsuitable for fire trucks; fire prevention rail tracks are poorly maintained)	20
Forest complex is not open, there are no fire prevention rail tracks	40

Source: *Ratknić et al., 2014*

i) The development level of an area for tourist and outing activities

Table 12. *The development level of an area for tourist*

Development level	Number of points
Forest complex is well-developed for tourist and outing activities (areas designed for fire making are properly marked and their safety is ensured, barrels with sand for extinguishing smaller fires in the initial phase are provided, forest fire danger signs are properly placed)	5
Forest complex is partially developed for tourist and outing activities (forest fire danger signs are properly placed)	20
Forest complex is fully undeveloped for tourist and outing activities (there are no marked areas for making fire nor forest fire danger signs)	40

Source: *Ratknić et al., 2014*

Table 13. *Biotechnical protection measures*

Development level	Number of points
Forest complex has provided biotechnical protection measures (representation of mixed forests, combustible material that is less susceptible to fire, construction of fire protection rail tracks, construction of observation points and organisation of forest monitoring system, creation and implementation of a fire occurrence assessment system)	5
Forest complex has no biotechnical protection measures	40

Source: *Ratknić et al., 2014*

j) Other biotechnical protection measures

k) Fire record and its impact on forest fire threat. Fire record, or number of fires in a particular time interval in a specific area, has an impact on determination of the forest fire threat level. More specifically, the number of fire in a monitored area indicates what part of an area is more susceptible to fire occurrence and how increased a fire threat is. Furthermore, combustible material is not the same in areas with frequent fire occurrence, since the weather conditions that produce an impact on condition of combustible material susceptible to ignition, also change in that area. Some characteristics used for determination of a forest fire threat level, related to fire frequency in a monitored area within 10 years, are presented in Table 14.

Table 14. *Fire record parameters*

Number of fires in an area within a 10 year period	Number of points
5 and above	40
2 – 4	20
below 2	10

Source: *Ratknić et al., 2014*

A level of forest fire threat. Based on the above-mentioned parameters used for the assessment of forest fire threat, the points earned from the represented parameters are added; a level of forest fire threat is determined according to the total number of points. Categorisation of forest fire threat based on the number of points is presented in Table 15.

Table 15. *Forest fire threat categorisation*

| Forest fire threat level	Total number of points	Colour
Level one – extremely high threat	631-705	red
Level two – high threat	556-630	orange
Level three – medium threat	481-555	yellow
Level four- low threat	405-480	green

Source: *Ratknić et al., 2014*

Based on certain numeric indicators of forest fire threat, fire threat maps are created in which areas exposed to fire threat are presented in relevant colours (Figure 2).

Conclusions

The increasing frequency of forest fires and large fire-affected surface area require timely prevention against forest fires. In our country the assessment of forest fire vulnerability has not included all the elements that make forests vulnerable to fire. It has been mostly defined by tree species, without taking other parameters into consideration. For timely detection of the risk of fire it is necessary to be familiar with the things that may be the cause of forest fires, to provide continuous monitoring, collect data and improve knowledge.

Figure 2. *Map of Fire Risk in the Municipality of Knjaževac*

Legend
Map of fire risk
- low vulnerability
- medium vulnerability
- big vulnerability
- very big vulnerability
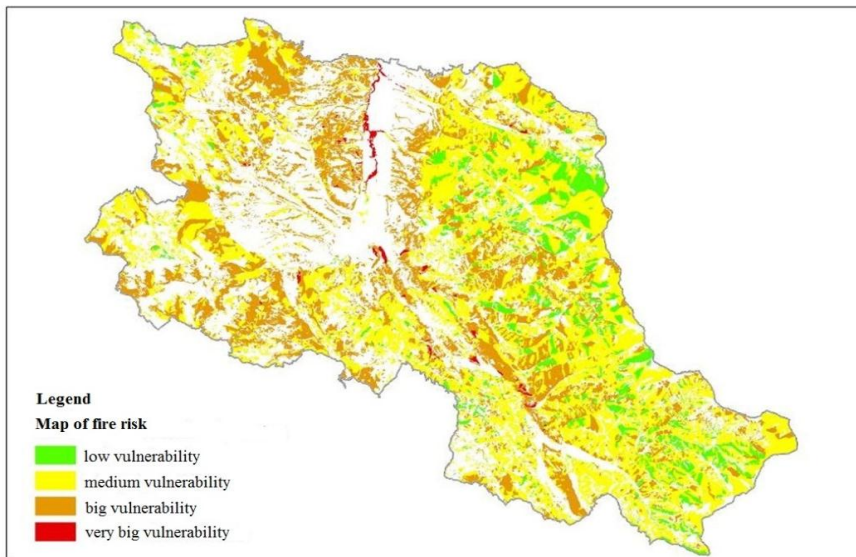
The methodology of forest fire vulnerability assessment should include a number of important parameters which would allow us to determine the vulnerability of a monitored area at any time. Along with the system of forest fire risk assessment, it would provide a starting point for an organized and professional approach to forest protection. Successful implementation of the presented methodology is required as a prior condition for the preparation of planning documents. It is further necessary to complete the currently valid Forest fire protection action plan because the existing plans are fundamentally different from the fire protection plans applicable to buildings. Successful risk management in the protection of forests against fires will reduce the damage, preserve natural ecosystems and biodiversity, increase tourism revenues, and eventually enhance rural development of Knjaževac.

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STATE AND CONDITIONS FOR SUSTAINABLE TOURISM DEVELOPMENT OF THE MUNICIPALITY VRBAS[1]

Predrag Vuković, Biljana Grujić[2]

Abstract

Municipality of Vrbas thanks to its high-quality tourism resources has favorable conditions for its development. Located on the „Great Bačka Canal" with the river Jegrička, with respectable hunting resources, tradition bound for event tourism, respective resources for the development of „wellness" and „spa" tourism, developed agriculture, Vrbas has the ideal conditions for investing in tourism and expected results from investments. An important determinant of tourism is that it provides just as much into it invests. Integrated marketing approach, with consistent respect all the rules, principles and the sustainable development approach, is essential guidelines which will, (if consistently complied with), undoubtedly give the effects. The aim of this article is to show directions and possibilities for further sustainable tourism development of the Vrbas municipality, bearing in mind its very favorable natural and social resources for tourism development.

Keywords: *tourism, destination, tourism product, rural tourism, marketing.*

Introduction

The basic assumption on which begins process of planning tourist destination development is specification of objectives and guidelines as a basis for determining the features and framework for practical action. Therefore, the assessment of tourist resources in the light of their practical valuation is a precondition for general tourism development strategy, which as such is always the result of three basic strategies that have each destination: a

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strategy of segmentation tourist market, strategy differentiation tourist products, strategy and the strategy of profiling destination image.

Analysis of possibilities for development tourist destination Vrbas is based on hospitality facilities (accommodation and restaurant). Monitoring statistical indicators of Vrbas[3] showed that municipality recorded better results than other municipalities in the South Bačka District (except City of Novi Sad). The Vrbas municipality has accommodation capacity which in its quantity can meet the current and potential tourist demand. Hotel «Bačka" and motel "Mandić" have accommodation units, restaurant and adequate parking space. Restaurant Capacities municipalities (pastry shops, snack bars, traditional restaurants) for its quantity can meet the needs of tourists and complement their stay. However, the main problem is allocated decreased quality of accommodation facilities. In fact, in the last 25 years little things has been done to improve the quality of catering services. In the municipality of Vrbas is a present possibility for development hunting tourism. Hunting tourism is considered the most promising tourist product of the municipality. As a market perspective tourist product is allocated also fishing tourism. Natural resource for the development fishing tourism is the "Grand Bačka Canal", but problem is that company "Carnex" discharges waste water in canal. Till that point of canal pollution there are big possibilities for development fishing tourism. Company "Carnex" in a large extent in the downstream part of polluting channel and makes it unsuitable for fishing. This is one of the biggest environmental problems of Vrbas municipality. A second important resource for development fishing tourism is river "Jegrička".

Municipality Vrbas has a great potential for the development of spa tourism. Namely, in the municipality are present great potential for exploitation of local thermal water. As perspective tourist product can also be mention possibilities for excursion, sports and recreational tourism and tourism of events. The municipality has a significant cultural and historical attractiveness that may be of concern to tourists, to those who stay longer in the municipality, and those who would Vrbas could come for a visit.

Important factors for sustainable development of tourism destinations

In order to ensure sustainable development, it is important to create combination of tourist supply factor that will leads to follow all changes in the

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[3] Publications *„Municipality in Serbia"* for 2006, 2007, 2008, 2009, 2010, 2011, 2012, Statistical Office of the Republic of Serbia.

contemporary market and which will be effective in the long term, and that will meet the needs of tourist demand. *Kotler, P. Keller, K. L. (2006)* insist on the mutual harmonization factors of supply and demand in order to more easily integrate and make tourism development. Accordingly, in order to adequately market and economic valorization of the tourist destination it is necessary to create appropriate marketing mix. Primarily, it is a clear definition of the tourism product, price-mix, promotional mix and the mix of sales (distribution) channels. It is important to harmonized aforementioned elements in order to created a marketing concept and then the implementation policy to contribute increasing of tourist attendance and capacity utilization.

Buhalis (2000) expires the *tourism product* should be understood as an "amalgam" of different elements of the tourist supply. *Bakić (2005)* insists on the following elements of tourist supply:

- *Attractiveness of tourist destination* - the natural and social benefits;
- *Conditions for staying in the destination* - include facilities for accommodation and food (local transport, sports activities, shops, etc.);
- *Accessibility – i.e.* communicative factor.

However, in order for all these elements were available, it is necessary to have an appropriate level of management and marketing activities. Hence, it is one of the priority tasks of the organization to perform all the factors of the tourist offer in accordance with prescribed regulations of the Law on Tourism. According to Article 40 of the Law, it is possible the formation of destination management organizations which work is not only focused on external marketing, but also include internal destination resource management. Functions of external marketing in almost all municipalities in Serbia belong to Tourist Organization of Serbia, so far. However, with this article of the Law, it is possible to manage with internal resource and external marketing. This article is a suitable basis for the formation of local clusters of the tourism from all sectors and grouping tourism cluster in the model. These are some of the assumptions on which long-term should be made sustainable tourism development in any destination in Serbia and the municipality of Vrbas.

Gastronomy and accommodation capacities of Vrbas municipality

Municipality Vrbas achieved better results in tourism (overnight stays and tourists turnover) than the other municipalities in the South Backa District (excluding City of Novi Sad) in the last seven years. In the period 2005 - 2011, based on insight into indicators of tourist movements, it can be noted

that in 2007 and 2008 achieved better results than in other monitored years. Detailed view of tourist movements per year is given in Table 1.

Table 1. *Tourists movement in time 2005–2012 in the municipality of Vrbas*

Year	Tourists			Tourists nights			The average number of tourist nights	
	Total	Domestic	Foreign	Total	Domestic	Foreign	Domestic	Foreign
2005	5,086	4,188	898	14,593	12,518	2,075	3.0	2.3
2006	9,304	5,346	3,958	22,055	17,787	4,268	3.3	1.1
2007	10,186	4,445	5,741	19,354	12,457	6,897	2.8	1.2
2008	12,415	7,900	4,515	17,635	12,054	5,581	1.5	1.2
2009	7,520	5,555	1,965	11,226	8,770	2,456	1.6	1.2
2010	4,044	3,704	340	29,341	28,740	601	7.8	1.8
2011	4,914	3,995	919	12,951	11,577	1,374	2.9	1.5

Source: *Statistical Office of the Republic of Serbia (SORS), „Municipality in Serbia" for years 2006, 2007, 2008, 2009, 2010,2011,2012.*
Note: The average number of tourist nights calculate by dividing the number of nights with the number of tourists. Since tourists registered in every place where he is staying, in the case of change of place goes to his restatement or duplication. Therefore, probably, and the average number of overnight stays, calculated in this way, smaller than the real one.

The municipality has storage capacity which in quantity can meet the current and potential tourist demand. However, the main problem is the quality catering accommodation and restaurant units. Table 2 shows the structure of catering units Vrbas municipality.

Table 2. *Accommodation units in the municipality of Vrbas*

Type of object	Total	Category	Number of hotels units in the facility	Types of accommodation units and their number
Hotels	2	"Bačka" three star	59	22 single rooms 29 double bed rooms 2 triple bedrooms 3 four beds 3 apartment
		„Drago Jović" three star	24	19 double bed rooms 1 single rooms 4 apartment
Motels	1	„Braća Mandić" three star	34	6 single rooms 24 double bed rooms
Hostels	2	-	10	30
Total	**4**	-	**104**	-

Source: *Administration of Vrbas municipality, November 2013*

Age of largest Hotel "**Bačka**" in Vrbas is over twenty years. The hotel has two restaurant units (big and small hall) and a coffee bar.Hotel has a conference room and adequate parking space. The average price for overnight is 18 euros. In order to raise quality services it is necessary to investments and adaptation, as well as training of employees according to the

increasingly demanding needs of modern tourism demand and the very age of the facilities, as well as the development of the IT sector.

Motel "**Mandić**" was built in 1994. Motel completes the accommodation facilities of the Vrbas municipality. Motel offers 34 accommodation units, a restaurant room and parking space. Motel is categorized with three stars.

"**City Restaurant**" is located in the city center, the restaurant also has a 13 beds and open parking space as well as a cage for pets.

Restaurants in the Vrbas municipality is presented in Table 3.

Table 3. *Gastronomy facilities in restaurants*

Gastronomy facilities in restaurants	Total number
Classic restaurants	11
Diary restaurants	2
Buffets and Bars	65
pastry shops	4
Total restaurants units	82

Source: *Administration of Vrbas municipality, November 2013*

It can be concluded that the restaurant's facilities in quantity meet the needs of tourist demand and can complement the stay of tourists in the municipality, but hospitality units must constantly work on improving the quality of services to ensure competitiveness in the tourism market.

Current and potential tourism products in Vrbas municipality

Hunting tourism representing most promising and most developed tourist product of the Municipality Vrbas. Because of the well-known events which were happened during the nineties and the economic crisis after 2007, investment in development of hunting is insufficient, and foreign tourists from Italy, Austria, Germany, France, Spain, etc, who had earlier visited the Municipality are practically reduced to a minimum. Hunting tourism nowadays mostly done through guest appearances from other hunting associations from the country and from the Montenegro.

In the municipality there is Hunting Association "Vrbas" which has 500 members. The structure of hunting associations with hunting area by local communities in the municipality is given in Table 4.

Table 4. *Structure of hunting associations in the municipality with an area of hunting grounds*

No.	Name of the hunters' association and location	Number of members	Hunting area, ha
1.	H. A. „*Pheasant*" Vrbas	212	9,000
2.	H. A. „*Falcon*" Kucura	48	5,000
3.	H. A. „*Pheasant*" Savino Selo	70	6,000
4.	H. A „*Rabbit*" Ravno Selo	45	5,000
5.	H. A. „*Deer*" Zmajevo	75	6,000
6.	H. A. „*Partridge*" Bačko Dobro Polje	50	6,000
	Total	500	37,000

Source: *Administration of Vrbas municipality, November 2013*

The hunting ground is mainly used for hunting small feather wild animals and roe deer (doe). Dates of the hunting season on game species are given in Table 5.

Table 5. *Type of hunting wildlife and hunting season in the municipality of Vrbas*

No.	Type of hunting wildlife	Hunting season
1.	Roebuck	April 15th – September 30th
2.	Roe	September 30th - January 31st
3.	Rabbit	October 15th – December 31st
4.	Pheasant	October 01st - January 15th
5.	Quail	August 01st – September 30th
6.	Wild duck	August 15th – January 31st
7.	Wild goose	October - January

Source: *Administration of Vrbas municipality, November 2013*

Hunting infrastructure in the territory of municipality is relatively well developed, it includes:
- 26 feeding areas for big wild animals (in each hunting ground at least 4);
- 18 waiting located in Zmajevo, Kucura, Bačko Dobro Polje, Vrbas;
- 13 water trough located in Vrbas, Kucura, Zmajevo;

- through three hunting areas make up the watercourse Danube-Tisa-Danube (DTD), the Grand Bački Canal and detailed canal network at all the areas of the settlements;
- in all settlements and hunting clubs there is a hunting lodge.

It was developed cooperation with all hunting associations for which bordering three hunting areas and which H. A. "Vrbas" is managed.

Cooperation with other associations organized individually and / or through hunting Alliance of Vojvodina. They are organized regular guest appearances include:
- H. A. „Pheasant" Savino Selo is bosom friend with H. A. „*Srem*";
- H. A. „Pheasant" Vrbas is bosom friend with H.A. „*Nikšić*", Montenegro;
- H. A. „*Deer*" Zmajevo is bosom friend with H.A. „Kladovo";
- H. A. „Rabbit" Ravno Selo is bosom friend with H.A. „*Zeta*", Montenegro

Tourists from abroad (Italy, Austria, Spain) come primarily interested in hunting deer, while Italian tourists have shown a special interest in hunting quail. Domestic tourists usually love hunting pheasant and rabbit of small wild animals and of the big wild animals there is interest in hunting roe deer and deer.

Hunting Association regulated price lists for shooting venison, which are in accordance with the price list which prescribes Hunting Association of Serbia, and every hunting association is independent in making decisions about price lists for a specific type of game. The venison can be hunted with previously issued permit and allows the removal from the hunting grounds with the appropriate shipping document and other supporting documentations (veterinary confirmation of the correctness of meat, etc.). Professional service has the gamekeeper employed full-time and volunteer guards.

Development of a hunting tourism is closely linked with the development of event tourism. On the territory of the municipality organized following hunting events:
- "Hunting pot" in Kucura is held in September;
- "Saint Eustatius" the Saint`s patrons day of hunters' associations, which is celebrated on October 03rd.
- "Kinology cups" are organized by calendar for any year;

- Competition "Hunter and Dog" are organized by calendar every year.

By combining hunting, fishing and event tourism effects are significantly increases, while the municipality on the tourist market positioning as a destination for significant segment of hunting tourism.

Fishing excursions - The most important natural resource for the development fishing tourism is the *„Grand Bačka Channel"*. On the territory of the municipality it enters from the Kula municipality and continues its course towards Srbobran. At the entrance channel in Vrbas there is a dam. This is important information, because in the upper flow channel is a good ground for the development of fishing (according to the data obtained, the water in this part of the canal is first class). However, the downstream discharge of wastewater (industrial and other) channel is environmentally much polluted, where in addition to the water very polluted and the river ground. This part of the canal is one of the most polluted water not only at home but also in Europe. Contrary to the channel through the territory of the municipality flows the river Jegrička which is partly protected as a nature park "Jegrička" category III. Area Jegrička is 1,144.18 ha where the established protection regime II and III degree. Natural resource is located in the southern part of the municipality in the settlements Zmajevo and Ravno Selo. In the municipality there is an association of fishermen, "Zlatni Karaš" which has about 800 members. It is characteristic that there are feeding and spawning fish location. However, along the channel (in the upper stream to the dam) there are so called "places" suitable for fishing.

To date, they have been developed and appropriate fishing events that could further complement the tourist offer and animate the tourist demand. It is an event, "*Card Cup"*, then *"Štukijada"* which is regularly held every year in October in Savino Selo, as well as *"School for hunting carp",* held in the Zmajevo.

"Wellness" **and** *"spa"* **tourism** – Scientist In municipality of Vrbas found several locations with thermal waters. To date, none of the localities is not exploited for the development of "*wellness"* and "*spa"* tourism. Also, these sources are not used in potential energy purposes. These locations are the following:
- The localities CFK *"Drago Jovic"* Verb-1 / H-2 and Vrb / H was found that the thermal water can be used for the purposes of

development, "*wellness*" and "*spa*" tourism and as a complementary tool for the treatment of chronic inflammatory rheumatism, for treating wounds and various types of injuries.
- On the locality *"Yellow water"* in the Zmajevo, it was found that the water which is suitable for treatment of the following types of diseases: the situation after rheumatic fever, chronic rheumatism and inflamotrony and degeratitivly rheumatism, extra-articular rheumatism, neuralgia and neuritis, different kinds of gynecological diseases.

In the municipality there are a few localities with sources of thermal waters but neither of them has not been researched in terms of identifying opportunities for exploitation health rehabilitation purposes. It is important to note that the exploitation of thermal waters and limited formal legal sense, because the company *"Gazprom Neft"* has become legally responsible for all underground thermal water and other underground sources[4].

Manifestation tourism ("Tourism Events") - Vrbas is full of many different events that take place throughout the year and that certainly can complement the tourist offer in tourist and cultural life of the municipality. These are the following events:
- *"Poetry Festival of Youth"* is the largest and oldest cultural event in the municipality. It is an event that includes the most important poetic events in the country. The festival has a tradition of more than forty years and is regularly held each year in May with a duration of 5 to 7 days. The festival is organized by program wholes (Palette youth, Portrait of the poet, promotion of the book winners from the previous year, the final evening of the proclamation of the laureate of the festival).
- *„Festival of folk traditions of Vojvodina"* has a tradition longer than 30 years. This event is held so far in a number of municipalities throughout AP Vojvodina, however, the decision of the Office of the Vrbas municipality has become a regular event and will be held in Vrbas every year in September.
- *„Autumn Art Salon"* has a long tradition until 1958, when it was founded and represent the oldest event of its kind in the municipality. The event is held in October and / or November every year.

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[4] The data obtained from the municipal administration of the Vrbas.

- *„Kostelnik autumn"* inter- municipal music and poetry event which is the "encounter" of choirs organized by the KDP *"Carpathians"* and the Cultural Centre *"Vrbas"*. The event usually organizes in November every year.
- *„Night of Museums"* regularly organizes in May every year. It is an event which is organized by museums and other cultural institutions when museums are open to visitors during the period from 18 hours to 02 hours after midnight. The idea is that the museum and other collections and exhibits be closer to visitors in an unusual and attractive way.
- *„Marigold Festival"* is an event of children poets held in Savino Selo since 1989. It is an event of international character that aims to affirm children with special talent for poetry. The festival also has a publishing company and established in a special edition of *„First Book the most gifted poet."*
- *„Triangle"* art colony usually organize in Savino Selo every year. It is an event that takes place in May, which lasts for three days and bringing together artists who during the event create works of art.
- *„Kucurska harvest"* is an event that brings together the Ruthenian and Ukrainian cultural societies, as well as several other cultural societies of AP Vojvodina. The aim of the event is the preservation and cultivation of traditions of Ruthenians and other ethnic communities of AP Vojvodina.
- *„Festival of tambourine music"* in Zmajevo. It is an event which is held in honor of Sava Vukosavljev who was one of the most important figures on the music scene of AP Vojvodina in the second half of the last century.

Rural tourism - Beside evident present respectable natural and social (anthropogenic) resources which can be important for the development of rural tourism, in the municipality of Vrbas to date it has not received significant importance. Currently in the municipality there is neither a farm involved in this type of tourist activity in any way. Bearing in mind the role and importance that rural tourism can have on total rural development, as well as eliminating all the negative consequences that are loaded with the same, this circumstance in the future must take more account. It is important to emphasize that in developing rural tourism imprtant roles take private investors and also an important role should be played by the Tourist Organization of Vojvodina and Tourist Oranization of Vrbas. The task of these activities would be that local population be familiar with the benefits

of doing rural tourism. Even more, the European Union promotes the development of rural tourism as a way to remove all the negative consequences that burden the lives of residents of rural areas through its concept of *„Common Agricultural Policy"* (CAP).

Excursions - Vrbas municipality beside the natural attractiveness important for the development of tourism (which is discussed above), also has a significant cultural and historical attractiveness that may be of concern to tourists, to those who stay longer in the municipality, as well as those who would come for a visit. These are the following anthropogenic heritage:
- In the municipality of Vrbas there are several archaeological locations, which represent extremely important database of signs of life in the territory of AP Vojvodina through history. The most important archaeological locality are: *„Čarnok"*, *„Brickyard enthusiasm"* and *„Šuvakov farm"*.
- The municipality has a large number of religious localites:
  - *Serbian Orthodox church* has been built between 1730 and 1738.
  - *Evangelical (Lutheran) Church* built 1824. Church was painted by the famous painter *Joseph Pehan* 1910.
  - *Chapel „Vodice"* is a unique type of chapel characteristic of Vojvodina and Slavonia - built in 1793.
  - *Reformed (Calvinist) Church* built in the same period where the Evangelist.
  - *The Roman Catholic Church* built in 1884 and its forerunner was the first Catholic Relief school built in 1872.
  - *Methodist Church* beginning with the construction before the First World War but was completed only in 1921.
- *Museum of the Vrbas municipality* established in 1968. The museum's collection is now several thousand museum exhibits.
- Gymnasium *„Žarko Zrenjanin"* has a long tradition. It was founded in 1809.
- *„Monument to Joseph Kish"* is located on a hill above the dam at *„Šlajz"*. This monument represent memory heritage of the designer of the *Grand Bačka Canal*.
- *„Base Center"* or *„Bapina base"* represents the most illegal base on the territory of Vrbas municipality during the *Second World War.*

In the municipality there are several sites important to develop staying in natural ambience:
- In the area between Bačko Dobro Polje and Vrbas is natural monument, botanical locality of steppe vegetation „Čarnok".
- In Savino Selo is a natural monument „White poplar"and Nature Park „Jegrička"which mention before in this article.

None of these sites does not have built adequate infrastructure for tourism, which in the future must change if we want to develop this kind of tourism.

Sports and recreational tourism - Municipality has the appropriate sports and recreational infrastructure that can be used to enrich stay of tourists in Vrbas municipality. These are the following facilities:
- Center for physical culture „Drago Jovović"is one of the finest on the territory of AP Vojvodina.
- Municipality has several gyms that their predispositions and contents can be categorized as a basis for the development of sports and recreational tourism activities, among which should be mentioned: P.S. „20 October", P. S. „P. P. Njegoš"and P. S. „Svetozar Miletić".
- Football field is located in all settlements of the municipality. City stadium is used for training and match play, the younger categories football teams, teams of American football and recreationists.

The vision of tourist development Vrbas municipality

The municipality of Vrbas to the domestic and international tourist market represent small tourist destination which offers animate specific market segments interested for tourism of specific interest with tourist supply of those kinds of tourism on which the forward was discussed.

To successfully valorize all tourism resources (natural and social - anthropogenic) tourism must develop complementary all branches with economic and non-economic activities.

Bearing in mind the synergistic nature of tourism and its multiplied positive impact on the economic and non-economic developments, it is expected that the development of tourism will contribute to the overall „betterment"of the Municipality life in the long term.

**Sustainable development of tourist resources of the municipality of Vrbas**

In order to ensure sustainable tourism development it is necessary to respect the entire premise on which it based. *Björk, P.* (2001)[5] pointed out the 10 dimensions of successful sustainable tourism development:

1) Stakeholders involved in tourist development should have an ethical responsibility to avoid misuse of resources by the tourism industry. Therefore, it is important to be clearly set goals of sustainable development;
2) The development of tourism must be controlled;
3) Planning Perspectives of tourism must be long-term;
4) All resources - environmental, economic, social, cultural, political – must be taken into account in the development of tourism and payload capacity of each of them must be assessed;
5) Special attention should be given to the basic needs of the poor population;
6) Tourist development must be focused locally and all stakeholders involved in development must be consulted; the importance of cooperation must be constantly emphasized;
7) The variety of different mini tourist destination must be recognized and the principles of sustainable tourism development must be applied in a unique manner;
8) Interests, reasons and goals of different participants which give support for sustainable tourism development must be taken in account;
9) The compromise approach and balanced use of resources must be accepted at the operational level;
10) Must be carried out assessment of the negative and positive impacts of tourism with different actors.

In order to ensure sustainable development in a destination of the World Tourism Organization (WTO) suggest "VICE" model (Visitor, Industry, Community, Environment and Culture), Figure 1. UNWTO takes three capstones: the economy, local communities and tourists who has influence on environment and heritage of destinations such as assumptions on which can be develop tourism.

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[5] Bjork, P. (2001): "*Sustainable Tourism Development, Fact or Fiction in Small Tourism Companies?*" *Liiketaloudellinen aikakauskirja* (2001): LTA3/01 p. 328-345.

Figure 1. „*VICE" model*
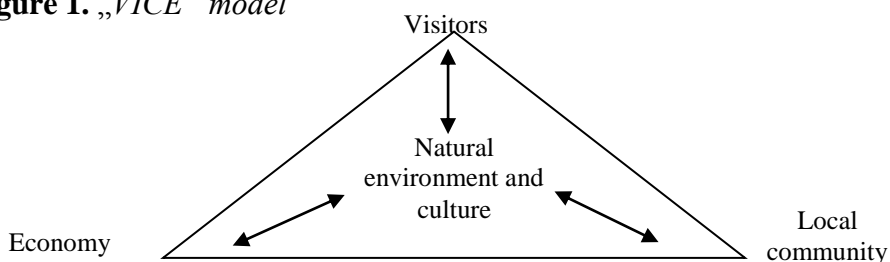
Source: UNWTO (2007): "*A Practical Guide to Tourism Destination Management*", p.12.

In this sense, UNWTO highlighted "VICE" model that allows the destination management in the way of interaction between tourists, economy that serve them, local communities and for the environment in which the interaction takes place. Environment can be understood in the broadest sense of the natural resources to the built resources, where many tourism products based. The role of destination management is working to strengthen partnerships and joint management plan destination to:[6]

- Tourists feel welcome, involved in the „life" of the destination and satisfy with current offer;
- Create a profitable and perspective tourist industry;
- Create benefits for local community;
- Protect and advance local environment and cultural heritage of destination.

Conclusion

Municipality Vrbas has resources suitable for tourism development. The favorable geographic position and developed transport infrastructure contribute to increase attractiveness of the destination. With respectable resources suitable for tourism development, it can be concluded that there is space for activities that municipality is required to carry for long-term realization of sustainable tourist development. The number of accommodation capacity is satisfactory, but the quality is bad. There are need for adequate investments for renewal and possible expansion of hospitality facilities. To a touristic products become commercially attractive it is necessary to create conditions at the organizational level. The

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[6] UNWTO (2007): "*A Practical Guide to Tourism Destination Management*", Madrid. p.13.

current activities of the Tourist Organization of the Vrbas are primarily directed towards external marketing. However, bearing in mind the great potential for the development of a large number of tourist products, it is essential tourist coordination at the level of destinations. In this sense, it is necessary to form a local destination management organization that would coordinate the activities of tourism development in accordance with the Law on tourism. This organization would work in the form of public-private partnership in the interest of all stakeholders.

The municipality is currently detected insufficient investment in the development of hunting and fishing as potentially the most promising tourism products. Tourist visits related to hunting and fishing has been kept to a minimum number lately. In the municipality there is a feeding and spawning fish, and is therefore necessary to determine the space in the channel that would attract visitors. This would contribute to the long-term conservation of fish found and the fishing conditions for the promotion of tourism. Vrbas has for many years been one of the most important tourist destinations in the hunting tourism of AP Vojvodina. Evidently present well-developed hunting infrastructure requires certain investments to be able to serve its purpose. The plan of the municipality and TO Vrbas is that hunting tourism dedicates a special attention in the future. The focus of future activities will be to animate those market segments which are in previous years (beside nineties) brought significant income to the municipality. The management focus must be on the domestic market and later with appropriate manage of promotional mix will be animating international market (traditional markets of Italy, Austria, Germany, France, etc.). What gives a special seal is great enthusiasm that shows a large number of members of the Hunters' Association, as well as their mobility in all hunting activities with which to improve how hunting infrastructure, as well as hunting. One of suggestions is that, due to the five hunting associations, construction of hunting lodges in ethnic style, with more appropriate offer hospitality (hotel and restaurant) will significantly increase the attractiveness of the Vrbas as a destination. In this sense, an important role will be played with cooperation that can be made with the private sector. To ensure balanced of tourist development, there is need also to invest in rural tourism, due to the fact that currently in the municipality of Vrbas there is neither a farm that is in any way engaged in this type of tourism activity. About these circumstances must be taken into account; because rural tourism gives opportunities that tourist will have interactive relationship with local residents and local environment (natural and cultural heritage) of Vrbas municipality.

Finally, it is necessary to invest in the restoration and preservation of cultural and historical monuments and museums, which are evidence of the existence of a civilization which through the centuries has been changed. If all of the mentioned above realized, it is reasonable to expect that tourism contributes to the overall development of the municipality, and resources on which it based development in the long term can be protected or used in a function of the overall economic and social development.

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