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

- sustainability and multifunctionality -

Thematic Proceedings

Belgrade, 2019

INSTITUTE OF AGRICULTURAL ECONOMICS BELGRADE

Volgina Street no. 15, 11060 Belgrade, Serbia
Phone/Fax: +381 (0) 11 69 72 858
Phone: +381 (0) 11 69 72 848

E-mail:
office@iep.bg.ac.rs

Internet address:
www.iep.bg.ac.rs

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Jonel Subić, Ph.D.
Marko Jeločnik, Ph.D.
Boris Kuzman, Ph.D.
Jean Vasile Andrei, Ph.D.

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PREFACE

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Besides the papers from Serbia, in Thematic Proceedings are also included the invited papers prepared by foreign authors, which are associates of the IAE Belgrade and whose institutions have close scientific, professional and technical cooperation with IAE Belgrade.

The Thematic Proceedings addresses the wider audience scientifically and practically oriented to all segments of agriculture and rural development.

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Jonel Subić, Ph.D.
Marko Jeločnik, Ph.D.
Boris Kuzman, Ph.D.
Jean Vasile Andrei, Ph.D.

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BUSINESS ENVIRONMENT ABILITY FOR INNOVATION TRANSFER TO RURAL AREAS IN POLAND[1]

Adam Wasilewski[2], Pawel Chmielinski[3], Marcin Gospodarowicz[4]

Abstract

The main goal of the study was to estimate the potential of non-public business environment institutions that can be used in the innovation transfer process, including the contribution to the adaptation of instruments supporting improvement in innovativeness of the economy used under the policies of other countries. Measures to achieve the goal involved studying documentation including literature on innovation transfer, development of entrepreneurship, policy diffusion and business environment institutions. The documentary studies also involved studies on innovation policy of countries with highly innovative economies and legislative solutions stemming from such policies.

The research shows that the non-public Business Environment Institutions have a significant potential that can be utilised to improve innovativeness and competitiveness of both broadly understood rural economy and the agri-food sector (particularly with regard to the development of small processing and direct sales of agri-food products). Among the non-public business environment institutions selected for the study, a relatively large portion of them are large entities with adequate number of employees, strong position on the market, i.e. funded from diversified funding, and usually several years of experience in their operations.

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

1 Paper was presented within the Plenary section of the conference as a invited paper.

2 Adam Wasilewski, Ph.D., Assistant Professor, Institute of Agriculture and Food Economics – National Research Institute, Swietokrzyska Street no. 20, 00-002 Warsaw, Poland, Phone: +48 22 505 44 19, E-mail: Adam.Wasilewski@ierigz.waw.pl

3 Pawel Chmielinski, Ph.D., Assistant Professor, Institute of Agriculture and Food Economics – National Research Institute, Swietokrzyska Street no. 20, 00-002 Warsaw, Poland, Phone: +48 22 505 47 74, E-mail: Pawel.Chmielinski@ierigz.waw.pl

4 Marcin Gospodarowicz, Ph.D., Professor, Institute of Agriculture and Food Economics – National Research Institute, Swietokrzyska Street no. 20, 00-002 Warsaw, Poland, Phone: +48 22 505 44 36, E-mail: Marcin.Gospodarowicz@ierigz.waw.pl

Introduction

In recent decades, actions have been carried out in Poland to establish an institutional system for supporting entrepreneurship in rural areas and agriculture through innovation transfer. The system would include the entire set of interrelated standards, principles and organisations and mechanisms that would represent mutual contact between the participants taking part in the rural development process. It needs to be coherent and adjusted to various aspects of rural development (i.e. economic, social, spatial and environmental aspect). Such a system also has to use both domestic and foreign solutions for improvement in innovativeness of rural economy. Therefore, the need to place the Business Environment Institutions (BEI), particularly the non-public Business Environment Institutions, which may support innovation, transfer to the national economy, including the rural economy.

The main goal of the study was to estimate the potential of the non-public business environment institutions (nBEI) with regard to support for innovation transfer and, more broadly, the analysis of their material and technical basis, human resources and competencies necessary to provide services within the above scope. In the area of innovation transfer, the particular attention was paid to innovation policy of countries where innovation is an important factor for the efficiency of the economy. The use of innovation support instruments offered by the policies of those countries requires well organised and functioning business environment. In other words, in case Poland decides to adopt certain solution, it might be necessary to reorganise the institutional system. Nonetheless, the use of the already existing potential might generate much smaller transaction cost than construction of a system from scratch.

Methodological remarks

The basic tool used in the study was the survey questionnaire addressed to the non-public Business Environment Institutions, i.e. institutions supporting development of entrepreneurship, including the institutions capable of supporting innovation transfer, and the addresses of the offer of the nBEIs. Survey was carried out in 2016. The selection of the nBEIs for the study consisted in procedurally representative sampling based on the nBEI catalogue produced at the first stage of the study (n=5662).

The study of nBEIs has included foundations, associations and other privately owned entities supporting development of entrepreneurship, e.g.:

- business incubators;
- entities within the national service system for small and medium enterprises and the regional ESF centres;
- loan and loan guarantee funds;
- business clusters;
- industrial parks;
- special economic zones;
- private counselling businesses;
- non-governmental organisations.

The process of selecting service users (i.e. entities taking advantage of services provided by nBEIs) for quantitative surveys was purposive based on contact details provided by nBEIs covered in the study. This made it possible to avoid a small representation of persons interested in cooperation with EBIs (and to a greater extent, nEBIs) among the selected sample. This allowed researchers to obtain details of 204 entities that took advantage of services provided by nEBIs in the last two years, and this group was covered by the survey according to the adopted logic of the research approach.

The sizes of the samples and the applied data analysis techniques allowed the findings from the analysis to be generalised and problems connected to cooperation between the nBEIs and the service users to be related taking account of various points of view.

Theoretical background

When considering the issue of institutional support for innovation transfer, we should primarily bear in mind that it might be a certain form of state intervention in market processes. The welfare economics, on the other hand, states that the market economy is by nature efficient (Feldman, Serrano 2006, Mas-Collel et al., 1995, Herbener, 1997). The existence of market economy in the European Union countries should therefore lead to the common use of innovation as the source of efficiency (Aghion, Jarave, 2015, Arrow, 1962, Thirtle, Ruttan, 1987).

In such a case, support for knowledge transfer and application of new and innovative solutions should be a redundant measure, or even an action that reduces

efficiency. It can be regarded as a form of interventionism, which does not facilitate efficiency improvement (Ajefu, Barde, 2015, Cordato, 1980, Grand, 1991) of course, such measures are addressed only to a specific group of businesses.

The economic literature, however, points to market failures (Stiglitz, 2004), which are causes of inefficiency. It can therefore be said that imperfect competition, asymmetric information or other market failures to some extent restrict the use of innovation as the source of efficiency. The example that can illustrate this is the great variation in innovativeness of economies of European Union countries (European Commission, 2017) and the fact that the policy for supporting innovation transfer does not always result in an adequate improvement in innovativeness of the economy (European Commission, 2013).

In practice, the economic growth of a country, at least in a short term, does not have to stem from knowledge transfer to the industry and services sector. Another source can be the low price of labour, availability of cheap raw materials or favourable market situation on the global market (Kasperkiewicz, 2008). As stated by Kasperkiewicz (2008), the Polish economic growth in the recent years also resulted primarily from the above mentioned factors. The disregard of knowledge transfer, however, resulted in the continuing or even increasing gap between Poland and the most innovative economies in the European Union.

The limited use of knowledge as an economic growth and development factor might affect both the entire national economy and its specific sectors (Consortium Europe INNOVA, 2011, Pavitt, 1984, Malerba et al., 1997). Virtually all sectors face that risk, including the food processing sector, which is particularly important for the rural economy. The main causes of limited innovativeness, however, include the existing structural conditions in the specific sector in a particular country.

An example that can be used to illustrate the point is the application of organisational innovation related to new human resources management sector in Serbia (Ratković, 2015). As stated by Ratković (2015), the implementation of those innovations depended on both the size of the business and the ownership form. The specific character of the Polish food industry (Mroczek, 2014) might also condition certain institutional solutions in the field of innovation transfer. A particular structure of an economic structure may therefore be a barrier to innovation transfer that has to be taken into account when designing the policy for supporting the process.

Internal structure of a specific economic sector is to some degree linked to market failures. Cases in point include imperfect competition or asymmetric information. On the other hand, the intensification of particular market failure is related to the extent to which knowledge is used as an efficiency improving factor. This might in consequence lead to institutional changes in the field of knowledge transfer, which may be illustrated by various policies aimed at supporting the process.

Currently one of the main economic schools that study the role of institutions is the New Institutional Economics. Referring to the relations between competition and knowledge transfer, one of the leading representatives of this school, namely North (2005), states that: "... companies, political parties, and even higher education institutions in the face *of competing organisations have to strive for improving efficiency*". According to that author, stifled competition negatively affects an organisation's motivation to invest in new knowledge and, as a consequence, does not lead to sudden institutional changes. On the other hand, strong competition accelerates institutional changes. Thus, the author states in his reflection that the improvement in efficiency in general results from competition, and the means to that end is improvement in knowledge.

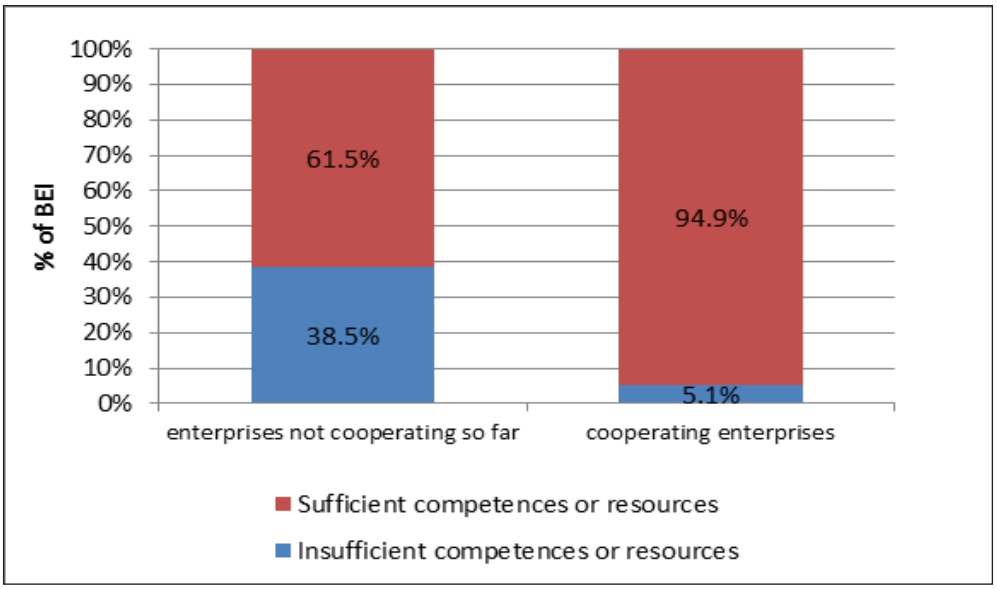
Discussion of results

The survey has shown that over 75% of the entities classified as business environment institutions according to the adopted methodology cooperated with businesses active in rural areas or businesses whose activities were linked to the agri-food sector. This means that there are already strong connections between the rural economy and non-public business environment institutions. Therefore, there is quite a large group of institutions that are experienced in activities supporting development of agriculture, rural entrepreneurship, and food processing. Thus, an opportunity exists to use their experience in the current policy, particularly policy aimed at improving innovativeness and competitiveness of the economy.

The interviews suggest that over 90% of all businesses have both relevant competencies and human resources understood in quantitative terms that allow them to carry out further cooperation or even to expand it. Even a portion of institutions that have not started cooperation with regard to supporting rural entrepreneurship are capable of starting such cooperation. In the case of those companies, however, the absence of earlier cooperation with entrepreneurs active in rural areas resulted from the limited demand.

In practice, there is some opportunity to increase the number of non-public institutions that could provide counselling services for rural entrepreneurs. A detailed analysis, however, shows that about 5% of companies experienced in cooperating with rural entrepreneurs are not capable of expanding their activities in this area (Figure 1.) based on the current resources.

Figure 1. *Competence level and human resources of the studied Business Environment Institutions with regard to counselling activities for further development of rural entrepreneurship according to the cooperation to date*



Source: *own calculation on the base of survey data.*

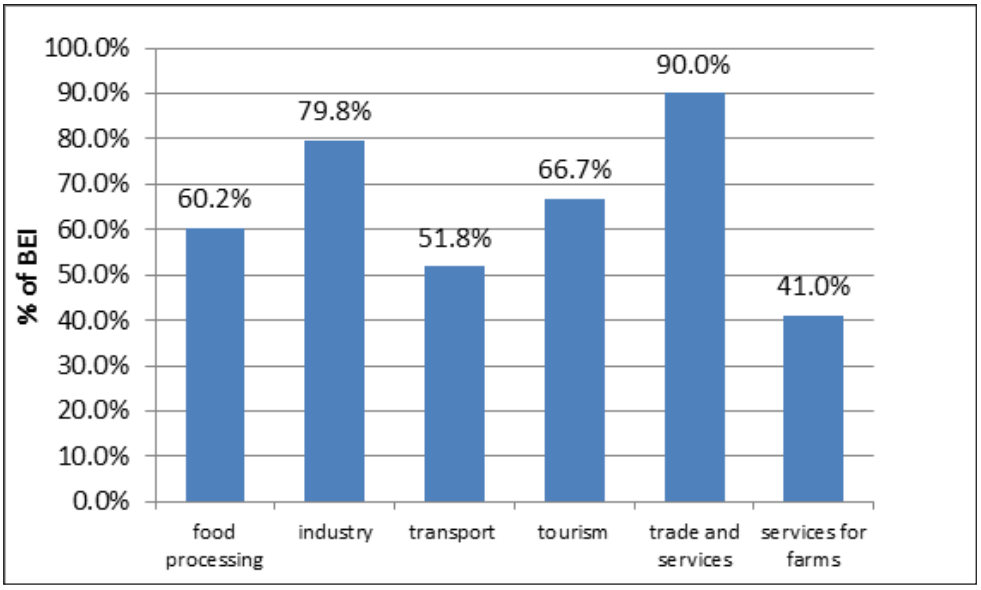
However, they do not rule out the possibility of employing additional staff if the demand for their services gives rise to such a necessity. As of now, these institutions can be replaced by entities that have not cooperated with entrepreneurs active in rural areas so far. Over 60% of them declare that they have relevant competencies and human resources understood in quantitative terms to expand their activities. In other words, they are ready to provide counselling services to both new business entities and in the new areas of economic activities.

The studied institutions provided counselling services to businesses in virtually all major field of economic activity in rural areas, particularly those linked to the agri-food sector (Figure 2.). The largest group of clients consisted of trade businesses and businesses providing various services. Among the studied institutions, as

many as 90% of them provided their services to that sector. The second most common category of service users consisted of industrial production businesses. Nearly 80% of the business environment institutions cooperated with that group. Nevertheless, the BEIs also provided counselling services to enterprises strictly connected to the agri-food sector. The scale of that cooperation, however, was a bit smaller. 60% of the institutions collaborated with the food processing sector, and 41% – with entrepreneurs providing agriculture-related services.

Quite a significant portion of entities classified as business environment institutions also cooperated with businesses active in the tourism sector (66.7%). The rations between the scales of cooperation with particular fields of economic activity, however, to some extent depend on the structure of the rural economy. The rural economy is dominated by trade enterprises. The number of entities that work e.g. in transport, on the other hand, is quite small compared to the previous group. For this reason, the ratios can be deemed satisfactory. They also demonstrate the broad spectrum of activities undertaken by the non-public business environment institutions. Therefore, they constitute important potential that can be used primarily for brokerage in innovation transfer to rural areas.

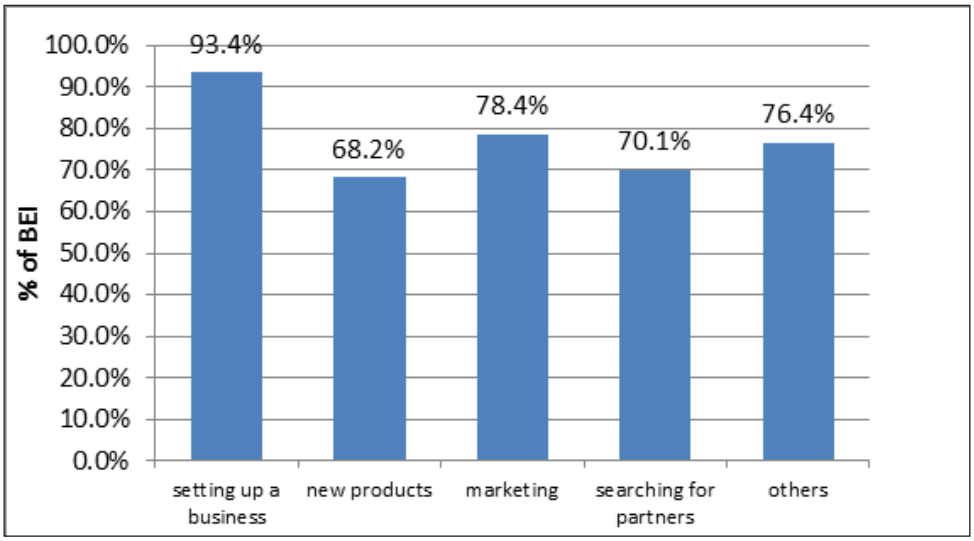
Figure 2. *Provision of counselling services by business environment institutions to various fields of economic activity in 2014-2015*



Source: *own calculation on the base of survey data.*

The businesses were interested in quite a broad range of counselling services (Figure 3.). To the largest extent, however, the studied business environment institutions were involved in establishing enterprises.

Figure 3. *Involvement of Business Environment Institutions in provision of various counselling services*



Source: *own calculation on the base of survey data.*

Over 93% of those institutions provided such services in the last two years. Nonetheless, the cooperation also took place in other areas of economic activity. Over 78%\ were involved in the preparation of marketing campaigns for enterprises using their services. Research by the Polish Agency for Enterprise Development (PARP) shows that the agri-food sector has quite limited access to the services related to marketing and sales.

The rather wide-ranging cooperation between the studied entities and the enterprises with regard to marketing can to some extent result from the implementation of the pilot project in the field of marketing and sales of products for micro- and small enterprises in the agri-food processing sector under the National Services System for Small and Medium-sized Enterprises (KSU). Nonetheless, it is impossible to determine the impact of that project in this study. This is caused by the fact that the survey focused on institutions providing services to enterprises not only in the food processing sector but in all fields of economic activity that can be carried out in rural areas or linked to the agri-food sector.

The research also shows that about 70% of the entities supported enterprises in introduction of new products and search for trade partners. The business environment institutions provided also many other specialist services for businesses. The services that ought to be named here are primarily investment, financial and tax counselling services, certification-related services, technological counselling and counselling in the field of real estate management. Therefore, in rural areas, there is rather high demand for counselling services provided by non-public business environment institutions within quite a broad but similarly diverse objective scope.

Thus, it seems rather infeasible that public advisers, i.e. various public institutions whose statutes provide for provision of such services, e.g. Agricultural Advice Centres, universities or research institutes, could provide such a range of services. Public institutions have rather inflexible internal structures that cannot be quickly adjusted to the changing market conditions. The decision process with regard to internal structure reform in public counselling is usually much longer than in the case of non-public entities.

In order to improve innovativeness of the food processing sector, which is quite poor, it will be necessary to involve the non-public business environment institutions in the process. The support provided by those institutions will be indispensable particularly in the case of micro- and small enterprises, both the newly founded ones and those that are already active in the sector. The data presented earlier shows that over 60% of the studied entities have already cooperated with the food processing sector. On average, each of them provided services to 53 businesses. Some of those entities, however, provided business-related services that are not associated with the specific nature of the sector, e.g. introduction of particular technologies. More in-depth studies show that only 56.7% of the institutions declare that they have experience related to the specific character of that sector. In other words, they have human resources with relevant knowledge and qualifications.

The decisive majority of the studied entities, however, is ready to start cooperating with the food processing sector, even in the areas that are specific for the sector. These units declare that if such needs arise, they are ready to improve the qualifications of their existing human resources or employ additional, appropriately qualified staff. In addition, the survey shows that 73.2% of the entities are ready to start cooperating for the benefit of small food processing businesses. The studied institutions do not only focus on larger scale business activity but are also interested in providing services even to micro-enterprises.

The research shows that the non-public Business Environment Institutions have a significant potential that can be used to improve the innovativeness and competitiveness of the agri-food sector and the broadly understood rural economy. Among the analysed institutions, over 75% have already cooperated with entrepreneurs active in rural areas or associated with the agri-food sector. Over 90% of the entities declare that they have relevant qualifications to start such cooperation. Nonetheless, about 5% of the institutions that have already cooperated with the agri-food sector and nearly 39% of the entities that have not would need to improve their qualifications or increase their human resources in order to extent their activities with the aim to support the development of rural entrepreneurship.

The awareness of the necessity to introduce innovative solutions does not necessarily result in entrepreneurs taking action to achieve it. A business can have insufficient human resources that will not be able to find and implement solutions adequate to the scale and profile of production. The barriers may also include the amount of the capital that a business will be able to invest to acquire new knowledge and the entrepreneur's willingness to take risk. It also seems that some limits to the improvement in innovativeness can result from the demand-based approach to innovative solutions, which currently dominates in Poland. This in turn results in a situation where entrepreneurs are not able to find innovations whose introduction will be allowed by the structures existing in a business or slight modifications to those structures.

What is important in the light of the above facts is the opportunity to start cooperating with the broadly understood business environment. Such cooperation can result in measurable benefits both on the large scale, i.e. at the level of the entire economy, and on the level of individual enterprises and business environment organisations. According to the Oslo Manual (Ministry of Science and Higher Education, 2008), the following types of partner institutions are listed among the business environment organisations in the activities in the field of innovation:

- other enterprises in the same group of businesses,
- suppliers of equipment, materials, components and software,
- clients,
- competitors and other enterprises active in the same field,
- consulting businesses (consultants), commercial laboratories, private research and development institutions,
- scientific facilities of the Polish Academy of Sciences,
- research institutes,

- foreign public research and development institutions,
- universities.

Therefore, business environment institutions that support innovation in business include institutions of the public, private and the non-governmental sector with which an enterprise may cooperate to obtain information on the availability of new solutions, requirements for acquisition of such solutions and benefits from the introduction and the process of adaptation and application of these innovations in a business.

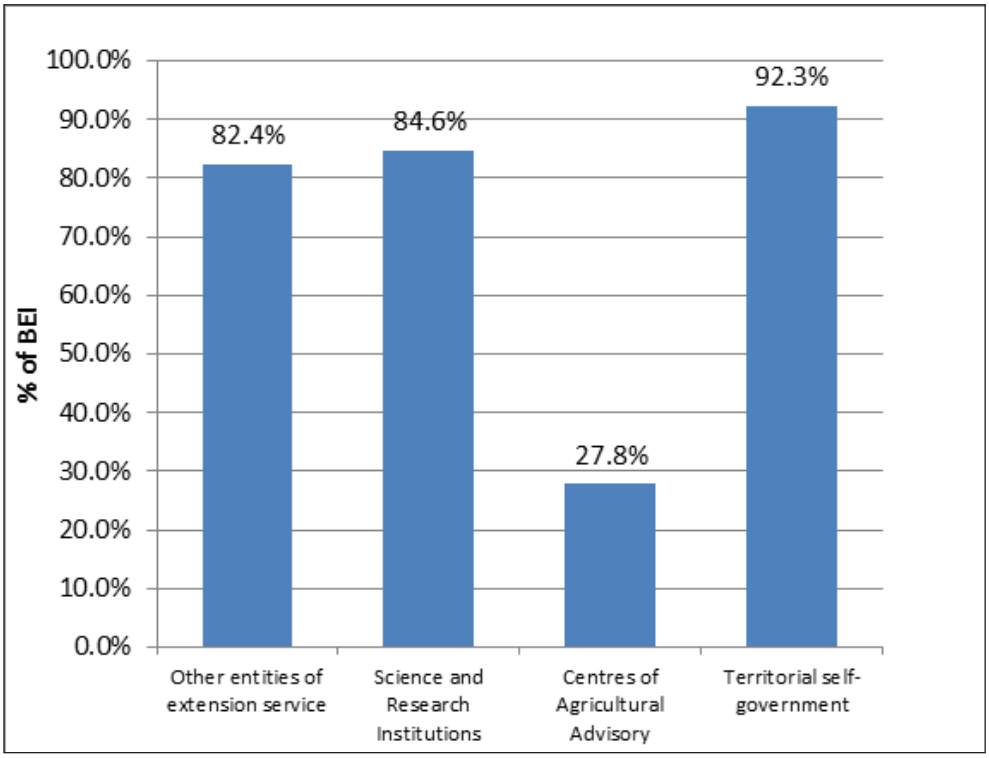
As a consequence, such cooperation should result in the reduction in unit cost of implementation. Such contact leads to actual benefit for the environment. In the case of public sector units it is the opportunity to collect information on the demand for innovative solutions, which can result in gradual transition from the supply-based to the demand-based model of innovation development. In the case of private sector institutions these are measurable financial benefits resulting from the sales of solutions held by the entities or brokerage in innovation transfer.

The non-public business environment institutions may therefore act as intermediaries between the public sector and businesses, particularly if certain factor, e.g. the size of an enterprise and its capital, restrict direct contact. However, they have to start cooperating with other elements of the environment they belong to.

In the studied business environment, there is quite wide-ranging cooperation between institutions in various sectors (Figure 4.), i.e. the public, the private, and the non-governmental sector. Nonetheless, most, i.e. 92.3%, of the analysed institutions cooperate with the local government. This cooperation results e.g. from the scope of the services they provide. These institutions are most involved in activities related to foundation of a company, which is a process where a local government (commune) plays an important role.

Over 84% of the entities also cooperated with research units, and over 82% - with other non-public institutions. The fewest studied units were engaged in cooperation with Agricultural Advice Centres (27.8%). This means that in most cases they are not forced to take advantage of the skills of employees working at such centres, but they are ready to start such cooperation if necessary.

Figure 4. *Involvement of non-public Business Environment Institutions in mutual cooperation and contact with public institutions*



Source: *own calculation on the base of survey data*.

To sum up, many public, private and non-governmental organisations are classified as business environment institutions. Provision of a relevant level of services – adjusted to the entrepreneur's requirements – requires cooperation within that sector. The studied institutions do quite well in such environment. Wide-ranging cooperation with research units and local government, on the other hand, proves that they already act as intermediaries in the transfer of knowledge to enterprises and in contact with the public administration.

The policy should aim at reinforcing the sector and avoid solutions that could eliminate them from the market. An attempt at replacing them could slow down the process of improvement in innovativeness of the economy, which even now is quite slow. The information obtained in the course of the study also shows that in order to ensure the relevant scope and quality of services, they are even willing to cooperate with their competitors.

Conclusions

The research shows that the non-public Business Environment Institutions have a significant potential that can be utilised to improve innovativeness and competitiveness of both broadly understood rural economy and the agri-food sector (particularly with regard to the development of small processing and direct sales of agri-food products). Among the non-public business environment institutions selected for the study, a relatively large portion of them are large entities with adequate number of employees, strong position on the market, i.e. funded from diversified funding, and usually several years of experience in their operations.

Among the analysed institutions, over 75% have already cooperated with entrepreneurs active in rural areas and/or associated with the agri-food sector. Over 90% of the entities declare that they have relevant qualifications to start such cooperation. Nonetheless, about 5% of the institutions that have already cooperated with the agri-food sector and nearly 39% entities that have not would need to improve their qualifications or increase their human resources in order to extent their activities with the aim to support the development of rural entrepreneurship.

The analysis of the population of users of services offered by the nBEIs has shown that they have a favourable opinion on cooperation with entities in the business environment. Nearly 83% of representatives of the businesses (service users) utilising support provided by the nBEIs rated such cooperation very good (i.e. gave it the highest rating in a five point scale). In the studied group, the cooperation involved primarily training (24% of responses), establishing a business (20%), obtaining subsidies for development (15% of the respondents have pointed to such a form of cooperation). An important form of nBEI activity was business incubator support, which involved e.g. preferential conditions of rental or free rental of a premises and equipment, support in the field of human resources, accounting and administration – such a form of support was declared by 14% of the studied entities. The good ratings for nBEI functioning from their service users are reflected in the trust in such units among the people who had an opportunity to cooperate with such units. More than a half of them declare that they will address nBEIs to undertake cooperation.

The non-public business environment institutions, on the other hand, have pointed to various barriers to cooperation with users of their services. They included financial barrier to their own activities that limited the scale of their operations and

the offer for entrepreneurs. An important barrier to proper recognition of needs and opportunities for counselling as part of services for clients is inaccessibility of relevant staff or lack of knowledge on the specific character of the sector where businesses or persons intending to launch a business are active.

The measures aimed at overcoming the above mentioned barriers indicated by the nBEI representatives included primarily participation in specialist training and cooperation with other entities active in the market for the purpose of knowledge transfer and exchange of experience. In another case, the nBEIs started temporary or permanent cooperation with specialists in specific sectors. The representatives of the nBEIs also pointed to problems with spreading information on their activities among the potential clients. They intensified their marketing campaigns in order to improve the situation and spread knowledge on their operations among open training sessions and workshops for rural population. In general, according to the respondents, the development of nBEIs and the improvement of the conditions of their functioning depends largely on the opportunities for cooperation (networking) between such entities in order to transfer knowledge and experience but also on the availability of information on their activities among rural population and the opportunities for staff to improve their qualifications through participation of specialist courses.

An important sector of the national economy and the rural economy is the food processing sector. Its importance results primarily from the positive and increasing foreign trade balance. Unfortunately, that sector is poorly innovative. According to some economists, this partially results from the specific nature of the sector, which determines its reluctance to adopt innovation. Nonetheless, its competitiveness, particularly on the international market, largely depends on the low cost of labour. It should be therefore expected that the competitiveness will decline in quite a near future. Hence, introduction of innovative solutions should already be a priority under the current policy.

Non-public business environment institutions have an important role to play in the process. This role boils down to the brokerage in the innovation transfer, particularly if its beneficiaries will be micro- and small enterprises that could face difficulties in establishing direct contact with research units. Nevertheless, the increase in involvement of non-public business environment institutions in this area will require primarily more adequately qualified human resources. Only 56.7% of the studied entities have relevant competencies. Apart from the acceleration of the innovation transfer process, the effects will also include growth in business-to-busi-

ness services. The definite majority of the institutions declare that their readiness to extend their activities in this regard. This is confirmed by the fact that over 73% of the studied institutions is ready to become involved in the development of a small food processing business despite the absence of human resources of adequate quantity and quality. The development of small processing sector might also lead to an increase in the demand for general business services that could be provided by the analysed institutions.

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MULTIFUNCTIONAL RURAL DEVELOPMENT AND GRAPE-WINE SECTOR ORGANIZATIONAL STRUCTURES

Albena Miteva[1], Ivan Kanchev[2]

Abstract

There is a great variety of business units that produce grapes and wine, as there are farmers with holdings ranging from a few decars to several tens of thousands of decars of vineyards amongst the grape growers. Most numerous are the small producers who provide their grapes for processing or process it for their own consumption.

Still limited number is the farms that have built their own cellars and suitable facilities for rural and other tourism. By diversifying their activities horizontally and vertically and by processing the agricultural product, they still do not generate sufficient incomes to modernize production activities and to introduce innovations.

The aim of the article is to make a review of the development of organizational structures in the grape-wine sector and on this basis to draw up guidelines for their development as well as the integration links between them which help the establishment of multifunctional rural regions.

Key words: *multifunctional rural regions*, *organizational structures, grape-vine sector, integration links*

Introduction

Vine-growing is one of the sectors of agriculture for which the problems of management of production, marketing and sustainable development have a specific manifestation. A prerequisite for the latter are the peculiarities of viticulture and the production and trade with wine and other products of grape processing (Doitchinova, et al., 2005; Doitchinova, et al., 2009).

1 Albena Miteva, Ph.D., Professor, University of National and World Economy, Economy of Natural Resources Department, Sofia, Bulgaria, Phone: +35 988 886 96 290, E-mail: albenakm@yahoo.com

2 Ivan Kanchev, Ph.D., University of National and World Economy, Economy of Natural Resources Department, Sofia, Bulgaria, Phone: +35 988 417 29 47, E-mail: albenakm@yahoo.com

The aim of the article is to make a review of the development of organizational structures in the grape-wine sector and on this basis to draw up guidelines for their development as well as the integration links between them which help the establishment of multifunctional rural regions.

Material and methods

The methodology includes an assessment of the existing organizational structure of sector Viticulture. The aim is to reveal farmers in the form of farms specializing in the production of grapes as well as those who have a closed production cycle and produce their own wine brands in their cellars. The indicators for the vine farms are their number and the area of their vineyards, measured in thousands of decares.

The assessment of these indicators is established in the development of the age and variety structure for the last reporting year. These indicators were also analysed by planning regions, and the dynamics of the production of white and red varieties of grapes was established, which allows to prove the leading position in the structure of vine plantations of the individual vine varieties and varieties.

Indicators are used to assess the production structure of integrated economic units that have their own vineyards and wineries for industrial production. The aim is to identify wine producers who have a registered geographical origin and have a specialized variety for the production of wines of designated origin and their own brands.

Object of the methodology are the indicators for evaluation of organic production of grapes, in particular regions, companies, the size of the areas and the variety structure.

Farms are considered according to their ownership of natural and legal persons - cooperatives and commercial companies. The distribution of farms depends on the realization of the production of grape varieties and its purpose. The methodological approach for analysing and assessing wine production includes indicators and criteria for the capacity of the sector's production facilities, types of white, red, bio and rosé wines, including newly built vertically integrated wine business units that are organized as cluster trade associations for wine tasting, for wine tourism and in some cases offering trade and hotel services.

The statistical information used for this analysis is provided by the National Statistic Institute, the National Crape-Wine Union and Agro-statistics of Ministry of Agriculture and Food.

The survey is chosen as the main method of micro-level research - vineyard / enterprise. The coverage of the differences in the type of production - open or closed, the way of supply of raw materials, labour resources, the specifics of the functioning, was achieved by including specialized boxes with questions related only to the respective type of production. Most of the questions are open-ended, or they are a combination of choosing a response option and an opportunity to freely specify or explain this answer.

Structurally, the questionnaire includes issues that characterize economic sustainability, social development, environmental protection, and the level of institutional relations. The farm is represented by its production specialization, size, organizational status and the different combinations of ownership of the used production factors. The different agricultural activities, their importance for the farm, the level of intensity of the agricultural production, etc. are also characterized. The combination of these features determines the unequal opportunities for developing a variety of activities that can be interpreted as potential development factors.

The survey on farm/enterprise level aims to collect information on the characteristics of the production specialization, the size and the results of the business activities of the farms, the personal characteristics of their owners and their intentions to adapt to the conditions of the Common Agricultural Policy.

Results and Discussions

Growing grapes and winemaking is a serious resource in the Bulgarian economy and an important prerequisite for the development of other sectors. In Bulgaria there are 28 thousand vine-growers farmers, the wine cellars are over 270, according to the data of the Executive Agency for Viticulture and Wine (EAVW), most of the cellars are new or renewed. Most of them have a small and medium capacity of production - between 20 and 50,000 bottles of wine. Wine production is spread around the country. Over 30 grape varieties grown in our country are the reason for the very good flavour qualities that distinguish our wines and make them popular: Cabernet, Riesling, Aligote, Tamianka, Chardonnay, Misket Ottonel, Misket, Mavrud, Dimyat, Gamza and so on (Dimitrov, et al., 2017; Apostolov, et al., 2012; Borisov et al., 2012).

According to the latest published data of the Agro-statistics Department at the Ministry of Agriculture and Food, the number of vine farms in Bulgaria in 2013 is 51 606 holdings with area of the cultivated vines totalling 456,35 thousand of decares. There is a drastic decrease in the number of specialized viticulture farms compared to the published by Agro statistic in June 2010 - 147883 number of holdings with an area of vineyards cultivated by them reaching 597.00 thousand of decares. According to Eurostat, the number of vine farms in Bulgaria in 2015 continues to decrease and reaches 45 179, while the area of vineyards grows and reaches 599, 91 thousand of decares, with the average size of one farm increasing to 13 decares. These data are an evidence of the enlarged concentration in the sector and increased production capacity.

The data on the holdings breakdown by size of areas for 2009 and 2015 show that the relative share of holdings with size under 0.1 ha (51.8%) growing vines in 2009 was the highest, while in 2015 there is a positive tendency for consolidation of the family vineyards - 43.7% of all farms are with size between 0.1 and 0.5 ha., followed by those with size between 0.1 and 0.2 ha (25.8%). Despite this tendency, the small size of ownership of this group of farmers determines them not as business-oriented, but as self-sufficient farm with its production. The data show that the role of small vine farms continues to decline as these two groups of farms manage 22.2% of the land under vines in 2009, while in 2015 this share is reduced to 8.55%, which proves the fact that they only supplement their income with the grape raw material they produce.

Most areas under vineyards in both periods are concentrated in farms over 10 hectares. Their number - from 614 in 2009 totals 1073 in 2015, and the areas under vines on these farms are increasing from 50.1% of all areas under vines in 2009 to 64.7% in 2015 while maintaining the areas under vines during this period. The average size of these farms is declining, probably as a result of the separation of some of them as independent companies. In practice, these are agricultural cooperatives and commercial companies owning large own plots of land under vines, which are structurally important for the sector.

From the made analysis it follows that, in terms of organizational structure, the sector is characterized by a small-scale model of ownership of vineyards. Nevertheless, 64.7% of the occupied areas with vines are cultivated by 1.073 economic units, which have significant wine-growing potential.
The data also show that the majority of farms have been in operation for over 20 years,

most of them were created after the establishment of the first land division plans in 1994 and 1995. Their over 20 years of functioning shows that the cultivation of vineyards is a strategy for the development of their business in the future as well.

The distribution of farms and areas under grape vines according to their use is shown in Table 1.

Table 1. *Distribution of farms and areas under grape vines according to their use*

Type of grape	Holdings, number	Areas with vines (ha)	Relative share of farms from all holdings (%)	Relative share of the area of all areas under vines (%)
Grapes for quality wines, 2009	38,124	35,889	25.8	59.7
Grapes for quality wines, 2015	18,540	36,702	41.03	61.2
Grapes for other wines, 2009	77,396	20,245	52.3	33.7
Grapes for other wines, 2015	28,696	23,038	63.5	38.4

Source: *Ministry of Agriculture, Agro-statistics, Eurostat.*

Around 38,000 farms (25,8% of all farms) grow grapes intended for the production of quality wines, located just over a quarter of the areas occupied with wine vineyards. There is a positive tendency to increase the relative share of farms and areas with quality wines /wines with protected designation of origin (PDO) and wines with a protected geographical indication (PGI) - with a concentration of 37.5% of the areas. This allows these farms to generate higher revenues and to be more sustainable in their development. The low purchasing power of the population, the large share of vineyard farms owned by physical persons, are the reason for the increase of the relative share of farms and the areas under vines for production of other wines (non-quality).

The tendency to specialize and produce a larger quantity of quality wines is enhanced by increasing the size of the farms, and is most pronounced in farms over 10 hectares. Of these, 352 farms (14.8%) produce wines with PDO on 8.43% of the areas dedicated to this type of wine. 452 farms (27.9%) offer wines with PGIs and their vineyards are located on 55.5% of vineyard areas designated for such purposes. Most of the farms are concentrated in the Southeast Region and South Central Region. In other regions, areas with wine grapes for the production of quality wines are of negligible size (Dimitrova et al., 2013).

It can be concluded that in the sector there is a strong polarization of the size and production structure of the farms, which has decreased slightly in recent years. In 2009, small farms with little or no market orientation prevail. They are owned by physical persons and have little potential for investing. This trend after 2015 is overcome when the number of farms per individuals decreases by 340% and their average size increases considerably.

It can be summarized that there are two types of holdings that have the potential to develop sustainably and to generate sufficient financial revenue. One type are the large holdings with size over 10 hectares, mainly owned by legal entities (co-operatives, commercial companies, wine producers and some big traders), which have a strong potential for realization of an independent successful business and an opportunity to achieve and maintain stable market positions. The most significant impact on income increase and the improvement of the social situation of the residents of the regions have the cooperatives and the firms that have diversified their activities establishing their own enterprises and creating new own vineyards (Kirechev, 2012).

The second type of farms are the medium sized farms with the size of the cultivated vineyards of 1 to 10 ha, the owners of which are mostly individuals, sole traders and others. For them, the smaller size of ownership implies that they should be considered as grape vendors for processing plants due to their lower resource and capacity opportunities. These farms have relatively high flexibility due to their smaller size, but also lower financial and production capacity. This is the main reason why their investment activity is more important for their sustainability and accelerated development.

There are a variety of organizational forms processing grapes, ranging from independent wine cellars to complex formations, with a closed cycle from grape and wine production until its final realization in their own trading network. Generally speaking, the differences between the different models of economic units are the presence or absence of their own vineyards, which closes the entire chain land-grape-wine-consumption of processed grape products.

Most widespread is the winery, which does not have its own vineyards, its own commercial network and does not carry out independent commercial activities, but only produces wine. The main problem with them is the realization of the produced final products, as they do not have their own distribution and realization

network for the wine. In recent years, some of these enterprises have large quantities of obsolete production, which forces them to implement a strategy aimed at producing small series of high-quality wine.

The second type is the wine-producing cooperatives, which produce grapes and wine, have limited commercial activity and do not offer additional support activities. In organizations of this type, the members have their own vineyards and annually provide their grapes to the cooperative. In the process of growing the vineyards, the plant protection and other mechanized practices are carried out by the specialized mechanized unit of the cooperative. In this way, the production process is constantly controlled by cooperative specialists, although the vineyards are owned by the grape growers who are members of the cooperative. The fragmentation of plantations and the small size of their farms are the cause of lower labour productivity and higher production costs for the treatment of vineyards in these farms.

Similar is the characteristic of the third type structures - wine-producing firms that produce grapes and wine but do not carry out independent business activities and additional side activities. In these organizations mechanized treatments throughout the production cycle are carried out with modern high-performance agricultural machinery. Their cellars meet all modern technological, ecological and hygienic requirements and some of them also develop wine tourism. From the grape residues after fermentation are produced tartaric acid, natural dyes and tannins, grape seed oils for the food and cosmetics industry. This way the final residues from the production process are used, which contributes to the protection of the environment.

The fourth type of organizational structures is the wine-growing complexes where not only grapes and wine are produced, but there are also commercial structures for realization of the production as well as for offering additional activities. In them, the quality of the grape raw material is controlled, a preliminary biological analysis is obligatory performed. Selected picking is applied, necessarily in boxes that preserve the integrity of the grapes during harvesting and transport. The main reference points in the production technology that determine the boutique character of the cellar are:

- selection of the raw material based on its grading by high technology methodology;

- manually selecting grape harvest in specially designed containers, which guarantees the mechanical integrity of the grapes and their microbiological purity;
- re-selection of the raw material when it enters for processing by manual dumping from the plastic crates into the hopper of the grape harvester;
- controlled fermentation achieved through the use of own, specially selected strain of yeast;
- formation of young wines in underground air-conditioned premises with optimal oxidation-reduction potential in new baric type oak barrels or in stainless steel vessels depending on the style of wine.

Tasting halls and hotel complexes are next to the cellars. For these companies, some of the production is sold in major retail chains or different quantities are exported to the European market.

The strategy of vertically integrated companies is aimed at creating high quality red and white wines, which are also winners of national and international competitions. The majority of vineyards of these companies are certified for the production of organic grapes and are located in suitable sloping areas and soil types. Wines are produced from selected white and red varieties in limited series. The strategy of some of these companies is aimed at providing wine tourism and creating conditions for its combination with other types of tourism. For this purpose, permanent relations with tour operators are established.

On the basis of the analysis of the distribution, the characteristics and the problems of winery enterprises, the following conclusions can be drawn:

- There are different forms of organization of grape and wine production and the realization of wine, which have a significant impact on rural development.
- The most significant impact for income increase and improvement of the social situation of the inhabitants of the regions has the co-operative forms as well as the enterprises which diversified their activities and that have created their own new vine plantations.
- Only newly built wineries and especially those who have introduced technological lines for deep processing of residues from the main grape and wine production, have a significant contribution to environmental protection.
- Wineries that buy the produce have no long-lasting relationship with local grape growers and often buy raw materials from other regions.
- All surveyed cellars have problems with the realization of the production. Depending on their assortment structure, these problems are more pronounced in those producing relatively younger wines and of lower price groups.

Guidelines for the development of organizational structures in the wine sector

On the basis of the conclusions from the analysis of the organizational restructuring of the vineyard farms, some basic guidelines and proposals for their development can be proposed. In the wine-growing areas vines are drown in holdings with different specialization, with the largest share being held by holdings of physical persons. All family grape-producing holdings have registered as agricultural producers and for single area payments, i.e. operate as market and semi-subsistence farms. Surveys show that farms registered with the National Vine and Wine Chamber are fewer than half of the farms registered as agricultural producers. Still less (about 26%) are the declared grape growers with the Executive Agency for Vine and Wine. Most of these farms are also registered under the Commerce Act.

The reason for the large differences between the three types of registrations is the accepted parameters for the lower limit and the size of the vineyard plantations of holdings of physical and legal persons as well as the insufficient awareness of the producers about the opportunities that their registration as wine-growing farms offers. Another main reason is the insufficient impact of the measures of the current Common Agricultural Policy in terms of increasing the incomes of vine growers. In order to improve current practice in this area, it is necessary to align the criteria and indicators on which farms are registered and the incentives which, through CAP subsidies, affect producers. In this respect, it is also necessary to revise the requirements for the economic size of a holding (which is at least one economic unit or 14 decares of a vineyard); the size of the arable land (which is at least 10 decares or 5 decares of permanent crops); as well as the requirements for legal entities (who must have received at least 50% of their total income for the previous year from agricultural activity and services).

In order to increase the quality of the carried out activities and to reduce the constant costs of operation and maintenance of the technical facilities, it is necessary further to reduce the used external services, which are currently applied by grape producers. The structure of the services used by types shows that mostly grape growers use commercial services - for the realization of the production and the supply of materials, as well as for plant protection measures. This practice helps them to speed up the organization of their own joint maintenance service activities, mainly through participation in producer associations.

A characteristic feature of the viticulture sector is its seasonality in the use of labour force and technical means. A specificity that derives from the biological characteristics of the vine and the agro-technical process. This is the main reason why in the vineyard farms is used constantly mainly the work of family members and the number of temporary workers is changed by seasons depending on the size of the production activity and the specialization of the organizational formation. In addition, in the majority of the regions predominate the hired workers with age structure between 51 and 65. These circumstances call for the creation by these manufacturers of additional and accompanying activities to increase the relative share of permanent workers and require additional staff training.

Based on the analysis of the distribution, characteristics and problems of the wine-producing enterprises, basic guidelines for their organizational strengthening and sustainable development can be formulated. In addition, the existing forms of organization of wine production and trade have a direct impact on the development of the rural areas in which they are localized.

Generally speaking, the differences between the different models of surveyed wine-producing enterprises include a variety of production units along the chain from the production of raw material to the final product. The largest distribution in the surveyed regions has the organizational structural units with main activity of production and processing of raw materials and wine trade. Some of these enterprises do not have their own vineyards and buy the raw material from vineyard farms of individuals and of legal entities. The main problem is the realization of their finished production. In order to overcome this weakness, it is necessary for them to set in their strategies an accelerated construction of their own distribution networks to sell their finished products, including the available quantities of obsolete production. These businesses also have potential for buying land and creating their own vineyards. This will help to overcome their current insecurity in securing the necessary quantities of quality grapes for the production of wines with established company origin and brand.

Another important direction for overcoming the existing difficulties with the supply of quality raw material is the possibility of creating contractual associations with the grape growers or their organizations. This is a prerequisite for building a stable relationship with interested grape growers and creating new wine brands that are unknown to manufacturers so far.

The most significant impact on raising income and improving the social situation of the inhabitants of the regions is executed by the cooperative and vertically integrated forms of organization of wine production. Grape producer members of these businesses have a high motivation of independent grape growers. Their raw material is of controlled quality and is obtained by applying modern technological solutions and from cultivated crops with certified seedlings.

A progressive form of organization of a wine-making enterprise is the wineries with a closed production cycle. These organizational structures have important advantages as they produce self-contained raw material production of controlled quality. Their high interest in the production of quality grapes is created by motivated entrepreneurs to introduce new technological solutions for the production of wine and especially wines from the high priced groups with their own brand and specific taste qualities.

Biggest part of these wine-producing enterprises diversify their main activity by creating other complementary activities such as organizing hotel and restaurant activities, providing wine tastings combined with wine tourism and participating in wine roads in the form of specialized tourist destinations (Michelloni et al., 2007; Wargenau, et al., 2006; Boudzine-Chameeva, 2011).

Closed production cycle wineries implement new technological solutions related to the deep processing of residual products from the main production process. The improvement of the activities of these structures is related to the provision of financial opportunities for the purchase of own land and the gradual restriction of the lease of land by other owners.

A problem for the development of integrated organizational structures is also the provision of a skilled labour force for viticulture and the provision of highly qualified wine production specialists.

The main directions for the development of these wineries is the development of strategic programs that provide for their inclusion in various cluster formations through the absorption of additional activities and tourist destinations, such as spas with wine in healthy programs using the products of wine making.
One of the possibilities to overcome a number of problems of the producers of grapes and wine in the wine-growing regions is the establishment of producer organizations. They are a particularly suitable form of association for small grape

growers and winemakers who do not have their own vineyards or are owners of small vines.

Producer organizations play an important role in stabilizing the production of grape raw material and for improving the market positions of producers. The uniting of farmers makes it possible to realize the classical advantages of consolidated production and supply. In this case, this means producing and delivering larger quantities of grapes of one type and variety, achieving a better market price, reducing production costs and improving the quality of production. Last but not least, these organizations create opportunities for higher revenues from the realization of the products produced by their members, which can hardly be achieved by the individual producer. The inclusion in the organization of producers economic operators with the object of producing and trading in wine creates the opportunity to use a number of advantages of vertical economic integration along the "land - final product" chain.

Although there are more than 25 years of opportunity to set up producer organizations, a limited number of such structures still operate in our country. The legal framework allows the producer organization to be set up to produce one or more products. The priority of the activity of the grape producer organizations is undoubtedly the collection of the production produced by the members and its supply on the market. At the same time, it should focus on developing rules for manufacturing and improving the production process, providing technical assistance to its members in the process of further manipulation of sorting and storing their production. Producer organizations, for their part, have the right to join associations that are responsible for the implementation of a common for all operational programs and a fund. Especially important are they for small family grape growers.

Another opportunity to unite wine grape growers is the cluster. The creation of clusters in the national economy for the time being is an initial phase process. The initiative objectively belongs to the business (private companies) and the state supports them indirectly or through funds under the operational programs. It is also a prerequisite for the cluster to have a leader, a company to unite smaller businesses and a sceptical minded business (Ditter, 2005; Bowen, 2010; Bruwer, 2010; Stamov et al., 2010; Neshkov, 2009; Hall, 2000).

In Bulgaria, it is also proposed to create such networks that cover all structures working on the creation of eight proposed wine roads. Leader in this case may be

the Regional Chamber of Viticulture and Wine Trakia, which is also the initiator of the development of several projects, which in practice lead to the creation of a cluster formation. Moreover, three clusters - "The Way of Orpheus", "The Way of Dionysius", "The Thracian Elector" are already registered in the territory of the South Central Planning Region. The organizer and the contact person of the first two is the chairman of the Thrace Chamber of Vine and Wine.

The "Wine Roads" tourist project is national and includes mapping of eight key routes, which follow the old wine roads that have crossed the territory of present-day Bulgaria since ancient times. The idea is for specialized tours to be advertised in foreign markets and offered by local tour operators. Wine tours include visits to ancient churches and monasteries, nature reserves, Renaissance towns and ethnographic settlements, as well as some of our more attractive balneal and spa centres. And everywhere guests can taste local varieties of wine in wine cellars and châteaux. The advantages of Bulgaria are the cultural and historical heritage, the geographical location, the wine culture and others. This allows the achievement of sustainable multifunctional development of rural areas (Dimitrov et al., 2016; Yancheva 2014).

The advantages of such a cluster are related not only to a good variety of vines, but also to developed mountain, cultural, spa, rural tourism, especially in the northern and eastern Rhodope and Srednogorie. The region is also characterized by the development of a considerable number of relatively small wineries, producing a wide range of quality wines with controlled and guaranteed origin. In practice, they have a strong potential to create added value for quality wines by offering them directly at the place of production. Last but not least, the growing number of foreign tourists in Bulgaria, especially from neighbouring countries, is also the reason for such a cluster.

The "Road of Wine" cluster includes several municipalities and the branch of the National Vine and Wine Chamber in Plovdiv.

Another interesting union is the Danube Wine Destinations, established under a project by OP "Cross-border Cooperation Romania - Bulgaria 2007-2013". This project aims to create and develop a common wine tourism product between the two countries, to popularize the area's attractions and to increase the number of tourists. The joint product of wine tourism will allow emphasizing the identity of the region and strengthening the links between cross-border branch

organizations, local authorities, businesses and non-governmental organizations. Unfortunately, this project has not been developed since its creation.

The owners of wine-producing farms and wineries with a wine-tourism orientation actually organize and offer information services, wine tasting, animation, catering, lodging and more. Currently, however, their approach is individual and they do not coordinate their efforts to assemble a comprehensive picture of the offer of wine tourism opportunities in Bulgaria.

The organization and offering of wine tours in Bulgaria by tour operators and tour guides are present rather as an assortment in their activities than as a main product line. The reasons are based on the still unformed trade policy of the wine cellars and the small segment of the wine tourism fans in Bulgaria.

Conclusions

There is a great variety of business units that produce grapes and wine, as there are farmers with holdings ranging from a few decars to several tens of thousands of decars of vineyards amongst the grape growers. Most numerous are the small producers who provide their grapes for processing or process it for their own consumption.

Still limited number is the farms that have built their own cellars and suitable facilities for rural and other tourism. By diversifying their activities horizontally and vertically and by processing the agricultural product, they still do not generate sufficient incomes to modernize production activities and to introduce innovations.

In the processing sector, prevail the number of companies that buy production from numerous agricultural farms, and in recent years the importance of processors that create their own vineyards is growing. In this way, they create the necessary prerequisites for changing their production wine list towards high quality wines from a declared and controlled geographical area or micro-region.

Successful implementation of the strategy for the development of the wine sector requires strengthening and sustainable development of the organizational structures and the integration between them which helps the establishment of multifunctional rural regions.

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ECONOMIC ASPECTS OF CATTLE FATTENING PRODUCTION IN LOWLAND REGION OF THE REPUBLIC OF SERBIA[1]

Aleksandar Miljatović[2], Veljko Vukoje[3]

Abstract

This paper examinees economic, production and organizational aspects of cattle fattening production. The aim of the paper is to determine and evaluate profitability level of cattle fattening production. This is being examined throw the determination of the justification of investment in raising a modern fattening farm in domestic conditions. The results of the survey indicate that investment in rising a modern fattening farm is payable after 8 years and 350 days, which can be considered as an acceptable period of time for this kind of production. Internal rate of return is relatively high (13.25%) and it is much higher than average level of current interest rates. The cost prices of the cattle from own production (200.0 RSD/kg) is significantly lower than the cost price of the bull's from import (218.9 RSD/kg). Sensitive analysis shows that the cattle from own production can sustain significant increase of material costs (up to 49%), i.e. decrease of market prices of final products (up to 32%).

Key words: *cattle fattening, justification of investment, cost price, profitability.*

Introduction

Livestock production is of great importance for the agriculture of a country, not only because of the main products that represent basic foods for human consumption (milk, meat, eggs, etc.), but also because of the manure that is important for quality rising of agricultural land. Animal husbandry in the Republic of Serbia (RS) is not at a satisfactory level, especially considering the real potentials, that

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2 Aleksandar Miljatović, M.Sc. in agroeconomy, associate, University of Novi Sad, Faculty of Agriculture, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 21 485 32 39, E-mail: aleksandar.miljatovic@polj.uns.ac.rs

3 Veljko Vukoje, Ph.D., Full Professor, University of Novi Sad, Faculty of Agriculture, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 21 485 33 97, E-mail: vukoje@polj.uns.ac.rs

is, the respectable natural and other resources that domestic agriculture has. Katić et al. (2007), Novković et al. (2009), Aleksić et al. (2009), Petrović et al. (2013) point to this problem, emphasizing that there has been a significant reduction in the number of cattle in the past period, which was particularly pronounced at the beginning of this century.

In 2016, livestock breeding accounted for 33.4% of the total value of agricultural production in the RS, which is 5.1% less than in 2015, but 1.8% more than in 2010 (Statistical Yearbook, 2011, 2016, 2017). Agricultural underdeveloped countries are characterized by less than 35% of livestock participation in total agricultural production (Petrović et al., 2011). It is clear that, according to this criterion, Serbia does not belong to agriculturally developed countries and that efforts should be made to raise livestock breeding to a much higher level. Observing the value structure of livestock production in the RS, the largest share in 2017 was in the production of pork - 49.39%, followed by the production of cow's milk with 25.35% and the production of beef with 8.53% (Calculation of the author based on data of the Statistical Office of the RS).

Cattle production (cow's milk and beef production), after pig-breeding, has the largest share in the total value of livestock production. However, Arsić et al. (2012) indicate a steady decline in beef production in the last two decades in the Republic of Serbia. The reasons for which farmers are reluctant to take on cattle production are numerous, and above all, they point out relatively modest and uncertain earnings, slow turnover of capital, unstable prices of final products, high initial investments, etc.

The total number of cattle in fattening, that is, the production of beef in the RS, has seen a significant decline in the last decade. Also, the consumption of beef in Serbia has a tendency to decrease, although it is already among the lowest in Europe with about 3 kg per capita (Bulletin of the RS Chamber of Commerce, 2017). The export of beef from the RS is very modest, incomparable with the 80s of the last century. The approved quotas for beef exports under preferential conditions to EU countries are far from being fulfilled. There are other very important markets where we could place quality beef on favourable terms, but domestic production is very modest and there are no such market surpluses.

In the upcoming period, the world population's demand for quality beef is expected to grow. Hocquette and Chatelliert (2011) consider that the consumption of beef

in 2025 will increase substantially, primarily in China (by 45%), Brazil (by 23%) and Japan (by 22%).

There is, therefore, a large market area and good natural preconditions for increasing the production of quality beef meat in Serbia. The question arises: "Can this production be economically viable in domestic business conditions?" Finding the answer to this question is the essence and main goal of research in this paper. In order to carry out a reliable estimate of the cost-effectiveness of cattle breeding, the research should include the production, organizational and economic aspects of this production. The paper primarily considers the justification of raising a modern farm for fattening cattle on a farm that is already engaged in crop production, whereby food is mostly supplied from its own production, and most of the cattle are imported.

Material and method

The material basis of the research are data primarily obtained from a specific farm from the Central Banat district, which is already engaged in crop production, and is planning to expand its activity with cattle fattening in the following period. Also, data from numerous literary sources published by domestic and foreign authors, as well as official data of the Republic Statistical Office (RSO), the newsletters of the RS Chamber of Commerce, the Ministries of the RS and the provincial secretariats of the Autonomous Province of Vojvodina (APV), were used.

Research in this paper is primarily of economic character. However, in order to be able to perform a quality analysis of costs and economic results, it is necessary to consider numerous production, organizational and technological data that are characteristic of the observed production (consumption of basic and auxiliary materials, labour, energy, then organization of work processes on the farm, meal structure, daily increment of individual categories of livestock, etc.).

The paper uses the classic methodology for developing an investment plan, where, due to space constraints, only the most important tables and summarized reviews are shown in the text. Firstly, on the basis of an analysis of the beef market, the possibilities of placing this product are examined and then the production costs and revenues, in the individual years for which the projection is made, are determined. To assess the cost-effectiveness of the investment, the basic dynamic methods (net present value of the investment and the internal rate of return) and static methods (indicators of economy and accumulation of production) are used.

An analysis of the current cost-effectiveness of cattle fattening production is primarily based on analytical calculations of the primary costs and results for individual categories of livestock in fattening. Finally, the method of sensitive analysis considers the movement of the achieved result in relation to the change in the market prices of basic raw materials and final products. The paper also uses appropriate methods of quantitative business analysis, primarily the method of comparing the results in a perennial period, or comparison with generally accepted norms. All calculations are based on real market prices of inputs and products from 2018.

Organizational and technological features of cattle fattening production

Cattle fattening represents organized production of beef meat, which has been gaining importance in recent times. The main reason for the presence increase of cattle fattening is the increased demand for top-quality meat. A good result in beef fattening can be achieved if the planned volume of production has sufficient quantity of high quality concentrated foods. Rationally organized feeding of cattle in fattening involves the preparation of meals based on norms or recommendations according to needs for certain nutrients. Depending on the relationship between concentrated and bulky foods, the types of fattening can be concentrated, semi-concentrated and extensive.

In a concentrated type of fattening, concentrates make up more than 60% of dry meal. In addition to the concentrate in the diet, smaller quantities of bulky feed are also used. The most favourable ratio of concentrated and bulky feed is 60%:40% respectively with the best utilization of feed for growth. In the case of concentrated fattening, high daily gain can be achieved, which greatly reduces the duration of the fattening period and the consumption of feed (Pavličević, 2001). In the semi-concentric type, these concentrates account for 40%-60% of the total dry matter of the meal, while the rest is bulky feed (Glamočić, 2002). In the selection of nutrition and meal preparation, in addition to meeting the needs for nutrients, it is necessary to ensure good feed consumption, i.e. the possibility of achieving an average increase of 1,150 g/day – 1,250 g/day. Semi-concentrated fattening are the most prevalent in Serbia, as it is cheaper than concentrated due to, first of all, a smaller concentration of concentrates in the meal structure. Bulky fattening represent an extensible type of fattening which is not very much represented, since the gain is considerably smaller than in the two previous types. In addition, the extensive production of beef is not economically efficient due to the low level of output it produces (Nastić et al., 2017). The gains that occur in this type of fatten-

ing are much lower than in the previous two types and are less than 1,000 g/day on average. It can last for two years, which significantly affects the quality of the meat and its placement. On the other hand, animals are allowed to move freely and live in a natural environment. Also, the huge potential of this production in Serbia are large areas of pasture in the mountainous areas which are not sufficiently utilized.

There is a big difference in the characteristics between breeds used in milk production and those used in fattening. The common characteristic of fattening breeds is that they feature exceptionally good weight gain with good feed conversion and achieve great carcass yield. These breeds are characterized by a low percentage of fat in the body, i.e. the tissue ratio is with a higher proportion of muscle. This ratio will not change significantly whether it is an intensive, semi-intensive or extensive fattening (Purwin et al., 2016).

This paper deals with the economic effects of the cattle fattening on the farm which provides one part of the cattle from their own production (Simmental breed), and the second larger part from imports (Limousine and Charolais breeds).

Simmental cattle are mainly used for dual production of milk and meat. They produce very good fattening results. The maximum daily weight gain of these cattle ranges from 1,300 to 1,600 g/day. The Limousine race is characterized by a relatively elongated body, wide back and extreme muscular musculature, which forms the basis for high values of slaughtering qualities. The daily gain that can be achieved in the fattening of these livestock is slightly above 1,000 g/day on average throughout the entire period of fattening, while in the final stage this increase can reach 1,500 g/day (Chambaz et al., 2003). The daily increase in the Charolais breeds ranges from 1,200 to 1,500 g/day, and fattening lasts about 10 to 12 months after calving (Alberti et al., 2008).

Basic investment information

Estimation of economic viability is based on the development of a business plan for a farm for cattle fattening in the Central Banat district which is already engaged in crop production. The household fulfils one of the basic preconditions for successful livestock production, which is the possibility of own and cheap high quality food production.

Total investments in raising a modern farm are quite high and amount to RSD 319,445,472. Fixed assets make 81.9% of this amount, while permanent working capital account for 18.1%. The investment in fixed assets should include the acquisition of non in-calf heifers and bulls and the construction of cattle accommodation together with the purchase of accompanying equipment. The largest part of the investment, as much as 67.7%, refers to construction objects. Modern housing for cattle is presumed, since the farm does not have the necessary infrastructure for cattle fattening.

Since the farm provides one part of the cattle for fattening from its own production, it is necessary to invest in high quality livestock for breeding. Procurement of non in-calf heifers and bulls makes 6.4% of the total investment. The state encourages the purchase of quality breeding material in the amount of 125,000 dinars for a quality breeding livestock. The maximum amount of incentives is 3,000,000 dinars for one calendar year. The household provides the breeding material in the first two years of project realization and in that way it generates a subsidy of 6 million dinars.

Rising the farm is mostly financed from own funds (81.2%), while the rest of the investment (18.8%) is provided from a long-term loan. The household plans to provide 60 million dinars of investment funds from a long-term loan from the Development Fund of Vojvodina (DFV), which financially helps selected projects under favourable conditions. The interest rate is 3% per annum, the repayment period is 7 years - quarterly (28 quartals). There is no grace period, which means that the repayment starts immediately. Annuity calculation is performed through a compound interest account.

Economic and financial analysis of the investment

The economic and financial analysis of the investment implies the projection of expenses and revenues of cattle fattening production for the entire period of exploitation of the project. In the production costs structure in the representative year 2024, material costs dominate with 89.4% share, followed by labour costs with 5.2% and depreciation with 4.1% (Table 1).

In addition to sales revenue, total revenue consists of income from activation of effects for own needs and income from subsidies.

Table 1. *Review of planned revenues and expenses in the years of the project (in 000 RSD)*

No	ITEM	Year of the project									
		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
		REVENUES									
1	Sales revenues	4,587	107,104	141,679	195,550	217,643	264,910	280,789	240,744	260,137	263,799
2	Revenues from activating effects	0	8,100	11,880	13,770	15,795	17,010	18,630	19,440	19,440	20,250
3	Revenues from subsidies	2,508	8,979	11,614	16,046	18,835	20,118	21,136	18,602	19,246	18,930
I)	**Total revenues (1 to 3)**	**7,095**	**124,183**	**165,173**	**225,367**	**252,273**	**302,038**	**320,555**	**278,786**	**298,822**	**302,979**
		EXPENSES									
4	Material costs	53,968	106,292	157,467	165,589	175,463	174,217	170,546	168,061	167,665	166,203
5	Labour costs	9,900	9,900	9,900	9,900	9,900	9,900	9,900	9,900	9,900	9,900
6	Production services costs	686	710	734	746	759	758	753	751	751	749
7	Depreciation	7,862	7,862	7,862	7,862	7,862	7,862	7,862	7,862	5,567	5,567
8	Intangible costs	877	941	1,034	1,281	1,587	1,627	1,585	1,565	1,499	1,371
9	Interest expenses	1,713	1,475	1,231	979	719	452	176	0	0	0
II)	**Total expenses (4 to 9)**	**75,005**	**127,180**	**178,227**	**186,357**	**196,291**	**194,815**	**190,822**	**188,139**	**185,382**	**183,790**

Source: *Author's calculation*

Sales revenues are, logically, the largest, since well-fed cattle are sold next to the cows after the expiration of their optimal service life (5-6 years), and, if necessary, heifers in order not to overload the accommodation capacities. Household female calve are used for breeding, so it is necessary that heifers from their own production are fetched at market prices. These are "revenues from activating effects", that is, converting their own final products into fixed assets. This represents an internal investment in fixed assets, which makes the same amount and at the same time appear as an outflow in financial and economic flow, so this transaction is neutral from the point of view of increasing inflows (Miljatović, 2018). Revenues from subsidies are very important for cattle breeding in general, even for cattle fattening, since it is a low-cumulative production. The state encourages fattening cattle breeding with 10,000 RSD/livestock unit (lu), while the farm also provides subsidies for breeding cow 25,000 RSD/lu.

In assessing the cost-effectiveness of the investment, financial and economic flows have been designed for a ten-year period of project exploitation. Due to the limited space, the paper presents only the economic flow on the basis of which the time limit for the return of funds has been determined. The main difference between the economic and financial flow is that in the economic flow on the side of the inflow there is no source of financing, in order to show to what extent and during what period the project can pay off itself. In outflows, on the other hand, there are no obligations towards the sources of financing (loan annuity).

On the side of inflows in the economic flow, besides the total revenues, there is the rest of the project value, which consists of the residual value of fixed and working assets at the end of the project century (Table 2). The residual value of fixed assets is the sum of the present value of construction objects obtained when the written-off value and the market value of the basic flock that are located in the household during the last year of project exploitation are taken from the purchase value. The residual value of working capital is the sum of the required working capital in the last year of the project's century and the market value of the livestock at that moment.

When determining the cumulative net cash inflow, the investments in the zero year are not taken into account, but only the inflows and outflows in certain years of project use. Positive net inflow, or surplus of net inflows over net outflows, appears in the fourth year of project exploitation, while the cumulative cash inflows become positive only in the sixth year of the project.

Table 2. *Economic flow in the years of the project (in 000 RSD)*

ITEM	"0"	Year of the project									
		2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
I INFLOWS	**0**	**7,095**	**124,183**	**165,173**	**225,367**	**252,273**	**302,038**	**320,555**	**278,786**	**298,822**	**713,674**
1. Total revenues		7,095	124,183	165,173	225,367	252,273	302,038	320,555	278,786	298,822	302,979
2. Residual value of the project	0	0	0	0	0	0	0	0	0	0	410,695
2.1. Fixed assets											228,134
2.2. Working capital											182,561
II OUTFLOWS	**319,445**	**65,431**	**125,943**	**181,014**	**197,138**	**211,902**	**219,595**	**220,874**	**213,314**	**216,271**	**216,352**
1. Investment in fixed assets	261,599	0	8,100	11,880	13,770	15,795	17,010	18,630	19,440	19,440	20,250
2. Investment in working capital	57,847	0	0	0	0	0	0	0	0	0	0
3. Operating expenses without depreciation		65,431	117,843	169,134	177,516	187,710	186,502	182,784	180,277	179,815	178,223
4. Income tax		0	0	0	5,852	8,397	16,083	19,460	13,597	17,016	17,878
III NET INFLOW (I-II)	**-319,445**	**-58,335**	**-1,760**	**-15,842**	**28,229**	**40,371**	**82,443**	**99,681**	**65,472**	**82,551**	**497,323**
IV CUMULATIVE NET INFLOW		**-58,335**	**-60,096**	**-75,937**	**-47,708**	**-7,338**	**75,105**	**174,786**	**240,258**	**322,809**	**820,132**

Source: *Author's calculation.*

The cost-effectiveness of the investment is assessed using dynamic and static estimation methods. From the *dynamic methods* the following are applied: net present value, internal rate of return and return time of invested funds. Future inflows from the economic flow are discounted at the present moment using a discount factor (DF), which is calculated as follows:

$$DF = \frac{1}{1 + i^n}$$

i - discount rate (4%),
n - years of the project.

$$DF_{2018} = \frac{1}{1 + 0{,}04^1} = 0{,}9615385$$

Discounted net inflow (DNI) is calculated as the product of the net inflow from the economic flow (NEF) and the discount factor (DF) for the year under review.

$$DNI_{2018} = (-58.335.450) * 0{,}9615385 = -56.091.778$$

The net present value (NPV) of the investment is obtained as a difference in the accumulated discounted annual effects from the investment (ΣDNI) and the present value of all investment costs (PVI) over the course of the century of exploitation of the investment. The net present value is RSD 248.781.736 using a discount rate of 4%, which is higher than the interest rate at which the farm received a loan for financing the investment. The relative net present value of the investment is obtained when the net present value of the investment and the present value of all investment costs during the life of the exploitation of the investment are put in relation. The relative net present value is 0.78 and indicates that after 10 years of business the household could finance almost one such project based solely on accumulation, with eliminating the barrier of price disparity with discount.

Internal rate of return (IRR) is the interest rate at which the sum of the cash receipts from the investment discounted at a certain calculation moment is equal to the sum of the monetary issuance for the acquisition and use of the investment, discounted at the same calculation moment. It is calculated as follows:

$$IRR = DR_1 + NPV_1 * \frac{DR_2 - DR_1}{NPV_1 - NPV_2}$$

DR_1 - the discount rate at which the net present value of the investment is positive (NPV1),
DR_2 - the discount rate at which the net present value of the investment is negative (NPV2).

$$IRR\ (\%) = 0{,}04 + 248.781.736 * \frac{0{,}20 - 0{,}04}{248.781.736 - (-181.635.671)}$$

$$IRR\ (\%) = 13{,}25\%$$

The internal rate of return is 13.25% and is significantly higher than the discount rate used, which means that the investment is justified and acceptable. This rate allows for a much higher degree of capitalization in invested capital than when it is placed on the money market.

The return time of invested funds (Table 3), as the most important indicator of the justification of investment, is determined when the value of the investment (RSD 319,445,472) is included in the cumulative net inflow from the economic flow. In this case, the funds invested are returned in the ninth year of project exploitation (2026), or after eight years and 350 days. This period is relatively long, however, it is known that cattle breeding is a low-cumulative activity, and that higher earnings can only be expected in the long run. In addition, raising a modern farm requires high investment, not only in facilities and equipment, but also in quality livestock.

In assessing the viability of this investment, the fact that in the last year, for which the projection of revenues and expenditures is made (2027), a large residual value of the facilities and the basic herd (RSD 410,695,245) remains, is important (Table 2). This value indicates that the farm has a large capital during the whole time of exploitation of the project in the facilities and the basic herd, which points to its solvency.

Table 3. *Return time of invested funds*

Year	Current value of net inflows (in 000 RSD)	The rest of the long-term investment (in 000 RSD)
-		-319,445
2018	-58,335	-377,781
2019	-1,760	-379,541
2020	-15,842	-395,383
2021	28,229	-367,154
2022	40,371	-326,783
2023	82,443	-244,340
2024	99,681	-144,659
2025	65,472	-79,188
2026	82,551	3,364
2027	497,323	500,686

Source: *Author's calculation.*

Static methods of investment estimation (accumulation, profitability and economy), unlike dynamic ones, do not take into account the factor of time. By applying these methods, phenomena are observed at the time of creation, or in a representative year (in this case it is 2024).

Economics shows the ratio of total revenues and expenses realized in one business year. The coefficient of economy in the representative year is 1.68 which can be estimated as good value for this type of production.

The accumulation rate (profitability of income) is obtained from the ratio of realized operating profit and total income. The achieved accumulation rate in 2024 is 34.40%. Considering that it is much higher than the assumed weighted capital price of 4%, it means that the costs of financing are covered and, moreover, a significant profit for the farm is realized.

The profitability of investment is calculated when operating profit and the estimated investment value are put in the ratio. In 2024, the profitability of investment was 34.52%. Given that it is more than 4% (assumed weighted cost of capital), this shows that the project is profitable, i.e. the price of funding source is covered.

Structure of production costs

Analysis of the operative profitability of cattle fattening (current income and expenditure ratio) is based on special analytical calculations for cattle from own production and bulls from imports. In the paper, due to the limited space, only the calculation of the cost price of cattle from own production is shown (Table 4). According to the data from the representative year of 2024, the most important item of total costs is the costs of fattening livestock (44.6% of cattle from own production and 61.5% of the bull's from imports). Fodder food has also a high share in production costs (39.7% and 27.1% respectively). Costs of basic material (food and fattening livestock) make up about 85% of the total cost, which corresponds to the results of other authors' research (Jelić et al., 2016).

The lower cost price for cattle from own production (200.0 RSD/kg) in relation to bull's from import (218.9 RSD/kg) was a result of lower livestock for fattening cost.

Table 4. *Calculation of the cost price of the cattle from own production*

No	COSTS	Amount (RSD/lu)	Structure (%)
1	Concentrated nutrients	26,619.2	21.8
2	Cabbage nutrients	21,864.8	17.9
3	Calves	54,421.2	44.6
4	Medicines	879.0	0.7
5	Energy	181.5	0.1
6	Fuel	1,906.5	1.6
I)	Material costs (1 to 6)	105,872.3	86.8
7	Direct services	159.6	0.1
8	Labour costs	8,388.6	6.9
A)	VARIABLE COSTS (1 to 8)	114,420.4	93.8
9	Fixed costs	7,572.2	6.2
B)	TOTAL COSTS (A + 9)	121,992.6	100.0
No	**ACHIEVED RESULTS**	**Value (RSD/lu)**	**Total C.P. (RSD/kg/t)**
10	Fattened cattle	159,300.0	200.0
11	Weight gain		138.2
12	Manure	4,000.0	1,000.0

13	Revenues from subsidies	10,000.0	
C)	VALUE OF PRODUCTION (10 to 13)	173,300.0	
D)	PROFIT (C - B)	51,307.4	
14	Coefficient of economy (C / B)	1.42	
15	Profitability of income (D / C) x 100	29.61%	

Source: *Author's calculation.*

The coefficients of economy show that in fattening cattle from own production (1.42), a significantly higher level of profitability is achieved in relation to the imported ones (1.30). The profit margin (accumulation of production) is also significantly higher in the case of own cattle (29.61%) than in fattening cattle purchased from imports (23.15%).

The cost price (CP) of 1 kg of weight gain was determined as follows:

$$CP = \frac{(TC - Cc - Vm)}{WG}$$

TC - total production costs,
Cc - costs of calves entered the fattening,
Vm - value of manure,
WG - total weight gain.

The resulting price of 1 kg of weight gain is considerably higher for cattle from own production (138.2 RSD/kg) than for cattle from import (120.5 RSD/kg). The total costs are considerably higher for cattle from imports (133,174.1 RSD/lu) compared to cattle from own production (121,992.6 RSD/lu). However, when from the total cost price expenditures of livestock for fattening is deduced, which make up the largest cost item for cattle from import, the cost of 1 kg of cattle gain from importation is significantly lower. Also, cattle from own production are introduced into fattening with a lower body weight (130 kg) compared to imported livestock (200 kg), so they achieve a higher total gain to the final weight (590 kg).

The sensitive analysis shows that the prices of basic materials (feed and fattening livestock) can increase up to 49% before the financial result in fattening cattle from own production becomes negative. On the other hand, the market price of cattle can be reduced to an average of up to 32%. As for cattle from imports, the

costs of basic materials can be increased by 33%, or the market price of the final product can be reduced by 25% without entering the zone of loss on the basis of this production.

Conclusion

The conducted economic calculations and work analyses enabled a clear overview of the most important aspects of profitability of cattle fattening production in Serbia. This is a specific production with a biological character, which requires high initial investment in fixed assets and equipment, while the fattening takes a long time (up to one year), which significantly slows down the turnover of capital, whereby this production cannot be highly accumulative.
Research has shown that cattle fattening production provides a satisfactory level of profitability in domestic business conditions, which was confirmed by a relatively high accumulation rate of 34.40%, as well as a very favourable economic coefficient of 1.68. High investments (RSD 319,445,472) are paid after eight years and 350 days which can be considered as an acceptable time period for this type of production. The high net present value of the investment (RSD 248.781.736) and the internal rate of return (13.25%) which is significantly higher than the discounted rate used (4%) show that the risk of the feasibility of the investment is low.

The cost of production of cattle is dominated by the costs of feed and livestock for fattening (basic material) with about 85%. Higher profit is achieved with calves from own production than with calves from imports, which shows a significantly lower cost of production of cattle obtained from own production (200.0 RSD/kg) than the price of cattle from import (218.9 RSD/kg). On the other hand, the livestock are sold at the same market price (270 RSD/kg).

In the long run, cattle fattening production provides significant revenues and a stable yield on invested funds. Republic of Serbia has respectable natural and other necessary resources for the development of this production. Also, the domestic market is not fully satisfied with these products, and there is a great potential for export to European and other developed markets. With the appropriate support from state institutions in the form of subsidies for livestock, incentives for the purchase of quality breeding material, the upgrading of modern facilities and the procurement of equipment, more and more producers will take on this production in the future.

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PROJECTIONS OF SELF-SUFFICIENCY OF BOSNIA AND HERZEGOVINA IN BASIC TYPES OF MEAT

Aleksandar Ostojić[1], Željko Vaško[2]

Summary

The volume, dynamics and trends in production, foreign trade and consumption of basic types of meat (beef, pork, lamb, poultry and trout) have been surveyed on the basis of historical data. The period from 2014 to 2017 was analysed. The aim of the paper is to evaluate the self-sufficiency of the basic types of meat, in order to determine matching of supply and demand. For the purpose of the paper, the methods of balancing and modelling were used by combining the collected data and own projections of the missing data. Production consumption balances through the level of self-sufficiency indicate the extent to which the country can meet demand through domestic supply. The results of the research show that in the analysed period Bosnia and Herzegovina did not satisfy domestic consumption with domestic production, with the exception of trout.

Key words: *Bosnia and Herzegovina, meat, production-consumption balances, self-sufficiency.*

Introduction

In the structure of agriculture in Bosnia and Herzegovina, livestock production has a significant place and has a multiple role that is reflected through: valorisation of labour and production potentials; achieving higher profits per head, per hectare and per employee; maintenance and improvement of soil fertility (manure production); strengthening export orientation in agri-food products; enabling the full utilization of agricultural resources and the realization of plant production and the revitalization of rural areas. Bosnia and Herzegovina has favourable conditions for the development of livestock production, from the aspect of ensuring the volume

1 Aleksandar Ostojić, Ph.D., Associate Professor, University of Banja Luka, Faculty of Agriculture, Bulevar vojvode Petra Bojović no. 1A, 78000 Banja Luka, Republika Srpska B&H, Phone: +387 51 330 926, E-mail: aleksandar.ostojic@agro.unibl.org

2 Željko Vaško, Ph.D., Associate Professor, University of Banja Luka, Faculty of Agriculture, Bulevar vojvode Petra Bojović no. 1A, 78000 Banja Luka, Republika Srpska, B&H, Phone: +387 51 33 09 29, E-mail: zeljko.vasko@agro.unibl.org

and quality of animal feed. However, the current situation regarding the utilization of land capacities for the production of animal feed is unfavourable. The low technological level of production, high production costs, disorganized market and purchase of animal products, low level of livestock production subsidies in relation to neighbouring countries, liberalization of market, depopulation of rural areas and migration of rural population as well as leaving livestock production have further affected the stagnation or reduction of meat production and low level of satisfaction of the population own needs in animal products. The level of self-sufficiency shows the satisfaction of the total consumer needs by their own (domestic) production (Tomić, Vlahović, 2002). This indicator shows the extent to which domestic production is used or could be used to exploit the potential of the domestic market. The same authors, quoting Vlahovic (1997), state that the level of satisfaction of their own needs in meat gives a clear picture of the complementarity of production, i.e. defines potential import quantities. Production and consumption balances provide information on supply and demand of agro-food products, level of self-sufficiency and consumption of food per capita (Grgić et al., 2011). Level of self-sufficiency gives us significant data for making business decisions or policy making.

Although some self-sufficiency in food production is emphasized only globally (that the whole world produces enough food to feed the world's population), for a country like BiH, one of the goals of agricultural development is to achieve self-sufficiency in food production (Vaško et al., 2016). In 2010, Ministry of Foreign Trade and Economic Relations of BiH (MOFTER) attempted to calculate production consumption balances and the level of self-sufficiency for key agricultural products, and for certain categories of meat, the following level of self-sufficiency was determined: beef (73.5%), pork (59.4%), poultry (83.2%), lamb and kid (91%). The authors of this paper previously considered food self-sufficiency for the Republic of Srpska, one of the two BiH entities (Mirjanić et al., 2011; Vaško et al., 2016). Grgic et al. in 2015 published several papers on the production balances of beef, pork and poultry for the period 2000-2012 giving a projection for 2016. Croatia does not meet its needs for domestic production for the mentioned types of meat. Grgic et al. (2015) state that when it comes to pork, domestic production did not match the population needs for fresh meat, but also need for processing industry for quality raw material, as far as beef is concerned, there is a decreasing tendency in number of cattle in Croatia, but due to the increase in imports of live cattle, especially calves for fattening, the level of self-sufficiency in beef is also increasing, while in the processing it is noted that since 2003, the imported quantities of meat are higher than those exported, making self-sufficiency at the

level of about 90%, which is still more significant than for other types of meat. The Statistical Office of the European Communities (EUROSTAT) issued a detailed inventory of methodological guidelines for the preparation of food balances so that all Member States could draw up similar balances (Grgić et al., 2011).

Slaboch and Kotyza (2016), comparing the level of self-sufficiency in pork, beef and poultry in the Visegrad Group countries, find that the situation in the Czech Republic, in terms of self-sufficiency significantly worsened after entering the EU, especially in pork and poultry, while the situation is very stable for beef. Similar situation is noticed in Slovakia, too. The production of beef, poultry and pork is sufficient in Poland, as production covers consumption. In Hungary, the situation is analogous to the situation in Poland, i.e. domestic consumption is covered by domestic production. In the European Union (EU-28) the level of self-sufficiency (https://www.statista.com) in 2015 was as follows: pork 110%, lamb 83%, beef 99% and poultry 107%. The consumption of trout in the European Union, according to EUFOMA (2018) data, amounted to 0.42 kg per capita for all Member States (2016), i.e. the level of self-sufficiency in trout was 89% (EU, 2017) in 2015.

The aim of this paper is to show to what extent, or in what percentage, domestic production can meet the needs of the market of Bosnia and Herzegovina in basic meat categories. The success and accuracy of the calculation depend, to a large extent, on the reliability of the data as the basic inputs in the model. The reliability of data in BiH is the biggest problem in calculating the observed balances, since significant part of data in statistical and other relevant sources, is determined by subjective methods (estimates, expert validation, etc.) or some movements have not been monitored at all, and data are not published. For some data, own expert's estimates were used for particular areas of production, as well as author's estimates.

Material and method

The method of the research was desk research by using official secondary data. The starting point for estimating the level of self-sufficiency is the following balance:

$$\text{Production} + \text{Import} = \text{Consumption} + \text{Export}$$

The assessment of the level of self-sufficiency is calculated according to the following formula (FAO, 2012):

Import Dependency Ratio = Import x 100 / (Production + Import - Export)

Not considering the initial and final stocks (Clapp, 2015-2016), which, anyway, which are mutually annulled in the long run.

Estimation of the level of dependence on imports is calculated according to the formula (FAO, 2012):

Self Sufficiency Ratio = Production x 100 / (Production + Import - Export)

The indicative consumption of certain types of meat per capita is calculated according to the following formula:

Per capita consumption = (Production + Import - Export) / Number of inhabitants

The number of inhabitants for the observed period was taken as a constant (3,531,159), according to the official data of the Agency for Statistics of Bosnia and Herzegovina from the 2013 census (ASBiH, 2013).

The estimate of consumption was made by production-consumption balances not detailed shown in this paper but which were the basis for calculating the level of self-sufficiency. The paper analyses the time period 2014-2017. The level of self-sufficiency can also be expressed as the ratio of domestic production and domestic consumption (Slabocha, Kotyza, 2016, citing by Lohoar, 1981). Meat production is the result of published statistical data on the production trend, i.e. slaughtering by certain types of meat expressed in the net weight of carcasses. Domestic meat production makes up the balance of slaughtering and foreign trade of animals intended for slaughter and enlarged by the so-called unregistered production. Unregistered production is an assessment of slaughter of animals outside slaughterhouses, which is not recorded through statistical publications. Foreign trade is the result of the obtained data on imports and exports from the database of the Indirect Taxation Authority.

Results of research and discussion

Production of beef in BiH

The production of beef, according to domestic statistics, ranged between 11,429 and 22,851 tons in the observed period (Table 2). The production ranged around 16 thousand tons on average for the observed period. The net production of beef was the highest in 2015, and the lowest in 2011. Data show that beef production has a decreasing trend in the period from 2015 to 2017. The average number of slaughtered animals was about 78 thousand pieces. Domestic statistics do not record slaughter outside the registered slaughterhouses, thus for the purpose of calculations, unregistered slaughter was estimated based on households' needs. Unregistered production is estimated at between 18.7 and 37.4 thousand tons per year. MOFTER, in its 2010 report, estimated that unregistered beef production was at the level of 15 thousand tons, which is an increase of almost 56% in relation to the recorded statistical net beef production. In the structure of world production, beef takes third place (behind pork and chicken) and participates with 22% (Vlahović, 2015).

Beef foreign trade

BiH imports 30 to 37 thousand tons of different categories of beef each year, and exports 1 to 9 million kg. Import value ranged between 135 and 170 million BiH convertible marks (international code BAM), and exports between 7 and 87 million BAM (Table 1). In terms of the quantity and value of beef exports, the year of 2015 is emphasized as the exporting year of 87 million BAM, while the import of beef did not increase. In the amount of imported and exported beef, the tariff groups of fresh chilled beef are dominant. Since the number of cattle in BiH is not changed significantly over the years, the export of beef has been carried out thanks to the import of live animals that are being fattened in BiH. For example, there were around 30 million BAM valued calves and cattle imported in BiH in 2015 and exported beef meat equivalent to 87 million BAM. Since BiH does not meet its needs in beef from its own production, all exports of beef are achieved thanks to the import of animals for fattening, with domestic animal feed, labour and slaughter services about 50 million BAM (or 2/3 of the value of the exported meat) were added. The cattle market is underdeveloped and insufficient to meet its own needs in the neighbouring Republic of Croatia (Tolušić et al., 2009).

Table 1. *The volume and value of foreign trade of beef and processed beef*

Year	Quantity (tons)			Value (million BAM)[3]		
	Import	Export	Deficit	Import	Export	Deficit
2014.	30,900	697	-30,203	135.95	7.57	-128.38
2015.	35,196	8,850	-26,346	169.40	87.73	-81.67
2016.	36,941	6,041	-30,900	171.26	53.05	-118.21
2017.	31,279	4,742	-26,537	157.23	50.56	-106.67

Source: *Data processing by author based on BIH Indirect Taxation Authority data*[3]

In the years of 2016 and 2017, beef was exported (primarily due to the agreed arrangement with Turkey), and it was 5-6 thousand tons annually, or 50-53 million BAM. And in those years, beef export was conditioned by import of cattle for fattening (BAM 18-22 million) with approximately the same ratio of added value through fattening (60-70%). The average coverage of exports by imports was around 30%.

Self-sufficiency of beef in BiH

Domestic needs are far above the domestic offer of beef, based on available data. There has been an increasing trend of meat imports in the first three years of analysed period. On the other hand, there has been a decreasing trend of exports since 2015. The lowest recorded import and export of beef were recorded in 2014.

Table 2. *Self-sufficiency level of beef in BiH (2014-2017)*

Year	2014	2015	2016	2017
Net weight of slaughtered animals (t)	11,429	22,851	15,960	15,530
Unregistered production (t)	7,315	14,625	10,214	9,939
Estimation of domestic production (t)	18,744	37,476	26,174	25,469
Import meat (t)	30,900	35,196	36,941	31,279
Export meat (t)	697	8,850	6,041	4,742
Import Dependency Ratio (%)	63.13	55.15	64.72	60.14
Self Sufficiency Ratio (%)	38.29	58.72	45.86	48.97
Production + Import - Export (t)	48,947	63,822	57,074	52,006
Per capita consumption (kg)	13.86	18.07	16.16	14.73

Source: *Author's own calculation*

3 Fixed exchange rate 1 EUR = 1,95583 KM (convertible mark, BiH currency), https://cbbh.ba/CurrencyExchange/

According to the assessment, Bosnia and Herzegovina has a very low level of self-sufficiency in beef. The level of self-sufficiency ranged between 38 and 59%. Also, there is a high level of dependence on imports, due to the low level of self-sufficiency. This coefficient ranged from 55 to 65%. Average consumption per capita is about 15.71 kg. The data show that the consumption of beef is even reduced since 2015, as a result of the standard of living, as this type of meat has the highest price in relation to other types of meat on the domestic market.

Pork production in BiH

According to Vlahovic (2015), pork keeps the first place in the structure of world meat production. The production of pork in BiH shows certain fluctuations and cyclical movements, which is also a characteristic of this production. The maximum official net production of pork was in 2014 (Table 4). According to official data at the state level, an average of 8.8 thousand tons of pork is produced. On average, according to statistics, about 124,000 pigs were slaughtered. As far as this type of meat is concerned, slaughtering and production of meat outside the registered slaughterhouses were also estimated considering domestic population consumption habits of this type of meat. Unregistered slaughtering was estimated at about 35,000 tons.

Foreign trade in pork

The insufficient number of live pigs and lack of capacities to compete with cheaper imported meat have resulted in significant imports of pork and pork products during all observed years.

Table 3. *Scope and value of foreign trade of pork and pork meat products*

Year	Quantity (tons)			Value (million BAM)		
	Import	Export	Deficit	Import	Export	Deficit
2014.	13,166	67	-13,099	60,74	2,02	-58,72
2015.	14,762	49	-14,713	61,77	0,54	-61,23
2016.	14,179	232	-13,947	65,51	1,60	-63,91
2017.	14,357	760	-13,597	65,45	1,86	-63,59

Source: *Data processing by author based on BIH Indirect Taxation Authority data*

Imports of pork and pork products was at the level of 13-14 thousand tons, or 60-65 million BAM per year. It was significantly exported in 2017, but it was only 5% in relation to the amount of imported pork, or 3% compared to the value of imports. In general, it can be said that the foreign trade exchange in pork is one-way, dominated by imports, and exports are still negligible. In the structure of the amount of pork imported, fresh, chilled or frozen pork is dominant. In the structure of the amount of pork exported, pork products were prevalent, and pork meat appeared only marginally in exports in 2014 and 2017. If we observe the value, the situation is almost identical. Imports are dominated by pork, fresh, chilled or frozen, in the amount of BAM 53-58 million per year. The value of exported pork is dominated by pork products in the amount of about 2 million BAM. Observing together, live pigs and pork, BiH has achieved a foreign trade deficit between 62 and 66 million BAM (13-16 thousand tons) over the years.

Self-sufficiency of pork in BiH

Import of pork was, on average, about 14 thousand tons, imports closely follow the tendencies in the production of this type of meat. The export of meat was modest, ranging from 49 to 760 tonnes, with an increase in exports since 2015. In Europe, pork consumption is dominated with almost 40 kg per capita (Vlahović, 2015). The import dependency rate for this product was, on average, around 24% for the analysed period.

Table 4. *The level of self-sufficiency of pork in BiH (2014-2017)*

Year	2014.	2015.	2016.	2017.
Net weight of carcasses (t)	9,663	8,532	8,523	8,771
Non-registered production (t)	36,000	35,000	35,000	35,000
Estimated domestic production (t)	45,663	43,532	43,523	43,771
Import of meat (t)	13,166	14,762	14,179	14,357
Export of meat (t)	67	49	232	760
Import Dependency Ratio (%)	22.41	25.34	24.67	25.03
Self Sufficiency Ratio (%)	77.71	74.74	75.73	76.30
Production + Import - Export (t)	58,762	58,245	57,470	57,368
Per capita consumption (kg)	16.64	16.49	16.28	16.25

Source: *Author's own calculation*

The level of self-sufficiency of pork ranged from 74% to 78%. The highest rate of self-sufficiency was at the beginning and the lowest during the mid-stage of the observed period. According to MOFTER (2010), the level of self-sufficiency in pork in BiH was 59%. Consumption of pork in the analysed period slightly decreased, and on average, it was about 16.41 kg per capita per year. Decrease of self-sufficiency in pork in Croatia was estimated by Grgic et al. (2015b) in 2016 to 55%, but with an increase in per capita consumption of 44 kg.

Production of lamb in BiH

According to official data, lamb production is rather modest (Table 6). Under our conditions, most of the production is done through unregistered trade channels. Official statistics show that the average weight of slaughtered animals was, on average, 1.3 thousand tons for the analysed period, while about 89 thousand sheep were slaughtered on average. The number of animals slaughtered, in registered slaughterhouses, has a declining tendency from year to year. Total production in the domestic market of meat is estimated, on average, at 9.5 thousand tons. The data show that this is a small number of slaughtered animals, so and structure of slaughter comes to a question, and probably the slaughtering of young lambs is dominant in relation to the total number of slaughtered animals. Tomljanović and Mijolović (2016) find that there is a decrease in lamb production in the EU as a consequence of the economic crisis, but also the fact that an increasing number of livestock farmers are not interested in sheep production, since it is difficult to plan income of sheep production accurately and precisely, which comes out of very variable lamb products price (and especially meat) on the market.

Foreign trade in lambs

In the case of lambs, it is dominated by imports, and the first export of lambs is reported in 2017. The structure of the quantity of imported lambs is dominated by fresh, chilled or frozen lamb.

Table 5. *Volume and value of foreign trade of sheep and lamb and their products*

Year	Quantity (tons)			Value (million BAM)		
	Import	Export	Deficit	Import	Export	Deficit
2014.	142	0	-142	1,05	0	-1,05
2015.	37	0	-37	0,26	0	-20,60
2016.	124	0	-124	1,06	0	-1,06
2017.	109	15	-94	0,87	0.20	-0,67

Source: *Data processing by author based on BIH Indirect Taxation Authority data*

Lamb was only exported in 2017 (Table 5). The value of imports is dominated by lamb with about 1 million BAM per year. The value of the exported lamb is dominated by fresh, chilled or frozen lamb with a modest 200 thousand BAM that occurs for the first time in 2017.

Self-sufficiency in lamb in BiH

Import of lamb is symbolic, and it was on average 103 tons, with the decreasing imports in the last two years. When it comes to the export of lamb from Bosnia and Herzegovina, it can be said that there are almost no any exports, as it only occurs in 2017 in the amount of 15 tons.

Table 6. *Level of self-sufficiency of lambs in BiH (2014-2017)*

Year	2014.	2015.	2016.	2017.
Net weight of carcasses (t)	1,484	1,366	1,278	1,304
Non-registered production (t)	8,904	8,196	7,668	7,824
Estimated domestic production (t)	10,388	9,562	8,946	9,128
Import of meat (t)	142	37	124	109
Export of meat (t)	0	0	0	15
Import Dependency Ratio (%)	1.35	0.39	1.37	1.18
Self Sufficiency Ratio (%)	98.65	99.61	98.63	98.98
Production + Import - Export (t)	10,530	9,599	9,070	9,222
Per capita consumption (kg)	2.98	2.72	2.57	2.61

Source: *Author's own calculation*

The level of self-sufficiency was on average about 99%, but compared to other types of meat, apart from trout, this production is the closest to the self-sufficiency of total needs. According to the MOFTER document (2010), the level of self-sufficiency in lamb and goat meat was 91% and 3.1 kg consumption per capita. Considering the extremely high level of self-sufficiency in this product, the dependence on imports is quite low, i.e. about 1% on average. Consumption of lambs is relatively stable, and it was around 2.72 kg per capita per year on average. Consumption of lambs in the EU in the period 2005-2014 recorded decreasing tendency, i.e. it was the highest in 2005 (2.8 kg), and the lowest in the last three years of observation period, about 2.2 kg (Tomljanović, Mijolović, 2016). Consumption of lambs in BiH, as well as in the EU, has a decreasing tendency but it is somewhat at a higher level. According to the same authors, the highest consumption of lambs per capita in Croatia, in the observed period was recorded in 2012 and 2013 (1.3 kilograms per capita). Matthews (2014) has predicted that the level of self-sufficiency in lambs will be in the range of 85 to 86.1% from 2014 to 2017.

Production of poultry in BiH

Slaughtering of poultry has an increasing trend, as well as production of poultry meat. As far as this product is concerned, unregistered production in BiH is the smallest given the development stage of this sector, but also the processing capacities. On average, around 34.8 thousand heads were slaughtered in the observed period, with a net weight of 53 thousand tons. The production of poultry meat in 2017 increased by 43% compared to the beginning of the analysed period. Production of chicken dominates the structure of poultry meat. Since chicken meat is relatively the cheapest type of meat, and at the same time, it has a significant nutritional and commercial value, it can be expected that the market for this type of meat will rapidly expand in the coming period (Vlahović, 2015).

Foreign trade in poultry

In case of poultry meat, imports are higher than exports, but the deficit over the four years period has been halved, thanks to decrease in imports. Although there is deficit in both quantity and value, all the time, the coverage of imports by exports has increased (from 40% to 58%).

Table 7. *The volume and value of foreign trade in poultry meat*

Year	Quantity (tons)			Value (million BAM)		
	Import	Export	Deficit	Import	Export	Deficit
2014.	13,379	4,502	-8,877	26,20	10,54	-15,66
2015.	12,765	3,540	-9,225	23,64	11,47	-12,17
2016.	9,505	3,803	-5,702	20,36	11,57	-8,79
2017.	8,475	4,754	-3,721	18,57	10,83	-7,74

Source: *Data processing by author based on BIH Indirect Taxation Authority data*

The exporting opportunities of poultry meat to the EU market are conditioned by the increase in domestic production. Otherwise, the increase in exports will result in an increase of imports, similar to what has happened with beef in the past years.

In the structure of the import volume of poultry and poultry meat, poultry meat is dominant, chilled and frozen. There is also turkey meat in the import. The structure of poultry exports is also dominated with chilled or frozen poultry meat, and turkey meat appears only marginally. Imports of poultry are dominated by poultry meat, but turkey meat is also significant (around 30%). The value of exports is dominated by poultry meat.

Self-sufficiency in poultry

Imports of poultry are decreasing, as well as meat exports. In general, Bosnia and Herzegovina mostly trade with poultry meat, primarily chicken as the dominant product in this group of meat, on the international scene.

In this product, domestic needs are still higher than domestic production. The level of self-sufficiency ranged from 86% to almost 92%. Thus, there is still a noticeable deficit in terms of this product, although it is also evident that the increase in production is due to the increased level of self-sufficiency, while at the same time reducing the dependence on imports. The dependence on imports has the opposite direction of movement from self-sufficiency and on average it was about 19%. Consumption of poultry meat in BiH per capita has increased and reached a level of 19 kg. According to MOFTER (2010) consumption of poultry meat was at the level of 16 kg, with a level of self-sufficiency of 83%. Estimation for 2016 (Grgić

et al., 2015c) is that the consumption will be at the level of 21 kg/pct. that the level of self-sufficiency will be 81%. For Europe, it is characteristic that it has relatively low consumption, given the high level of income, which is 20 kilograms per capita (Vlahović, 2015).

Table 8. *The level of self-sufficiency of BiH in poultry (2014-2017)*

Year	2014.	2015.	2016.	2017.
Net weight of slaughtered (t)	43,431	48,704	58,910	62,149
Non-registered production (t)	869	974	1,178	1,243
Estimated domestic production (t)	44,300	49,678	60,088	63,392
Import meat (t)	13,379	12,765	9,505	9,070
Export meat (t)	6,032	4,791	3,986	3,277
Import Dependency Ratio (%)	25.90	22.14	14.49	13.11
Self Sufficiency Ratio (%)	85.77	86.17	91.59	91.63
Production + Import - Export (t)	51,647	57,652	65,607	69,185
Per capita consumption (kg)	14.63	16.33	18.58	19.59

Source: *Author's own calculation*

Trout production in BiH

The production of trout in Bosnia and Herzegovina according to statistical data oscillated and was the lowest in 2014 (Table 10). In the observed period, on average, about 3 thousand tons of these products were produced. It is also noteworthy that in 2017, after 2014, the lowest production of trout was recorded. The production in 2017declined by 11% compared to 2016.

Foreign trade

The BiH trout is mainly exported, but the trend of a significant increase in trout imports is worrying (in 2017, imports were five times higher than in the previous year!). Trout export is one of BiH's favourite foreign trade exchanges. The export and import relations are so disproportionate in favour of exports so that there is no sense in expressing the coverage. The surplus of BiH in foreign trade ranges between 1 and 2 million kg, and the value is between 5 and 10 million BAM.

Table 9. *The volume and value of the foreign trade of trout*

Year	Quantity (tons)			Value (million BAM)		
	Import	Export	Suffice	Import	Export	Suffice
2014.	1	1,006	1,005	19	5,644	5,625
2015.	2	1,954	1,952	14	10,657	10,643
2016.	7	1,906	1,899	49	10,539	10,490
2017.	27	1,526	1,499	249	8,616	8,367

Source: *Data processing by author based on BIH Indirect Taxation Authority data*

There used to be small quantities of imported trout in BIH. It was imported live, chilled and frozen. The only exception was in the year of 2017, when 27 tonnes were imported. The export of trout volume is dominated by chilled trout, as well as significant amount of live trout. The export structure is more diversified than the imports, so in the exported quantities there is also chilled and frozen trout file as well as smoked trout. The structure of the import value of trout is dominated by live and frozen trout. Compared to the quantity structure of exports, trout and smoked trout are mainly involved in the value of exports due to higher export price in relation to fresh trout. Kuzman (2014) states that most of the vegetables and fruits are imported to Serbia from Bosnia and Herzegovina (17%), followed by fish and fish products (freshwater fish).

The self-sufficiency in trout

Trout is the only observed product, in this research, which has a positive foreign trade balance. According to the available data, between 34% and 62% of the total trout produced was exported. Imports are modest and reached their maximum in 2017.

Table 10. *Level of self-sufficiency of trout BiH (2014-2017)*

Year	2014.	2015.	2016.	2017.
Production (t)	2,930	3,163	3,395	3,037
Import (t)	2	3	7	27
Export (t)	1,006	1,954	1,906	1,526
Import Dependency Ratio (%)	0.08	0.21	0.47	1.78
Self Sufficiency Ratio (%)	152.20	261.17	226.94	197.47
Production + Import - Export (t)	1,925	1,211	1,496	1,538
Per capita consumption (kg)	0.55	0.34	0.42	0.44

Source: *Author's own calculation*

According to estimates, domestic consumption is lower than domestic production, resulting in a surplus in terms of this product. As a result, BiH have a high level of self-sufficiency, while at the same time almost negligible dependence on imports. According to the results, trout consumption ranged from 340 to 540 grams per capita. On average, it was about 440 grams. Consumption in Bosnia and Herzegovina is almost at the level of trout consumption in the EU (420 g).

Conclusion

Determining the amount of meat produced in BiH is a real challenge, given the unreliable data on the number of individual categories of livestock and the high share of unregistered slaughters. Nevertheless, calculations of the level of self-sufficiency for the main types of meat have been made, and in the event of a critical evaluation of these results, the aforementioned limitations should be taken into account.

Through the analysis of production, it is understood that poultry meat tends to grow, lambs tends to fall, while beef, pork and trout have oscillations in production.

There has been a deficit recorded in BiH in foreign trade of beef and beef products. Nevertheless, BiH began to export beef meat (mainly to Turkey), and the precondition for this export was the simultaneous import of calves for fattening. The level of self-sufficiency in beef was around 48% on average.

In pork, there has been a constant deficit recorded in BiH, both in terms of quantity and value. The level of self-sufficiency in pork was around 76% on average.

The scope of foreign trade in lambs is relatively small and more dominated by live animals than meat. The level of self-sufficiency in lambs was around 99% on average.

There has been a deficit recorded in BiH in foreign trade of poultry, but it is getting lower (from 16 million BAM in 2014 to 8 million BAM in 2017). The average level of self-satisfaction in poultry meat is about 89%.

BiH has recorded a surplus in the foreign trade of trout, both in quantity and value. Domestic production exceeds domestic needs, which makes the level of self-sufficiency positive for this product. Of all the observed types of meat, the

biggest dependence of import is recorded in beef, and it is about 60% in beef, and the lowest in trout and lambs. The only product with constantly growing consumption during the analysed period, is the poultry.

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NEW DEGROWTH IDEA AND ITS SIGNIFICANCE FOR AGRICULTURE[1]

Blagica Sekovska[2]

Abstract

In April 1968, a group of individuals from ten countries, scientists, educators, economists, humanists, industrialists, and national and international civil servants-gathered in the Accademia dei Lincei in Rome. Out of this meeting grew the Club of Rome, an informal organization that has been described as an "invisible college." Its purposes are to foster understanding of the varied but interdependent components-economic, political, natural, and social-that make up the global system in which we all live, to bring that new understanding to the attention of policy-makers and the public worldwide, and in this way to promote new policy initiatives and action. A series of early meetings of the Club of Rome culminated in the decision to initiate a remarkably ambitious undertaking the Project on the Predicament of Mankind. The intent of the project is to examine the complex of problems troubling men of all nations: poverty in the midst of plenty, degradation of the environment, loss of faith in institutions, uncontrolled urban spread, insecurity of employment, alienation of youth, rejection of traditional values and inflation and other monetary and economic disruptions. Team examined five key factors that determine, and therefore, ultimately limit, growth on this planet-population, agricultural production, natural resources, industrial production, and pollution.

Nineteen years later, in Brundtland report 1987, a new term occur and very soon become dominant in the world. For 20 years, that orthodox slogan was Sustainable Development, this meant (Brundtland report, 1987) economic and environmentally sustainable growth. However, the industrial economy depletes resources and overloads the sinks. Hubbert's peak oil is approaching. Carbon dioxide concentration in the atmosphere increasing 2 pm per year. Current environmental degradation and resource depletion challenge our societies in their fundaments. Scientific evidence shows that the negative impacts of our economies are grow-

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2 Prof. dr Blagica Sekovska, Department of rural economy and management, Faculty of veterinary medicine, University of St. Cyril and Methodius, Lazar Pop Trajkov Street no. 5/7, 1000 Skopje, Republic of Macedonia, Phone: +389 70 708 730, E-mail: bsekovska@fvm.ukim.edu.mk

ing, while wellbeing doesn't seem to follow this trend" (OECD 2011). This paper touches green growth ideas, and provides the resources and environmental services on which our well-being relies, and green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.

We will come to the term of de-growth, which is strongly different from the usual mainstream economic theorizing. According to the thinkers of this line of economic thought, growth is not necessarily desirable. Moreover, in many cases, it is specifically harmful and the cause of our ecological and social problems. The theory of de-growth suggests localizing production and consumption as much as possible, so in this way, these can be one of the keys to start the transition. One of my research questions is what are the characteristics of sustainable de-growth consumption, and how can the different kind of local food movements serve the goals of de-growth from the aspect of consumers. Degrowth theories are in the transitional period to reach global sustainability - tries to solve the ecological and social crisis through a shift in our socio-economic paradigm. In all societies, the agricultural world can be seen as the most important sector of production. We are not completely reinstituting Physiocrats' view, but agriculture is well presented as the foundation of the activities, due to many implications in others sectors. Our way to be a farmer can determine the quality of soils, water and food. Health is strongly related to what we eat. The global crisis occurring in the farmer world, plenty of farms disappear every year around the world, and is not a detail. Optimistically, many considerations are dedicated to tomorrow agriculture: it should be free from petrol use (as inputs and energy), extensive, local and environmentally sound.

Farmers have to live directly from what they produce, but this sector should be away from global profit focus. We can see it as a public service, providing many implications in other sectors and forcing them into the transitional period. Another application of the precautionary principle is the upholding of GMO on laboratories. This kind of seeds is directly linked with an intensive, centralized and profit-oriented agriculture. In agro ecological accounts, by contrast, agricultural methods incorporate and enhance of natural resources, as a basis for them to gain from the value that they add. Agriculture stands as the foundation of modern human societies. Any changes in social functioning should thoroughly consider how to guarantee people a proper supply of food, in terms of both quantity and quality. Degrowth represents a movement that aims at achieving

a radical change in the societal metabolism of societies, toward a more frugal, sustainable and convivial lifestyle. The movement envisages a society where concepts as sharing, conviviality, care, commons, justice could stand at its foundation and replace the call for economic growth, which is, obviously, biophysically unsustainable.

This paper aims to (1) review how agriculture has been addressed within the degrowth discourse (2) analyse the relationship between agriculture and societal metabolism and its relevance from a degrowth perspective. The paper points out that although many relevant socioeconomic, political and environmental issues have been addressed by degrowth scholars, agriculture is still poorly analysed. This paper will consider some distinguishing characteristics of these degrowth economics aspects, with special on agriculture, with thoughts on some of what will be required to redress this balance. It will conclude with an image of a healthier relationship between humanity and our natural environment – a relationship that will inevitably come about, whether we choose to move into it positively or are forced into it by breakdowns in all of our economies resulting from inevitable and social disasters. But in general this paper wants to connect degrowth idea with agriculture and to give us overview of development of this idea in field of agriculture.

Key words: *economy, sustainable development, degrowth, agriculture.*

Introduction

"The Earth is 4.6 billion years old. Scaling to 46 years, humans have been here 4 hours, the industrial revolution began 1 minute ago, and in that time we've destroyed more than half the world's forests" (http://greenpeaceusa.tumblr.com/post/93508666790/the-earth-is-46-billion-years-old-scaling-to-46). Sustainable development is an orthodox term for all of us. Even UN is dedicated to sustainable development with their 17 goals of sustainability. But, besides this fact, nothing is become more sustainable, in contrary the life on this planet become worst. We forgot that only treasure in this planet is life, so our main task is to keep and preserve life. For that purpose, our kids growing and became mature and responsible. Our economy is also growing, but it doesn't become more responsible, on the contrary too, it becomes more and more devastating and produces more and more harmful externalities. By Castoriadis, the theory of the permanent economic growth is equivalent on religious dogma. If somebody tries

to explain to any politicians or academic, that economic growth is a wrong and harmful thesis, they will think that it is insanity. So, this is not the end of history, like Fukuyama says, but it becomes more and clearer, even to the most conservative economic theorist that current economic paradigm is wrong and it should be changed. In this moment the world is in a vacuum, because one economic paradigm is dying and new one still is not born. According Boldina only insane people and economist still believe that economic growth is possible on the planet with biophysical limits.

Fortunately, understanding of these facts starts in the middle of XX century. Since 1968, when a group of thirty individuals from ten countries-scientists starts with The Club of Rome, an informal organization that has been aptly described as an "invisible college" scientists try to examine and explain the complex of problems troubling men of all nations: poverty in the midst of plenty, degradation of the environment, loss of faith in institutions, uncontrolled urban spread, insecurity of employment, alienation of youth, rejection of traditional values and inflation and other monetary and economic disruptions. The team examined the five basic factors that determine, and therefore, ultimately limit, growth on this planet-population, agricultural production, natural resources, industrial production, and pollution. At the same time, Georgescu-Roegen (1971) established the fundamental link between economic growth and natural limits in his book, The Entropy Law and the Economic Process. The process of production generated by the economic rationality that nests in the machinery of the Industrial Revolution is defined by an impulse to grow or die (unlike living beings, who are born, develop and die, and human populations, which usually stabilize their growth). 19 years later, in Brundtland report 1987, a new term occur and very soon become dominant in the world. For 20 years, that orthodox slogan was Sustainable Development, this meant (Brundtland report, 1987) economic growth that is environmentally sustainable. But, nowadays many scientists criticized the term sustainable development like oxymoron. Kallis say that sustainable development become alibi for permanent growth.

It is immensely encouraging that the issue of growth has begun to gain more interest. For decades a tiny few have been trying to draw attention to it, with negligible success. The "Declaration from the 2008 Paris Conference" is an excellent statement of grounds for scrapping the growth economy. For many years Herman Daly has been arguing for a steady-state economy and more recently Tim Jackson's Prosperity without Growth, has gained considerable attention. The birth of the word „décroissance" (French for degrowth), and with this the beginning of an

idea, can be dated to the year 1972. Already back then, the social philosopher André Gorz asked: "Is the earth's balance, for which non-growth, or even degrowth of material production is a necessary condition, compatible with the survival of the capitalist system?". Other intellectuals of that time influenced the debate: Among them Nicholas Georgescu-Roegen, Jacques Grinevald and Ivo Rens. The first economists to talk about economic growth, for example, never thought of growth as a never-ending process, but regarded it as necessary only for a period of time. The degrowth movement started about 30 years after the first appearance of "décroissance" in Lyon.

In 2007, François Schneider, together with Denis Bayon and Fabrice Flipo, founded the academic organisation Research and Degrowth (R&D). This organisation has since then initiated and accompanied the international degrowth conferences. The first international degrowth conference for ecological sustainability and social equity took place in Paris in 2008. At the turn of the millennium, the driving force of the degrowth narrative became the criticism of the idea of development and infinite economic growth. Public debate on the oxymoronic nature of the term 'sustainable development' was sparked by the influential books of French economic historian Serge Latouche. His critique aims to counteract the hegemony in the public debate of infinite economic growth as a one-way future for the whole of humanity. It is the automatic association of 'growth' with 'improvement' that this perspective sought to dismantle through the term 'degrowth'. Today, the rhetoric in mass media and politics frequently reinforces the public's association of growth with an improvement in well-being, despite mounting evidence that in developed countries this is no longer the case. "According to Serge Latouche "to save the planet and ensure an acceptable future for our children, we must not only moderate the current trends, but we must also straight give up development and economism". This degrowth would have to be "sustainable, and that is to say, it would not generate social crisis challenging democracy and humanism. Indeed, a sharp reduction in consumption would create a significant reduction in overall demand, and thus an increase in unemployment and social unrest. The key is therefore in a different distribution of preferences so that consumer chooses immaterial wealth based on human relations rather than material products being harmful to the environment. The material degrowth will be social-relational and spiritual growth, or it won't be" (http://sechangersoi.be/EN/6EN-Discover/Degrowth.htm).

Sustainable degrowth is a downscaling of production and consumption that increases human well-being and enhances ecological conditions and equity on the

planet. It calls for a future where societies live within their ecological means, with open, localized economies and resources more equally distributed through new forms of democratic institutions. "Such societies will no longer have to "grow or die". Material accumulation will no longer hold a prime position in the population's cultural imaginary. The primacy of efficiency will be substituted by a focus on sufficiency, and innovation will no longer focus on technology for technology's sake but will concentrate on new social and technical arrangements that will enable us to live convivially and frugally. Degrowth does not only challenge the centrality of GDP as an overarching policy objective but proposes a framework for transformation to a lower and sustainable level of production and consumption, a shrinking of the economic system to leave more space for human cooperation and ecosystems (https://degrowth.org/definition-2/). In this seemingly pragmatic, non-dogmatic fashion, Latouche tries to draw a distinction between the degrowth project and the socialist critique of capitalism by: (1) declaring that "eco-compatible capitalism is conceivable" at least in theory; (2) suggesting that Keynesian and so-called "Fordist" approaches to regulation, associated with social democracy, could, if still feasible, tame capitalism, pushing it down "the virtuous path of eco-capitalism"; and (3) insisting that degrowth is not aimed at breaking the dialectic of capital-wage labour or interfering with private ownership of the means of production. In other writings, Latouche makes it clear that he sees degrowth project as compatible with continued valorisation (i.e., augmentation of capitalist value relations) and that anything approaching substantive equality is considered beyond reach (Bellamy Foster 2011).

By "degrowth", we understand a form of society and economy which aims at the well-being of all and sustains the natural basis of life. To achieve degrowth, we need a fundamental transformation of our lives and an extensive cultural change. The current economic and social paradigm is "faster, higher, further". It is built on and stimulates competition between all humans. This causes acceleration, stress and exclusion. Our economy destroys the natural basis of life. We are convinced that the common values of degrowth society should be care, solidarity and cooperation. Humanity has to understand itself as part of the planetary ecological system. Only this way, a self-determined life in dignity for all can be made possible (www.degrowth.info/en/what-is-degrowth/). As Latouche (2010) says "let us immediately specify that degrowth is not a concept, and in any case, not one that is symmetrical to growth. It is a political slogan with theoretical implications. The watchword of degrowth especially has an aim to strongly signal the abandonment of the target of growth for the sake of growth, a foolish objective whose engine is precisely the

unrestrained search for profit by the holders of capital, and whose consequences are disastrous for the environment." According to Kallis et al. (2015), "Degrowth signifies, first and foremost, a critique of growth "sharing", "simplicity", "conviviality", "care", and the "commons" are primary significations of what this society might look like". Three major arguments against growth of economic production in developed countries (Victor, Rosenbluth, 2007) include "(1) global economic growth is not an option because of environmental and resource constraints, so developed countries should leave room for those that benefit the most from growth, (2) beyond a point that has been passed in developed countries, growth does not bring happiness, and (3) in developed countries growth is neither a necessary nor a sufficient condition for achieving such objectives as full employment, elimination of poverty and environmental protection."

In generally, the aim of de-growth is to help democratically and peacefully the transition into a more equitable society and liveable environment without extending the size of economy (Latouche, 2011). In the present economy growth is essential to prevent unemployment from rising, because technical progress constantly improves productivity. In a zero growth economy a stable quantity of output would be achieved with a declining workforce. If we moved the present economy in which labour is hired to a zero growth economy then unemployment, poverty and social squalor would increase as productivity gains accrued to capital (Trainer, 2010).

Unsustainability of agriculture

Food production and food consumption are of profound physiological, economic and cultural importance (Harlan, 1992, Pollan, 2013). The way in which the people of Europe feed themselves has changed very significantly, and these changes are some of the main causes of unsustainability, not only as regards human health but also as regards the health of the ecosystems and the stock of natural resources and not only for Europeans but also for third countries. New and increasingly costly processes have appeared between production and consumption. The feeding of the people now involves the use of new and more sophisticated "artefacts" powered by gas or electricity, which have increased the energy cost of food. Food processing and distribution are taken on an importance never before seen. The food market is now global and involves foodstuffs that incorporate high energy and material inputs (transport, processing, logistics, etc. agriculture became highly productive and efficient in supplying goods which also the effect of public support.

The farmers are ensuring highly flexible food supply, while they have to keep relatively high standards relating to the veterinary and phytosanitary conditions or food quality. But as agricultural modernization progressed, the ecology-farming linkage was often broken as ecological principles were ignored and/or overridden. It is fair to say that common worldwide, not only in the EU farming sector. Agricultural scientists have arrived at consensus that modern agriculture confronts environmental crises (Altier, 1995). Developments in modern agriculture have led to heavy on reliance chemical inputs, and to degradation of wildlife habitat, soil, environmental and human health, which are arguably unsustainable (Rigby, et al., 2001).

Evidence has accumulated showing that whereas the present capital- and technology-intensive farming systems have been extremely productive and competitive they also bring a variety of economic, environmental and social problems. The European agriculture is not an exception. Most agriculturalists had assumed that the agro-ecosystem/natural ecosystem dichotomy need not lead to undesirable consequences, yet, unfortunately, a number of "ecological diseases" have been associated with the intensification of food production. They may be grouped into two categories: diseases of the ecotope (homogeneous landscape unit), which include erosion, loss of soil fertility, depletion of nutrient reserves, salinization and alkalinisation, pollution of water systems, loss of fertile croplands to urban development, and diseases of the ecosystem, which include loss of crop, wild plant, and animal genetic resources, elimination of natural enemies, pest control mechanisms. Under conditions of intensive management, treatment of such "diseases" requires an increase in the external costs to the extent that, in some agricultural systems, the amount of energy invested to produce a desired yield surpasses the energy harvested (Altieri et al. 1995).

Today, for example, monocultures have increased dramatically. Available data indicate that the amount of crop diversity per unit of arable land has decreased and that croplands have shown a tendency toward concentration (e.g. Imhof et al., 2004). There are political and economic forces influencing the trend to devote large areas to monoculture, and in fact such systems are rewarded by economies of scale and contribute significantly to the ability of national agricultures to serve international markets. The regional consequences of monoculture specialization are many-fold (see e.g. Altieri et al., 1995, http://nature.berkeley.edu/~miguel-alt/modern_agriculture.html).Industrialized agriculture is also dependent on fossil fuels in two fundamental ways: through the direct consumption on the farm and,

due to indirect consumption, to manufacture inputs used on the farm. For example in Spain for each unit of energy available in the form of food 6 units of energy have been consumed in its production, distribution, transportation and preparation (Infante Amate et al., 2013). Similar results are provided in a Danish study: the current agricultural system of Denmark consumes 3-4 times more energy that it produces (Markussen et al., 2013).

Modern agroecosystems are unstable, and breakdowns manifest themselves as recurrent pest outbreaks in most cropping systems. The worsening of most pest problems has been experimentally linked to the expansion of crop monoculture at the expense of vegetation diversity. This diversity is a key landscape component providing crucial ecological services to ensure crop protection through provision of habitat and resources to natural pest enemies (Altieri, 1994). "Externalities in agriculture cause very high cost around the world. Just for illustration: UK: GBP 5.16 billion (a cost greater than annual net farm income), USA: USD 34.7 billion, Germany: USD 2 billion, China: USD 1.4 billion (only from pesticides for rice), (In China agriculture is larger source of water pollution than industry), Flow of phosphorus to the oceans: approximately 10 million tonnes, and also top 4 seed companies control more 50% the commercial seed market, top 10 corporations (four of them are among the top 10 seed companies) control 82% of the world pesticides business, top 10 corporations control 28 per cent of the global market for food processing, top 15 supermarket chains represent more than 30% of global food sales etc." (www.fao.org/fileadmin/user_upload/suistainability/Presentations/Naqvi.pdf).

There is lot of black facts connected with environmental degradation caused by agriculture. In 2010, the International Resource Panel of the United Nations Environment Program found that agriculture and food consumption are two of the most important drivers of environmental pressures, particularly habitat change, climate change, water use and toxic emissions. Agriculture is the main source of toxins including insecticides, especially those used on cotton. The 2011 UNEP Green Economy report states that "[agricultural operations, excluding land use changes, produce approximately 13 per cent of anthropogenic global GHG emissions. Total amount of fresh residues from agricultural and forestry production of biofuel amounts to 3.8 billion tons per year. Livestock production occupies 70% of all land used for agriculture, or 30% of the land surface of the planet. And it is responsible for 18% of the world's greenhouse gas emissions as measured in CO2 equivalents. It also generates 64% of the ammonia emission. Livestock expansion is a key

factor driving deforestation; in the Amazon basin 70% of previously forested area is now occupied by pastures and the remainder used for feed crops which leads to land degradation and reductions in biodiversity. The UN-FAO reports that 1.5 billion people rely upon the degrading land. Degradation can be deforestation, desertification, soil erosion, mineral depletion, or chemical degradation (acidification and salinization). Pesticide use has increased since 1950 to 2.5 million short tons annually worldwide, yet crop loss from pests has remained relatively constant. The WHO estimated in 1992 that three million pesticide poisonings occur annually, causing 220,000 deaths.

Unsustainable agriculture has several specifics:

1. Using lots of chemicals which are not only toxic to human health, they are also poisoning wildlife and pollinators, running off into water bodies, polluting land, rivers, and wetlands, and destroying important soil microbes that are critical for healthy soils.
2. Growing and producing genetically modified organisms (GMOs) which are not only detrimental to human health, they are detrimental to the environment.
3. Growing monoculture crops is leading to deforestation, widespread use of heavy machinery, and a large use of agricultural chemicals.
4. Overproduction and more food waste and caused large portions of the human family go hungry on a daily basis the global market economy favours the overproduction of food which leads to waste.
5. Paying workers poorly under terrible working conditions,
6. Global corporate agribusiness is driving small local producers out of business because small producers cannot compete with low commodity prices on a global market. Today, many farmers struggle with poverty because of pressure for low global commodity prices in race to the bottom.
7. Growing crops on every inch of land - with the pressure from global markets to increase production, many farmers are producing crops on the entirety of their land. In many cases, there are no more “buffer strips” to protect waterways from erosion or runoff, or for habitat that remains for native species.
8.Natural vegetation clearing -to make way for agriculture, natural habitat is being destroyed and the land is becoming increasingly degraded which caused exposed topsoil being blown away by wind or washed away by rain, erosion due to deforestation, increased flooding etc.
9. Using manufactured fertilizers to feed the soil - most of the fertilizers used in industrial agriculture are made from petrochemicals and only supply three

basic nutrients: nitrogen, phosphorous, and potassium.
10. Wasting water,
11. Agro fuels - using food crops to produce energy is wrong-headed. It typically takes just as much fossil fuel energy to raise these crops as you get out of them when you burn them as fuel.
12. Only growing a few varieties of crop plants - only a few varieties have been grown in commercial agriculture it caused losing a lot of genetic diversity in our crop plants.

Because many of humanities unsustainable practices and lot of them in agriculture, in nowadays we are facing global modifications in many environmental areas leading to a situation never seen before like climate changes, collapse of biodiversity or chemical contamination are some examples of this global degradation. Agriculture significantly contributes to greenhouse gas emissions, while climate change potentially destabilizes agricultural systems, so this greater vulnerability is to be addressed through adaptation and resilience. We can summaries from all this that an infinite growth in a finite world is impossible and "the devil will come to pay his tax" (figuratively saying).

Sustainable and de-growth agriculture

Many in the agricultural community have adopted the sense of urgency and direction pointed to by the sustainable agriculture concept. Lack of sharp definition has not lessened its authenticity. Sustainability has become an integral component of many government, commercial, and non-profit agriculture research efforts, and it is beginning to be woven into agricultural policy. Increasing numbers of farmers and ranchers have embarked on their own paths to sustainability, incorporating integrated and innovative approaches into their own enterprises. Critical discussion of the sustainable agriculture concept will and should continue. Understanding will deepen; answers will continue to come. On-going dialog is important for another reason: with more parties, each with its own agenda, jumping into the sustainable agriculture "tent," only a continued focus on the real issues and goals will keep sustainable agriculture from becoming so all-encompassing as to become meaningless. To qualify as sustainable agriculture, we consider the simple environmental criterion: that production may be maintained without non-renewable inputs or cumulative degradation of physical and biological resources.

According to Infante Amate and de Molina (2013, p. 32), "Economic degrowth, in order to be sustainable, must pay particular attention to how this process is carried out. We think that only a shift towards organic farming and corresponding changes in consumption patterns can contribute to substantial reductions of resource use in the food system and to sustainable degrowth". The same authors, paraphrasing the 8 RS proposed by Latouche (2009, namely: Re-evaluate, Reconceptualise, Restructure, Redistribute, Relocalize, Reduce, Re-use, Recycle), propose the strategy of the 4RS: namely: re-territorialisation of production, re-localisation of markets, re-vegetarianisation of diet, and re-seasonalisation of food consumption, as the way forwards for degrowth. Jackson (2009) briefly addresses the impact of intensive farming and calls for a more sustainable agriculture, offering only some general warnings. The overall sustainability of organic agriculture is still debated, and there is a lack of a scenario analysis in relation to the impact of a large-scale transition to low-input agriculture on the food system and society. That is to say, linking the agricultural system to societal metabolism. Georgescu-Roegen advocated the adoption of organic agriculture, but he was aware that a reduction in yield was to be expected. A process of de-intensification of agriculture is certainly needed, in particular in regions such as Europe and the USA. Nevertheless, different realities face different problems.

In the debate around sustainable development and degrowth, there is a lot of 'religious' invectives. Degrowth criticises the 'market economy' as a new God. Some denounces sustainable development as a "new religion"(Brunel 2008). On the other hand, voices are rising against the 'spiritualism' of degrowth (Di Méo, 2006). These 'transcendences' are however not established in the same way. Growth is institutionalised in the framework of sustainable development, like a kind of self-prophetic pantheism: all is becoming market. On the other hand, degrowth is a way to debate over ends, to get away from economism. This differences between sustainable development and degrowth can be apply on agriculture as well (Weleborn, 2008).

Degrowth way to sustainability, according to Lievens should be possibilities to farmer can determine the quality of soils, water and food. Health is strongly related to what we eat. The global crisis occurring in the farmer world - plenty of farms disappear every year around the world - is not a detail. Optimistically, many considerations are dedicated on tomorrow agriculture: it should be free from petrol use (as inputs and energy), extensive, local and environmentally sound. Farmers have to live directly from what they produce but this sector

should be away from global profit focus. We can see it as a public service, providing many implications in other sectors and pushing them into the transitional period. Another application of the precautionary principle is the upholding of GMO on laboratories. This kind of seeds is directly linked with an intensive, centralized and profit-oriented agriculture.

Lievens, propose a set of indicators focused on the agricultural world in a degrowth transition period. This indicators are submitted to the debate, in a way to underline his abilities to engage the paradigm, which create an indicator, dedicated to agriculture in degrowth period, directly connected with the program of "8R steps" proposed by Latouche (2006). These steps are: to revalue, to reconceptualise, to restructure, to relocate, to redistribute, to reduce, to re-use, and to recycle.

1) According to Lievens ***to revalue*** in generally means to change agricultural paradigm and our way of thinking like first step. Values are fundamental to help us through the entire process of paradigm transition. Considering the current situation of agriculture, it doesn't seem excessive (according to the author) to speak about 'war' agriculture. Therefore the perception has to evolve from war to cooperative agriculture. This cooperation should concerns two levels:

a) cooperation between Humanity and Nature. The objective is to reach a high level of sustainability with a better knowledge and use of natural capacities. Many sweet practices already exists as organic farming for example. Some agro-environmental measures can help to preserve habitat biodiversity in a way to improve or keep places dedicated to auxiliaries (birds, bees, ladybirds etc.). This biological pest control requires no energy inputs and helps the lowering of chemical inputs. Permaculture (permanent agriculture) could also be a beneficial for cooperation between Humanity and Nature. Finally, the use of transgenic plants appears as in total opposition with degrowth transition.

b) cooperation between people. The significance is to improve the links between people around farming practices and get away from social competition. Many initiatives provides this kind of links, as for example the associations for the maintenance of rural agriculture (AMAP in French) in which people pay in advance for the future production of their local farmer and help him during work intensive periods. We can also mention the collective purchase groups (GAC in French). All these practices help to create link between people around farming and could provide better knowledge of farming for city dwellers.

2) ***to reconceptualise:*** To back agriculture close to nature and close to the people with targeting its first major goal: to feed people. Alimentation practices are directly connected with farming practices and are so essential to be questioned. But the central question is : what means to feed? In a degrowth transition, the food is not only an amount of calories a day, but represents something more important because of the consequences on health, environment and social concerns. Rearing of 6|8 livestock and the meat industry can create large environmental and social degradations when it is intensive-oriented. The high level of current meat consumption should decrease and shift to a balanced proportion between vegetable and animal proteins. The quality is also a part of the problem and initiatives like Slow Food Movement are directly connected with degrowth philosophy, aiming to build some alliances between farmers and 'eaters'. Advertising for junk food has to sharply decrease to stop the demand for such food.

3) ***to restructure***: a global modification of the production structure is the objective. Due to lower fuel intensity, more human work could be requested in the agriculture. It would lead to an increase in the farmers into the population, with a reduction of the average size of farms (crop areas). This land restructuration needs to be coupled with a shift from monoculture areas to multi-species and extensive agriculture. To ensure a cyclic process, each farm could keep mixed activities (crops and breeding).

4) ***to relocate***: key concept for the objectors to growth, relocalization appears as a solution to the future peak oil, and offers the possibility to create links and social relations where people live. Current high level of transportation for delivering goods appears unsustainable and is based on cheap oil. The reduction of "food miles" will be a beneficial to local farming and distribution. Author proposes three domains where relocalization could occur:

a) to relocate the choice of crops through local and adapted seeds. This choice gives the opportunity to be more adapted to environmental specificities at the local level and provides biodiversity.

b) To relocate the transformation/distribution of the products with direct-selling

c) to relocate the financing with models like co-operative.

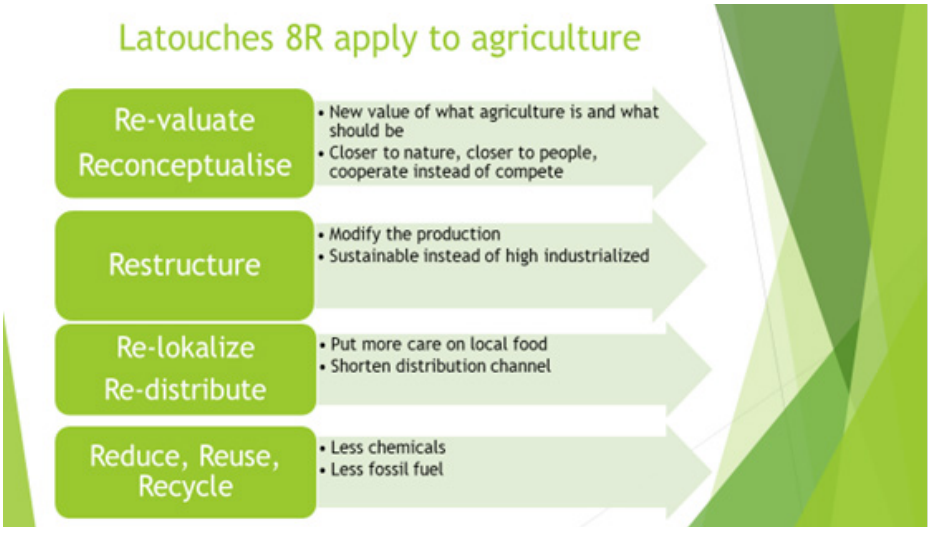
The realization could be started first in the field of food supply, and later it could be extended to a broader economic and financial self-sustainability too (Domby, 2015).

5) ***to redistribute***: millions of people suffer from hunger around the world and even in developed countries, even if the global production of food calories appears sufficient to feed the entire population. Degrowth is first a decrease in inequalities at every scales, then a redistribution of food production. The redistribution is also related to the power redistribution. The abilities to decide food orientations (alimentary sovereignty) can preserve from miss-orientations of production.

6) ***to reduce***: the goal of agriculture in a degrowth society is not about a reduction in the production but more about a strong cut in the impacts and in the dependence. Author proposes a reduction in chemical products and in fossil fuel use to reach a sustainable agriculture. No more damage should be done on nature and humanity.

7/8) ***to re-use, to recycle***: these last two steps in the "8Rs" scenario are supported by many former practices to achieve the process. For example, use of fertile seeds allows not to depend anymore on big seed groups and to obtain adapted local varieties. About the recycling process, it should be reach a full recycling of the nourishing elements via local composting areas for example.

Picture 1. *8R steps scenario*



Degrowth theories propose to avoid and end up with what is called economisation of the world (i.e. seeing everything through economic glasses of profit and loss). Trying to convert every dimension into money appears unthinkable.

Conclusions

Society is facing various cultural and resource problems that could be solved by decreasing economic production. Physiological human needs may be met, while abandoning metal and fossil resource extraction, by encouraging high levels of local net primary production through improved economic value systems and agricultural land use. In a closed-loop scenario, organic, high biodiversity cropping with extensive plant cover, labour intensive farming will produce the highest yield and level of sustainability over the long term. Decreasing levels of population density and per capita consumption will improve the probability of future resource self-sufficiency for humans within the biosphere. According the current experience sustainable development practices in agriculture is not well enough.

Degrowth theories just begin to be studied and deepened even if we find very old roots that nourish this thinking. Review of the literature suffers from a lack of available studies, making sometimes difficult to highlight relevant proxy. As presented at the beginning, this paper does not pretend to prove the hypothesis, only to give an overview of the development of degrowth idea, especially in the field of agriculture. In generaly, Latouch 8R must be starting point for developing the idea. A key success factor for such an index will be its acceptation by the Civil Society and even more by the farmers. Envisioning degrowth, as a transitional period from unsustainable societies to a variety of sustainable ones seems to be pertinent. Nevertheless, to be able to take off and go on with this paradigm shift, some measurements need to be able to support political decisions about society's orientations for farming. At the current time, no existing indicator seems appropriate to support this decision-making process.

This paper does not pretend to prove the hypothesis, only to give an overview of the development of degrowth idea, especially in the field of agriculture.

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WATER QUALITY AND IRRIGATION MANAGEMENT IN ORGANIC PRODUCTION[1]

Boris Kuzman[2], Radivoj Prodanovic[3]

Abstract

The aim of paper is to present the specifics of irrigation in organic production, to point out the most important principles and parameters of water quality for irrigation.

Irrigation management in organic production is tasked with paying special attention to the quality of water. Irrigation in organic production may have an adverse effect on yield and product quality, if irrigation water contains toxic elements or is microbiologically contaminated.

The results from this study show that the water resources of the Republic of Serbia are suitable for organic production, but there are water sources that are contaminated. The best system of irrigation in organic production (vegetables, fruit growing) is 'drop by drop', because other ways increase the risks of spreading pathogens and spoilage of soil structure. In organic production, irrigation water must be of adequate quality.

The process of certification of organic production can include water analysis from the aspect of the content of elements, on physical parameters and microbiological correctness. If certain failures are identified, the manager is obliged to inform the certification body about this and to take appropriate actions.

Key words: *management, irrigation, water quality, organic production.*

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2 Boris Kuzman, Ph.D., Associate Professor, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 63 590 129, E-mail: kuzmanboris@yahoo.com

3 Radivoj Prodanovic, Ph.D., Assistant Professor, University Business Academy in Novi Sad, Faculty of Economics and Engineering Management in Novi Sad, Cvecarska Street no. 2, 21 000 Novi Sad, Serbia, Phone: +381 21 400 484, E-mail: rprodanovic@fimek.edu.rs

Introduction

Irrigation means the provision of plants with the necessary water for growth, development and fruiting. It has been applied in plant production since ancient times, and today it has developed into a modern applied discipline.

The paper starts from the assumption that irrigation is a factor that can contribute to stability and increase the economic and ecological effects of organic plant production.

Irrigation stabilizes yields at a high level, enables the production of products of satisfactory quality, and contributes to greater employment of capacity and workforce. However, irrigation in certain cases may also have negative effects on yield and quality, as well as on land. These are cases when irrigation is done with water of inadequate quality or if excessive amounts of water are added.

Therefore, the task of irrigation management in organic production is to prevent possible risks, such as contamination of plant organs and fruits, land, and to rationally dispose of water resources in an attempt to maintain or increase their quality.

The lack of precipitation (drought) occurs almost every year, lasts longer or shorter, and leaves serious consequences on yield. Bošnjak and Mačkić (2009), based on several years of research, found that drought is a regular occurrence, that 76% of the summer period has a lower or greater water deficit.

Irrigation in organic production should be carried out in a professional manner, ie it is necessary to perform rational irrigation with quality water in accordance with the needs of plants, the dynamics of water consumption, climatic conditions and water physical properties of the land. It is necessary to correctly determine the watering time, the watering rate, which depends on the way the irrigation and the technical condition and possibilities of the irrigation equipment are concerned.

Due to the existing climatic conditions, characterized by the lack of precipitation, irrigation is gaining importance. Vegetable production can not be imagined without irrigation. Irrigation of orchards and vineyards contributes to high yields and stable production of high quality (Mihailović et al., 2014). The second and posterior sowing is without irrigation.

Given the increasing trend in organic production areas, as well as the increasing demands for preserving water and land resources, we are motivated to explore management practices for irrigation, which could result in the development of organic production.

The aim of the paper is to present the specifics of irrigation in organic production and to indicate the most important principles and parameters of water quality for irrigation.

Water quality for irrigation

Irrigation water contains less or more soluble salts and solids. Water quality for irrigation is influenced by water temperature, presence of gases, microorganisms and chemical substances derived from wastewater and pesticides (Dragović, 2006).

Herbal organs and fruits are subject to a certain degree of pollution because in soil, water and air there are polluting substances. The risk of contamination is also possible through water for irrigation, due to the general trend of deterioration in its quality, the increase in areas under irrigation systems, and the use of waste water in irrigation (Dragović, Cicmil, 2008). The main cause of poor water quality is the lack of water management or poor farm management (Cesáreo Landeros-Sánchez et al., 2011).

In irrigation in organic production, water quality is of particular importance. Given that this is the era of technical prosperity and industrialization, irrigation water is also the recipient of huge quantities of wastewater. In nature, there is less water of good quality in the presence of the trend of further deterioration.

In organic production, the basic principle of irrigation is the tendency for us not to exploit the land, as if the last generation, that is land and water resources, must be treated as a natural resource, to which the future generations are entitled (Dragović, Cicmil, 2008).

In order to certify organic production, it must meet precisely defined conditions, which among other things include adequate water quality for irrigation (Petrović et al., 2016).

The basic criteria for assessing water quality for irrigation are the analysis of chemical and physical properties as well as microbiological correctness. The chemical

properties analyze the quantitative salt content, as well as their qualitative composition, separately analyzing the content of cations and anions. Also, the participation of other elements from the waste waters is analyzed: microelements, heavy metals, so-called trace elements. Only those elements that show negative effects on soil and plants and pose a potential danger to humans and animals are analyzed. Physical properties analyze the application and temperature of the water. Analysis of microbiological properties consists in the consideration of the representation of species and number of pathogens.

Table 1. *Basic parameters for water quality assessment for irrigation*

Physically	**Chemically**	**Biological**
Temperature	Reaction (pH)	Number of coliforms
Suspended particles	Total soluble salts	Number of pathogenic calls
Color / Mutually	Species and concentration of anion	Biological need for oxygen
	Type and concentration of cations	
	Microelements	
	Toxic ions	
	Heavy metals	

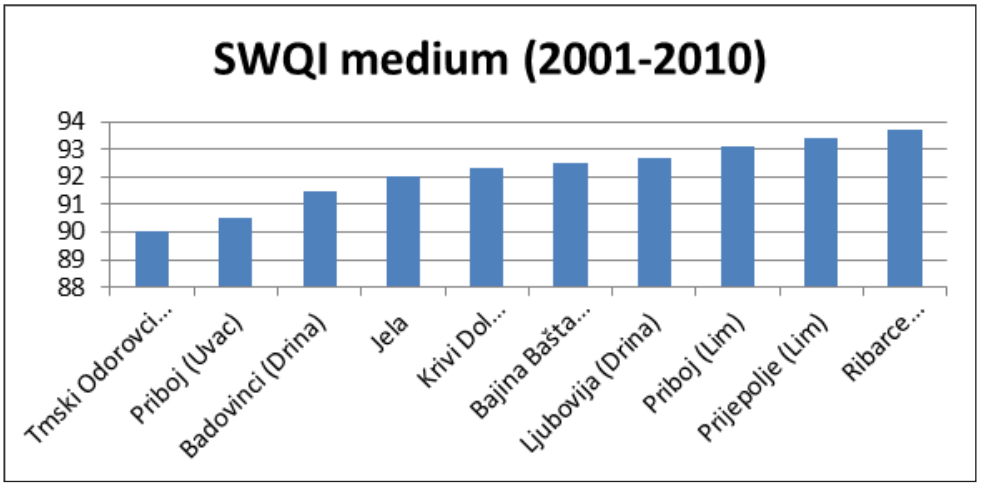
Source: *Romić, 2006.*

In addition to the mentioned quality parameters, the suitability of water for irrigation should be assessed on the basis of specific conditions of use, including cultivated culture, soil characteristics, irrigation practices, agro-technical measures and climatic conditions (Romić, 2006).

It is especially important to know the aquatic physical properties of irrigated soils, mechanical composition, texture, adsorption capacity, infiltration, filtration, natural drainage, etc. One of the criteria for irrigation of soil is rough texture (skeletal, sandy), and the other for heavier clay and organic soil. The climate is very important (arid/semiarid), ie whether there are conditions for natural salt rinsing or artificial drainage is necessary, or if there is precipitation outside the irrigation season. Then, plant species are of varying salt tolerance, so the right choice should be made. Only after the complete analyzes water is classified in the class and the final decision is made (Vučić, 1976).

Figure 1 shows ten watercourses of the highest quality, which have great impact and to which special attention should be paid when constructing irrigation systems.

Chart 1. *Watercourses with best quality*



Source: *Veljković, Jovičić, 2011.*

There are numerous classifications in the world for water quality assessment for irrigation. A few of them are universal in the application around the world. This first classification was provided by the US Salinity Laboratory, whose presentation was made by Vučić (1976) for our conditions. Then, Ayers (1979) gave a more recent classification, so that the FAO would employ more than 30 leading world experts, who gave the most complete classification for water quality assessment for irrigation, and published by Ayers and Westcat (1985). It is widely used around the world, and it was presented by Bošnjak (1994) and Belić et al. (1996).

Chemical properties of irrigation water

Table 2 shows the guidelines for the interpretation of the chemical quality of water for irrigation, ie water quality and the possibilities of its use under certain conditions. Irrigation water is classified into three categories.

Category I include water that can be used for irrigation of all plant species on all land without risk of harmful consequences. In the second category are water which cannot have a negative impact on the quality of plant products, but it is possible to partially shade the soil, and reduce the yield by 5-10%. Some low to

medium intensity measures should be taken to prevent unwanted consequences (meliorative irrigation). In category III, water with a high risk of adverse effects on plants and land and their use requires strict implementation of the necessary measures, so as not to cause adverse effects. In organic production, standards and policies allow the use of the first two categories of water.

Table 2. *Guidance for interpretation of water irrigation quality*

Potential irrigation problems		**Unit**	**Degree of limitation of use**		
			No	**Weak to medium**	**Sharp**
Category water			I	II	III
pH normal level		6,5-8,4			
SOIL SALINITY:					
ECw		dS/m	<0,7	0,7-3,0	>3
Total salts		mg/l	<450	450-2000	>2000
Na SAR			<3	3-9	>9
INFILTRATION:					
SAR = 0-3	ECw =		>0,7	0,7-0,2	<0,2
3-6	=		>1,2	1,2-0,3	<0,3
6-12	=		>1,9	1,9-0,5	<0,5
12-20	=		>2,9	2,9-1,3	<1,3
20-40	=		>5,0	5,0-2,9	<2,9
TOXICITY OF SPECIFIC IONS:					
Cl					
surface irrigation		me/l	<4	4-10	>10
sprinkling plants		me/l	<3	>3	
B		me/l	<0,7	0,7-3	>3
DIVERSITY IMPACT:					
NO_3		me/l	<5	5-30	>30
HCO_3					
Artificial rain		me/l	<1,5	1,5-8,5	>8,5

Source: *Ayers, Westcat, 1985.*

Nešić et al. (2003), they examined the quality of water for irrigation in AP Vojvodina. The results indicate increased mineralization, but not the risk of alkalisation. The content of microelements and heavy metals is generally below the maximum acceptable toxicant concentration (MATC), except in three samples in which the slightly increased nickel content is observed above the MATC. The situation is not bad regarding the quality of water for irrigation in conventional production, while for organic production a large part of the sources in Vojvodina is not of adequate quality.

Table 3. *Usability of surface water for irrigation in Republic of Serbia*

Watercourse	Profile	Classification						
		Stebler	US SL	Neiggeb	F A O		Miljković	
					Salinity	Toxicity	Salinity	Salin. type
Dunav	Novi Sad	> 18	C2 - S1	Ia	I	I	I	b
Tisa	Martonoš	> 18	C2 - S1	II	I	I	I	b-s, b-h
Tisa	Novi Bečej	> 18	C2 - S1	II	I	I	I	b-s, b-h
Sava	Sr.Mitrovica	> 18	C2 - S1	Ia	I	I	I	b
Kan. DTD	Sombor	> 18	C2 - S1	Ia	I	I	I	b
Kan. DTD	Melenci	> 18	C2 - S1	II	I	I	I	b-h, b-s
Kan. DTD	N.Miloševo	> 18	C2 - S1	II	I	I	I	b-h, b-s
Drina	B.Bašta	> 18	C2 - S1	Ia	I	I	I	b
Kolubara	Draževac	> 18	C2 - S1	Ia	I-II	I	I	b
V.Morava	Lj.Most	> 18	C2 - S1	Ia	I	I	I	b
V.Morava	V.Plana	> 18	C2 - S1	Ia	I	I	I	b
Z.Morava	Kraljevo	> 18	C2 - S1	Ia	I	I	I	b
J.Morava	Aleksinac	> 18	C2 - S1	Ia	I	I	I	b
J.Morava	Vl. Han	> 18	C2 - S1	II	I-II	I	I-II	b, b-s
Beli Timok	Zaječar	> 18	C2 - S1	Ia	I	I	I	b
Lim	Priboj	> 18	C2 - S1	Ia	I	I	I	b
Nišava	Pirot	> 18	C2 - S1	Ia	I	I	I	b
Ibar	Raška	> 18	C2 - S1	Ia	I	I	I	b
Vlasina	Vlasotince	> 18	C2 - S1	Ia	I	I	I	b
Zobnatica	B.Topola	> 18	C3 - S1	IIIb	II	II	II	b-s

(Salin. type b-HCO_3, s-SO_4, h-Cl)

Source: *Belić et al., 1997.*

Belić et al. (2003) find that most of the potential irrigation water in the Republic of Serbia is from I to II class. Also, a part of the water source is contaminated, which places them in a category that is not suitable for irrigation, even in conventional production.

The basis of the Neiggebauer classification is the degree of salinity, expressed through the dry residue, as a sign of the danger of shading and the ratio of Ca and Mg to Na, as an indicator of the danger of soil alkalisation (Pejić, 2011). In the United States salinity remains the most dangerous water irrigation problem affecting one third of all irrigated areas (Cesáreo Landeros-Sánchez et al., 2011).

Table 4. *Classification of irrigation water according to Neiggebauer*

Class of water	Subclass	Conditions	Usability of water
I	a	S.O.<700 mg/l (Ca+Mg):(Na+K)>3	Waterless water
	b	S.O.<700 mg/l (Ca+Mg):Na>3	
II		S.O.<700 mg/l (Ca+Mg):(Na+K)>1	Good quality irrigation water
III	a	S.O.700-3000 mg/l (Ca+Mg):Na>3	Waters to be examined under our conditions
	b	S.O.700-3000 mg/l (Ca+Mg):Na>1	
IV	a	S.O.<700 mg/l (Ca+Mg):Na<1	Water unsuitable for irrigation
	b	S.O.700-3000 mg/l (Ca+Mg):Na<1	
	c	S.O.>3000 mg/l (Ca+Mg):Na>3	
	d,e	S.O.>3000 mg/l (Ca+Mg):Na>1	

Source: *Pejić, 2011.*

The FAO classification considers the risk of shading over the total salt concentration, expressed in mg/l or most often through electrical conductivity dS/m. The first category does not have a danger of shading; in the second category there is a possibility of shade, it can be used on the soil of medium to good natural drainage, where there are natural conditions for washing the salt with precipitation outside the irrigation season. For lower Ecw values, measures for preventing the shading are rarely applied. In arid conditions, occasional salt rinsings

should be carried out, with an increase in the Ecw value to 3. In lightweightly well drained soils, more frequent occasional rinses are required, while on heavy soils of poor drainage, artificial drainage and occasional rinsings are required. Under these conditions, it is medium-sensitive to medium-tolerant plant species towards salts. If it is used for Irrigation Water Category III, severe measures are needed to prevent shading. They can be used on lighter lands of rough texture, it is always necessary that artificial drainage is occasional as well as permanent and rinsing of salt by cultivating high tolerance plants.

The danger of alkalisation is overlooked SAR[4] values, ie the absolute content of Ca, Mg and Na cations, and their relative relationship. The SAR value is combined with Ecw and the waters are classified into six classes, and each class is divided into three categories. In fact, the emphasis is on the danger of alkalisation with increasing salt concentration in irrigation water. If there is a higher Ecw value then smaller SAR values pose a great risk of alkalisation (Pejić, 2011).

The toxicity of specific ions, such as Na, Cl and B, is also considered. Na and Cl are accumulated in plant tissue mainly in perennial plantations, are particularly harmful to stone fruit, cause yield reductions, damage the trees and lead to the rapid aging of the orchard. Even small quantities of these elements, by long-term irrigation, cause harmful levels of their content in the tissues of perennial plants. B is a beneficial microelement in small concentrations, and in large quantities it is harmful, and also toxic to plants (Bosnjak et al., 1994).

The diversity of negative impacts on plants and land is shown by nitrates (NO_3) and bicarbonates (HCO_3). Nitrogen is a macroelementate, yield carrier, if NO_3, especially NO_2 (nitrite) are found in larger quantities in irrigation water, are very harmful to the soil and plants and are dangerous to humans and animals. They are mainly accumulated in plants in large quantities, deposited in proteins, where they form nitroamines, which are carcinogenic compounds (Cesáreo Landeros-Sánchez et al., 2011).

The FAO classification specifically considers the maximum allowed concentration of trace element (trace elements) in irrigation water, and which are not

4 Sodium Adsorption Ratio (SAR). The classification is based on electroconductivity values as indicators of salt concentration - SAR values as a relative activity indicator On in removable reactions with soil, ie, potential adsorption indexes Na. If the proportion of Na great danger of alkalisation is high, if Ca and Mg dominate the risk of alkalisation is small (Pejić, 2011).

included in routine analyzes. It is necessary to analyze them in the use of water, which are also recipients of wastewater. These elements are analyzed, which can be expected depending on the pollutant. At higher concentrations, they accumulate in plants, most often slow down, and they stop growth or cause other damage. Several experts in this field conducted numerous studies, which served as the basis for determining MATC elements in traces of irrigation water (Table 5).

Table 5. *Maximum allowed concentration of trace elements in irrigation water*

Element	MDC (mg/l)	Observations
Al	5,0	It can cause acidic soil to be non-productive (pH <5.5), but in pH> 7 ions, precipitates and eliminates any toxicity.
As	0,10	Plant toxicity varies in a wide range, from 12 mg/l in sudan grass to 0.05 mg/l in rice.
Be	0,10	Plant toxicity varies from 5 mg/l for honey to 0.5 mg/l for beans.
Cd	0,01	For several plant species, it is toxic at a concentration of 0.1 mg/l in a nutrient solution. There is a potential risk of accumulation in soil and plants in concentrations that can be very dangerous to humans.
Co	0,05	It is toxic to tomatoes in concentrations of 0.1 mg/l in a nutrient solution. It has a tendency to inactivate in neutral and alkaline soils.
Cr	0,10	It is not known as a biogenic growth element. The limit is determined based on toxicity.
Cu	0,20	It is toxic for many species with a content of 0.1-1.0 mg/l in a nutrient solution.
F	1,00	It is inactivated in neutral and alkaline soils.
Fe	5,00	It is not toxic to plants in aerated land, causing soil acidification and loss of affordable P and Mo. When irrigated by artificial rain, it is deposited on plants and equipment for irrigation.
Li	2,50	It is tolerated by many plants, it is mobile in the soil. It is toxic to citrus in low concentrations (> 0.75 mg/l) by activity is similar to boron.
Mn	0,20	It is toxic to plants at a concentration of several tens of to a few g/l, but usually only in acidic soils.
Mo	0,01	It is not toxic to plants at normal concentrations. Cattle can be toxic if food is produced on highly concentrated soils.
Ni	0,20	It is toxic for many plant species at a concentration of 0.5-1.0 mg/l, its toxicity is reduced in neutral and alkaline environment.

Element	MDC (mg/l)	Observations
Pb	5,00	It can inhibit the growth of plant cells at very high concentrations.
Se	0,02	It is toxic to plants at very low concentrations of about 0.025 mg/l. It is toxic to livestock if food is produced on high-level Se sites. It is one of the essential elements for animals, but at very low concentrations.
Sn, Ti, W	/	Plants do not tolerate them, specific tolerance is unknown.
V	0,10	It is toxic to many plants at relatively low concentrations.
Zn	2,00	It is toxic to many plants in fairly variable concentrations. Its toxicity is reduced at pH> 6, in fine texture lands and organogenic soils.

Source: *Ayers, Westcat, 1985; Dragović, Cicmil, 2008.*

Not all trace elements are harmful; many are in low concentrations useful, such as biogenic growth elements and microelements.

According to the recommendation of this classification, MATC values refer to intensive irrigation with an irrigation norm of 10,000 m^3/ha of water annually. If the irrigation norm is higher, the allowed maximum concentration is reduced proportionally. In the application of smaller irrigation norms, the criteria are not alleviated (Ayers, Westcat, 1985). In our country, the criterion for concentrating some of these trace elements is regulated by the Law on Waters, which is interesting for organic agriculture, to which the interested parties are referring to this issue.

Physical properties of irrigation water

Physical properties consider the temperature of the water and the application, are much less important for the quality of water for irrigation of chemical properties, they rarely occur locally and do not leave more severe consequences. Low temperatures occur when using water from mountain reservoirs, in which water from ice and ice melts, it can be below 10 °C. Also, when using groundwater, the temperatures are low 10 - 14 °C. Low temperatures slowly slow down, and they stop the growth of plants, which in difficult cases begin to yellow. Although the process most often takes a short time, it is negatively reflected, because it prolongs the vegetation, reduces yields and impairs the quality of the product. The minimum irrigation water temperatures are 19 – 20 °C, optimal 25 - 30 °C and maximum 34 - 35 °C (Bosnjak, 1999).

Application in river waters is analyzed by quantity, primarily by mechanical composition. Large particles of 0.1 mm are undesirable, easy to settle in the channels and tubes. From 0.1 - 0.05 mm favorably affect physical properties, especially heavy soils, reducing their attachment, but they are poor in nutrients. Particles larger than 0.05 mm are rich in nutrients, but in large quantities adversely affect the physical properties of the soil, reduce infiltration, filtration and aggravate aeration. This application is very favorable for sandy soils. The chemical composition of the coating is very similar to the composition of clay, it consists of oxides Si, Al, Fe, Ca, Mg, K, Na and organic matter (Belic, 1997).

Microbiological properties of irrigation water

Organic production pays great attention to health food safety, therefore it is of special importance microbiological correctness of water for irrigation. Irrigation water can transmit pathogenic microorganisms, infect plants and their products, which can cause human diseases, such as Salmonella, Escherichia coli 0157: H7, Cryptosporidium parvum and others (Kljujev, 2012). In surface waters there is a greater possibility of microbiological contamination of wastewater from cities, as well as from agroindustry. If groundwater is watered, the risk of microbiological contamination is reduced to a minimum.

Contaminated plant products are difficult to clean, because it is impossible to completely remove the bacteria by washing with water only. Also, contamination of the product depends on the irrigation mode, and the highest is in irrigation by rain. There are considerably fewer contamination possibilities for surface irrigation and drip irrigation. Also, the type and variety of pathogens and their ability to survive on plant products depends on the infection and the onset of disease in humans and animals. Some pathogens such as *E. coli* and her are similar if they are fed with just a few bacteria (less than 10) causing illness. For the analysis of the microbiological properties of irrigation water, the presence of the total number of pathogens is observed, then the presence of faecal pathogens and *E. coli* bacteria (Kljujev, 2012) is analyzed in particular. *E. coli* K-12, from contaminated water for irrigation, often superficial and endophytic, colonizes the root of the green salad and through the vascular system has reached the leaves of plants. Therefore, constant monitoring of the microbiological correctness of water is necessary (Kljujev, 2012). According to Jones (2005), a total of 1000 pathogens per liter of water are allowed, of which 100 bacteria *E. coli.*

Table 6. *Criteria for irrigation water quality of microbiological aspect (Canadian Ministry of Environment)*

Types of irrigation	*E. coli*	*Enterococci*	*P. aeruginosa*	Fecal coliforms
Vegetables and fruits that are consumed fresh	≤ 77/100 ml	≤ 20/100 ml		≤ 200/100 ml
Public areas and pastures	≤ 385/100 ml	≤ 100/100 ml	≤ 10/100 ml	
Generally	≤ 1000/100 ml	≤ 250/100 ml		≤ 1000/100 ml

Source: *Kljujev, 2012.*

Reducing the risk of contamination of plant fruits by irrigation can be achieved by choosing an appropriate irrigation method, such as drip irrigation system, by selecting the water source and purifying water, if economically justified (Dragović, Cicmil, 2008).

Specificity of irrigation in organic production

Organic production primarily involves plant species in which people eat green products in the diet of people, creating a large green mass with very high water content and a relatively poorly developed root system. For these reasons they have high water requirements and require a higher level of soil moisture (Dragović, Cicmil, 2008).

Organic production requires high water quality for irrigation, due to increased demands for healthy food safety. An authorized controller may also request water analysis for irrigation, where samples must be taken directly on the plot during irrigation, as water can be contaminated by water from the water intake to the plot (Prodanović, 2015).

In organic production, irrigation is carried out with respect to the basic standards IFOAM and Codex Alimentarius. Irrigation in organic production requires the application of a larger amount of organic fertilizers in order to avoid deterioration of soil structure and elution of elements. It is recommended, as in conventional production, that it is less frequent and more abundantly watered (20-30 ml/m^2) (Dragović and Cicmil, 2008), in order that the plants form the root deep and

be less sensitive to the lack of moisture. It would be preferable to use hot water, preferably rainwater and water from the river and the channel, in order to avoid cold water and water from the water supply (Water Management in organic production, 2017).

Irrigation water must not contain more than 0.15% soluble salts and must be free from harmful pesticide residues, heavy metals and other harmful substances. Irrigation should be done in the morning, when the smallest difference between the water temperature and the temperature of the plant, in order to avoid thermal stress in the plants. It should be cautious, because when water is stagnant more than 10 l/m^2, the possibility of soil compaction and rinsing of nutrients increases (Dragović, Cicmil, 2008).

Table 7. *Desired water parameters for irrigation in organic production*

Parameter	Values
pH	5,5-6,5
Electrical conductivity	< 2,0 mS/cm
Salts	< 1,5 g/l
Bicarbonates	< 5 meq/l
Sulphates	< 2200 meq/l
SAR	< 10
Nitrates	< 120 ppm

Source: *Irrigation, 2017.*

Artificial rain (spilling) is not suitable for organic production, because in some species, which are sensitive to certain diseases, losses can occur, and the soil structure deteriorates.

Drip irrigation is suitable for some types of organic production (vegetables, fruit growing), for crops requiring high soil moisture and low humidity. In order to avoid clogging of the drops, which can be mechanical, chemical and biological, the system must be properly maintained. Permanently, water filtration is performed. Occasionally rinsing of the pipe is required. Irrigation by drop-in stroke should be applied to wide-spread vegetable production and in a protected area.

Prior to irrigation, it is advisable to require the organic production inspector to conduct a chemical analysis of water in accredited laboratories, such as the Institute for Health Protection. When certifying organic production, it may be required that the manufacturer submit to the authorized certification house the results of the water analysis, which is used for irrigation.

Irrigation specifications in organic orchard

Thanks to the powerful and deep root system, most fruit trees are well tolerated by dry periods, but yields are of low and poorer quality. The importance of irrigating fruit trees is reflected in the fact that droughts have a negative effect on the next season, since there are not enough floral buds formed. In some fruit species (apple, pear, plum), the so-called alternative birth (Dragović, Cicmil, 2008). Modern intensive production of organic fruit is without irrigation, and the installation of irrigation systems, as well as anti-grid networks, has recently become a standard in the area of AP Vojvodina (Keserović et al., 2008).

In the world, insufficiently worked on the study of irrigation problems in orchards (Ferreres, Goldhammer, 1990), with the most studied apple, while for other species much more research is needed. Vučić et al. (1980), they established the needs of apples for water 550 - 600 mm for varieties for winter consumption. Bošnjak et al. (1994), they determined the need for pear water of the Viljamovka 470 mm plus/minus 10 % for the fruiting period, but this should be added to the precipitation outside this period of 200-300 mm. In fact, for our conditions it is estimated that the annual needs of orchards for water are 600 - 800 mm depending on the species and variety, ie from its era of maturation, as well as from the applied biotechnology, primarily the breeding form. In our conditions, orchards for high and stable yields of good quality should be provided during the vegetation season by months of the following amount of water: April 40-60 mm, May 70-100 mm, June 90-120 mm, July 110-130 mm, August 100 - 130 mm and September 50 - 60 mm, totaling 460-600 mm. It is necessary to add the consumption of water outside the vegetation season 150 - 250 mm (Vučić et al., 1980).

The water regime according to soil moisture is rarely applied in practice, but the critical period method is used, which is the period when the fruit has high demands on water (period of intensive growth of fruits), (Dragović, Cicmil, 2008). If the technical minimum is used, it is at the level of the water constant of the lentocapillary moisture, which separates the easily movable from the heavier

moving water spore in the soil. It amounts to medium to medium to heavy soil 60-65% of the Polish water capacity (PWC), to 65-70% of PWC hard, it is lighter and can be 30% PWC on the sand. Fereres and Goldhamer (1990) suggest for US conditions the measurement of soil moisture for local irrigation of drops by a tensiometer, and for other gypsum blocks or electrometric methods, where there are several types of accessories and a neutron for measuring soil moisture.

The most commonly used is the flooding regime in critical periods in practice, since the procedure is the simplest. Vučić (1976) recommends that the first watering be done 10 - 20 days after flowering, if the winter was sparse, and the spring is dry. This watering is rarely done under our conditions. Roughly watering is done until the end of June, because in most years there are enough water from winter reserves, which are supplemented with spring rainfall. The season of irrigation irrigation in our conditions is in July and August in the stages of intensive growth of fruits, the formation of organic matter and the formation of flower and foliage for the next year. In our conditions, when watering an orchard, it is most acceptable to apply water balance as the basis of the water regime.
The most suitable way to irrigate an organic orchard is drip irrigation system, although other methods can also be used. drip irrigation system is at least stressful for fruit trees, at the very least it is compaction of soil, the most precise is the addition of water, it allows for fertigation and constant humidification in the root zone, water is rationally used and it is possible to specify the inlet norm. Water filters are obligatory, and if slope of the parcel is higher than 5%, compensatory droplets should be used (Vukoje, 2015).

The economic effects are the result of regular and regular agro-technology inherent in organic production, the selection of good varieties, the use of manure, as well as the drip irrigation system.

Conclusion

Irrigation in organic production is specific because it requires high water quality, rational disposal of it and irrigation systems that will not impair the soil structure and cause the spread of the pathogen. The best way of irrigation in organic production in most vegetable crops, even in perennial plants, is the drip irrigation system, since other ways increase the risks of spreading pathogens and deterioration of soil structure. The process of certification of organic production may include water analysis from the aspect of the content of elements, physical pa-

rameters and microbiological correctness. In organic production, irrigation water must be of adequate quality.

The results of the research show that the water resources of the Republic of Serbia are suitable for organic production, but there are water sources that are contaminated. The monitoring of the quality of water for irrigation in organic production must be carried out continuously and that all possible changes and factors that could endanger the quality will be reported to an authorized certification house in order to take appropriate measures.

The task of agrarian policy is to provide support for investments in irrigation systems, in order to develop organic production, produce quality food products and save production resources.

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THE INFLUENCES OF THE MARKETING METHODS ON THE INTERNATIONAL TRADE WITH AGRO-PRODUCTS[1]

Branko Mihailović[2]

Abstract

This paper examines the international marketing program for agricultural and food products from Serbia, in order to encourage the development of rural areas. The desk research was used in realization of the research task. At the same time, quantitative methods were used, especially time series analysis. The diagnosis of the condition in this area indicates that successful participation in the international market is restricted by insufficient assortment of agri-food products compared to the current market offer in the developed world, while the research for the better utilization of existing capacities by introducing new production lines and products is neglected. One of the main limiting factors is the quality variation of market products either due to the lack of standards or the non-compliance with the existing standards. At the same time, the agricultural sector should stimulate the development of more propulsive and competitive agriculture, which is made up of commercial and family farms, engaged exclusively in agriculture and / or engaged in agriculture in terms of additional revenue sources. The results of the research show that it is necessary to involve small-scale producers into modern market chains because they are insufficiently competitive, they trade in the informal channels, and cost of their standards implementation is high.

Key words: *agriculture, international marketing, rural development, competitiveness, standards.*

Introduction

Agriculture is one of the pillars of economic development of the Republic of Serbia, and its importance to the national economy bears not only economic but also

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2 Branko Mihailović, Ph.D., Senior Research Associate, Institute of Agricultural Economics Belgrade, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 697 28 58, E-mail: brankomih@neobee.net

social and environmental component. However, despite the great potential in the sector of agricultural production as a result of favourable climatic conditions, natural soil properties and available water resources, it is not optimally utilized. Because of such potential, agriculture in Serbia does not represent a common economic branch, considering that in all municipal or regional strategies it has been defined as one of the strategic directions of development. Development of farmers in rural areas implies their full integration into the system of Serbian agro-complex. Contemporary agricultural production is characterized by a high dependence of all segments of the agro-complex, which is an important subsystem of the national economy and which includes: (1) the means of production in agriculture and the food industry; (2) primary agricultural production; (3) agriculture and food processing industry (into the ready-made industrial food and industrial non-food products); (4) agri-food products marketing, and (5) final consumption of food. The main characteristics of this great subsystem is the complexity of functional relationships and interdependence of all the individual segments (Milanovic 2002, 35).

The disintegration of the agro-industrial conglomerates in the 1990s caused the institutional and organizational disorganization of agricultural product markets in Serbia. The condition for revitalizing the market of agricultural products was made primarily by privatizing the processing capacities, and later by strengthening the food market chains.

In the production of food in Serbia there is a relatively well-integrated production and income chain only in the production of industrial crops, fruit and vegetables, milk etc. These are the segments of the system that have a stable placement in the domestic and foreign markets and that have been privatized in the initial stage of privatization. Accordingly, the Serbian agriculture is expected to increase the overall level of competitiveness in terms of product quality and price along with simultaneous adjustment of production, processing and placement with international standards. In order to meet these requirements, it is necessary to encourage restructuring in agriculture in order to redeem the negative effects of changes on the stability of agricultural production, and to enable the economic actors in this field to be competitive in business.

Methods of research

The desk research was used in realization of the research task,in which data dominantly relate to: the characteristics of rural areas in Serbia; agriculture and food industry; export markets and export products of the agricultural sector in Serbia; as well as the international marketing program of agri-food products. The analysis of export markets is focused on market segments: the market of the European Union, CEFTA market and the market of the Russian Federation. Accordingly, this research involves the use of data from official sources: the data of the Serbian Statistical Office, materials from Serbian Chamber of Commerce and the like, domestic and foreign literature; internal documentation of the Institute of Agricultural Economics in Belgrade. Also, quantitative methods were used, especially time series analysis. By combining the aforementioned research methods more reliable answers to key questions that arise in the context of the analysis of international marketing of agri-food products can be obtained, which primarily contributes to the development of rural areas in Serbia.

Characteristics of rural areas in Serbia

Agriculture is an important segment of the overall rural economy, not only in economic but also in social and cultural terms. Agriculture is also the most important activity in the majority of rural communities and of great importance to the way of life in rural areas. However, agriculture and farmer in modern rural community should be closely linked with other industries and occupations (Milic 2015, 27). That is why nowadays isolated observations and problem solving do not give successful results. Only a comprehensive plan of small rural areas development based on the principles of sustainable development has resulted in the EU as a successful model of revival and progress of underdeveloped rural areas. The Republic of Serbia has no official definition of rural areas, considering the fact that there is still no compliance with the geocode standard of the EU according to which Europe is divided into administrative regions (the so-called NUTS regionalization).

The criteria applied by the Republic Statistical Office (RSO) do not include standard rural indicators which are common in international practices, such as: population quantity and density, the percentage of agricultural workers in the population,etc.. In line with this approach, rural areas are considered to be residual parts of the country, and this classification is based primarily on municipality level decisions which assign the town (urban) status to a community which has a

general town plan.This approach makes it harder to make statistical analysis and interpret the indicators of rural areas in Serbia. This Strategy envisions a change in the categorization methodology of the Republic Statistical Office until the NUTS regionalization is complete. By the altered categorization, rural areas are all populated areas except 24 cities that received that status in accordance to Serbia's Law of territorial organization (Official Gazette of RS, no.129/07).Considering that both Belgrade and Niš have municipalities with significant agricultural production, the OECD rural classification has been applied there.

The dominant part of the rural labour force in Serbia, ie. the dominant part of the active rural population in Serbia works in agriculture, which puts Serbia among the most agrarian European countries. This is primarily the result of insufficiently developed and diversified economic structure, which is still largely dependent on agriculture and the food industry. Lack of jobs and reduced employment opportunities are a core feature of the rural labour market. On the other hand agriculture based on small family farms, with low productivity and low market surplus is not able to provide adequate income to those who live on it. At the same time, one of the main characteristics of poverty in Serbia is rural poverty and among the rural population the following categories are very vulnerable: farmers who are engaged exclusively in agriculture, or receive income only in this sector, the elderly and pensioners, women, the young, displaced persons. In the revenue structure of small rural households in Serbia, the most represented are the off-farm employment income, income from sale of agricultural products and income from pensions. The employment and income structure of the rural population indicates that Serbia is dominated by the "afflicted" diversification of income resulting from the unfavourable economic environment and poverty (Bogdanov, 2007, 32). In fact, the largest share of rural household income stems from non-agricultural sources, followed by earnings from agriculture. This data indicates a disproportionate ratio between number of people employed in agriculture (45%) and its share in total household income (25%), which once again confirms the low realized productivity of agriculture (Bogdanov, 2007).

Economic development of rural areas involves much more than just agriculture, and the policy objectives and measures for rural development do not refer exclusively to farms and producers (Cvijanovic et al., 2011, 62-79). According to Article 12 of the Law on agriculture and rural development "measures of rural development are the kind of incentives that encourage the improvement of competitiveness in agriculture and forestry (investment in agriculture and forestry and the introduction

of new standards in the production and transport of agricultural products), the promotion of environmental programs, biodiversity conservation and diversification of rural economy and improving the quality of life in rural areas "(Official Gazette of RS, no. 41/09). Namely, rural development assumes different socio-economic activities that are defined by rural policy and are focused on rural areas. They should contribute to improving the quality of life and economic activity in rural areas, primarily through investment in the means of agricultural production, construction and reconstruction of rural infrastructure, training and education of rural population, the affirmation of traditional and cultural values, environmental protection, rural tourism development,etc. Regarding demographic, economic, social,and trends in infrastructure, it can be concluded that rural areas in Serbia are characterized by a high degree of differentiation with defined homogeneous rural regions that reflect the specificities of rural areas in Serbia (Mihailovic et al., 2012, 109-119):

- The region of highly intensive agricultural production and integrated economy is in the northern part of Serbia and covers the territory of AP Vojvodina and the northwestern part of Serbia (Macva). This region is characterized by high quality plain land and significant water resources: large rivers that flow through this region (Danube, Sava and Tisa). On an area of about 21,000 square kilometers there are land amelioration systems which are used for the removal of excess water. Based on demographic characteristics, economic structure and development of the region, certain regional differences are noticeable between the western and eastern part. The western part of the region has a higher population density, increased investment activity and higher economic growth. Specific lowland landscapes, rivers, lakes, national park "Fruska Gora" and Deliblato sands represent a fundamental part of the tourist offer of the region, and more than 200 natural resources are under special protection.
- The region of small urban economies with intensive agriculture is located in the northern parts of Central Serbia, Sumadija, parts of Macva and Stig.This region is surrounded by large urban centres, which affects the demographic, economic and social trends in the region. The region of small urban economies with intensive agriculture takes up 16.31% of the total territory of Serbia, while in terms of natural and geographical conditions the region is somewhat homogeneous. The sloping topography is dominated by mountains at the west and the east end of the region. The region of small urban economies with intensive agriculture is more developed in terms of infrastructure compared to other rural regions of Central Serbia. Being located near large urban centres it has better infrastructure facilities, as well as easier access to public services

and utilities. The road network is at the level of the national average and is evenly distributed throughout the territory of the region.

- Mountainous region, with an economy based on natural resources is the biggest rural region in Serbia and covers 29% of the territory. A significant part of this area includes parts of Serbia with an altitude over 500 m, and can be classified as hilly mountainous area. In the valleys of the Danube, Juzna Morava and Timok there are lowland areas, where the landscape diversity and heterogeneous structure of natural resources contributed to an extremely diversified economy and agricultural structure. The main limiting factors for the development of agriculture in this region are: under-utilized land potential, labour shortage, unorganized market and lack of adequate rural infrastructure.
- The region of high tourist potential with a poor agricultural structure is the smallest rural region in Serbia. It covers 14% of the territory and taking into account natural and geographical conditions of the region it is relatively homogeneous. This region is one of the strongest trump cards for the successful positioning of the tourism product of Serbia, with an exceptional combination of tradition, history and natural beauty. The development priority of the region is the construction of the Ibar highway, with simultaneous protection and rational utilization of natural attractions and areas.

Decades of neglect of agriculture and natural and demographic depletion of rural areas have resulted in very negative economic and social trends and today's unfavourable situation, characterized by numerous problems. The most important among them are small and uncompetitive farms, a large number of elderly households, fragmented agricultural land, small-scale plots, extensibility and low technological level of production, insufficient or inadequate use of agro-technical measures, low productivity, poor disposal of manure and agricultural waste, etc. (Milic, 2015, 29). Such agriculture results in poor farming income, is uncompetitive and unprofitable, and can not be a factor in sustainable development in the current situation.

Export markets and export products of Serbian agriculture

Total trade between Serbian agriculture and the World in the period January-December 2015 amounted to 4354.5 million. USD, of which 2,865.2 million USD relates to export and 1,489.3 mil. USD to import. During this period, agriculture recorded a surplus in trade with the world of 1375.9 million USD, which is 2.8% more than in the previous year. Agricultural export was 6.6% lower than in the

previous year, while import decreased by 13.9%. In this period there was an increase in the share of agriculture export in total merchandise export from 20.7% to 21.4%, and an increase in the positive balance of trade from 1,338.9 to 1,375.9 million USD, consequently increasing the coverage of import by export from 177.4% to 192.4% (Serbian Chamber of Commerce, 2016).

The export of agricultural and food products from Serbia is predominantly focused on the EU market (where about half of the total export of food from Serbia is sold), as well as the markets of Macedonia and Bosnia and Herzegovina. In short, Serbia is facing a well protected agricultural market in the EU (Cvijanovic et al., 2009, 137). Namely, in addition to traditional customs, the EU applies a number of other qualitative and quantitative restrictions on imports (technical barriers, ISO standards), which represent a new, more subtle form of agricultural protection measures. The EU encourages its vendors to export more in non-EU markets, but also grants many countries (including Serbia) the privilege to export most agricultural products to the EU market without customs duties and without obligation to open their markets to products from the EU (sugar, beef). Situation for Serbian agriculture changes by expanding the Union through the accession of 10 new member states in 2004, with the biggest changes in the EU market in the agricultural sector brought by two major agricultural producers - Poland and Hungary. The most important export products of agrarian origin in the period January-December 2015 were (Table 1): corn and other in the amount of 353.0 million USD, frozen raspberry in the amount of 267.6 million USD, cigarettes in the amount of 215.8 million USD, white sugar in the amount of 102.6 million USD and fresh apples in the amount of 102.1 million USD. According to the structure of agricultural export it is dominated by fruits and vegetables with the share of 26.66%, followed by grains with 22.27%,tobacco with 8.78% and beverages with 6,60% (Serbian Chamber of Commerce, 2016). Considering the trends in the EU market, and bearing in mind the current level of production and the competitiveness of domestic producers, it can be concluded that we are, under the assumption of fulfillment of quality control standards, competitive in the world agricultural market only with differentiated offer, in terms of exports of high quality products, with the brand and / or label of indigenous origin. Serbia can seek its chance to export in the EU market only by using the modern concept of competitiveness, which involves the creation of competitive advantages through quality and innovation, and differentiated offer (Mihailović, 2011).

Table 1. *The most important export products of agrarian origin,January-December 2015*

Products	Export in tonnes	Export in mil. USD
CORN, other	2,206,352	353.0
RASPBERRIES,frozen	93,811	267.6
CIGARETTES	20,072	215.8
SUGAR,white	230,098	102.6
APPLES, fresh	178,666	102.1
WHEAT	519,905	98.1
SUNLOWER OIL-raw	79,877	77.0
NONALCOHOLIC beverages	133,797	60.5
SOYBEANS	129,585	50.8
SOYBEAN OIL	65,217	46.1

Source: *Analysis of agriculture and food industry of Serbia in 2015, the Association for agriculture, food industry, forestry and water management, Serbian Chamber of Commerce (PKS), Belgrade, March 2016, p. 16.*

Serbia partly uses this strategy in placement of beef, but this strategy concept obtains its true dimension only at a higher level of final product processing, thus moving from the export of resources and raw materials towards the export of knowledge, technology and innovation. In short, the basic assumptions of this export strategy and the modern concept of competitiveness are: 1) greater investments in production modernization; 2) harmonization of the entire legislation with the regulations of the WTO and the EU; 3) compliance with numerous standards, sanitary and veterinary control. In 2015, the Republic of Serbia realized a total volume of trade in agricultural and food products with the signatories of CEFTA 2006 in the amount of 1,130.1 million dollars (2.2 million tonnes), which represents a decrease of 9.4% compared to 2014. Exports from Serbia amounted to nearly 942.5 million dollars (1.9 million tonnes), while imports from CEFTA signatories amounted to 187.6 million dollars (231,000 tonnes). Also, the value of export decreased by 9% and import by 11.4% compared to 2014. The surplus in trade with CEFTA region is about 755 million USD, which is a decrease of 8% (69.5 million USD) compared to 2014 (Serbian Chamber of Commerce, 2016). In 2015 the share of CEFTA 2006 signatories in total export of agricultural and food products amounted to 32.9%, EU countries - 47.1%, while the share of the Russian Federation in export amounted to 9.4%.

The Russian Federation is a market with 142 million people (IMF, 2013), and their consumption of food products is a major challenge for Serbian manufacturers and exporters, particularly bearing in mind exemptions from customs duties for export of Serbian products to this market. The potential for food export to the Russian Federation, primarily involves the manufacturers of: (1) fresh beef; (2) meat products (ham, bacon, pates, meat slices); (3) ready-made meals; (4) dairy products; (5) fruits and vegetables and their derivatives (Parausic et al 2013, 324). On the other hand, the most important partners of Serbia in foreign trade with CEFTA region are Bosnia and Herzegovina, Macedonia and Montenegro. Trade with Albania and Moldova is very modest (Table 2).

Table 2. *Foreign trade in agricultural and food products of Serbia with the signatories of CEFTA 2006 in 2015*

Country	Export in USD	Import in USD	Trade	Balance	Share (in %)
Albania	45,183,000	10,000,000	55,183,000	35,183,000	4.9
Bosnia and Herzegovina	469,535,000	72,087,000	541,622,000	397,448,000	47.9
Moldova	565,000	799,000	1,364,000	-234,000	0.1
Montenegro	248,359,000	17,261,000	265,620,000	231,098,000	23.5
Macedonia	178,912,000	87,433,000	266,345,000	91,479,000	23.6
TOTAL	942,554,000	187,580,000	1,130,134,000	754,974,000	100

Source: *Analysis of agriculture and food industry of Serbia in 2015, the Association for agriculture, food industry, forestry and water management, Serbian Chamber of Commerce (PKS), Belgrade, March 2016, p. 18.*

Most agro-economists agree that our country's perspective lies in exports to the markets of Southeast Europe. However, great caution is required in increasing grain production since there is surplus production of wheat and corn in this region. Southeast Europe is extremely deficient in sugar, however, there is a big problem, regarding that sugar has the stock market price, which is in the world market well below our manufacturing cost.

International marketing of agro-products

Marketing Management is the process which regulates the marketing activity of a company. It is a dynamic process since the conditions both in the business environment and in a company are constantly changing (Cvijanovic et al., 2009, 10).

Due to its pretensions to serve a wider and more diverse market, global marketing faces stronger and more complex challenges that require faster and more subtle strategy answers. Namely, rapid changes, complex strategic situations, sharper and more unpredictable competition and changing mental maps of management must be taken into account, particularly with regard to the affirmation of social awareness about the importance of respecting environmental, social, political, cultural, and other components of local markets (Hamovic et al., 2007, 381-389). Marketing management basically means influencing the level, "timing" and a composition of demand in a way that will help the organization in achieving its goals (Kotler and Keller 2006). Namely, the process of management of marketing activities provides an analysis of market opportunities (existing or potential market), formulation of objectives to be achieved in the market, defining the supply and allocation of resources on the adopted course of action, creation of an efficient organizational structure that will implement programs and plans in the market, permanent control of the achieved results of marketing activities and review of the rationality of pursued actions in the market (Milisavljevic, 1999, 21).

Numerous definitions are used to describe the concept of international marketing. Some authors defined this concept by focusing on its content, arguing that international marketing is "a set of activities associated with marketing in foreign markets" (Albaum, Peterson, 1984, 161-173). This definition should include, among other things, exporting, importing and managing of foreign operations, and activities related to marketing, relevant to the products and services that cross national boundaries. However, there is a disagreement over the practice of a single universally accepted definition. In fact, it is often argued that the manner in which international marketing is defined and interpreted depends on the degree of involvement of the company in the international market, and therefore we differentiate between ''export marketing, international marketing and global marketing" (Doole, Lowe, 2008).

International marketing program of agri-food products should be oriented towards real and anticipated needs of foreign consumers, economy and society and enable efficient sale of products through touristic offer. The characteristics of these products and their use as well as the characteristics of supply and demand affect the program of marketing activities for these products. Marketing concept has four basic elements (known as 4P): 1) product - should be designed to satisfy the needs of consumers and be competitive; 2) price - refers to the price of products or services; 3) placement - distribution of products and services to

the consumer; 4) promotion - in addition to advertising (advertisement) includes other types of promotion: promotional sales, sweepstakes, personal selling etc.

The combination of these elements is called the marketing mix. The aim is to achieve such a combination of elements (4P) as to gain the competitive advantage (positive characteristic that separates the product / service from competitors) and thus satisfy consumers, and consequently achieve higher sales and higher profits. In such circumstances, it is important to balance the management's efforts in acquiring or attracting new and retaining existing customers. In fact, no matter how satisfying it is to acquire new customers it is also as necessary to devote enough attention to retain them. For efficient management of marketing activity, it is significantly important to adequately plan the use of individual marketing instruments (Todorovic et al., 1998, 447).

Product mix includes relevant activities referring to: planning and development of new products, modification or elimination of the existing ones, determining branding, packaging and quality strategy, customer service, etc. (Todorovic et al., 1998, 289). Product is a very important instrument in agricultural marketing program. Marketing was created to solve the problems of production and producers when the supply was greater than the demand, and the ultimate goal was the realization of manufactured goods and earning profits for the company. Today, the essence of marketing consists in resolving consumers' problems - faster and better than the competition. Accordingly, it is rightly pointed out that "possession of a competitive advantage is like having a gun in a knife fight" (Kotler, 2003, 121). It is important to distinguish between products intended for direct consumption, which underwent no further processing, except for cleaning, sorting and packaging (eg. vegetables) and the other group, consisting of products intended for industrial processing like raw materials (eg. grains, cattle, etc.). Good number of products falls into both categories, because they are used both for direct consumption of households and large consumers, and as raw materials for industrial processing. In short, specificity of agri-food products in the marketing mix is derived from the very specifics of agricultural production, which is the result of its biological nature.

Modern packaging is much more than the wrapping or cardboard boxes used for transportation. Packaging issues in international marketing are related to: overcoming major geographic distances; overcoming numerous cultural differences; dealing with various environmental standards in the world. There is general agreement that there are two dominant and unavoidable functions of modern packaging:

protective and promotional. Packaging may also play a role in the differentiation of products, especially in retail. Product packaging is used to reinforce the distinctive image of brands' characteristics in the minds of the consumers. That is why a continual consumer research and investment in innovations are necessary. Namely, the foundation of our development is in knowledge and innovation, in using information and communication technologies and promoting research and development in all fields. At the same time knowledge is seen as the greatest source of competitive advantage of firms. This is precisely what is most difficult to copy, download, or simply attain. Accordingly, we are witnessing a process of change in which knowledge becomes a key resource in any organization (Vukotic et al., 2014,172-181).

In international marketing, it is particularly important that the company addresses the concerns of its host country stakeholders, who may have very different attitudes from the headquarters (Petrovic-Lazarevic, Vukotic, 2009, 401-414). At the same time, one of the most important strategic issues is certainly "timing", ie. the speed at which the company will invest funds in foreign markets. The dilemma, similarly to that related to the stages and focus of internationalization, boils down to whether to rush in order to pre-empt the competition or go slowly and carefully, and whether to go step by step (concentrating first on one key market, and when experience is gained go to the other) or simultaneously (diversified way) to invest immediately in several foreign markets. For the decision to be made it is predominantly important to bear in mind the intensity of development and sustainability of the market as well as to anticipate the capabilities and intentions of the competition (Mihailovic et al., 2008, 289-305). A very small number of agri-food products with geographical indications is standardized at national level (ham from Zlatibor, hard cheese from Pirot), and at international level, as already stated, there are no such products. In late 1990s, Bulgarians and Slovaks protected the production of plum brandy, and in the meantime Slovenians "took" our distinctive product - ajvar. We are now at a turning point. For example, we have the famous "oblacinska" sour cherry, with by far the highest content of ascorbic acid - vitamin C, which is bought mostly by Austrians and Germans. It grows in the south of Serbia, and no other cherry in the world has that composition.

With respect to the content of bioactive components, it can be labeled as functional food. Unfortunately, this kind of sour cherry is not protected and Serbia achieves much lower price in export than its competitors (Chile and Poland).

True, there are positive examples, but these are exceptions. Brandies "Bojovcanka" and "Yellow Wasp" protected their names, and as such they are recognized even beyond national borders. Our "Arilje" and "Valjevo" raspberry is quite famous in the world, but we failed to protect these raspberry genotypes, and it lost its identity.

Price as an instrument of marketing mix assumes determining price levels and price ranges, calculation techniques, sale conditions, price adjustments and the like. (Kono, 1990, 9-19). Consequently, business success depends on the ability of firms to: (1) recognize promising and sufficiently large market segments, (2) identify the critical success factors, and (3) develop business processes in order to acquire distinctive competence (Todorovic 2003). On the other hand, from the standpoint of price competitiveness of agri-food products, Serbia has diverse characteristics. Due to small holdings, Serbia has higher production costs for basic types of grains, which causes the price incompetitiveness in trade of these products.

On the other hand, because of the relatively cheap labour, favourable climatic conditions and high quality, Serbia is competitive in export of vegetables, beef and lamb meat (meat of specific and high-quality young cattle, which is exported to the markets of Greece and Italy, which enables higher export price than the global average). In general, the possibility to influence the prices of agricultural products is lower than to influence the prices of industrial products. For a good number of agricultural products, there is a perfectly competitive market. Both on the supply and on the demand side there are more participants in the exchange, and the product is homogeneous. Since most agricultural products have stock market prices, it is clear that international competition is more intense in terms of price. In this sense, Serbian producers and exporters (to achieve price competitiveness in these products is impossible for them) - must turn to the export of those agricultural and food products which require higher processing and where there are possibilities of differentiation, either through autochtonous products, higher quality and / or environmental safety. In the export of agricultural products from Serbia, an important element of competitiveness in the future will be the development and promotion of non-price aspects of competitiveness: quality, innovation, design, packaging, reliability and speed of delivery, trade mark, the ability to satisfy the specific demands of consumers and the like. The aim is to reach a marketing strategy which will capitalize on the advantages based on scale, synergy and external flexibility. Namely, great strategies comprise of

the unique configuration of different increased activities, which cannot be easily matched (Kotler, 2003, 19).

Distribution channels involve the selection and definition of the arrangement with the sales channels, physical distribution management, inventory, transportation and the like. (Todorovic et al 1998, 289). Distribution as an activity encompasses all those activities that are essential for agri-food products to be delivered from the manufacturer to European consumers or users of the product. Distribution channels are a tool of marketing mix which is used as a means to attract customers. When making decisions about sales channels, the existing product policies, price and promotions are taken into account, but at the same time any decision on the selection of sales channels influences later decisions about the product, price and promotion.

Consequently, decisions on individual instruments of marketing mix must be taken coordinately. The purpose of sales channels is to ensure that goods reach the customer on time and suitable for use. Successful marketing assumes logistics that fits in a perfect chain from producer to customer. The producers of agri-food products are expected to: 1) identify and define European geographical areas and identify potential customers; 2) assess the level of unmet demand among customers within a defined market area; 3) consider the competition in the market (knowledge of current and potential competitors, their locations and services they provide).

Promotional mix includes a selection of promotional forms, budgets and ways of their realization (Todorovic et al., 1998, 289). Promotion has less important role in agricultural marketing program compared to industrial products. In general, only large producers and associated manufacturers may have brand products. In order to stimulate primary demand for certain agricultural products, it is possible to go for a cooperative economic advertising of associated producers. In this context, it should be noted that in many countries there are joint programs of certain groups of producers, aimed at better placement of their products in the domestic market or for exports. Promotion in the international context has an additional form, which could be characterized as the promotion of national identity, and national export promotion.

Companies in many countries seriously count on state assistance (informational, financial and promotional) when entering the international market, and this

support could be rightly expected from the manufacturers and exporters of agricultural products from Serbia. Improving the image of the country of origin "Made in Serbia" (development of the image of environmentally clean land) is very important because it directly affects the image of certain products, which is reflected in the positive economic effects of the placement of agricultural and food products.

Integration of product offers - through the development of agricultural clusters, strengthening farmers' associations, the promotion of agricultural cooperatives; only by joining farmers have the ability to compensate for what each of them lacks (finance, procurement of cheaper inputs, modern machinery and technology), with a significant increase in their bargaining power - both in relation to the state, and in relation to the food industry, trade, exporters (Parausic et al., 2007, 49-97).

Conclusion

Rural areas of Serbia are characterized by a high degree of differentiation in terms of natural, infrastructural and other conditions for agricultural production, proximity to markets, conditions for marketing of the product - differentiation in terms of economic, social, infrastructure development, demographic characteristics, and the like. The economic structure of rural Serbia is highly dependent on the primary sector and still based on the depletion of natural resources. Traditional, mono-functional agriculture is dominant and the labour market in rural areas is characterized by: unfavourable age and educational structure in relation to the total population, rising unemployment of the economically active population, employment is high in primary sector (high dependence on agriculture), and low in tertiary (the processing of agricultural products, other industries and tertiary sector are insufficiently developed). The participation of the private sector is also modest (it is most represented in trade).

Accordingly, it is necessary to involve small-scale producers into modern market chains because they are insufficiently competitive, they trade in the informal channels, and cost of their standards implementation is high. Also, it is necessary to improve competitiveness at the level of processing capacities, which would thus find new markets and increase consumption. In the area of primary production there is high competition, while at the processing level there is little competition as a result of unattractive areas for investment because of the undeveloped

institutions, failure to comply with the EU exporting standards for a large group of products, as well as lack of knowledge concerning real competitiveness due to high tariff protection.

By producing internationally competitive agri-food products, agriculture in Serbia would ensure sufficient income for family farms, focusing its activities on meeting the needs and preferences of consumers and working closely with the food processing industry. In order to achieve this, certain economic, social and environmental goals must be fulfilled: 1) agriculture must efficiently use natural resources, 2) it must be integrated into the rest of the rural economy and society, 3) it must significantly contribute to environmental protection.

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THE DEVELOPMENT CONVERGENCE IN THE AGRICULTURE – THE EUROPEAN PERSPECTIVE

Cezary Klimkowski[1], Igor Tomaszewski[2]

Abstract

In the globalized world the convergence of economic growth processes in various sectors world-wide is expected. The authors focused on convergence of development processes in agriculture on global and regional scale with special focus on Europe. The main aim of the paper is to examine whether there is such convergence. Using yearly data from more than 100 countries and years 1992-2016, it was proven that there is globally significant beta-convergence when technical effectiveness indicators and the share of agricultural employment are taken into account. It is especially true for Europe. When share of agricultural employment is analyzed strong beta- and sigma-convergence is observed for every analyzed region. Still there is strong sigma-divergence and no sign of beta-convergence in the case of agricultural value added per worker. Europe and Asia are the only exceptions. The results suggest strong relation between overall economic development and development in agriculture. One can also conclude that substantial differences in agricultural sectors among analyzed countries are caused by the differences in capital equipment.

Key words: *agriculture, agricultural growth, agricultural development, convergence.*

Introduction

The topic of growth convergence is familiar to all economists dealing with various problems related to economic growth and development (Solow, 1956; Jones, 2008). The problem of economic convergence itself was popularized by Barro and Sala-i-Martin (1992). Currently convergence issue is very often raised by the economists concerning economic growth (Majchrzak, Smędzik-Ambroży, 2014).

1 Cezary Klimkowski, Ph.D., Agricultural and Food Economics – National Research Institute, Świętokrzyska street no. 20, 00-002 Warsaw, Poland, Phone: +482 25 054 609, E-mail: cezary.klimkowski@ierigz.waw.pl

2 Igor Tomaszewski, M.Sc., Agricultural and Food Economics – National Research Institute, Świętokrzyska street no. 20, 00-002 Warsaw, Poland, Phone: +482 25 054 592, E-mail: igor.tomaszewski@ierigz.waw.pl

There are many various questions concerning economic convergence analysis and the convergence processes in agriculture is one of the most commonly raised in the literature. For instance, Siljak (2015) presents a broad survey of agricultural growth convergence analysis. Prevalence of such a researches is mostly due to fact of extraordinary importance of this topic. Development of agriculture is of utmost importance because the occurrence of shift from an agrarian to an industrially based economy is strictly dependent on the growth of the productivity in agriculture (Gollin et al., 2002; Olsson, Hibbs, 2005). Moreover agricultural development plays fundamental role in reducing poverty (Thirtle et al., 2003).

Although there is still ongoing and very interesting debate on what agricultural development really is (Sabouri, Solouki, 2015) and on what factors it depends the most (Olujenyo, 2006), in this paper the authors focus on less sophisticated problems.

The main aim of this paper is to answer the question whether there is agricultural development processes convergence on a global and regional scale with the special focus on European perspective.

Based on the literature review, the authors assume that the agricultural development must consist of three elements: production effectiveness growth, the decrease of agricultural employment, and the increase of value added per employed in agriculture. Using indicators corresponding to these three processes the convergence during years 1992-2016 is analyzed.

The key question is why one should expect agricultural development convergence. First, it is well proven that the agricultural development is strongly tied to overall economic development (Hayami, Ruttan, 1985; Nakajima, 1986; Tomczak, 2006). So if there were economic development during analyzed period, as indicates results of other researches (Boyle, McCarthy, 1999; Gáspár, 2012) there should also be agricultural development convergence.

Data and Methods

Apart from one indicator referring to the overall economic development during analyzed period, three main indicators related to agriculture were used in the analysis. Data needed to verify if there is a global and regional convergence among countries were taken from World Bank database. This database offers the data for

259 countries and group of countries. However some of the records were excluded from analysis.

First, we resign from data referring to group of countries like Least Developed Countries, Central Europe and Baltics, High income Baltics, Middle East and North Africa countries etc. There were 43 records. In the next step the authors rejected to use data from dependent territories like French Polynesia, British Virgin Islands, Gibraltar, etc. Then we excluded data from countries, where population is smaller than 2 million countries. It was due to the fact, that in convergence analysis every country is single information. The authors considered comparing data from large countries like China, Brazil or Poland with the smallest ones like Nauru, Fiji or St. Kitts and Nevis. One of the methods to avoid these problems was weighing procedures however it would cause some other methodological difficulties. The authors also rejected data from countries that were during analyzed period in the state of war due to the fact, that in these cases not-economic factors would biased obtained results. It is countries like Afghanistan, Iraq or Syria. In the last step data that was considered by the authors as not enough reliable from countries like Turkmenistan or North Korea were excluded. This leaded to the database that contains information from 113 countries.

The first of the analyzed indicator is the Gross Domestic Product (GDP) per capita in constant prices from 2010. It helps to answer the question about overall economic development in analyzed countries on a global and regional scale.

The first indicator among from the ones referring to agricultural sector is the one dealing with technical effectiveness of agricultural production and it is cereal yields in kg per hectare. Since this aggregated indicator in some cases – especially for large continental groups like Asia – could lead to biased results, we also use the data referring to wheat and rice yields. These two indicators were taken from FAOSTAT database. This database contains a considerably smaller number of countries. Together with the mentioned above thresholds it let the authors employ data from 72 countries in case of rice yields, and 77 in case of wheat yields.

The third analyzed indicator is employment in agriculture as a share of total employment given in percentage. The last one is the value added per worker in agriculture given in constant prices from 2010 and denominated in US dollars.
The results concerns global scale and regional groups as well. The authors considered that the continental grouping is the optimal way to show regional differences.

It is worth to mention that two countries from Oceania region are added to Asian group. Since one of the questions highlighted in the title of this article is the European perspective there is also additional grouping concerning European countries. There are three groups. The first on is composed of countries that were the European Union (EU) members before 2003 plus Norway and Switzerland. It is called "The old EU countries". The second one includes the countries that become EU member states after 2003. This group is called "The new EU countries". The third group is composed of European countries that do not belong to any of two previously mentioned groups.

To verify whether the convergence of analyzed indicators occurred during analyzed period two convergence measures were used. The first one is the beta-convergence measure. There is beta-convergence when the rate of growth of the scrutinized variable is higher for those countries where its initial value is low and, at the same time, in countries characterized by a high initial level of the variable, the rate of its growth over the period considered is lower. If it occurs we can say that there is beta-convergence and weaker countries are "chasing" the stronger ones. To estimate beta-convergence simple model is estimated using ordinary least squares method, which can be written as:

$$ln\left(y_{i,1}/y_{i,1+T}\right) = a + b * ln(y_{i,1}) + u_t,$$

where: $y_{i,1}$ – variable for i-th country in 1st period,

T – the length of analyzed period,

b – coefficient measuring the pace (and its existence itself) of convergence,

u_t – random component (Kusidel, 2013, p. 46).

Ordinary least squares regression is employed to evaluate b coefficient. If $b<0$ and statistically significant it means that there are beta-convergence. Opposite, if $b>0$ and statistically significant there is beta-divergence, which means that the pace of growth of analyzed variables is higher in countries were initial values of the variable were higher.

When convergence occurs, the convergence rate coefficient β is calculated, using following equation $\beta = -\frac{\ln(1+b)}{T}$, where *b* and *T* is the same as in previous equation. This coefficient informs what percentage of the distance from the state of equilibrium is defeated in every.

Another coefficient called half-life gives information about number of years needed to cut current differences in half. It is estimating using equation:

$$hl = -\ln 2 / \ln(1 + b/T).$$

Since some indicators were very volatile, it was needed to avoid problems with short term fluctuation. It was especially important for data referring to plant production yields. Because of that the first period is not exactly the first year, but the average level for first three years of analyzed period (1992-1994). The same with the last year – the authors used the average level for three last years (2014-2016). The increase of analyzed variable was measured using the ratio of the three-year average level in last years of analyzed period to the three-year average level in first years.

Beta-convergence analysis helps to answer the question if analyzed variable rises faster in countries where the initial level of variable were lower, and simultaneously the growth pace of this variable is lower in countries were initially value of the variable was higher. It is important part of convergence analysis, but not the only one. Among various other approaches, sigma-convergence evaluation seems to be the most helpful.

Sigma-convergence occurs when the dispersion of the analyzed variable across countries decreases during the analysis period and this fall is statistically significant. To verify if there was the sigma-convergence variance of analyzed variable in the 1st (σ^2_1) and the last period (σ^2_2) is compared. The same as in case of beta-convergence these periods are three-year average. If there is statistically significant decrease in variance, which means that $\sigma^2_1 > \sigma^2_2$, there is sigma-convergence. On the contrary if there is a statistically significant increase in the value of variance between first and last three-year average there is sigma-divergence.

The T statistics that equals σ^2_1/σ^2_2 is employed to verify statistical significance of sigma-convergence. This statistics has Fisher–Snedecor distribution with (N-2, N-2) degree of freedom, where N equals the number of countries in the analyzed

sample. Opposite if there is an increase in the value of three-year average variance, the T statistic equals σ^2_2/σ^2_1 and the rest of the procedure is the same. In tables presented in the next sections the statistical significance is marked with asterisks. It shows the level of confidence. Three asterisks equals 99% confidence level, two – 95% confidence level, and one asterisk – 90% confidence level. It refers to beta- as well as sigma-convergence results.

Results

In the first step of the analysis it is needed to verify if there was overall economic development during the analyzed period. To answer this question GDP per capita convergence analysis was conducted, and results presented in table 1.

In the whole article main results are presented in tables, where left side is dedicated to the results of beta-convergence analysis, and the right side to sigma-convergence.

Beta-convergence results contains of the value of coefficient *b,* together with confidence level, the value of beta coefficient that inform about the pace of the convergence, and the half-life coefficient indicating what time it takes for current differences to be halved. Then there is column showing if there is a beta-convergence or beta-divergence. On the left side there is a ratio of the value of variance in the last period to the same value in the first period. Asterisks show the level of statistical significance. There is also a column showing if there is a sigma-convergence or sigma-divergence.

Table 1. *GDP per capita convergence analysis results*

Region	Coef. *b*	Beta coef.	Half-life	β-conv. decision	$\sigma^2_{Tk}/\sigma^2_{t0}$	σ-conv. decision
Globally	-0.130***	0.61%	122.3	β-conv.	1.73***	σ-diver.
Europe	-0.408***	2.28%	38.7	β-conv.	1.38	-
Asia	-0.262***	1.32%	60.5	β-conv.	1.38	-
Africa	-0.043	-	-	-	3.32***	σ-diver.
North America	-0.051	-	-	-	1.91	-
South America	-0.194	-	-	-	2.09	-
Old EU members	-0.466*	2.73%	33.9	β-conv.	1.74	-

Region	Coef. *b*	Beta coef.	Half-life	β-conv. decision	$\sigma^2_{Tk}/\sigma^2_{t0}$	σ-conv. decision
New EU members	-0.753***	6.08%	20.8	β-conv.	1.06	-
Outside EU	-0.526**	3.25%	30.0	β-conv.	1.80	-

Source: *Own elaboration based on the World Bank Database.*

First analyzed indicator is GDP per capita. The results of beta- and sigma-convergence analysis are presented in table 1. As it can be seen there was a beta-convergence of GDP per capita growth on a global scale in the analyzed period. However its pace should be considered slow (half-life indicator shows that it would take 122 years to diminish observed differences in half. At the same time there was sigma-divergence, which means that the initial differences in GDP per capita across the countries were very large. We can also observe beta-convergence for two regional groups: European and Asian countries. It should be also emphasized, that for these two groups the pace of the convergence processes is much faster. Beta coefficient is more than two-fold higher for Asian countries and three-fold for European countries than globally. For other parts of the world nor beta- neither sigma-convergence have been proved. In fact *b* coefficient for every analyzed regional group was negative, however there were no statistical significance. The same as on global scale, in case of African countries sigma-divergence was detected. It is worth to mention that in every analyzed case the variance at the last period was higher than in the initial period, although only in two cases this growth was statistically significant.

These results indicate that although one can observe the convergence of economic development processes on a global scale it is mostly due to strong convergence in Europe and Asia. One should remember that despite the fact that Asia is only one of five continental groups it contains a considerably large number of countries (together with New Zealand and Australia) that constitute more than a half of all global population. The importance of changes in Asian countries group is much higher than meaning of the same processes in other continents. At the same time the results of sigma-convergence analysis emphasize considerable differences among analyzed countries in the level of initial GDP per capita especially among African countries.

Quite strong beta-convergence of GDP per capita changes during analyzed period seems to be confirmed by the results related to three isolated groups of European

countries. As it can be seen, at the bottom part of table 1, in every case strong beta-convergence was proven. The pace of the convergence processes is the fastest for New EU member states with half-life indicator that equal less than 21 years. For Old EU member states, where the statistical significance of b coefficient is the lowest, the same indicator equals 33,9. Although for every three groups variance of GDP per capita increased, according to F test any change was considered to be statistically significant. It indicates that initial differences of economic development among European countries generally and in analyzed groups were not as significant as it was on global level. Furthermore, it can be stated that all analyzed European countries were during analyzed period on their economic development growth path and they were "chasing" the most developed countries in their region, opposite to African countries.

Table 2. *Cereal yields convergence analysis results*

Region	Coef. *b*	Beta coef.	Half-life	β-conv. decision	$\sigma^2_{Tk}/\sigma^2_{t0}$	σ-conv. decision
Globally	-0.110***	0.51%	144.6	β-conv.	1.55**	σ-diver.
Europe	-0.342***	1.82%	46.3	β-conv.	1.07	-
Asia	-0.111			-	1.64*	σ-diver.
Africa	-0.206**	1.00%	77.0	β-conv.	1.50	-
North America	-0.051			-	1.67	-
South America	-0.127			-	2.29	-
Old EU members	-0.297**	1.53%	53.3	β-conv.	1.11	-
New EU members	-0.404***	2.25%	39.1	β-conv.	1.25	-
Outside EU	-0.479*	2.83%	32.9	β-conv.	1.61	-

Source: *Own elaboration based on the World Bank Database.*

The first indicator relating to technical production efficiency is the yields of cereal crops. The results of beta- and sigma-convergence analysis are presented in Table 2. As can be seen in the analyzed period, beta-convergence occurred globally, although its pace should be considered slow (the half-life index equals 144). At the same time there was sigma-divergence, which means that differences in the initial values of cereal yields were very high. Beta-convergence (without sigma-divergence) also applies to a group of European countries, as indicated by the negative value of *b* coefficient. In Europe, differences between countries are reduced every

year by 1.82%, while in Asia by 1%. On a global scale the pace of convergence is much slower while beta coefficient equals 0,51%.

When analyzing results referring to European countries, the authors divided European countries into three groups: Old EU member states, New EU member states and European countries outside the EU. In every analyzed groups of countries there is a significant beta-convergence of the cereal yields. The pace of this convergence is the fastest for the new EU member states and non-EU countries. The beta coefficient equals for this groups 2.25% and 2.83% respectively. It means that pace of the convergence within these groups is faster than for the whole group of European countries. It is worth to mention that there were no signs of sigma-convergence. In fact the observed variance increased but this growth was too small to be considered as statistically significant.

Returning to continental group analysis, it is worth to mention that opposite to GDP per capita convergence analysis results one can observe that there are no beta-convergence of cereal yield changes in Asia. One of the reason for this observation might be the fact that cereal yield indicator is much aggregated. Asia is a very large continent and in different countries different types of cereals are the most important one. Since yields of specific cereals change in different manners it is considered as valuable to take a closer look at these changes. The authors decided to analyze changes in rice and wheat – two most important crops – yields convergence separately. In this part of the analysis dividing European countries into different groups was not taken into account, since the problem of the level of aggregation in cereals yield indicator affected mostly large groups like Asia or Africa.

Table 3. *Rice yields convergence analysis results*

Region	Coef. *b*	Beta coef.	Half-life	β-conv. decision	$\sigma^2_{Tk}/\sigma^2_{t0}$	σ-conv. decision
Globally	-0.311***	1.62%	50.9	β-conv.	1.132	-
Europe	-0.417**	2.35%	37.9	β-conv.	0.691	-
Asia	-0.394***	2.18%	40.1	β-conv.	1.031	-
Africa	-0.223*	1.10%	71.1	β-conv.	1.387	-
Americas	-0.348***	1.86%	45.5	β-conv.	1.353	-

Source: *Own elaboration based on the FAOSTAT Database.*

In table 3 rice yield convergence analysis results are presented. Opposite to the aggregated cereals yields there is strong beta-convergence for every analyzed region. The pace of the observed beta-convergence in rice yields changes is the fastest for Europe and Asia. The half-life coefficient for those two regions is close to 40 years and is much lower than for global level or for African countries. In case of sigma-convergence although there is an increase in the value of variance across countries in every analyzed group, no statistically significance was found. The only exception is Europe where the dispersion falls during the analyzed period.

Table 4. *Wheat yields convergence analysis results*

Region	Coef. *b*	Beta coef.	Half-life	β-conv. decision	$\sigma^2_{Tk}/\sigma^2_{t0}$	σ-conv. decision
Globally	-0.250***	1.25%	63.4	β-conv.	1.401*	σ-diver.
Europe	-0.247**	1.23%	64.2	β-conv.	1.062	-
Asia	-0.282**	1.44%	56.2	β-conv.	2.068**	σ-diver.
Africa	-0.182	-	-	-	1.651	-
Americas	-0.543***	3.40%	29.0	β-conv.	1.622	-

Source: *Own elaboration based on the FAOSTAT Database.*

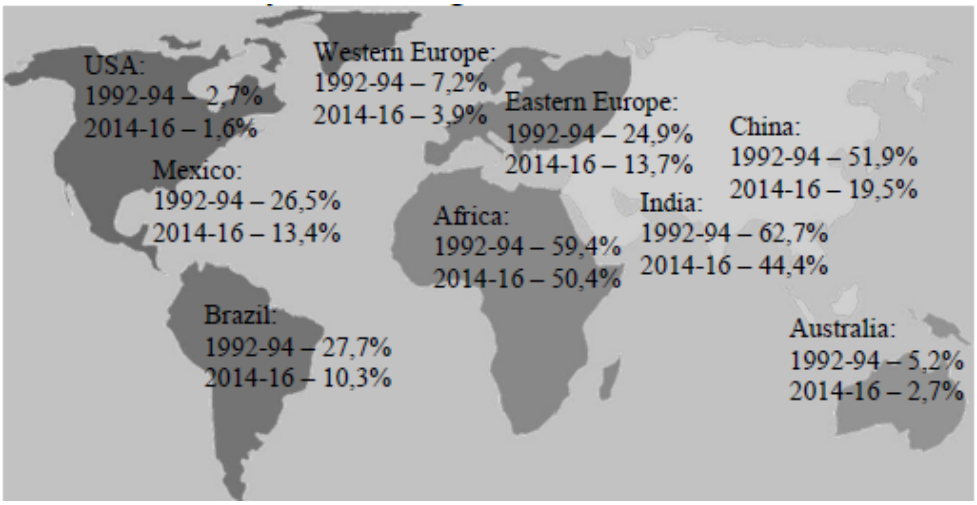
Quite similar results refer to wheat yield convergence analysis, which are presented in table 4. Beta-convergence was observed for every region except Africa during the analyzed period. The pace of convergence was the fastest for American and Asian countries. Although half-life coefficient was the highest for European countries there were no sigma-divergence in this case. Moreover the increase in dispersion of wheat yields across European countries was the smallest in relation to variance growth for other analyzed groups.

The results of convergence analysis for more specific technical effectiveness crop production indicators show that agricultural development convergence in African countries is less obvious that it would appear from aggregated cereal yields convergence analysis. It was also proven that in Asia region there is significant beta-convergence for crop yields. In case of every three indicators there is evidence that there is agricultural development convergence for European countries.

In the next step the share of agricultural employment in total employment was analyzed. As it can be seen in Chart 1 between the first and last three-year period there were significant changes in the level of this indicator. It can be stated that in

general there was a considerable decline in the share of employment in agriculture, although the rate of this fall is different depending on the analyzed region. For instance, in African countries and India drop in the analyzed ratio is relatively low. At the other end of the scale there is China and Brazil, where the share of employment in agriculture decreased much more. It is also worth to mention that during analyzed period there was an increase in the share of employment in agriculture in 7 countries: Uruguay, Guatemala, Angola, Botswana, Senegal, Mali and Malawi.

Chart 1. *Changes in the share of employment in agriculture between 1992-1994 and 2014-2016 for selected regions and states*



Source: *Own elaboration based on the World Bank Database.*

In table 5 the results of convergence analysis for share of employment in agriculture are presented. The general conclusions is that there were significant beta- and sigma-convergence in changes of agricultural employment globally and in most of analyzed regions. The pace of convergence processes was quite large for every analyzed sector. However the quickest changes refer to Europe and Asia. If the changes in agricultural employment would be the same as during analyzed period it would take less than 29 years for current differences to be halved in Europe and exactly 30 years in Asia.

One can also see that on a global scale as well as for European and Asian countries there was also sigma-convergence. The increase of variance during analyzed person was observed only for group of African countries. Taking into account statis-

tical significance there was neither sigma-convergence nor sigma-divergence for African, South American and North American group of countries. It is also wort to stress that for this three regions the pace of beta-convergence was quite slow with beta coefficient close to 2%.

Results of analysis for different European countries groups show that there were strong convergence processes for every analyzed group. The strongest sigma-convergence refers to Old EU member states and Non-EU countries. In case of beta-convergence very low high-life coefficient for Non-EU countries should be emphasized. It will take less than 26 years for this group of countries to reduce differences by half.

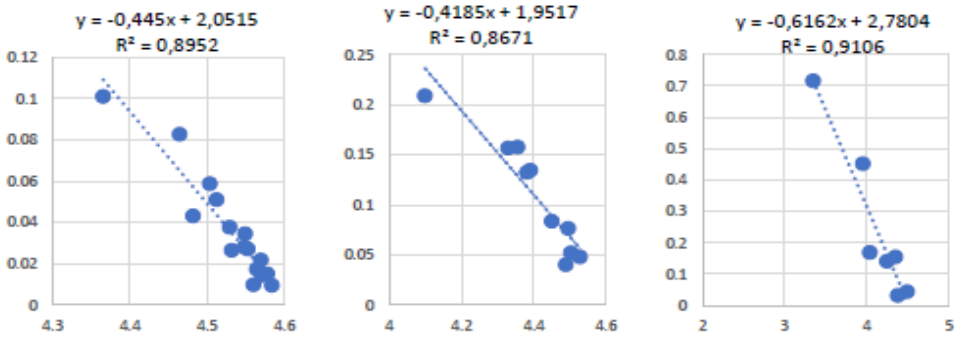
Table 5. *Employment outside agriculture convergence analysis results*

Region	Coef. *b*	Beta coef.	Half-life	β-conv. decision	$\sigma^2_{Tk}/\sigma^2_{t0}$	σ-conv. decision
Globally	-0.359***	1.93%	44.1	β-conv.	0.73**	σ- conv.
Europe	-0.549***	3.46%	28.7	β-conv.	0.37***	σ- conv.
Asia	-0.526***	3.25%	30.0	β-conv.	0.49**	σ- conv.
Africa	-0.356***	1.91%	44.4	β-conv.	1.18	-
North America	-0.349***	1.87%	45.3	β-conv.	0.69	-
South America	-0.390***	2.15%	40.5	β-conv.	0.48	-
Old EU members	-0.445***	2.56%	35.5	β-conv.	0.37**	σ- conv.
New EU members	-0.418***	2.35%	37.8	β-conv.	0.46*	σ- conv.
Outside EU	-0.616***	4.16%	25.5	β-conv.	0.36*	σ- conv.

Source: *Own elaboration based on the World Bank Database.*

To illustrate strong beta-convergence processes for three analyzed European countries group relation between initial values and the level of growth during analyzed period was shown in chart 2. It should be remembered that all values are expressed in logarithms.

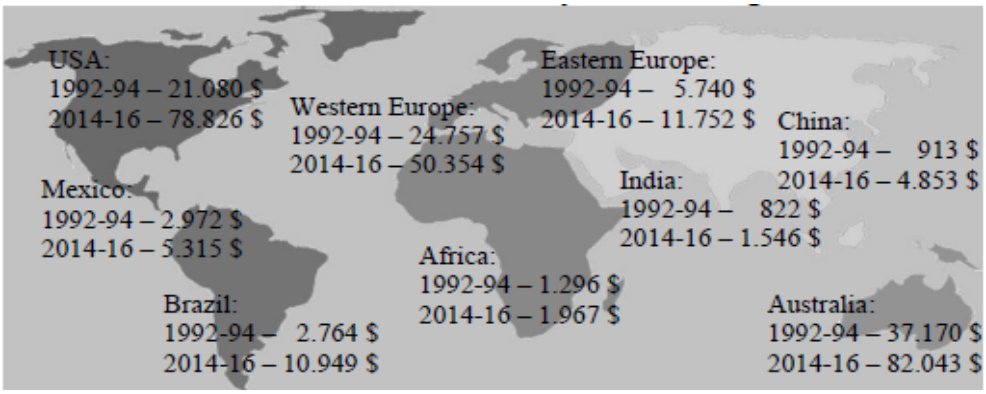
Chart 2. *Employment outside agriculture beta-convergence relations for European groups*



Source: *Own elaboration based on the World Bank Database.*

The last analyzed indicator is the value added per worker in agriculture. The authors consider this indicator as the most important, since it shows the actual effectiveness of labour force in the agricultural sector. As it can be seen in chart 3 there were considerable changes in the level of the value added per worker in agriculture during analyzed period. The increase occurred in every presented region or country. However there are significant differences in the pace of observed changes. Relatively small increase concerns African countries and India. There was moderate growth in both Eastern and Western Europe or Mexico. The biggest changes concerns USA and China. During analyzed period there were drops in value added for employed in agriculture in 14 countries, mainly African countries.

Chart 3. *Changes in the value added per worker in agriculture (constant 2010 $) between 1992-1994 and 2014-2016 for selected regions and states*



Source: *Own elaboration based on the World Bank Database.*

The results of beta-convergence analysis presented in table 6 show that there was no convergence on a global scale. The same is true for Africa, and South America, where negative *b* coefficient was statistically insignificant. In case of North America *b* coefficient was even positive, mostly due to considerable growths of value added per worker in Canada and USA. Although globally there was no sigma-divergence it was observed in for out of five analyzed regions. The rise in variance was especially huge for North American group of countries.

The only region where value added per worker in agriculture beta-convergence was observed is Europe and Asia. Still the pace of the convergence is considered to be extremely slow with the half-life coefficient bigger than 130 in both cases.

Table 6. *Value added per worker in agriculture convergence analysis results*

Region	Coef. *b*	Beta coef.	Half-life	β-conv. decision	$\sigma^2_{Tk}/\sigma^2_{t0}$	σ-conv. decision
Globally	-0.029			-	1.21	-
Europe	-0.115*	0.53%	138.3	β-conv.	3.69***	σ-diver.
Asia	-0.113**	0.52%	140.7	β-conv.	3.03***	σ-diver.
Africa	-0.192			-	3.37***	σ-diver.
North America	0.381			-	16.4***	σ-diver.
South America	-0.196			-	0.95	-
Old EU members	0.118			-	4.44***	σ-diver.
New EU members	-0.003			-	5.63**	σ-diver.
Outside EU	-0.406			-	1.46	-

Source: *Own elaboration based on the World Bank Database.*

When European countries are separated into three groups there are no signs of beta-convergence for any group. It indicates that although differences among poorer (Non-EU countries) or wealthier (Old EU members) countries remain more or less the same, poorer countries are "chasing" wealthier countries since there is beta-convergence for all European countries. There is also significant sigma-divergence for Old and New EU member groups just as in case of Europe region.

Conclusions

Summing up the results of conducted analysis it must be emphasized that due to the GDP per capita convergence evaluation one could expect agricultural development

processes convergence mostly in Europe and Asia and to a lesser extent globally. However when aggregated cereal yields together with rice and wheat yields were analyzed it occurred that convergence processes in agriculture are more common. It is mostly due to the fact that globalization facilitates the spread of scientific and technical progress. Even in regions where there were no economic development convergence proven, there are strong convergence of crop production yields. Still the examples of the African states show that lack of economic development convergence hampers convergence of agricultural production technical effectiveness.

When changes in the share of agricultural employment are analyzed it is obvious that some fundamental changes in agricultural sector are universal. There is significant decrease in the share of agricultural employment all over the world. Still the pace of this convergence is the slowest for regions where the GDP per capita convergence was relatively poor and that are Africa and North America.

The results of convergence analysis for value added per worker in agriculture confirmed observations that agricultural development convergence is interrelated with overall economic development convergence. Statistically significant beta-convergence refers only to European and Asian countries groups. In authors opinion value added per worker convergence must be associated with the convergence of the level of capital equipment on farms and this is achievable only when in analyzed group of countries there is overall economic development convergence.

When focusing on European countries it is obvious that there is strong agricultural development processes convergence. Firstly because virtually all European countries are on their development path and are "chasing" more developed countries. In case of cereal yields as well as rice and wheat yields there are statistically significant beta-convergence among European countries and the pace of this convergence is relatively fast. When share of agricultural employment is analyzed beta- and sigma-convergence was proven during analyzed person for Europe region as a whole and for all three European subgroups. The pace of this convergence is very fast with half-life coefficient less than 30 for Europe and Non-EU European states and less than 40 for other two European countries groups.

Only in case of value added per worker in agriculture no beta-convergence was shown for analyzed European subgroups. Still there is statistically significant beta-convergence on a continental level, which means that less-developed European countries are "chasing" the most-developed ones.

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THE SPECIFIC TRAITS OF RURAL DEVELOPMENT IN ROMANIA[1]

Dan Boboc[2], Marin Florian[3]

Abstract

The issue of rural environment is considered to be of utmost importance for Romania, the situation being generated by the share of rural area in the total area of the country. The identification of the characteristics of the Romanian rural environment, of the competitive advantages which it benefits is a permanent concern both for the national authorities and for the European authorities. In the context of an increasing the need to reduce regional development disparities, to reduce inequalities between urban and rural areas, as well as to establish relations of economic complementarity between rural and urban areas, the analysis of the specificity and diversity of the rural environment is an imperative premise, necessary to identify the development potential of the Romanian rural environment. This article aims to highlight the way in which rural development is approached in Romania, the strategic problems faced by the Romanian rural environment and the differences between the Romanian environment and the rural environment of other European countries.

Key words: *rural development, agriculture, European funds, National Rural Development Program.*

Introduction

China's significant economic growth as well as its global geopolitical expansion, the geopolitical tensions between the US, the European Union and Russia, or Brexit is elements that compel Europe to reposition itself internationally. Europe faces one of the most tense periods of the last decade, a period that generates direct consequences both in the economic and social spheres. In addition to the geopolitical tensions - that are increasingly pressing for the regional development pol-

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2 Dan Boboc, Ph.D., Full Professor, Bucharest University of Economic Studies, Piata Romana no. 6, Bucharest, Romania, E-mail: dan.boboc@eam.ase.ro

3 Marin Florian, Ph.D., Full Professor, Bucharest University of Economic Studies, Piata Romana no. 6, Bucharest, Romania, E-mail: marinflorian_21@yahoo.ro

icies – note the technological progress, globalization or the differences between the mobility of the production factors, all of which are elements that regional development policies must take into account. Against this background, Europe and, implicitly, the Member States, have been constrained to increasingly focus on the competitiveness elements existing in the European Union to ensure growth and economic development. Protecting and enhancing the comparative advantages has become a constant concern of the Member States, a situation that has affected both the European market and the relationship with the non-EU markets.

The EU enlargement to the east in 2004 and 2007 has contributed to the consolidation of a European economic model based mainly on significant complementarity between the East and the West; more precisely, the East is producing what the West is innovating. The permanent race for sources of economic growth has attracted the attention of stakeholders on the rural environment, which can significantly contribute to the catalysing of economic development, mainly within the newly admitted states. The rural environment is thus an important variable for the European economic dynamics, fact which is proven by the repositioning of rural development concepts that have been funded from the Common Agricultural Policy or the Cohesion Policy.

The rural development concept

Any successful rural development strategy of the 70s comprised a component of agricultural development, which was responsible for poverty reduction - as rural areas were associated with poverty. Agricultural development aims to improve the population welfare through sustained improvements in agricultural productivity, while rural development aims to improve the welfare of the rural population through the sustained growth of the rural economy, including agriculture, which is not the only component of the rural economy and not necessarily the most dynamic variable of the development process. The 70's are the years when the development of the agricultural sector is conceptually delimited from rural development (Gustavo et al., 2007).

The general idea of the 1970s was linked to the fact that the diversification of the rural economy depends on the vitality of the agricultural sector, and without a consolidated agricultural sector, reducing poverty is an impossible task (Singh, 1990). Local actors are primarily responsible for change and for identifying their own model of rural development, a model that is in accordance with the specific

territorial, economic and social reality. This paradigm shift was also dictated by the process of market liberalization, a process that began in the 1980s, which virtually eliminated the sector-level management (Ellis et al., 2001). The ongoing need for economic growth and diversification of the sources of economic growth, especially due to the inequalities generated by globalization, turned rural development a rather territorial than sectoral process (OECD, 2006). The urbanization process, accentuated in the last two centuries due to the rapid industrialization, has become one of the global problems of mankind due to the economic, social and cultural disparities that characterize both urban and rural civilization (Satterthwaite, 2007).

Rural development has become a multidimensional concept in the 2000s, which implies a fair and balanced rural development, a concept that integrates increasing levels of cohesion and social inclusion, as well as taking on the responsibility for the use of natural resources and environmental protection (Bleahu, 2005). There is a prevailing opinion that rural development includes a wide range of activities, including agriculture, infrastructure development and industrial development, based on sustainable principles (Todaro, Smith, 2011). The United Nations (UNDP, 2012) has developed a rural model known as the "rural triple wins". It consists of three components: economic, social and sustainable development, the purpose of which is to ensure that all three are included in every rural development strategy and project. This allows a growth favouring the inclusion, with new jobs that will improve the quality of life of rural communities and support the green economy (UNDP, 2012).

The premises of economic growth, environmental protection and preservation, as well as the improvement of social conditions are part of the concept of rural development (Armesto, 2007). In line with the provisions of the World Committee for Environment and Development (WCED), sustainable development has been called the development that aims to meet the needs of the present without compromising the ability of future generations to meet their own needs, which is also the most commonly used definition of development sustainable (WCED, 1987).

Agriculture has ceased to play a predominant role, and the principle of complementarity has become widespread, including in the rural development processes, which are processes with a territorial approach. The complementarity between urban and rural areas or the urban - rural ties has thus become the main concern of the rural development policies that benefit from both European and national funding.

The rural development approach in Romania

The EU member state status has significantly influenced Romania's approach to rural development. The approach to rural development in Romania integrates a mix of variables and entities that have a direct or indirect influence on the process itself. Since funding for sustainable development comes mainly from European financial sources, a number of elements such as managing finance, monitoring and controlling investments, reporting or programmatic framework have significantly influenced rural development process.

Also, the sustained involvement of stakeholders, their diversity or the specificity of the Romanian rural environment has been of utmost importance for the financing and management of the rural development process. The entire strategic and programmatic framework specific to rural development is carried out according to European principles and policies, a situation strongly influenced by the existence of European structural and investment funds. They are the main funding instrument used in rural development, the principles creating a synergy among the rural development policies - a normal element in the framework of a common, over-regulated, market.

The concrete expression of this synergy is the Common Agricultural Policy, which integrates two main directions, two pillars, namely direct payments and market interventions, namely pillar 1, and the modernization of villages, increasing the competitiveness of agriculture, diversifying the rural economy, protecting the environment and the landscape of rural areas, namely pillar 2. The introduction of Pillar 2 into the CAP as well as the eastward extension of the European Union has rendered more difficult the centralized coordination of the CAP, especially due to the different needs of economies and the structure of Member States' economies. The CAP has integrated over the 2007-2013 programming period three main objectives, as follows:

1. Food production under efficient conditions,
2. Sustainable management of natural resources and adaptation to climate change
3. Balanced regional development (European Commission, 2010)

Romania has transposed Pillar 2 of the CAP into the National Rural Development Program, this being the main funding instrument for rural development processes used since Romania's EU accession. From a thematic point of view,

NRDP finances the whole range of specific needs for sustainable development, these being agreed with the European Commission. During the first programming period, Romania benefited from a rural funding allocation dedicated to rural development, through the NRDP 2007 - 2013, amounting to 8.12 billion euros. The interest for the rural environment was considerable, as evidenced by the implementation characteristics of the NRDP 2007 - 2013. A total of 150,944 projects totalling 18,533,168,276 euro were implemented by 06.10.2016, out of which 98,444 projects totalling 7,610,446,693 euro were selected for funding. 79,784 projects with a total value of 5,707,979,271 euro were contracted.

The structure of investments made through NRDP 2007 - 2013 proves a different approach from one development need to another, so that the vocational training and knowledge generation for farmers benefited from 19,347,351 euro, the installation of young farmers amounted to 305,303,458 euro, the modernization of agricultural holdings amounted to 602,274,906 euro, and the support of subsistence and semi-subsistence farms benefited from investments amounting to 333,595,687 euro. The economic diversification of the rural environment, namely investments in microenterprises, received investments worth 315,832,321 euro, while rural tourism and encouragement of tourist activities in the rural areas got investments worth 138,673,679 euro. Involvement of local stakeholders through local development strategies got investments amounting to 298,533,198 euro in 2007 - 2013.

The total value of investments in rural development, made from both European funds and national funds, through NRDP 2007 - 2013, amounted to 8,457,435,930 euro. The NRDP 2014 - 2020 has 8,127,996,402 euro, but the programming period is not concluded, the program being currently under implementation. Since the beginning of the current programming period, 3,235,370,485 euro has been paid to beneficiaries throughout the entire program. Of these amounts, 2,938,188,488 euro was requested from the European Commission, and 2,919,646,454 euro has been settled.

An imperative element to be analysed to determine the characteristics of the rural environment in Romania is related to the structure of the investments made so far from 2014 – 2020 programing period. The investment character in the Romanian rural areas is an integrated one, which approaches the whole set of functionalities specific to the rural environment.

Table 1. *Structure of investments in agriculture - NRDP, 03.01.2019*

Sub-measure	Public allocation 2014-2020 – NRDP - euro	Payments made - euro
Sub-measure 1.1 "Support for vocational training and acquisition of competencies"	54.191.022	633.377
Sub-measure 4.1 "Investments in agricultural holdings"	844.672.338	376.002.994
Sub-measure 4.1a "Investments in fruit holdings"	284.356.109	34.690.820
Sub-measure 4.2 "Support for investment in the processing / marketing of agricultural products"	359.883.695	49.434.301
Sub-measure 4.2 "Minimis scheme"	12.500.000	63.415
Sub-measure 4.2a "Investments in the processing / marketing of fruit-growing products"	34.629.439	1.159.486

Source: *Ministry of European Funds*

The central pillar of the rural economy, agriculture benefited from significant investments from the funds of 2014-2020 programming period. The investments were mainly oriented towards agricultural holdings, which benefited from investments amounting to 376.002.994 euros, representing 44.51% of the specific allocation.

Fruit growing has benefited from investments worth 34.690.820 euro and the marketing of agricultural products of 49.434.301 euro. As we can see, investments in rural agriculture have focused on agricultural holdings, from a quantitative point of view. Also, the pace of use of European resources was consistent with the fact that approximately 44% of the funds allocated to agricultural holdings were used in the first 4 years after the beginning of the programming period.

Table 2. *Structure of investments in infrastructure and in the rural business environment - NRDP, 03.01.2019*

Sub-measure	Public allocation 2014-2020 – NRDP - euro	Payments made - euro
Sub-measure 4.3 "Investments for the development, modernization and adaptation of agricultural and forestry infrastructure - irrigation"	433.978.719	75.291.390
Sub-measure 4.3 "Investments for the development, modernization and adaptation of agricultural and forestry infrastructure - agricultural access infrastructure"	130.298.233	40.911.329
Sub-measure 4.3 "Investments for development, modernization and adaptation of agricultural and forestry infrastructure - forestry infrastructure"	99.271.119	29.655.595
Sub-measure 6.1 "Support for the installation of young farmers"	426.744.132	333.400.012
Sub-measure 6.2 "Support for the establishment of non-agricultural activities in rural areas"	106.569.178	79.431.204
Sub-measure 6.3 "Support for the development of small farms"	246.493.158	89.882.751
Sub-measure 6.4 "Investing in the creation and development of non-agricultural activities"	166.503.969	48.309.787

Source: *Ministry of European Funds*

The integrated character of the rural environment has also included the infrastructure serving the agricultural activity, the rejuvenation of the females and the diversification of the rural economy. Both elements are of the utmost importance to secure urban-rural links but also to ensure the mobility of production factors. In this respect, the irrigation sector benefited from investments financed from the NRDP 2014-2020 amounting to 75.291.390 euro representing 17.35% of the thematic allocation, the investment access infrastructure of investments amounting to 40,911,329 euro representing 31.4% of the available allocation and the forestry infrastructure amounting to 29.655.595 euro, representing 29.87% of the available allocation. The infrastructure serving the agricultural sector has benefited from such investments totalling 145.858.314 euro, investments that contribute to increasing the competitiveness of the sector.

Population aging represents a need addressed by the rural investment plan, providing young farmers with an investment of 426.744.132 euro for the period 2014-2020, of which 333.400.012 euro were spent until 03.01.2019. Also, the development of small farms and facilitating access to the market is a need that has benefited from investments worth 89.882.751 euro. The provisions of the European strategic framework attach great importance to the need to diversify the rural economy. This importance is materialized in total investments in value of 273.073.148 euro, of which 127.740.991 euro were actually used. The investment approach of the rural environment integrates needs that directly address the quality of life. Funding from the financial resources for the 2014-2020 programming period was funded by investments in small-scale wastewater infrastructure worth 190.126.851 euro, in the road infrastructure of 254.858.827 euro and 55.754.916 euro in the educational infrastructure and social issues.

Table 3. *Structure of investments in rural development, 03.01.2019*

Sub-measure	Public allocation 2014-2020 – NRDP - euro	Payments made - euro
Sub-measure 7.6 "Investments associated with the protection of cultural heritage"	188.010.999	88.172.498
Sub-measure 9.1 "Establishment of producer groups"	14.736.313	1.438.029
Measure 10 "Agri-environment and Climate"	1.069.002.274	235.191.612
Measure 11 "Organic Farming"	235.716.228	81.685.316

Source: *Ministry of European Funds*

The specificity of the rural environment, but also the cultural heritage it enjoys, benefited from an investment allocation of 188.010.999 euros, of which 88.172.498 euros were used between 2015 and 2019, resources from NRDP 2014-2020. The imperative need of association of producers generated by the characteristics of the rural environment benefited from investments amounting to 1.438.029 euro, representing 9.76% of the initial allocation.

Market opportunities in the sense that the preference for organic food grew significantly was a need in the countryside investment environment. Organic farming benefited from investments of 81.685.316 euro, the budget tire for the period 2014-2020 being 235.716.228 euro. The Romanian rural environment

benefited from real investments in agri-environment, realized in the period 2015 - 2019, amounting to 235.191.612 euro, investments made from a budget tire of 1.069.002.274 euro.

As we can see, the rural investment approach is one that achieves a wide range of functionalities and needs specific to the rural areas, thus proving an integrated character adapted to the socio-economic realities of the rural environment.

Specific characteristics of rural development in Romania

The diversity of the rural environment, the differences in development between Member States, the ways of interaction between production factors, at least in terms of dynamics, differing from one Member State to another or from one region to another, require an analysis of the rural model characteristics in view of identifying strategic issues that need to be considered in rural development processes. The definition used by the European Commission to analyse the rural environment belongs to the OECD and the rural area is defined as an area where the population density reaches maximum 150 inhabitants per square kilometre. At the same time, rural areas are defined, being grouped in (OECD, 2011):

- Predominantly rural areas - over 50% of people live in rural areas;
- Significant rural areas - between 15% and 50% of the population live in rural areas;
- Predominantly urban - less than 15% of the population lives in rural areas.

Romania is one of the countries with a large extent of predominantly rural areas in the European Union, with a surface area of 161,667 square kilometres. Countries like Germany (137,927 square kilometres), France (343,528 square kilometres) or Poland (163,062 square kilometres) are in a similar situation.

Romania is in the top 5 countries of the European Union as an area of predominantly rural areas, but the exposure and the importance of the rural environment for the economic dynamics is significant. The situation is similar, including in terms of the number of people living in predominantly rural areas, therefore, Poland had in predominantly rural areas, in 2017, 13,274,279 inhabitants, France had 20,742,604 inhabitants, and Germany had 12,965,682 inhabitants. Countries with a relatively small number of inhabitants in predominantly rural areas are the Netherlands, with 105,641 inhabitants or Iceland, with 121,471 inhabitants.

Projections on the predominantly rural population are pessimistic, as the countries with the largest population in these areas are also the countries with the steepest decline. Germany will have a population of 12,785,204 inhabitants in the predominantly rural areas in 2020, while in 2050 it will reach 10,467,068 inhabitants. At the same time, Poland will have in 2020 a population of 12,679,427 inhabitants in predominantly rural areas, while in 2050 it will be 11,429,098 inhabitants.

The aging of the population as well as migration will be the real problems in the near future for most EU Member States, with predominantly rural areas also affected, as illustrated by the aforementioned figures.

Figure 1. *Distribution of urban / rural population*

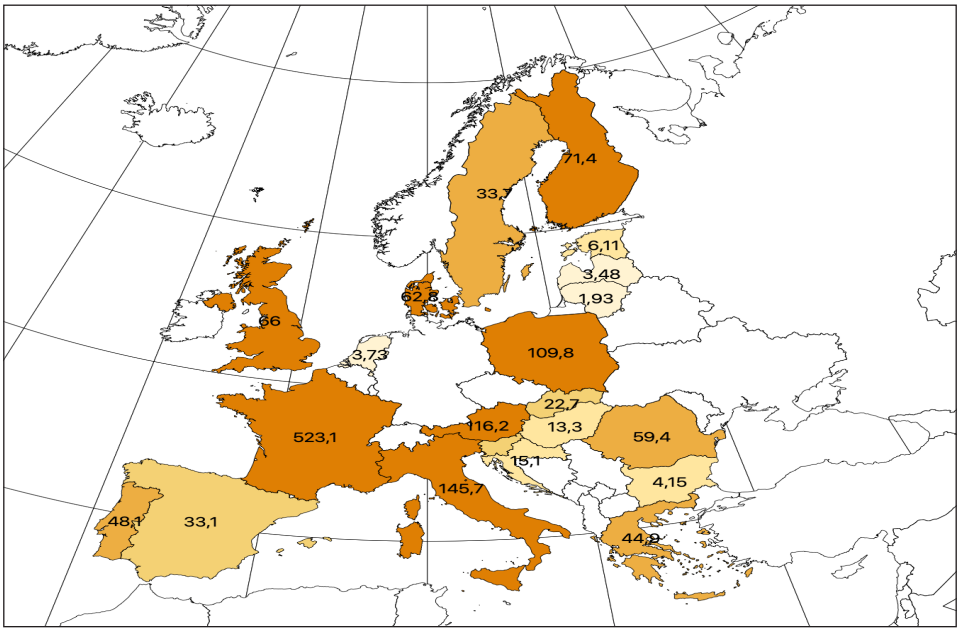
Source: *NSI.*

Analysing the population distribution in Romania by residence area, we notice that a significant share of Romania's population lives in rural areas. In 1996, 50.98% (5,822,395 inhabitants) of the Romanian population lived in the rural area, a decreasing trend in recent years due to migration and the aging trend. Upon Romania's accession to the European Union, 45.7% (4,564,204 inhabitants) of the Romanian population lived in rural areas, and in 2017 the share was 45.24% (4.126.090 inhabitants). The demographic decline is certain, and is documented by the fact that in 2017 there are 1,696,305 fewer people in rural areas than in 1996, and 438,114 less than in 2007. Also, the natural increase has been negative throughout the entire period since the EU accession, by -52834 persons in 2012, 46051 persons in 2016, and 52736 persons in 2017.

Another important element for the Romanian rural environment is the structure of the existing labour force, more specifically the number of graduates. In 2014, only 22 higher education graduates were identified, 35 in 2015, and 55 in 2016. At the same time, in the whole country there were only 4027 high school graduates in the rural areas, in 2014, 3503 in 2015, and 3412 in 2016.

Analysing the GDP situation in predominantly rural areas, note that the countries with the highest GDP in 2016 were Germany (392.286 million euro), France (523.102 million euro), Italy (145.716 million euro), Austria (116,234 million euro) and Poland (109,845 million euro). At the opposite end there is Bulgaria (4.146 million euro) and Estonia (6.106 million euro). The GDP generated by Romania's predominantly rural areas was 50.998 million euro in 2012, EUR 55.060 million euros in 2014, and 59.377 million euro in 2015, increasing in recent years.

Figure 2. *GDP in predominantly rural areas, 2015*.



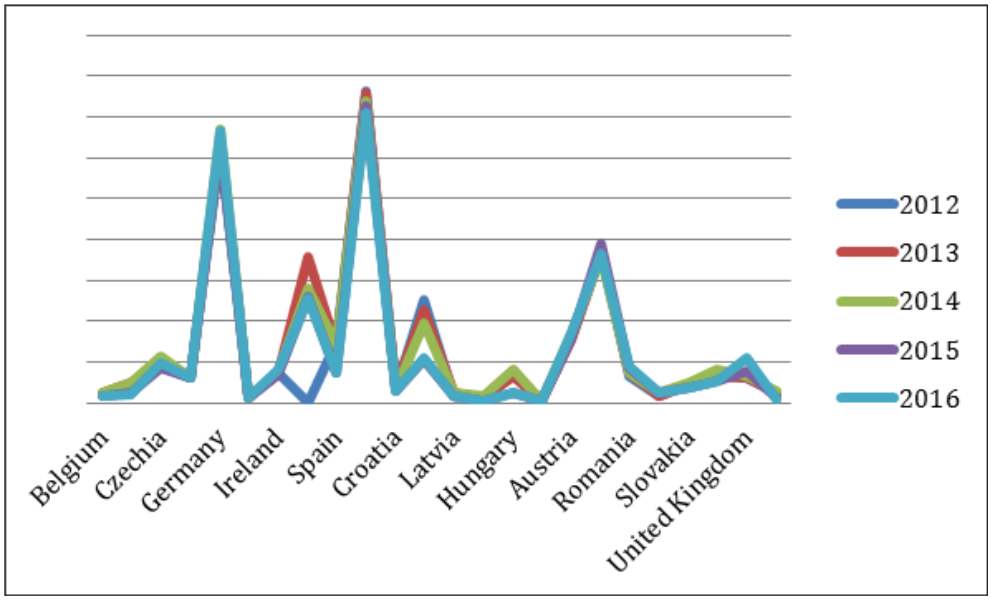
Source: *Eurostat.*

Analysing the distribution of GDP per capita in predominantly rural areas, note that there are significant differences from one Member State to another. In 2015, it was by 30527 euro in Germany, by 25294 euro in France, by 24995 euro in Italy, by 33106 in Austria, and by 8241 euro in Poland. Romania has a GDP / per capita in predominantly rural areas much lower compared to other Member States, which in 2015 amounted to 5543 euro.

By introducing in the analysis the situation of the number of persons employed in predominantly rural areas, in 2015, note that in Germany it was 6,255.75 thousand people, in France 7,707.73 thousand people, in Austria 1,671.3 thousand people, and in Italy 2,260.8 thousand people. As for the unemployment rate in predominantly rural areas in 2016, in countries such as France the unemployment rate was 9.3%, Poland 7.4%, Italy 10.6%, and Austria 4.2%. In Romania, there were 4,532.7 thousand employed persons in 2012, 4,527.4 thousand persons in 2014, and 4,618.8 thousand persons in 2015. The unemployment rate in predominantly rural areas in Romania was 6.8% 2010, 6.5% in 2013 and 6.7% in 2016. One of the significant problems faced by the rural environment is the dependence on the subsistence agriculture, and the large number of people employed in subsistence farming. Rural environment's dependence on agriculture is significant, with rural areas lacking other economic options. The rural environment is trapped in the low income trap, the number of rural workers being low, and the income level is also much lower than in the urban environment.

Urban rural connections, interconnection between regions and between Member States are of utmost importance for strengthening rural urban links or catalysing the development process.

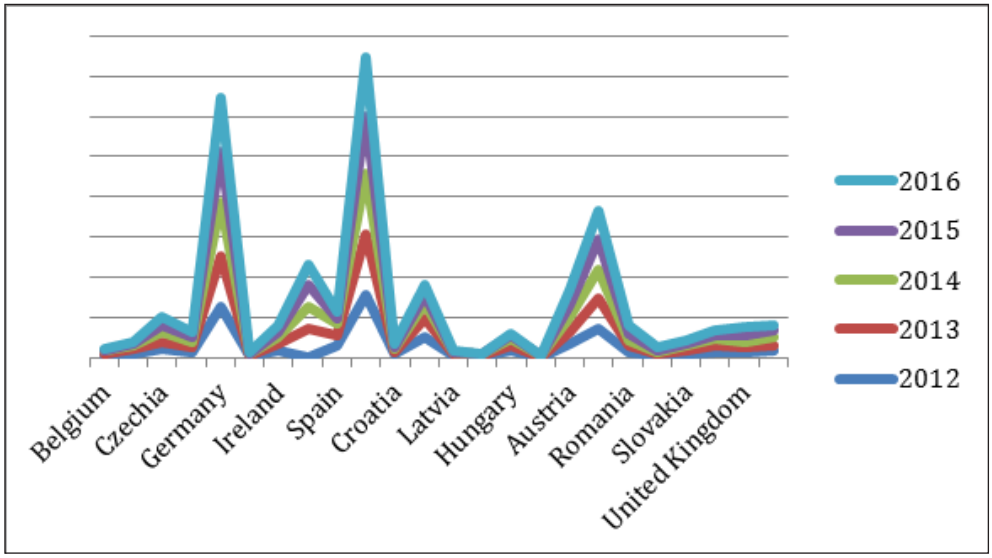
Figure 3. *Annual freight transport by regions of unloading*



Source: *Eurostat*

In this respect, the analysis of the annual freight transport by regions of unloading the quantity of goods in the predominantly rural regions, shows us that in Germany, in 2016, there were 666,569 thousand tons of freight, in France the value was 711,367 thousand tons, in Poland 366,237 thousand tons, and in Austria 171,039 thousand tons. The situation in Romania is one on an upward trend, but far below the above mentioned Member States. In 2012 the indicator showed 67,933 thousand tons, in 2014 it was 75,790 thousand tons, and in 2016 it was 91,790 thousand tons.

Figure 4. *Annual freight transport by regions of loading*



Source: *Eurostat*

Concerning the national transport of goods by unloading areas in predominantly rural areas, note that Germany delivered 661,883 thousand tonnes in 2016, France 716,767 thousand tonnes, Austria 173,313 thousand tonnes, and Poland 363,146 thousand tons. The situation in Romania is one in which the quantity of goods transported by landing area was 67,309 thousand tons in 2012, 74,750 thousand tons in 2014, and 90,105 thousand tons in 2016.

Another indicator that characterizes the peculiarity of the Romanian rural environment is related to the business environment and its dynamics. In 2015, in Romania, there were 154,859 enterprises in the predominantly rural areas, by 9,396 fewer than in 2011, and by 8,622 fewer than in 2012. The decrease is mainly due to the

recapture of the newly established business, in 2015 there were 15,358 businesses, while in 2013 there were 26,196 businesses, and in 2014 there were 21,911 businesses. In 2015, 6,606 businesses lasted more than 3 years, while in 2013 there were 5,275 businesses.

The agricultural potential is quite significant in Romania, where the natural environment allows the exploitation of the rural environment. Moreover, Romania is the country with the largest biodiversity in the European Union, with the framework of significant economic complementarity. However, the rural environment faces a number of barriers that prevent the opportunities offered by the rural areas, mainly in agriculture. The size of the farms is one of the barriers. Romania faces a significant fragmentation of the number of farms, while having the largest number of farms in the European Union. In Romania, there were 3,422,030 farms in 2016, farms managing 12,502,540 hectares of agricultural land. Romania has three times more farms than Italy, twice as many farms as Poland, and 12 times more farms than Germany. The structure of the farms provides a clear picture of their ability to harness the agricultural opportunities offered by the rural environment. This structure of farms generates major difficulties in accessing financial instruments, lending or the market, a situation that reinforces rural poverty.

Labour force employed directly in agriculture reached 1,587,650 people in Romania, in 2016. Perhaps one of the most important variables is that 2,956,380 farms target production for their own consumption, more precisely farms that are operating a subsistence or semi-subsistence farming, where farmers cultivate their own land for a living. Basically, 86.39% of Romanian farms are practicing subsistence or semi-subsistence farming.

Conclusion

The investments made from European funds, the common market, the economic complementarity between the East and the West, deriving from the European economic model, had a positive influence on Romania's economy, including on the Romanian rural environment. Becoming a full EU Member State, the alignment with the Common Agricultural Market, the Common Agricultural Policy were elements that also significantly influenced the way in which rural development is managed and financed in Romania. Since 2007, the European Commission has become the main investor in the Romanian rural development, with investments being made through the NRDP 2007-2013 and NRDP 2014-2020.

Rural development has benefited from approx. 9 billion Euro of investment since Romania's accession to the European Union. These funds covered a wide range of needs. Both the specific needs for sustainable development and the funding for every need are an expression of the synergy of interests between the European Commission and a Member State. Thus, the rural development approach in Romania is strongly influenced by the European programmatic strategies and frameworks.

The rural environment issue is paramount for Romania's economic and social dynamics. After France and Poland, Romania has the largest of rural areas, and a significant number of people who live in rural areas. The population living in rural areas is significantly decreasing, but even in these circumstances, over 40% of Romania's population lives in rural area. However, the demographic forecasts are somewhat unfavourable. Despite the fact that the rural area has a significant share of the country's surface and a significant share of the country's population, the rural environment is a poorly exploited opportunity in rural development. The GDP obtained in the rural regions is 8.8 times lower than that obtained by France, 2.45 less than that obtained in Italy, 6.6 times lower than that obtained in Germany and twice as low as the one obtained in Poland. The GDP / inhabitant were only 5543 Euro, in 2015, well below the level of other EU member states.

The insufficient use of the potential of the rural environment is shown by the quality of the labour force, one that is based on people having only primary education, the number of university graduates in rural areas being extremely low. The situation is complemented by the business environment, namely the number of companies operating in rural areas. Although Romania has one of the largest rural areas, the business environment faces significant volatility and a small number of companies capable of generating added value in rural areas.

One specific characteristic of the Romanian rural environment, the characteristic of utmost importance for the specificity of the rural development processes is given by the number of farms, their structure and the impact they have on the social environment. Romania is the country with the largest number of farms in the European Union, but they are small in size, most of them focusing on agricultural production for own consumption, not for sale. 86.39% of farms in Romania have subsistence and semi-subsistence farming, which is one of the most important features of the Romanian rural environment compared to other EU member states.

The specific traits of the Romanian rural environment require a discrete approach, adapted to its specificity. Although considerable amounts of European funds and investment have been invested in the Romanian rural environment, this is far from being considered an element of competitiveness for the Romanian economy. The structure of the workforce, a fragile business environment, and a structure of farms significantly different from other Member States are specific characteristics of the Romanian rural environment, which must receive increased attention in the immediate future.

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AGRI-FOOD ECONOMY AND RURAL DEVELOPMENT CHALLENGES FOR ROMANIA AFTER 10 YEARS OF CAP

Dan Marius Voicilas[1], Cecilia Alexandri[2]

Abstract

The Romanian accession into the EU represented an important moment of the post-communist period, being valued as a guarantee of the country's signing on a path of development and democracy. Now, 10 years after Romania's accession into the EU, we can evaluate the effects of the policies implemented, the CAP in our case. It is the most integrated sectoral policy of the EU, using a mix of interventions mainly aimed at integrating agricultural markets, supporting farmers' incomes and supporting rural development. Therefore, it is almost inviting that there are many inconveniences and reproaches related to the functioning and the effects of this policy. In this paper we aim to identify the effects of joining and especially the implementation of the CAP on agriculture and rural areas in Romania. In making this statistical analysis, the long series of data provided by the Romanian National Institute of Statistics and the Eurostat database were used.

The results obtained from the analyses show the changes made in the agriculture and rural space in Romania, following the implementation of the CAP. These changes have produced positive but also less satisfactory effects. In the same time, we identify what kind of challenges is evident after this period and the predicted future challenges having in view the dynamic international political context.

Key words: *agri-food economy, rural development, CAP, European membership, Romania.*

1 Dan Marius Voicilas, Ph.D., Associate Professor, Senior Researcher, Romanian Academy, Institute of Agricultural Economics, "Casa Academiei", Calea 13 Septembrie no.13, Sector 5, 050711 Bucharest, Romania, Phone: +40 722 398 119, E-mail: dmvoici@yahoo.com

2 Cecilia Alexandri, Ph.D., Director, Senior Researcher, Romanian Academy, Institute of Agricultural Economics, "Casa Academiei", Calea 13 Septembrie no.13, Sector 5, 050711 Bucharest, Romania, Phone: +40 728 026 661, E-mail: cecilia@eadr.ro

Introduction

Agriculture, forestry and fishing are an important branch of Romania in terms of agricultural, forestry and fishery holdings (about 94% of the country's total area), with about 62% of the agricultural area (55.9% of the agricultural area used on agricultural holdings), 28% forest area and 4% water-scented areas (Tempo on-line, National Institute of Statistic data). Also, arable land accounts for about 62.5% of the agricultural area (Ministry of Agriculture and Rural Development data), and the arable area per capita places Romania on the sixth position in the European Union (EU), with 0.41 ha/inhabitant compared to 0.21 ha/inhabitant as it is EU-27 average (Eurostat data). These characteristics place Romania among European Union (EU) countries with great agricultural potential. In some cases, Romania is among the first EU countries, but far below potential. Labor productivity is still low, low returns, insignificant investments, low gross value added (GVA), and too much workforce in this sector. For instance, Romania is the EU country with the largest share of the population employed in this sector. Over the period analyzed in this paper (2007-2016), the share oscillated between 27% and 30%, more than 6 times the EU average (4.4% in 2014, according to Price Waterhouse-Cooper Romania analysis, published in 2017). According to official statistics from Tempo online, in 2013 only 7.1% of the employed population in agriculture was represented by employees and employers. The rest is "self-employed" and "unpaid family workers". Thus, the contradictions persist in the sense that, Romania's agriculture continues to have a significant weight in gross domestic product (GDP), insignificant contribution to economic growth, although it concentrates many resources, strong competition from the foreign trade, specialized on unprocessed products for exports and products with high degree of processing in the case of imports.

Objectives, methodology and data

It is precisely for the reasons mentioned above that, this study should be carried out to identify the level of integration of the Romanian agri-food sector into the EU structures and mechanisms following the implementation of the Common Agricultural Policy (CAP), which were the advantages and disadvantages of the accession and what are the areas and needs to correct the identified shortcomings. In the paper we attempted to identify the effects of EU membership on agriculture and rural area. For this, we analyse the evaluation of the agri-food sector and rural development after 10 years of EU membership.

The methods used are based on the statistical analysis of the main macroeconomic indicators from the agri-food sector, like: farm structure land market, investments, agricultural markets, trade, also financial instruments and funds. The period took into account covers 2007-2016 or 2005-2013 (2014), where data were not available for the entire period.

We have grouped our research on two directions:

- Economic and structural effects of the European funds in agriculture;
- Integration of the Romanian agricultural markets into the European Single Market.

We used official data from National Institute of Statistics from Romania (INS), Ministry of Agriculture and Rural Development (MADR), Eurostat, also different studies elaborated by the Institute of Agricultural Economics from the Romanian Academy (IEA-AR), especially the book coordinated by Cecilia Alexandri in 2017, „Agricultura si Spatiul Rural – Evaluari la 10 Ani de la Aderare" (Agriculture and Rural Space - Assessments at 10 Years of Accession), published by Editura Academiei Romane, in Bucharest, Romania.

Premises

The accession to the EU represented an important moment of the post-communist period, being valorised as a guarantee for our country's inclusion on a development and democracy trajectory. This was a common approach for all the countries from Central and Eastern Europe, which joined the EU in the desire to belong to a stable political and economically prosperous area.

In time, the things were changes a little and the euro-optimism has diminished due to:

- The economic crisis of the years 2007-2008
- Increasing euro-skepticism from the EU-Old Member States
- The refugee crisis in 2016

But, among many other positive or negative aspects, CAP is the most integrated EU policy, which through its interventions has mainly in view the integration of agricultural markets, support to farmers' incomes, sustainability of agricultural resources and support to rural development. This is the reason why we considered that, this study is necessary and useful for other specialists, as well.

Forms of financial support

Direct payments

Schemes for direct payments to new EU Member States (Cyprus, Estonia, Latvia, Lithuania, Malta, Poland, the Czech Republic, Slovakia, Slovenia and Hungary that joined in 2004, Romania and Bulgaria, which joined in 2007) were based on the calculation of an annual ceiling determined on the basis of the historical performance of average production in the main agricultural crops over the period 2000-2002 (reference yield).

The direct payment schemes that have been granted since 2007 (GEO 125/2006) have resulted in the following support mechanisms for agricultural producers: a) Single Area Payment Scheme (SAPS); b) Complementary National Direct Payments (CNDP); c) Payment scheme for energy crops; d) Separate payment scheme for sugar.

The Single Area Payment Scheme is to grant a uniform amount per hectare considered eligible, respecting the criteria set for all Member States that have adopted this payment scheme. The reference area for direct payments negotiated by Romania with the EU was 8,716,370 ha. The funding source for payments under SAPS was provided by the European Agricultural Guarantee Fund (EAGF) and was granted to support the products or sectors for which quotas, reference areas or national ceilings were established. Amounts for direct payments from the EU agricultural budget were allocated according to an annual percentage increase calendar, with full payments (100%) from the EU budget in 2016.

Comparison with other EU Member States highlights the extremely large difference between the level of subsidies in the 2007-2013 financial cycle of Romania's and other EU Member States' agriculture. Direct payments per eligible hectare in Romania (annual average of 90 €/ha) represent only 67.2% of the average annual EU-12 budget allocations and 31.9% of the annual average per eligible hectare of the EU-15.

The large difference between the annual average of payments to Romania and the average annual level of payments to other Member States is due both to the progressive annual allocations and the historical yield on which the annual ceilings were determined (the product of historical yield, different from one state to

another, and a fixed amount per tonne, equal to all Member States) calculated for each Member State. From this point of view, we recall that reference production or historical yield (the average yields of the main crops in the period 2000-2002) considered for Romania was 2.65 tonnes per hectare, compared to 4.77 tonnes per hectare reference production of EU-15, 4.0 reference production of the 10 New Member States (which joined the EU in 2004) or 4.73 in the case of Hungary, 4.2 in the case of the Czech Republic, 4.06 in the case of Slovakia, 3,0 in the case of Poland.

The aforementioned deviations have become more acute given that in the case of Romania there is a very large agricultural area considered ineligible (a difference of 5,037 thousand ha between the utilized agricultural area (UAA) of 13753 thousand ha in 2007, and the eligible area of 8,716 thousand ha), a difference not eligible as a result of excessive land fragmentation (holding less than 1 ha or fragmentation of one hectare in more than 3 plots).

Analyzing the average of direct payments per hectare from the EU budget, over the entire 2007-2013 programming period, we find that Romania, with a payment of 57 €/ha, is on the last place in the EU-27, with only 11,2% of the level awarded to Greece (508 €/ha), 12.8% of the Dutch level (444 €/ha), 12.9% of Belgium (443 €/ha), 18.7% (304 €/ha), 26% of Hungary (219 €/ha), 41% of Poland (139 €/ha).

In the running of the current financial year (2014-2020), the payment schemes for farmers are differentiated into the single farm payment scheme practiced in the Old EU Member States (exceptionally, and in some New Member States with appropriate conditions of application of this payment method) and SAPS, specifies New Member States, including Romania, which opts for the continued application of the single area payment scheme.

With all the changes that have been made, there are still differences in the support per hectare for each Member State, differences that still generate major imbalances, unfair or discriminatory competition, with obvious negative effects, hard to bear by the poorer of the EU, as is Romania. These differences were and still are due to two reasons:

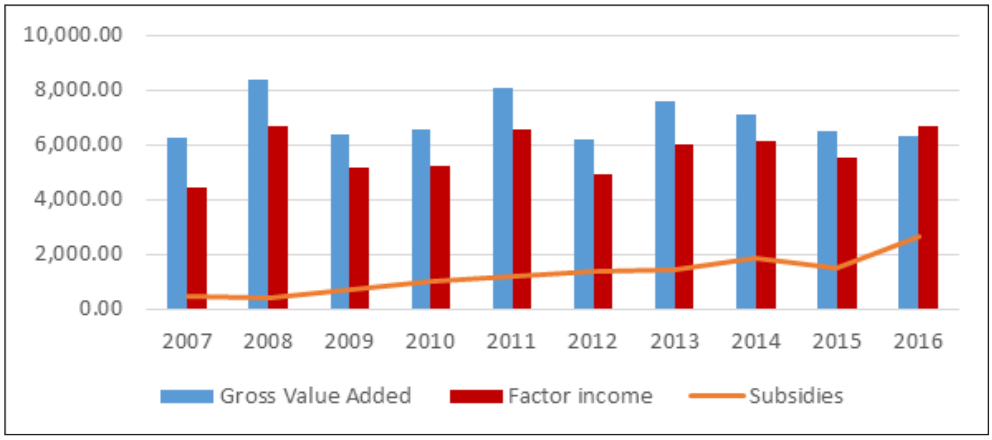
- The continued use of historical references in the calculation of the level of payments (average yields per hectare over the period 2000-2002), even if it is stated in the European bodies' declarations that they have been waived;

- The non-recognition of Romania's real eligible area (9.7 million ha in 2013, according to the eligible payment claims taken over by the Romanian institution responsible, which is under MADR coordination, compared to the 8.7 million hectares eligible in the 7-Agriculture negotiated with the EU dossier). This difference is increasing each year as a result of the land consolidation process. The difference between the utilized agricultural area of Romania (13,056 thousand ha in 2013) and the eligible area (8,716 thousand ha) is 4,340 thousand ha.

We highlight that, direct payments have become increasingly important for farms, but they are distributed unequally. Thus, in the year 2015, 97% of farms received only 40% of the total amount of direct payments, while 3% of farms received the remaining 60%. The direct aid (SAPS) to farmers resulted in farm production getting oriented to the crop production sector, i.e.to field crops, cereals and oilseeds.

As regards the incomes of the farmers, in the period analysed there were important changes. Thus, the share of subsidies in incomes increased from 10% in 2007 to 40% in 2016, as is shown in the Figure 1.

Figure 1. *Agricultural income (million EUR)*



Source: *Alexandri, C. (Coord.), 2017, ,,Agricultura şi Spaiul Rural – Evaluări la 10 Ani de la Aderare", Ed. Academiei Române, Bucureşti, România*

In conclusion, the accession to the EU brought predictability of the amount of support to agriculture due to the multi-annual financial programming of European funds. Additionally, there has been a national budget contribution of around one

billion euro per year over the entire period, but this has decreased in recent years. Also, public funds for agriculture have increased year by year, to exceed 3 billion euro in the last four years. The public funds for agriculture from European and national funds will continue to increase by the year 2020, to reach 4 billion euro and the cumulated amounts for the period 2014-2020 are 10.85 billion euro for Pillar 1 and 8.12 billion euro for Pillar 2.

National Rural Development Program

The National Rural Development Program (PNDR) has established policies and actions for rural development in the agricultural, forestry and rural development fields, being developed by the MADR through the Rural Development General Directorate. Restructuring of the agri-food sector requires important direct investments to equip agricultural holdings coupled with environmental protection measures and agricultural and forestry land management, as well as the development of the non-agricultural rural economic sector, aimed at facilitating the employment of the labor force made redundant in agriculture, and poverty reduction in rural areas.

In terms of the size of the funds allocated from the EU budget for the period 2007-2013, Romania is ranked 4th in the total EU member states and in terms of the total budgetary sources from the public budget (EU + national budget) Romania is situated on the 6th place, due to the low contribution of the national budget of only 19.53% of the total public funds.

For a more detailed analysis of the implementation of the PNDR 2007-2013 and of the program for the current period (2014-2020), the measures and sub-measures were grouped by types of activities that allow for the systematization of the amounts allocated and used according to the destinations by economic sectors, respectively: I. Agricultural activities; II. Food industry; III. Non-agricultural activities; IV. Rural infrastructure; V. Other activities.

For the 2007-2013 period, the absorption rate, calculated by reporting actual payments to the initial allocations, is only 84.82% (lower than that calculated and reported by the Ministry of Agriculture, i.e. 90.97%).

For a complete analysis of the rural development process, we analyze the financial structure of PNDR 2014-2020 compared to allocations and payments made for

PNDR 2007-2013 (Table 1). This approach allows a clearer identification of the rural development vision, the priorities and the implementation of this program.

Table 1. *Level of public funding allocation (million EUR) by type of activity-comparison of PNDR 2007-2013 and PNDR 2014-2020*

Activity	Initial allocation (IA) 2007-2013	Final allocation (FA) 2007-2013	Difference IA-FA	Allocation 2014-2020*	Difference IA-PNDR 2014-2020
I. Agricultural activities	5.814,7	5.721,1	-93,5	6.107,3	+292,6
II. Food industry	1.071,2	719,9	-351,3	546,1	-525,1
III. Non-agr. activities	927,6	741,3	-186,3	291,1	-636,5
IV. Rural infrastructure	1.546,1	1.596,6	+50,5	1.281,4	-264,7
V. Other activities	611,2	517,6	-93,6	1.105,6	+494,4
Total	9.970,8	9.296,5	-674,3	9.331,5	-639,3
Out of which: -EU Budget -National Budget	8.022,5 1.948,3	8.097,2 1.199,3	+74,7 -749,0	8.015,0 1.316,5	-7,5 -631,8

** Sums broken down by type of activity from 2014-2020 correspond to the original PNDR. For the corrected version of the Commission Delegated Regulation (EU) 2015/791 of 27 April 2015 (EUR 8.128 million), the appropriations recalculated under the sub-measures are not published.*

Source: *Alexandri, C. (Coord.), 2017, „Agricultura* şi *Spaiul Rural – Evaluări la 10 Ani de la Aderare", Ed. Academiei Române, Bucureşti, România*

The data in Table 1 highlights a number of unfavorable aspects due to both the decrease of the total allocation allocated to the PNDR in the new financial year 2014-2020, only EUR 9,331.5 million compared to EUR 9,970.8 million in the previous financial year, mainly from the reduction of the national contribution, from EUR 1,948.3 million in the initial version of PNDR 2007-2013, to 1,316.5 in the provisions of the PNDR 2014-2020, resulting in a decrease of the national contribution by 631.8 million EUR.

A more detailed analysis of the proposed PNDR for the period 2014-2020 highlights other shortcomings in the superficial way of financing the need for knowledge, counseling and research which, although declared as priority, only benefit from less than 2% of the budget. Moreover, the modernization of the agricultural education infrastructure, although mentioned as a priority measure, is not covered by any financial allocation.

Easy access to financial instruments for small processors, small rural entrepreneurs, restructuring and modernization of small farms in market-oriented farms, risk management in agriculture and forestry are also identified but unsolved needs through financial allocations. In practice, the conditionalities required by the program will lead to the exclusion of a significant number of small-scale farms from the possibility of funding, in fact stimulating the concentration of funds allocated to large or very large holdings.

Summarizing the information for the period analysed, we present Table 2.

Table 2. *Evolution of support for agriculture and rural development from national and European funds in the period 2003-2016 (effective payments per calendar years – mil. EUR)*

Element	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pillar 1						474	601	682	805	1021	1305	1390	1072	2184
Pillar 2	5	175	147	184	261	195	432	740	1257	856	1316	1771	1519	927
State Aids	326	555	575	557	1093	1039	975	976	1004	840	948	687	741	489
Total	331	730	722	741	1354	1708	2008	2398	3066	2717	3569	3848	3332	3600

Source: *Alexandri, C. (Coord.), 2017, „Agricultura* şi *Spaiul Rural – Evaluări la 10 Ani de la Aderare", Ed. Academiei Române, Bucureşti, România*

Farm structure

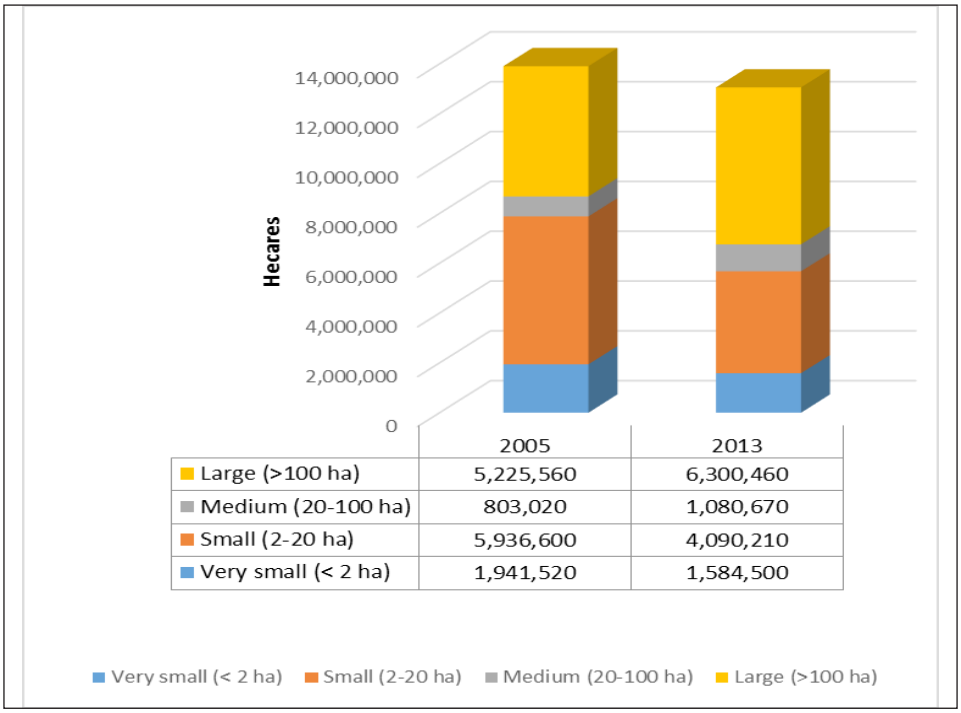
Following the implementation of successive legislative regulations for the return of agricultural land to former owners and their heirs, Romania has become the country of the EU with the largest number of farms. Thus, in 2013, there were about 3.6 million farms owning agricultural land, accounting for 33% of the total farmland in the EU. However, most of these farms are subsistence and semi-subsistence farms, playing an important role in ensuring food security for peasant households, but a minor role in the formation of the food supply that crosses the pipelines, processors and end-users. In the period 2007-2016, there are a few major characteristics of the evolution of the farms that are summarized below:

- The total number of farms decreased between 2005 and 2013, by 15%;
- The land areas operated by the small-sized farms decreased by over 2 mil. ha;
- The areas operated by the large-sized farms increased by over 1 mil. ha;
- The average farm size increased from 3.3 ha (in 2005) to 3.6 ha (in 2013);

- Labour productivity, the net value added per agricultural work unit (AWU) respectively, doubled;
- The areas under cereals and oilseeds increased;
- The share of livestock production in GAO was down from 35% in 2007 to 28% în 2016;

For a better view, we present Figure 2.

Figure 2. *Utilised agricultural area by farm size*



	2005	2013
Large (>100 ha)	5,225,560	6,300,460
Medium (20-100 ha)	803,020	1,080,670
Small (2-20 ha)	5,936,600	4,090,210
Very small (< 2 ha)	1,941,520	1,584,500

Source: *Alexandri, C. (Coord.), 2017, ,,Agricultura şi Spaiul Rural – Evaluări la 10 Ani de la Aderare'', Ed. Academiei Române, Bucureşti, România*

In conclusion, in the last 10 years, there has been a tendency to decrease the number of farms and to concentrate the land on medium and large farms, in various ways, mainly by leasing, but also by selling/buying. The concentration of land has led to an increase in the number of large and very large farms and partly to the number of medium farms. The areas used by large and medium farms also increased, and the areas used by small farms have decreased. Between 2005 and 2013, the total number of farms decreased by 15% and the average size of the farm increased.

Land market

The evolution of the Romanian land market was the result of the gradual liberalization of the legal movement of agricultural land, starting from the very rigid provisions of the Land Fund Law 18/1991, relaxed by the Law on the Legal Movement of Agricultural Land 54/1998 and liberalized almost completely by the provisions of Title X of Law 247/2005 on the reform of property and justice, as well as some accompanying measures; on the expiry of the transitional restriction, Law 17/2014 on some measures regulating the sale - purchase of agricultural land located on the outskirts of the country brought some corrections to the mechanism of land acquisition without affecting the free functioning of the land market.

The evolution of the land market has the next characteristics:

- The agricultural land sale-purchase was possible after Law 54 of 1998 was adopted;
- In the year 2005 certain corrections were made that simplified the legislation on land transactions. The Life Annuity Scheme was also introduced, a system that stimulates agricultural land concentration through elderly owners' land lease or sale;
- After accession, land market became much more active, both as regards the number of transactions and the prices. The corrections made in 2014 to the land procurement mechanism did not affect the free operation of the market;
- The agricultural land prices began to increase even since the pre-accession period. (e.g. 247 EUR/ha in 2004, 884 EUR/ha in 2005). Price increase continued from year to year, so that in the year 2015 there were many situations when prices exceeded 5000 EUR/ha;
- The foreign farmers could organize farms in Romania, both before the accession (2005) and after the accession, mainly under the form of commercial companies with foreign capital. In 2011 there were about 700000 ha that belonged to the firms with Italian, German, Arab, Hungarian, Spanish, Danish and Austrian capital.

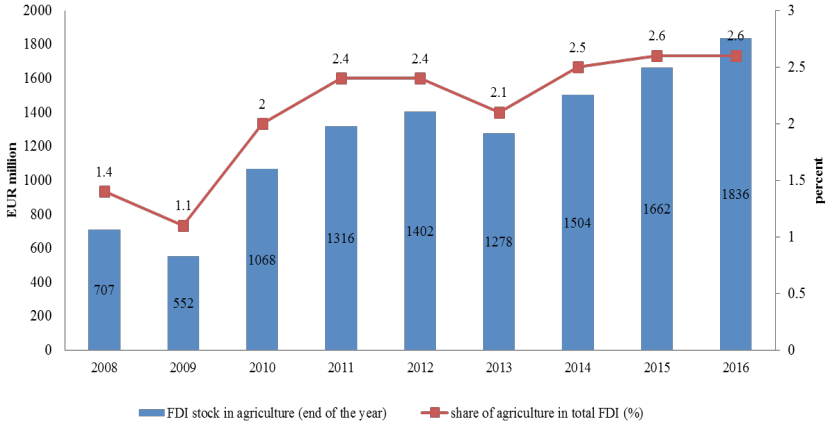
The conclusion is that the land market in Romania is a functional market.

Foreign direct investments

A 2009 report by a large commercial bank in Romania (BCR) estimated that "Romanian agriculture could become a priority for foreign investors" (Dobre, T, 2009), its strength being the low prices of agricultural land and extensive arable land with quality soil. The press reports on the agricultural land market have highlighted in the post-accession period the orientation of real estate agencies to agricultural land business, as well as the acquisition of such land by large agri-food companies and even by investment funds.

The official foreign direct investment (FDI) survey conducted annually by the INS in cooperation with the National Bank of Romania (BNR) shows that the FDI balance in agriculture, forestry and fisheries on December 31, 2008 was EUR 707 million, or 1.4% of total FDI of the Romanian economy. By 2014, this balance had doubled (Figure 3), reaching € 1836 million at the end of 2016, which represented 2.6% of total FDI in Romania.

Figure 3. *Foreign direct investments in Romania*



Source: *Alexandri, C. (Coord.), 2017, ,,Agricultura şi Spaiul Rural – Evaluări la 10 Ani de la Aderare", Ed. Academiei Române, Bucureşti, România*

Agricultural markets

At the level of agricultural markets, the effects of joining the Single Market were not at the level of expectations. There were a few reasons why this happened, like:

- Low competitiveness of most agricultural products;
- Production instability and low yields;
- Poor organization of agri-food chains;
- Large scale of subsistence economy;
- Gaps between the direct payments received by the Romanian farmers and the other countries in the region.

For instance, if we analyse the main market, the conclusions are:

- CEREALS, evaluated with (+) – evolution because, yields increased, they are grown on large-sized farms and the prices are competitive;
- OILSEEDS, evaluated with (+) – evolution because, yields increased, they are grown on large-sized farms, they are exported, surplus in the balance of trade; RO ranked 3rd in EU-28, in 2016;
- VEGETABLES, evaluated with (-) evolution because, the chain is poorly organized (1% of farmers got organized), variability of weather factors, diminution of areas under greenhouses; Negative balance of trade, low absorption level of PNDR funds;
- FRUIT, evaluated with (-) evolution because, decline of land areas under orchards, old-aged plantations, low yields, non-competitive prices; PNDR measures were mainly focused on marketing;
- VINEYARDS, evaluated with (+) evolution because, funding the restructuring/reconversion and establishment of new plantations through the national support program 2009-2013, also with PNDR funds;
- BEEF, evaluated with (-) evolution because, cattle herds and meat production significantly diminished; A positive element is represented by the beginning of the consolidation process of herds on large-sized farms and the increase in number of specialized slaughterhouses;
- MILK, evaluated with (-) evolution because, dairy cow herds diminished, production decreased, the chain continues to remain unorganized (only 19-22% of milk is collected);
- PORK, evaluated with (-) evolution because, diminution of herds and production, decrease of farm profitability due to the increase of feed prices, Romania became a net importer;
- POULTRY, evaluated with (+) evolution because, increase in importance of large scale farms integrated with slaughterhouses, competitive prices, poultry meat production increase; One problem is consumers' preference for cheap, low quality products, which are imported;
- SHEEP and GOATS, evaluated with (+) evolution because, this sector experienced an important revigoration, sheep and goat herds significantly increased, due to financial support from national and European funds and mainly to foreign demand increase; Sheep are exported as live animals to Middle East and North Africa.

Foreign trade

Extensions from 2004, 2007 and 2013 have had a significant impact on the EU's agri-food trade. Value of trade has grown in real terms, making it still a place among the top players in world agri-food market. The New Member States have contributed positively by increasing the volume of traded goods but also in negative by adding the negative balance of their extra-Community balances to the already negative balance of the Old Member States.

At the time of its accession to the EU, Romania presented itself with a non-competitive agri-food sector, and hence non-competitive international trade compared to other EU Member States, whether old (EU-15) or new (EU-13).

Romania's accession to the EU initially had, in the first years after accession, a negative effect on the trade balance, meaning that imports from the Community space grew more than exports, so that the balance of agricultural trade balance increased its deficit. In the coming years, however, adherence favored commodity trade in the sector under consideration, exports increased, and the agricultural trade balance (with all the countries of the world) became positive. Vegetable products and especially grains are the ones that have contributed to balancing the trade balance and then transforming the trade deficit into surplus. 2013 is the first year after accession when the trade balance (with all countries of the world) becomes positive (Table 3). For comparison, we specify that the trade balance with the EU countries was permanently negative during the analyzed period.

Table 3. *Agri-food balance of trade (mil. EUR)*

Specification	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total products, group I-IV	-2217	-2181	-1580	-813	-423	-746	334	453	-89	-557

Source: *Voicilaş, Gavrilescu, 2017, Un deceniu de transformări* în *economia agroalimentară a României sub impactul aderării la Uniunea Europeană, in "Economic growth in conditions of globalization", Ed. INCE, Academia de* tiine *a Moldovei, Chişinău, Rep.Moldova*

Unfortunately, in the last two years of the analyzed period, the trade balance has again become negative, especially as a result of the increase of the deficit with the EU member countries, the causes of this evolution being the lack of competitiveness of the indigenous products compared to the EU ones and the heavier adaptation of the Romanian producers to the new directions of the CAP. We can also add the embargo on Russia, which has boosted EU exports to other countries, including Romania, or weaker agricultural years for some of the main crops. Another problem of Romania's foreign trade with agro-food products remains the specificity of the products sold, in that it exports mainly unprocessed agricultural products with low added value and imports of animal products with high degree of processing and added value. In many of the analyzed years, trade in agri-food products accounted for about 10% of Romania's total foreign trade. In conclusion, in the post-accession period, the deficit of the agricultural trade balance significantly decreased. At the moment of accession, the deficit value exceeded 2 billion EUR. In 10 years, the value of exports increased 7.2 times, while the imports 2.8 times. As a result, the deficit diminished and even a slight surplus existed in the years 2013-2014.

Conclusions

Romania's accession to the EU has been one of the greatest achievements of the last 30 years. The effects of accession are generally positive, and issues still presenting deficiencies can be corrected by specific Community mechanisms. The most important conclusions of this study are summarized below.

Romania's accession to the EU implied, among other things, the commitment to implement development policies designed and designed by European decision-making bodies: the CAP is one of them. Romania was one of the main beneficiaries of the Pillar II of the CAP, with € 8.4 billion allocated for the period 2007-2013 (fourth place after Poland, Germany and Italy) and € 8.1 billion allocated for 2014-2020 (6th place after France, Italy, Germany, Poland and Spain). Addition also brought predictability of the amount of support for agriculture due to the multiannual financial programming of European funds. The implementation of the CAP, and in particular the measures in Pillar 1, had the effect of increasing farm incomes, but at the same time it produced mutations in the structures and productive orientation of farms.

Agricultural structures have been heavily influenced by the CAP. Thus, in the post-accession period, the Romanian land market has become a functioning market as a result of the gradual liberalization of the transition period, which culminated in the 2005 provisions on the legal movement of agricultural land, also agreed with the accession treaty to the EU. The structure and size of farms have been heavily influenced by the combination of land, the decrease in the number of small subsistence and semi-subsistence farms and the increase in the number of medium and large farms. The structure of farm production has also changed and specialized or integrated farms have emerged. At the level of agricultural markets, the effects of joining the European single market were not at the level of expectations, with the most important causes being the low competitiveness of most agricultural products, the instability of production, low yields, the large scale of the subsistence economy, and, last but not least, between the levels of direct payments received by Romanian farms and the other countries in the region.

At the time of accession to the EU, the agri-food sector of Romania was uncompetitive, reflecting an imbalanced structure of international trade with this product category: the export value represented only 35% of the value of imports, resulting in a trade deficit of 2.2 billion EUR. Pre- and post-accession development programs and investments with Romanian and foreign capital have allowed for significant increases in the volume, efficiency and quality of agricultural and food products, to which free access has been added to the Single Market; As a result, in the 10 years since accession, the value of exports increased 7.2 times. The slower increase in imports (only 2.8 times) has led to a massive reduction of the agri-food trade deficit and even a surplus (2013-2014).

There are still gaps in some areas of activity, both vis-à-vis the old Member States and the New Member States. The existing CAP, which is underway by 2020 and beyond, is subject to a gap recovery, provided that the positive trends recorded in recent years are maintained, that shortcomings are quickly rectified and that no external disturbing factors to stop the process of EU integration.

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MEASURING ECONOMIC SUSTAINABILITY: THE CASE OF DANUBE REGION[1]

Danijela Durkalić[2], Mihailo Ćurčić[3]

Abstract

The goal of economic development is that the economy with its ability to attain the highest level of productivity and meet the unceasing needs of its nation. Thanks to technical and technological achievements, it is evident that economic development continues. However, the whole process of development requires the spending of resources that are limited. The basic assumption of this paper is that the assessment of economic sustainability requires the use of multidimensional factors. The subject of work is measuring the convergence of the Danube region in the context of the economic sustainability dimension. By using the entropy method, a comparative regional analysis of 9 European Union countries (Austria, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Romania, Slovakia and Slovenia) will be carried out, 3 accession countries (Bosnia and Herzegovina, Montenegro and Serbia) and 2 neighbour countries (Moldova and Ukraine). The results of the analysis of 14 countries will point to the persistence of large differences in the economic viability of the measured GDP per capita and lower discrepancies in the HDI index and domestic investments.

Key words: *economic sustainability indicators, convergence, entropy, Danube region.*

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2 Danijela Durkalić, Teaching assistant, Faculty of Hotel Management and Tourism, University of Kragujevac, Serbia, Vojvođanska street no. 5a, 36210 Vrnjačka Banja, Phone: +381 64 580 65 99, E-mail: durkalicdanijela@gmail.com

3 Mihailo Ćurčić, Teaching assistant, Military Academy, Public Finance Department, University of Defence, Pavla Jurišića Šturma street no. 33, 11000 Belgrade, Phone: +381 65 400 90 49, E-mail: curcicmihailo@gmail.com

Introduction

It is well known that the economic system cannot function isolated from a social, political, ecological and institutional system. The economic system is multidimensional system as a part of the social system that with its various instruments influences the realization of complex development goals.

The process of globalization has had a major impact on the ecological environment, as illustrated by the discrepancy between the underdeveloped and developed countries, especially those industrialized and non-industrialized. Therefore, there are differences between countries, not only in the number of population and the size of income, but also in the impact on the ecological environment and the exploitation of natural resources.

The subject of this paper is the economic sustainability of the Danube Region. The Danube region, which contributes $ 5104491 million to the GDP, represents a significant region of the European continent (UNCTADstat, 2018). According to UNCTAD statistics, the Danube Region achieved GDP in the value of 6% of the world GDP, 30% of GDP of the European Union and 25% of the GDP of the entire European continent in 2017. Also, in 2017, the Danube Region participated in international commodity exchange with 13% of world exports, 38% of EU exports and 33% of exports to the European continent.

Economic sustainability: Literature review

Considering that most of the environmental problems are regional or global, it is required to join actions of all interested countries in order to preserve the concept of sustainability (Voza et al., 2016). The question of measuring economic sustainability is considered a complex issue and it can be pointed out that there is no specific economic doctrine that gives unique indicators of economic sustainability. Answers to questions about whether an economy is close to a sustainable economy or away from it cannot be viewed using only one indicator (Munda, 2005). Often it is more of an indicator or group of indicators. One of the comprehensive indicators of economic sustainability is the Index of Sustainable Economic Welfare (ISEW) which takes into account GDP, unpaid household labour, social costs, environmental damage and income distribution (Stockhammer et al., 1997). For example, the authors Van den Bergh and Verbruggen (1999) argue that trade can positively or negatively affect ecological sustainability. In order to arrive at adequate measures of economic sustainability, following are the indicators used by various authors.

Table 1. *Overview of various indicators of economic sustainability*

Author(s)	Used indicators
United nations (2001)	• Gross Domestic Product Per Capita • Investment Share in Gross Domestic Product • Balance of Trade in Goods and Services • Debt to Gross National Product Ratio • Total Official Development Assistance Given or Received as a Percentage of • Gross National Product • Intensity of Material Use • Annual Energy Consumption Per Capita • Share of Consumption of Renewable Energy Resources • Energy Use Per Unit of GDP (Energy Intensity) • Intensity of Energy Use: Commercial/Service Sector • Intensity of Energy Use: Manufacturing • Intensity of Energy Use: Residential Sector • Intensity of Energy Use: Transportation • Generation of Industrial and Municipal Solid Waste • Generation of Hazardous Wastes • Generation of Radioactive Wastes • Waste Recycling and Reuse • Distance Travelled per Capita by Mode of Transport
Munda, G. (2005)	• Houses owned (%) • Residential density pers/hectare • Use of private car (%) • Mean travel time to work (minutes) • Solid waste generated per capita (t./year) • City product per person (US$/year) • Income disparity • Households below poverty line • Crime rate per 1000
Spangenberg, J. H. (2005)	macroeconomics: • innovativeness • competitiveness • public debt traditional: • aggregate demand, • consumption levels • savings rate
Rutkauskas, A. V. (2008)	• environment adequacy • technological and organisational perfection • utility and efficiency of the international relations
Estoque, R. C., & Murayama, Y. (2014)	• Human development index–income index • City internal revenue allotment • Tourist arrivals • Incidence of poor families

Author(s)	Used indicators
Mihai, I. (2015)	• GDP • GNI • GDP per capita • GINI index • HDI index • Labour productivity
Szopik-Depczyńska, K., Kędzierska-Szczepaniak, A., Szczepaniak, K., Cheba, K., Gajda, W., & Ioppolo, G. (2018)	in the area of Gross domestic Expenditure on R&D by sector: • total intramural R&D expenditure (GERD) by business enterprise sector (Euro per inhabitant), • total intramural R&D expenditure (GERD) by government sector (Euro per inhabitant), • total intramural R&D expenditure (GERD) by higher education sector (Euro per inhabitant), in the area of employment in high- and medium-high technology manufacturing sectors and knowledge-intensive service sectors: • employment in high- and medium-high technology manufacturing sectors (% of total employment), • employment in knowledge- • intensive service sectors (% of total employment), • patent applications to the European Patent Office (per million inhabitants)

Based on the presented indicators used in different studies, it can be concluded that used indicators of economic sustainability are different. A set of indicators is used, depending on the object and subject of the research, as well as the results of previous studies. The results of the authors Estoque and Murayama (2014) show that there is a high divergence between socio-economic growth and environmental sustainability. Investigating the city's case on the Philippine Baguio City, suggests that the ecological component did not get the attention it deserved. The conclusion of this authors points to the need to promote sustainable economic development with an acceptable standard of living and to ensure the availability of natural resources, not only in the present, but also for future generations.

A significant contribution to the theoretical analysis of economic sustainability was given by Spangenberg (2005), who divided the economic sustainability indicators into two groups: (1) macroeconomic (innovativeness, competitiveness and public debt) and (2) traditional (aggregate demand, consumption levels and savings rate).

The author Ratkauskas (2008) pointed out that great efforts are often needed in defining adequate sustainability indicators, and those they are often based on subjective assessments by experts. According to him, in order for the country to

be a competitor and economically viable it is necessary to take into account three attributes: environmental adequacy, technological and organizational perfection and utility and efficiency of international relations. In addition, this author pointed out that the competitiveness of one country depends on its ability to market participants efficiently using available resources in the market, as well as the ability to use innovations and positively change the environment in the context of sustainable development.

A significant contribution to economic sustainability is also shown by the work of the author Agovino et al. (2018), which enables the ranking of EU countries towards three pillars of sustainability: ecological, economic and social. These authors also emphasize the importance of climate change in agricultural production as a significant factor in the sustainable economy. The conclusion of these authors that relates to economic sustainability refers to the necessity of incentives in agricultural production. Development policies must focus on the sustainability of agricultural production, which will affect the preservation of the environment and increase productivity.

According to Ćurčić et al. (2015), there are frequent interpretations of economists that modern economy and economy are not based on primary activities, such as agriculture, but it should be industry and service activities. However, since the countries of the region, including Serbia, have an extraordinary capacity of arable land (on average above other European countries), this comparative advantage should also be used.

The productivity of an economy in the context of economic sustainability was analysed by author Mihai (2015). Analysing the Danube countries came to the conclusion that economic productivity creates economic effects, but hides social. The author analysed several indicators of economic sustainability in 2007: GDP, GNI, GDP per capita, GINI index, HDI index and labour productivity. The results show that the level of productivity would be considerably lower if economic activity would be linked to social implications.

Methodology and data

Bearing in mind that convergence can be observed within one country and within a group of countries or regions (such as the Danube Region), an entropy method can serve as a good model for measuring the convergence of economic sustainability.

The process of economic convergence or divergence can be analysed by comparing entropy with other stochastic indicators of concentration like distribution of inequality (Olimpia, 2015). The term entropy is used to define the level of order or disorder of the economic system. The concept of entropy has been presented by German physicist Clausius in the mid-nineteenth century. There are different definitions of entropy, but it can be generally defined as a measure of chaos or disorder of a system (Downarowicz, Frej, 2001). This concept is closely related to the laws of thermodynamics since entropy was first applied in thermodynamics, and then Shannon introduced it into the information theory (Shannon, 1984).

By analogy with economics and thermodynamics, an economic behaviour and the failures in the past are partly attributed to the failure to recognize the entropy factors which must be controlled in order to bring economic changes into balance, just like in thermodynamics. It is especially emphasized that entropy is applicable in macroeconomics where the macroeconomic system does not provide answers to existing theories and measures, but simply reacts in the direction of increasing entropy just like the thermodynamic system reacts to increasing entropy since it is being limited by conservation of mass, energy, etc. In physics, thermodynamic entropy of macrostate (defined by the determination of pressure, volume, energy, etc.) is essentially the logarithm of the number of microstates (quantum states) which macrostate consists of. Likewise, "economic entropy" can be expressed as a function (Jaynes, 1991):

$$S(X, Y, Z...)=\log W(X, Y, Z...)$$

The function consists of certain macroeconomic variables (X, Y, Z) which is defined in the theory, while W is a factor of multiplication of a macroeconomic state consisting of a larger number of microeconomic variables.

Entropy is a measure of the system disorder, where its higher value implies a higher degree of disorder. It is used in numerous scientific fields such as ecology, engineering, medicine, economics, finance, and the like (Chuansheng et al., 2012; Ermatita et al., 2012; Li et al., 2001; Guo, 2001). In the case of a convergence analysis, the increase in system disorder is defined as the process of divergence (Simionescu, 2014).

Measuring the convergence of economic sustainability of the Danube region by the entropy method will be used analogically to Czyz and Hauke (2015)

analysis of the differences in development of regions in Poland. The information obtained from certain events is determined by the monotonically decreasing function with probability *p* which is displayed in the form *log 1 / p = -log p*, which is also treated as a measure of uncertainty of the occurrence of events. For a series of events x_i and with probabilities p_i, *i=1, 2....n* follows (Czyz, Hauke, 2015):

$$0 \leq p(x_i) \leq 1, \sum_{i=1}^{n} p(x_i) = 1,$$

The measure of entropy H (x), defined by Shannon (1948), is the expected value, which can be presented as:

$$H(x) = -\sum_{i=1}^{n} p(x_i) \log p(x_i)$$

or

$$H(x) = \sum_{i=1}^{n} p(x_i) \log_2 \frac{1}{p(x_i)}$$

The use of the logarithm function with the base 2 implies the measurement of information in bits.

The basis of Shannon function has the following characteristics:

1. H (x) ≥ 0, it is a non-negative value,
2. H (x) assumes the value of 0 when p (x_i) = 1 for a specified i, which means the absence of uncertainty among indicators,
3. H (x) assumes the highest value equal to $\log_2 n$ when all values of p (x_i) are equal for i = 1, 2, ..., n. The maximum value H (x) implies a complete disparity or uniform distribution. The entropy statistics H (x) applied in this paper relate to the measure of uniform distribution which gives the basis for creating an inequality measure I (x), or in the case of convergence, the measure of differences among countries. This inequality measure is useful in the study of spatial differences among countries or regions. It can be represented by the equation:

$$I(x) = H(x)_{max} - H(x) = \log_2 n - \sum_{i=1}^{n} p(x_i) \log_2 \frac{1}{p(x_i)}$$

$$= \sum_{i=1}^{n} p(x_i) \log_2 [n\, p(x_i)\,]$$

for $0 \leq I(x) \leq \log_2 n$

where I (x) = 0 shows the absence of inequality (or equal distribution), while I (x) = log $_2$ n denotes maximum non-uniformity in the occurrence of event x.

For the analysis of real convergence in the countries of the Danube Region, data were used: (1) GDP per capita, (2) Domestic capital investments% GDP and (3) HDI index. All data are collected from the official World Bank statistics for the period 2005-2017.

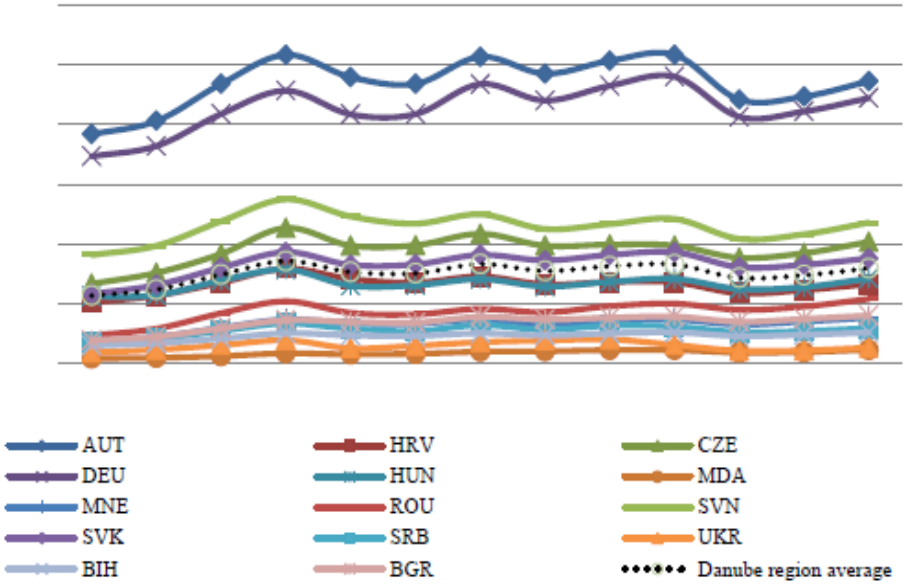
Results and discussion

GDP per capita

The economic development of a country is primarily measured by its ability to produce goods and services in a single period of time, most often one year. However, the question arises of the use of adequate resources by the domicile population of a country. The relevant indicator in the economy used for this purpose is GDP per capita.

Economic productivity as a measure of the efficiency of an economy shown GDP per capita (current US $) indicates that Austria has the highest level of GDP per capita within the Danube Region group. Also, Germany is at the very top of economic productivity. Above the average level of the whole group there are still Slovenia, Slovakia and the Czech Republic. Moldova has the lowest level of productivity within the observed group.

Figure 1. *GDP per capita in Danube region from 2005-2017*



Source: *Authors calculation based on WB data and UN*

By calculating entropy it is possible to determine the (non) existence of convergence in economic sustainability in the countries of the Danube region. In this sense, the entropy for GDP per capita was first calculated in the period 2005-2017, and the results are shown in Table 2.

Table 2. *Mean and entropy of GDP per capita (current US $) in the countries of the Danube Region in the period 2005-2017*

Year	Mean	Standard Deviation	Entropy
2005	11363,6954	11835,2458	0,6270
2006	12391,1114	12376,0629	0,5818
2007	14901,5746	14075,2427	0,5282
2008	17163,5523	15346,4428	0,4814
2009	15324,0348	14208,3562	0,5104
2010	15107,5099	13977,2939	0,5052
2011	16647,5805	15369,1205	0,4971
2012	15508,5325	14451,5020	0,4982
2013	16296,1820	15077,1553	0,4885
2014	16580,5819	15538,0105	0,5039

Year	Mean	Standard Deviation	Entropy
2015	14339,9212	13345,1454	0,5047
2016	14793,5765	13521,5925	0,4905
2017	15955,4162	14209,4059	0,4690

Source: *Authors calculation*

Based on the data in Table 2, it can be concluded that the inequality in GDP per capita is significant among the observed group of countries. However, what is important to point out is that this difference has been decreasing over the years. Austria and Germany share the same GDP per capita as the sum of all the other 12 countries together. The differences between the countries observed decreased until the last financial crisis, then they increased in the following years (2009) and are still decreasing. However, observing the Danube Region, they are still large. For example, Germany has 10 times higher GDP per capita than Serbia, and Austria 8 times higher GDP per capita than Bosnia and Herzegovina.

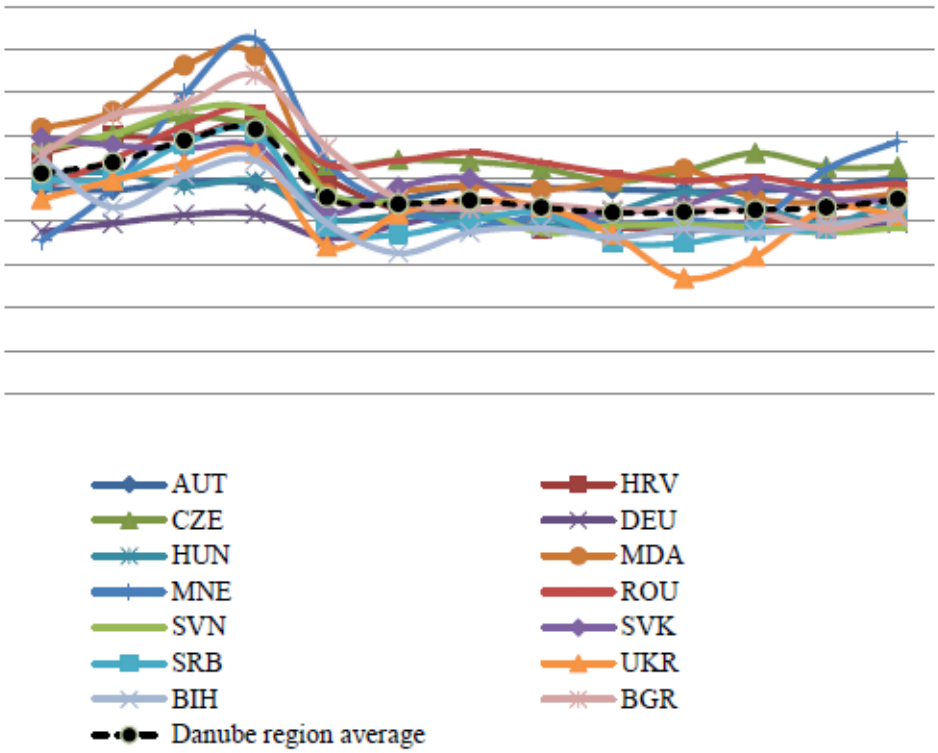
Investment Share in Gross Domestic Product

Representing the thesis that the growth is better financed from domestic investments, the indicator of the convergence of economic sustainability in this paper uses the inflow of domestic investments (Gross Fixed Capital Formation% GDP), which is most frequently present in the literature as a measure of economic sustainability (Mihai, 2015). It is necessary to pay attention to this indicator as domestic investments represent the level of exploitation of the capital of one country.

Domestic investments (% GDP) in the Danube region had a generally similar trend in average value. This indicator grew sharply from 2005-2008, and after that, it declined in all countries. In 2017, Montenegro had the highest growth in domestic investment (% GDP) (29.3% GDP), while Slovenia had the smallest in 2016 and 2017 (18.7% GDP and 19.28% GDP, respectively).

Just like the absolute values, and the average values of this indicator in the Danube region grew by 2008, in order to shrink every year. It is not until 2017 that this indicator has recorded an increase of 22.57% of GDP within the group of countries. The inequality between the countries of the Danube region had double growth, with divergence occurring in 2008, after which the differences were reduced and 2014 again enters the growth of entropy and the occurrence of divergence in this indicator.

Figure 2. *Gross Fixed Capital Formation (%GDP) in Danube region from 2005-2017*



Source: *Authors calculation based on WB data and UN*

Table 3. *Mean and entropy of Gross Fixed Capital Formation (%GDP) in Danube region from 2005-2017*

Year	Mean	Standard Deviation	Entropy
2005	25,5785	3,9407	0,0166
2006	26,8265	3,9632	0,0148
2007	29,3843	4,7604	0,0178
2008	30,6952	5,7477	0,0235
2009	22,7681	3,6103	0,0169
2010	22,0189	2,9462	0,0120
2011	22,4437	2,8143	0,0103
2012	21,6233	2,6307	0,0097
2013	21,0151	2,6313	0,0103

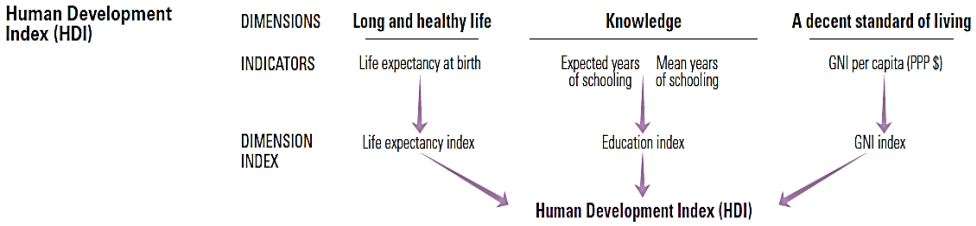
Year	Mean	Standard Deviation	Entropy
2014	21,0760	3,4971	0,0191
2015	21,3336	3,1416	0,0144
2016	21,6135	2,6595	0,0099
2017	22,5749	2,8507	0,0103

Source: *Authors calculation*

Human development index

The next indicator that we include in the economic sustainability analysis is the human development index. This index is very important because it incorporates into the economic analysis of several dimensions: long and healthy life, access to education and a steady income. The objective of using this indicator lies precisely in its methodology, which, in addition to economic growth, includes human development and its capabilities as an assessment of the development of a country.

Figure 3. *Content of the HDI index*



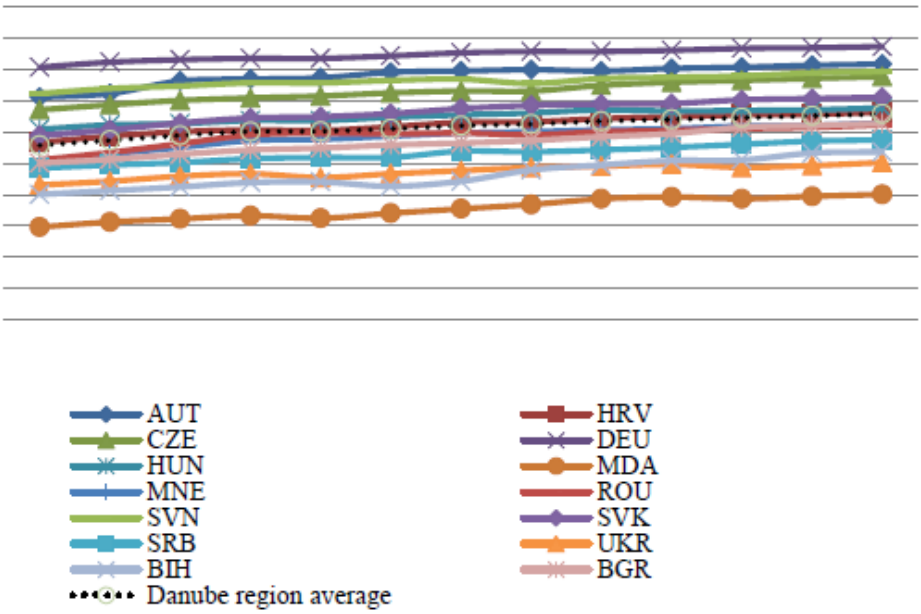
Source: *Human development data: http://hdr.undp.org/en/content/human-development-index-hdi, (6th September, 2018)*

Figure 4 shows the human development index in the countries of the Danube Region in the period 2005-2017. It is evident that the level of this index has recorded growth in all countries of the observed region. Nevertheless, the level of human development throughout the period is the lowest in Moldova, and the highest in Germany.

In order to determine (non) equality in measured human development, in the continuation of the work, in Table 4 will be shown the average values, standard deviation and entropy for the HDI index in the Danube region.

In Table 4 it can be noted that the arithmetic mean of the observed indicator grew up to the financial crisis, ie in 2008. This mild growth continues to this day. When it comes to inequality among regions, it has been decreasing until 2008, then it grows slightly until 2010 and until the end of 2017 it has recorded a slight decline.

Figure 4. *HDI in Danube region from 2005-2017*



Source: *Authors calculation based on WB data and UN*

Table 4. *Mean and entropy of HDI index in Danube region from 2005-2017*

Year	Mean	Standard Deviation	Entropy
2005	0,7784	0,0695	0,0054
2006	0,7863	0,0697	0,0053
2007	0,7942	0,0703	0,0053
2008	0,8002	0,0693	0,0051
2009	0,8007	0,0705	0,0052
2010	0,8046	0,0715	0,0053
2011	0,8096	0,0702	0,0051
2012	0,8123	0,0673	0,0046
2013	0,8168	0,0658	0,0044
2014	0,8197	0,0653	0,0043
2015	0,8222	0,0667	0,0044

Year	Mean	Standard Deviation	Entropy
2016	0,8254	0,0657	0,0043
2017	0,8283	0,0653	0,0042

Source: *Authors calculation*

Conclusion

Based on theoretical and empirical analysis, it is possible to make several conclusions. The first suggests that there is no single measure and one single indicator of the economic viability of any country or region. Economic sustainability must be seen in line with the connection with other dimensions of sustainability, ecological and social. The economic recovery of the Eurozone and the EU continues at a moderate pace, supported by favourable circumstances, including the quantitative easing by the European Central Bank. On the other hand, they are adversely affected by external factors, primarily the slowdown in world trade (Ćurčić, 2016).

Although there has been significant improvement in the convergence of economic sustainability of the countries of the Danube Region, there is still a long way to go. All the effects of this area in the domain of ecological and economic sustainability should be considered and used. It is similar with the countries of the European Union. The differences have been reduced, to a lesser or larger extent, but are still present (Fedajev et al., 2017).

Based on the analysed data, the following conclusions can be made:

- GDP per capita: The biggest discrepancies among countries are found in this indicator, because they are the largest differences in the size of the economy and the allocation of income to the population. When it comes to convergence, it can be emphasized that it is aiming for balanced growth and development. However, throughout the observed period of 13 years, entropy is above 0.5 in 7 out of 13 years, indicating a divergence in this indicator. Over the past years, divergent values have been significantly reduced.
- Domestic investments: show inequality both in absolute and relative indicators. In the countries of the Danube region, domestic investments, observed as% GDP, had a double fall and double growth, which led to a rise in divergence in this indicator in 2008 and 2014. The lowest entropy was achieved in 2012, so it can be said that this year there was a convergence in this indicator among the countries observed.

- Human development index: The trend of the HDI index in the Danube region is similar for all 13 years of observation, which speaks of the fairly uniform average movement of the index. It is similar with inequality measures: divergence was noticed at the beginning of the observed period, but at the end of the observed period (2017), the convergence of the countries of the Danube Region when it comes to the HDI index can be talked about.

We can agree with author Ikerd (2012) that economy is a part of nature and society, or part of a living system, or with Ilić et al. (2017) that the focus should been on raising the awareness of policy makers of the need to accelerate and enhance the use of environmentally sustainable practices. In this regard, economic development must be forecasted for organized and sustainable system-related organisms that survive in the living system.

For future research, we propose the expansion of indicator analysis in order to obtain a general picture of the economic sustainability of the countries of the region, through the analysis of several databases, such as the World Bank, the Global Footprint Network, Eurostat. Also, for future research, the question of social behaviour in the productivity of an economy may arise, or is there a concrete mathematical formula that will measure sustainable production or still prevails as an individual or group?

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Appendix 1. Abbreviations

Austria	AUT
Croatia	HRV
Czech Republic	CZE
Germany	DEU
Hungary	HUN
Moldova	MDA
Montenegro	MNE
Romania	ROU
Slovenia	SVN
Slovak Republic	SVK
Serbia	SRB
Ukraine	UKR
Bosnia and Herzegovina	BIH
Bulgaria	BGR

RANKING COUNTRIES OF DANUBE REGION BY DEVELOPMENT PERFORMANCES OF AGRICULTURE

Danilo Đokić[1], Žana Kleut[2]

Abstract

Danube represents linkage between Western, Central and Eastern Europe. Countries of Danube region had very different stages of economic development in the last 50 years. Also, performances of their agricultural sector are very different. Aim of this paper is to rank Danube region countries by their development performances of agriculture. Additionally, environmental performances of agriculture are analyzed. The development performances of agriculture are considered according to the production and export performances of this sector. The level of the partial agricultural productivities - labor and land, as well as the value of exports in relation to engaged labor and agricultural land, are analyzed in such a context. Environmental performances are analyzed by EPI (Environmental Performances Index). The empirical research was based on the data of the Food and Agriculture Organization (FAO) and World Bank.

Key words: *Development performances, Environmental Performances Index, agriculture, Danube Region.*

Introduction

The area covered by the EU Strategy for the Danube Region stretches from the Black Forest (Germany) to the Black Sea (Romania-Ukraine-Moldova) and is home to 115 million inhabitants (Danube Region strategy, 2018). This region consists of 14 countries. Nine of them are EU members: Germany, Austria, Slovakia, Czech, Hungary, Bulgaria, Romania, Croatia and Slovenia, while Bosnia and Herzegovina, Montenegro and Serbia are accession countries. Moldova and Ukraine are not in process of EU integration and they can be classified as neigh-

1 Danilo Đokić, Assistant, Faculty of Economics in Subotica, Department of Agrarian Economics and Agribusiness, Segedinski put no. 9-11, 24000 Subotica, Serbia, Phone: +381 24 62 8049, E-mail: danilo.djokic@ef.uns.ac.rs

2 Žana Kleut, Assistant, Faculty of Economics in Subotica, Department of Agrarian Economics and Agribusiness, Segedinski put no. 9-11, 24000 Subotica, Serbia, Phone: +381 24 62 80 46, E-mail: zana.kleut@ef.uns.ac.rs

borhood countries (Table 1). Danube represents linkage between Western, Central and Eastern Europe. These regions had very different stages of economic development during 20th century. The most of Central and Eastern European countries were centrally-planned socialist economies. Such historical circumstances had a major impact on the production performances of agriculture in these countries (Gajic et al., 2015).

The changes in Danube Region countries have been significantly influenced by the European integration process, since it creates a wide variety of options, such as the improvement of the socio-economic development, increase of competitiveness, adequate environmental management, efficient use of resources, as well as the ongoing modernization of the security and transport corridors (Gajić et al., 2011). Countries preparing for the membership in the European Union must follow European model of rural development which promote multifunctional agriculture and the integral rural development concept with more respect to environmental protection (Lovre et al., 2010).

Table 1. *Danube region countries in process of EU integration*

Country	Status	Year	Open negotiations
FYR Macedonia	Candidate country	2005	No
Montenegro	Candidate country	2010	Yes
Serbia	Candidate country	2012	Yes
B&H	Potential candidate	-	No
Ukraine	-	-	-
Moldova	-	-	-

Source: *European Commission, 2018 (ec.europa.eu).*

The aim of this paper is to rank Danube region countries by development performances of agriculture. Development performances are observed according to production performances and export performances. Additionally**,** environmental performance of agriculture will be analyzed by environmental performance index (EPI) due to increasing importance of environmental issues.

Material and methods

It is very difficult to define development performances of the agricultural sector precisely and comprehensively. A huge variety of indicators is considered by many authors in order to explain this term. Some studies use partial labor productivity, capital productivity and land productivity (Van Passel et al., 2007). In their study of the agriculture sector of the Western Balkans, Nikolic et al. (2017) used share of agriculture in total employment, net production index, balance of agriculture product trade, agricultural gross value added as variables that describe importance of agricultural sector. In order to evaluate position of Slovakian agriculture in European Union, Szabo and Grznar (2015) used the following indicators: agricultural production, intermediate consumption, fixed assets, labor force, levels of livestock and supports/subsidies for the rendition of the level of inputs. Zekić et al. (2009) used net production of agriculture, labor and land productivity in order to analyze production performances of agriculture of Western Balkan countries.

Usually, unavailability of some data for all observed countries has influence on the selection of variables. Development performances of agriculture are described by variables given in Table 2. Variables Y1 and Y2 are indicators of production performances, while other variables are indicators of export performances. Partial labour and land productivities are connected via the factor land/labour ratio, which can be expressed through the relation: (P/L)=(A/L)*(P/A), where P, L and A are the production, labour and land, respectively (Gajic et al., 2015). According to European Commission (2009), the most reliable indicator of competition in the long term is productivity.

Table 2. *Indicators of development performances of agriculture*

Mark	Variable	Unit	Description
Y_1	Land productivity in agriculture	$/ha	The ratio of value of agricultural products to the area of agricultural land in use. It can be indicator of intensification of production.
Y_2	Labour productivity in agriculture	$/active farmer	The ratio of value of agricultural products to the number of active farmers. Higher values indicate more effective absorption of the labour factor in agricultural production, and consequently a higher residual income per unit of agricultural labour.
Y_3	Export of agricultural products per hectare of agricultural land	$/ha	The ratio of export value of agricultural products to the area of agricultural land in use. This is indicator of export performances of agriculture.

Mark	Variable	Unit	Description
Y_4	Export of agricultural products per active farmer	$/active farmer	The ratio of export value of agricultural products to the number of active farmers. Higher values indicate better export performances of agriculture.
Y_5	The export/import coverage of the agricultural products	%	The ratio of export value of agricultural products to the import value. Values above 100% indicate positive trade balance of agricultural products.

The empirical research was based on the data of the Food and Agriculture Organization (FAO) 2010-2014. The data of the number of active farmers in Bosnia and Herzegovina and their distribution were taken from the national statistical databases, while the data of share of agriculture in gross domestic product (GDP) were taken from The World Bank database. Standard mathematical and statistical methods were used for the analysis of the main trends and characteristics of the agricultural development performances in the Danube Region countries.

In terms of values of the analysed variables, there is a high degree of differentiation between countries (Table 3). In the observed period, the land productivity in Germany was almost 8 times higher than the same in Montenegro, while labour productivity was 16 times higher than in Romania. Also, export of agricultural products per hectare and per active farmer is highest in Germany, while the export/import coverage of the agricultural products are highest in Ukraine.

Table 3. *Characteristics of the variables describing development performances of the agricultural sector of the selected countries*

Variable	Max	Min	Avg
Land productivity in agriculture ($/ha)	1.990	250	866
	Germany	Montenegro	
Labour productivity in agriculture ($/active farmer)	54.975	3.382	15.121
	Germany	Romania	
Export of agricultural products per hectare of agricultural land ($/ha)	4.473	185	1.474
	Germany	Montenegro	
Export of agricultural products per active farmer ($/active farmer)	123.553	1.922	28.126
	Germany	Romania	
The export/import coverage of the agricultural products (%)	231	13	103
	Ukraine	Montenegro	

Source: *FAOSTAT, 2018.*

The PROMETHEE method was used as an adequate method for solving problems whose aim is multi-criteria ranking of final set of alternatives based on a number of criteria which need to be maximized or minimized (Nikolić et al., 2017). For each observed alternative it calculates its value expressed in level of preferences. Thereby, each alternative is evaluated based on the two preference flows. Positive preference flow φ + (P) indicate how much is given alternative better than the other (according to all criteria). Accordingly, the higher this preference flow is, the alternative is better. The negative flow of preference φ - (P) indicates how much a given alternative is worse than the rest, and therefore if this flow is lower, the alternative is better. After that, the PROMETHEE method accounts net preference flow φ (P) as the difference between these two flows (Brans et al., 1984; Brans, Vincke, 1985). The multi-criteria analysis was conducted by using the Visual PROMETHEE software package in order to rank selected countries by their performances of agriculture.

The environmental aspect of agricultural production over time has gained increasing importance, because the visible negative effects on the environment. For the purpose of considering the situation of the environment, the Environmental Performance Index (EPI) was developed in 2006, whose forerunner was the Environmental Sustainability Index (ESI) of 1999 (Environmental Performance Index, 2018). The EPI provides a coefficient for each country, where country ranking is possible. EPI ranks countries according to high-priority environmental issues. Ilić et al. (2017) used the EPI index in order to rank European Union countries, and it has pointed to the existence of medium-level quantitative agreement of the positive direction between the achieved environmental performance and environmental policy area – agriculture.

Development performances of agriculture

On the basis of The PROMETHEE method, the countries were ranked by development performances of their agricultural sector. Table 4 shows the results of the analysis. Net preference flow (φ) takes the values from -0.7538 to 0.8154. All countries can be divided in five groups (Figure 1).

First group (net preference flow ranged from 0.6 to 1) consists of two best rated countries Germany and Austria (0.6615). These two countries are the most developed in whole Region, so they should be the drivers of more intensive interstate cooperation within the Region in order to exploit the advantages provided by the Danube properly and to enable a balanced agricultural development in the Region.

In the second group (net preference flow ranged from 0.2 to 0.6) are countries that joined EU in 2004 (Hungary, Czechia, Slovakia and Slovenia). Agricultural sector of these countries has experienced a couple of important institutional and structural changes in the last two decades. These changes were predetermined by their accession to the European Union (EU), an event which significantly influences the performance, structure and size of their agriculture. According to Chrastinová and Burianová (2009) this event had positive effect on Slovakian agriculture. Compared to the pre-accession period, the years 2004–2007 saw a growing income within the sector of agriculture, i.e. higher profits, as well as the increased proportion of profitable enterprises.

Table 4. *The ranking of the Danube region countries in terms of trade and production performances of agriculture*

Country	Phi	Phi+	Phi-
Germany	0.8154	0.9077	0.0923
Austria	0.6615	0.8308	0.1692
Hungary	0.5385	0.7692	0.2308
Czech	0.2308	0.6154	0.3846
Slovakia	0.2308	0.6154	0.3846
Slovenia	0.2	0.6	0.4
Serbia	0.1077	0.5538	0.4462
Bulgaria	0.0769	0.5385	0.4615
Croatia	-0.1385	0.4308	0.5692
Ukraine	-0.3231	0.3385	0.6615
Republic of Moldova	-0.4769	0.2615	0.7385
Romania	-0.5385	0.2308	0.7692
Montenegro	-0.6308	0.1846	0.8154
Bosnia and Herzegovina	-0.7538	0.1231	0.8769

Source: *Author's calculation.*

The improved performance was possible also due to subsidies and the increased production efficiency, whereas the enterprises reduced the volume of loss-making production and reduced labour costs. On the other hand, CAP subsidies helped to improve productivity and profitability, but Hungarian agriculture's per hectare and per worker indicators are still very far from those of its main competitors in Western Europe. A significant part of CAP direct payments landed in landlords pockets in form of rent. Nevertheless, farmers made good use of the rest of their grants as net investment has in almost each year been positive (Somai, 2014).

Serbia, Bulgaria and Croatia are in the third group (net preference flow from -0.2 to 0.2). Good ranking of Serbia can be explained by export performances of this country, especially positive export/import coverage (196%) that is consequences of trade agreements of Serbia with the EU, CEFTA countries and EFTA as well as with Russia, Belarus, Kazakhstan and Turkey. According to Volk (2010) agricultural production in general shows a high degree of uncertainty and variation in Croatia due to transition from a centrally planned to a market economy system.

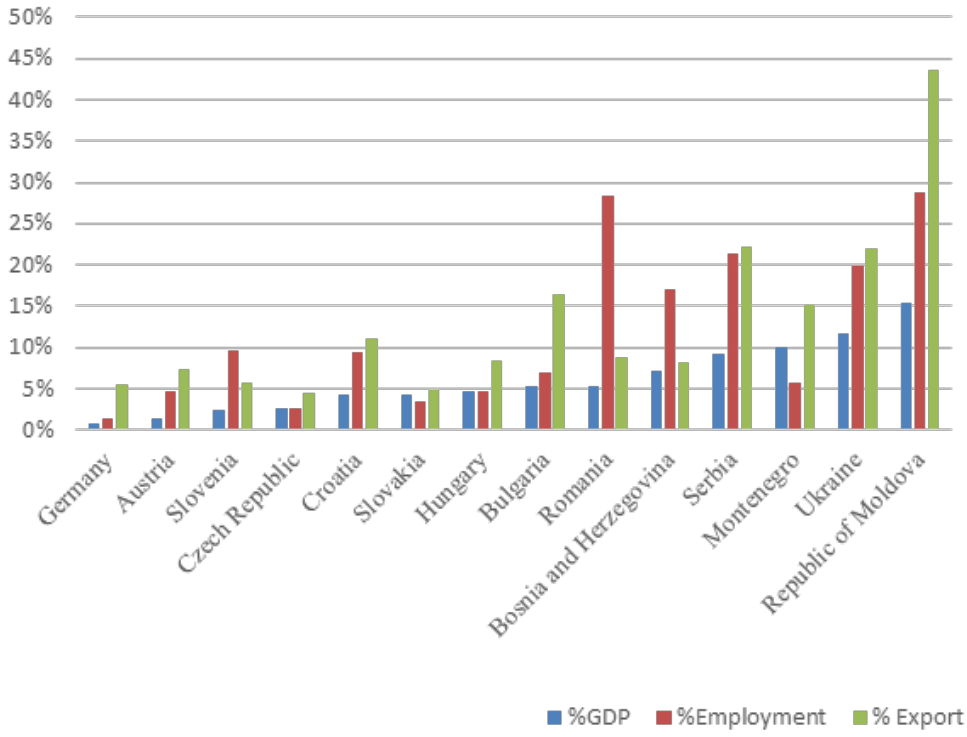
Figure 1. *The classification of the Danube region countries by development performances of agriculture*

Source: *Author's calculation.*

In the fourth group (net preference flow ranged from -0.2 to -0.6) are Ukraine, Republic of Moldova and Romania. Although these countries have high resource potential, the poor economic and political situation in these countries has most likely affected the agricultural sector. In their study of farmland abandonment in Ukraine, Baumann et al. (2011) showed that 6,600 km^2 (30%) of the farmland used during socialism was abandoned after 1991. This abandonment was a result of the institutional and economic shock, compared to those in Europe's West, where abandonment resulted from long-term socio-economic transformation such as urbanization and industrialization. According to Ciutacu (2015) Roma-

nia would require at least 50 years of steady and consistent policies of financial and technical support to reach an agricultural employment of approximately 5% of her labour force, farmsteads of minimum 20 ha, and the current productivity of the other European countries. The last group (net preferences flow form -0.6 to 1) consists of Montenegro and Bosnia and Herzegovina. Most likely, unfavourable agro-ecological conditions in these countries affected their low level of production and export performances of agriculture. Also, the difficult economic and political situation in Bosnia and Herzegovina is one of the major obstacles for development of agricultural sector.

Figure 2. *The indicators of the agricultural importance in the economic development of Danube region countries*



Source: *FAOSTAT and World Bank, 2018.*

These results showed that there is a gap in development of agriculture between EU countries and non-EU countries of Danube region. In the non-EU countries, agriculture has greater relevance (the indicators of the agricultural importance in the economic development are: share of agriculture in GDP,

share of people employed in agriculture and share of agriculture in total export) than in other Danube Region countries, but also lower development performances of agriculture (Figure 2). In case of participation in GDP, this percentage ranges from 1% in Germany to 15% in Moldova. Similar conclusion can be made in case of share of people employed in agriculture and share of agriculture in total export.

Environmental performance index (EPI) of the countries of the Danube Region

Current economic, environmental and sociological challenges affect the agricultural sector, in the direction of creating a sustainable production model. Sustainable agriculture has been defined as part of the overall concept of sustainable development at the United Nations Conference in 1992, by formulating Agenda 21 (UNCED, 1992). The concept of sustainable agriculture was created in response to increased exploration of natural resources in agriculture, due to conventional, agricultural production. In addition to economic sustainability, sociological and ecological sustainability of agriculture has a significant role in defining the overall functioning of agriculture. Increasing agricultural production affects resources such as land, water, etc. For example, fertilizers rich in nitrogen support plant growth and are thus vital to the agricultural sector, but nitrogen pollution, however, has the potential to cause widespread damage if managed inadequately (Zhang et al., 2015). Since the 1960s, the use of mineral fertilizers has grown, primarily in developing countries. The average productivity of fertilizers (kilogram of product obtained from kilograms of active substance) is influenced by various factors, such as resource differences (soil, climate), achieved technology level and fertilizer management in agriculture. The consumption of fertilizers in cereal production, in particular wheat, rice and corn, accounts for about 60% of the world's total production, with a significant increase in the consumption of fertilizers in the production of oilseeds, primarily soybean and rapeseed by 2050 (Alexandratos, Bruinsma, 2012).

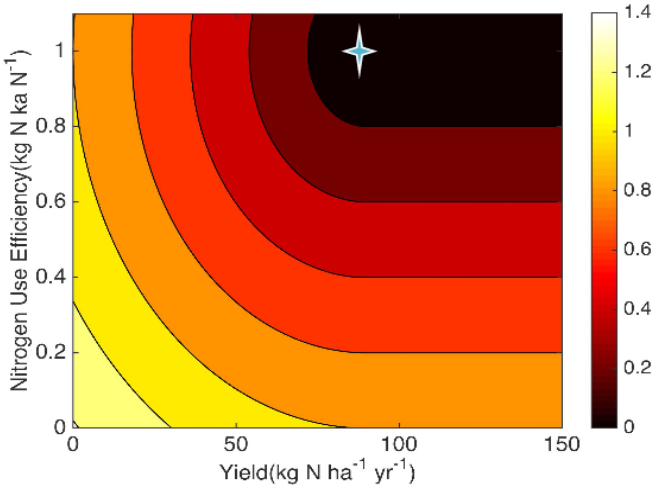
Within this research, the environmental impact of agriculture was considered using the *Environmental Performance Index* (EPI), developed by Yale University (Yale Center for Environmental Law and Policy) and Columbia University (Center for International Earth Science Information Network) in collaboration with the World Economic Forum and the Joint Research Centre

of the European Commission (Environmental Performance Index, 2018). According to this methodology, the overall environmental impact was observed through 24 indicators, grouped into 10 categories:

1. Air Quality,
2. Water & Sanitation,
3. Heavy Metals,
4. Biodiversity & Habitat,
5. Forests,
6. Fisheries,
7. Climate & Energy,
8. Air Pollution,
9. Water Resources, and
10. Agriculture.

The impact of agriculture on the environment is measured by different indicators over the years. According to the latest methodology from 2018, the Sustainable Nitrogen Management Index (SNMI) is used as an indicator of efficiency (Figure 3). *SNMI* indicator uses nitrogen use efficiency (*NUE-the fraction of applied nitrogen that is absorbed and used by the plant*) and crop yield to measure the environmental performance of agricultural production (Zhang, Davidson, 2016).

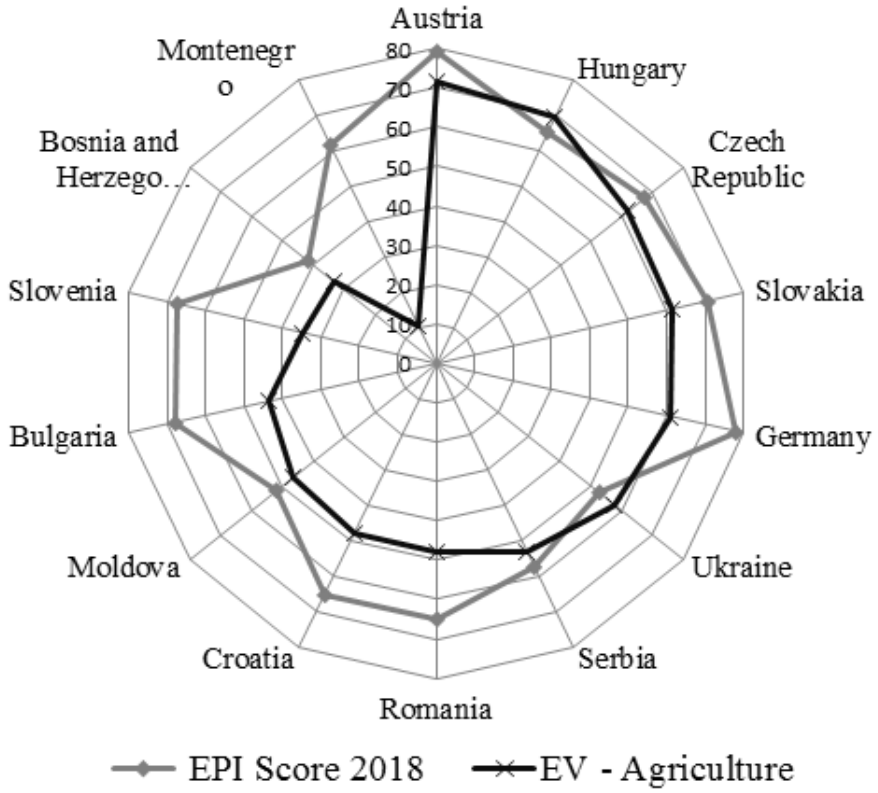
Figure 3. *Sustainable nitrogen management index (SNMI)*



Source: *Zhang, Davidson, 2016.*

The influence of agriculture on the environment of the Danube Region, expressed by SNMI, is shown in *Figure 4*. Austria has the highest index of sustainable use of fertilizers within the analyzed group of countries. Such results are expected, since Austria's agriculture is aimed at increasing organic production, whereby Austria is the only country in the European Union that has almost reached the targeted level of organic production of 20% in total areas (Siiskonen, Nuutila, 2017). It is very important to notice that there is a strong positive correlation between the level of economic performance and the environmental performance of agricultural sector in these countries (coefficient of correlation is 0.71). Therefore, it is possible to conclude that among other factors, the level of economic development of agriculture has a significant impact on environment.

Figure 4. *Overall environmental performance (EPI) and the environmental performance of agriculture of the Danube region*



Source: *EPI 2018 data.*

There is growing concern over the negative impact of agriculture on the environment, primarily due to the use of chemical inputs. The growth of organic production and the development of innovations in agriculture are factors that influence efficient use of agricultural inputs. Precision agriculture plays a major role in a sustainable agricultural production system, increasing efficiency and protecting the environment. A significant segment of precise agriculture is the concept of "*sustainable intensification*", which responds to increased demand for food due to population growth, and hence the increased exploitation of natural resources (Lindblom et al., 2017).

Conclusions

The study assesses the development and environmental performances of agriculture of Danube region countries. In order to rank development performances of these countries, PROMETHEE method was used. Based on this analysis, countries can be roughly divided into five groups. The study showed that there is a gap in development of agriculture between EU countries and non-EU countries of Danube region. Among other factors, the level of economic development has a significant impact on development performances of agriculture. Significant difference between production and export performances of agricultural sector of the EU and non-EU countries indicate that there is a need for adequate instruments of agricultural policy that will improve agricultural sector in these countries. Agricultural policy of these countries must still be oriented on increasing of productivity of agricultural sector in order to get chance to compete on EU market. Among other factors, the level of economic development of agriculture has a significant impact on environmental performance of agriculture. It will be very difficult to balance with good environmental policy and agricultural policy oriented towards productivity growth for the least developed countries of Danube Region.

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TRADE AS A FACTOR FOR ECONOMIC SUSTAINABILITY OF THE AGRICULTURAL SECTOR IN THE WESTERN BALKANS[1]

Dori Pavloska Gjorgjieska[2], Boban Ilic[3]

Abstract

Sustainable agriculture contributes to all four pillars of food security – availability, access, utilization and stability – in a manner that is environmentally, economically and socially responsible over time. Full access to food, as a human need of the present and future generations, can be achieved by free agri-food trade.

Western Balkan countries are important trade partners with significant contribution of their mutual agri-food trade in the total amounts. However, in the past period there has been a downward trend in the mutual trade among most of the Western Balkan countries.

The purpose of this paper is to analyse the current trends in the agri-food trade in the Western Balkans, to identify their causes and to provide recommendations for policy measures that would contribute to a sustainable development of the region. The methodology used is primary research through focus group discussions with relevant stakeholders, as well as secondary data and information collection from reliable sources.

Key words: *economic sustainability, agri-food trade, Western Balkans, sustainable development, agriculture, access to market.*

Introduction

"Humanity has the ability to make development sustainable, to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs". This was stated by the World Commission

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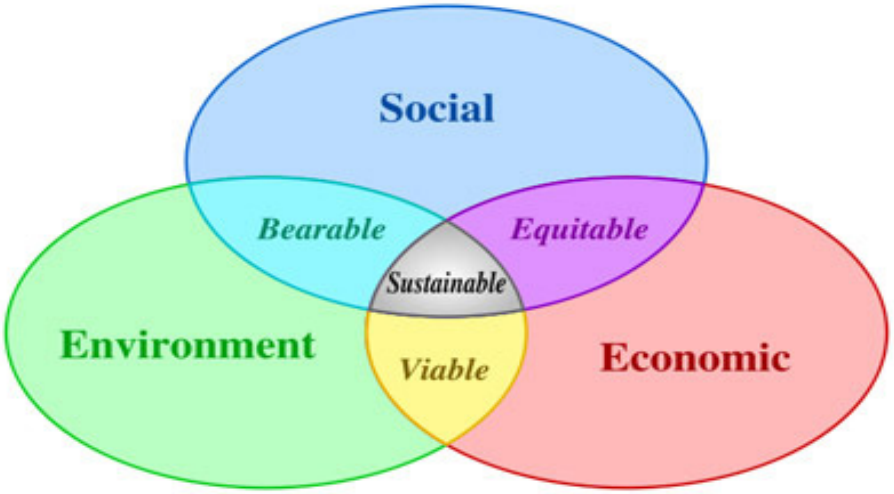
2 Dori Pavloska Gjorgjieska, Ph.D., Project Manager, SWG Secretariat, Goce Delcev Street no. 18, 1000 Skopje, Macedonia, Phone: +389 70 25 96 49, E-mail: dori.pavloska@swg-seerural.org

3 Boban Ilic, Secretary General, SWG Secretariat, Goce Delcev Street no. 18, 1000 Skopje, Macedonia, Phone: +389 70 24 86 36, E-mail: boban.ilic@swg-seerural.org

on Environment and Development in its report "Our Common Future" from 1987. Since then, sustainable development has gained increasing attention in the international debate. The UN Rio Summit in 1992 reaffirmed the need to ensure a balance between economic development, social development and environmental protection as interdependent and mutually reinforcing pillars of sustainable development, as shown in Figure 1.

Figure 1. *The three pillars of sustainable development*



Source: *Thatcher, A. (2015) HFSD definition working paper 19.08.2013.*

Having in mind the great impact of the agriculture on the economy, society and environment, it is of crucial importance to address the sustainability of the agricultural development. FAO (2014) has defined sustainable agricultural development as "the management and conservation of the natural resource base, and the orientation of technological change in such a manner as to ensure the attainment of continued satisfaction of human needs for present and future generations". Sustainable agriculture would contribute to all four pillars of food security – availability, access, utilization and stability – in a manner that is environmentally, economically and socially responsible over time.

Full access to food, as an important human need of the present and future generations, can be achieved by free agri-food trade. Wisniewska (2011) determines

the terms of trade of agricultural products as one of the indicators of economic sustainability of agriculture.

Moreover, UN Agenda 21 from 1992 also emphasizes the role of trade in achieving sustainable development, stating that improved market access for developing countries' exports in conjunction with sound macroeconomic and environmental policies would have a positive environmental impact and therefore make an important contribution towards sustainable development. In addition, agri-food trade is recognized as an important factor for ending hunger achieve food security and improved nutrition and promoting sustainable agriculture in the UN 2030 Agenda for Sustainable Development.

According to Pretty (2008) access to international markets is important for developing countries. However, they have many difficulties in accessing international markets and market information, and the strong competition with downward pressure on prices just adds to the barriers to entry. Therefore, focusing on local and regional markets could be a favourable sustainable development strategy for the developing countries.

Western Balkan countries are developing countries. They are important trade partners in mutual agri-food trade and since 2006 are signatories of the Central European Free Trade Agreement (CEFTA), which in addition to the Western Balkans countries only includes Moldova[4]. Albania, Macedonia and Montenegro are already members of the World Trade Organization (WTO), while the WTO accession negotiations with Serbia and Bosnia and Herzegovina are still ongoing[5].

The contribution of agri-food imports from the Western Balkans in the total agri-food imports ranges from 12% in Albania to 53% in Montenegro, while the contribution of agri-food exports to the Western Balkans in the total agri-food exports ranges from 24% in Albania to 82% in Montenegro[6]. However, in the past period there has been a downward trend in the mutual trade among most of the Western Balkan countries.

The purpose of this paper is to analyse the current trends in the agri-food trade in the Western Balkans, to identify their causes and to provide recommendations for policy measures that would contribute to a sustainable development of the region.

4 http://cefta.int/cefta-parties/
5 http://ec.europa.eu/trade/policy/countries-and-regions/regions/western-balkans/
6 http://app.seerural.org/agricultural-statistics/

The hypothesis states: Western Balkan countries are important trade partners, and although there are barriers in agri-food trade among them there could be feasible solutions for improving the agri-food trade, which would contribute to a positive environmental impact, improved access to food, achieving food security and promoting sustainable agriculture.

The methodology used is primary research through focus group discussions with relevant stakeholders, as well as secondary data and information collection from reliable sources.

Methodology

In order to identify the trends in the agri-food trade in the Western Balkans the databases of Agricultural Policy Plus South Eastern Europe were used[7].

With the aim to identify the agri-food trade barriers both, primary and secondary research was conducted. Focus group was used as a primary research method. Two focus group discussions with relevant stakeholders from the Western Balkans were organized on the following topics:

- Situation and trends of the trade of agricultural products in the Western Balkans;
- Issues and obstacles in agricultural products trade in the Western Balkans;
- Necessary measures for agricultural products trade facilitation in the Western Balkans.

Additional tool used for identification of market access barriers was the CEFTA Transparency Pack, a series of trade related databases with information on trade relations among the CEFTA Parties[8].

Results

Trends in the agri-food trade in the Western Balkans

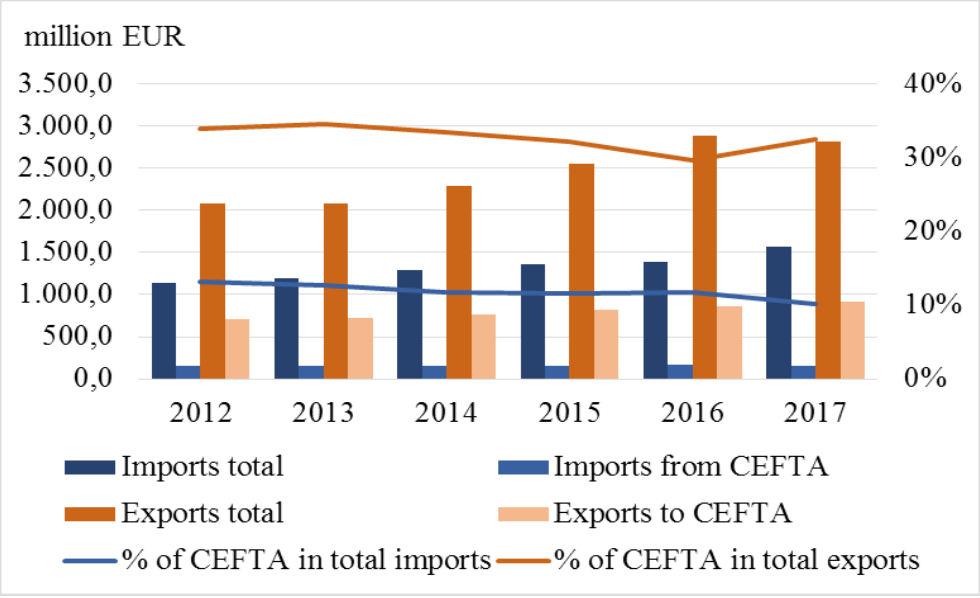
Western Balkan countries/territories are important trade partners in mutual agri-food trade. The contribution of agri-food imports from the Western Balkans in the total agri-food imports ranges from 12% in Albania to 53% in Montenegro,

7 http://app.seerural.org/
8 http://cefta.int/trade-info-centre/transparency-pack/

while the contribution of agri-food exports to the Western Balkans in the total agri-food exports ranges from 24% in Albania to 82% in Montenegro, as can be seen in the Figures 2-7.

Serbia is the only net-exporter of food in the Western Balkans. Foreign trade in food and agricultural products has been growing constantly. As a result of faster export growth, the trade surpluses increased. Serbia's principal trade destinations are EU countries, followed by the CEFTA countries. The trade with the CEFTA countries shows a mild decreasing trend, as can be seen in Figure 2. In 2017 the agri-food export to the Western Balkans was 32% of the total agri-food export, while import from the Western Balkans equalled 10% of the agri-food import.

Figure 2. *Agri-food trade in Serbia*

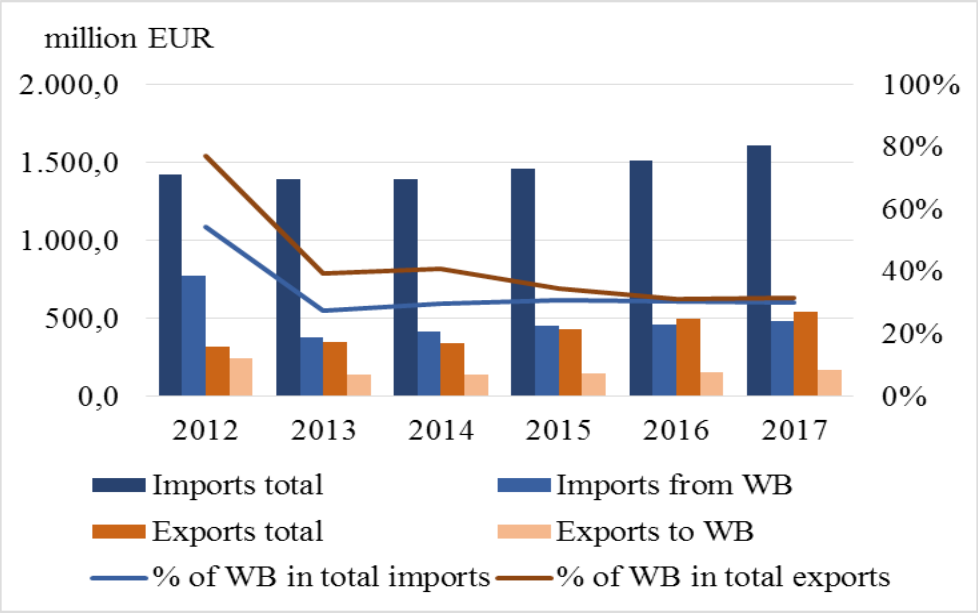


Source: *Agricultural Policy Plus South Eastern Europe*

One of the most important features of the total BiH economy is the high foreign trade deficit and dependence on imports, in which the agri-food sector has a very important contribution. BiH is distinct net importer of agricultural and food products, which significantly stress the poor image of BiH foreign trade. BiH has had a trend of constant growth of exports of agro-food products since 2014, however, it retains the high trade deficit thanks to the simultaneous growth of imports of this group of products in same period.

Trend of the agri-food trade with the Western Balkans countries/territories has been negative, with stagnation in the past two years. In 2017 the agri-food export to the Western Balkans was 32% of the total agri-food export, while the share of import to the Western Balkans was 30% of the total agri-food import, as shown in Figure 3.

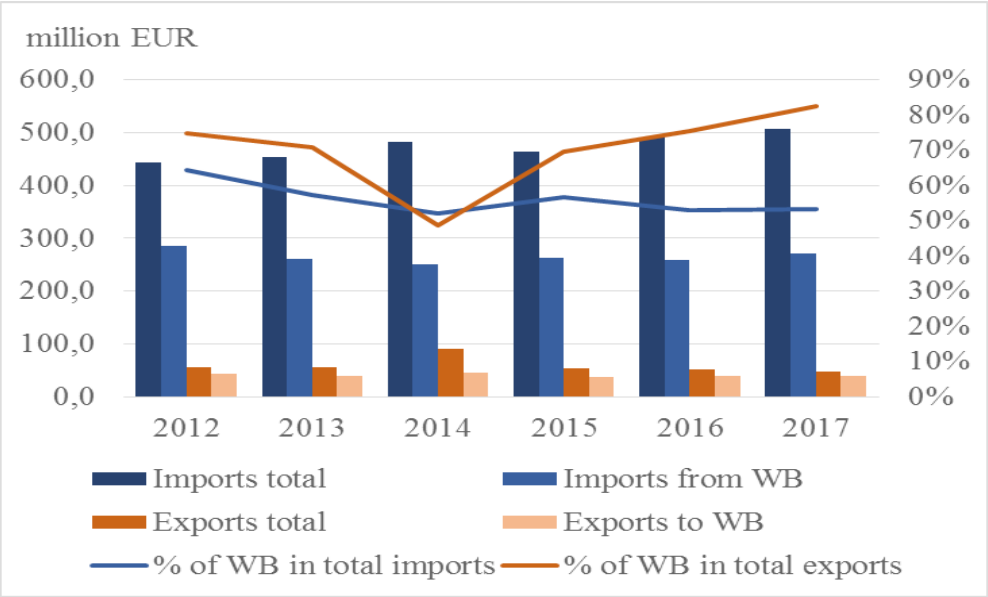
Figure 3. *Agri-food trade in Bosnia and Herzegovina*



Source: *Agricultural Policy Plus South Eastern Europe*

Considering the size and limited natural resources, Montenegro is a net importer of food and is characterized by a high foreign trade deficit. Tourism is one of the factors that influence the growth of imports. The agri-food export to the other Western Balkans countries/territories has been increasing over the past few years, while the import has decreased, as shown in figure 4. In any case, the Western Balkans is the most important trading region when it comes to the agri-food products. In 2017 the agri-food export to the Western Balkans amounted 82% of the total agri-food export, and the import to the Western Balkans resulted 53% of the total agri-food import.

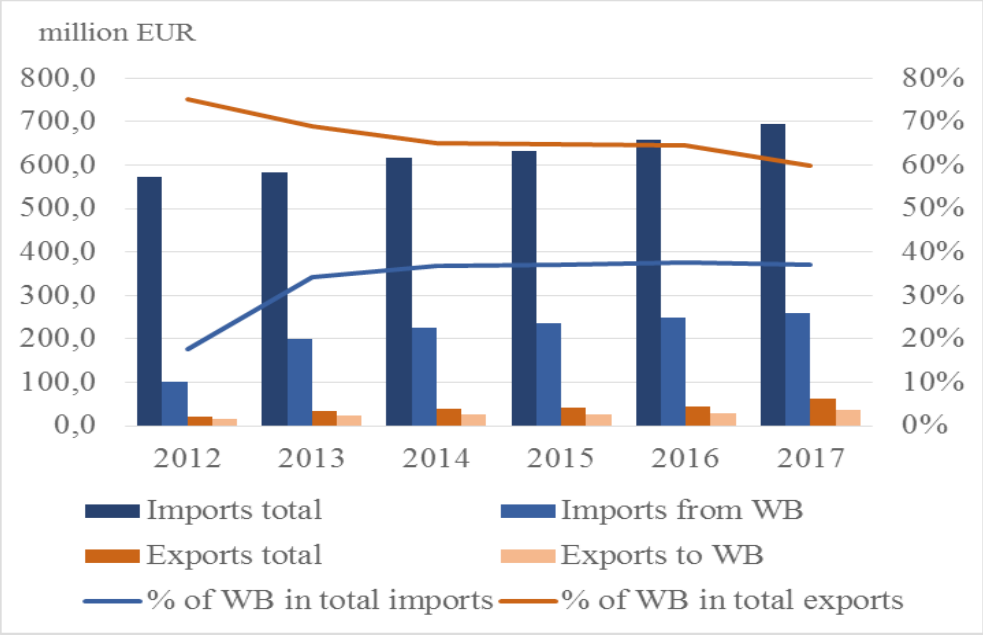
Figure 4. *Agri-food trade in Montenegro*



Source: *Agricultural Policy Plus South Eastern Europe*

For several years, Kosovo* has been facing a negative trade balance, due to dominating level of import and significantly lower level of export, resulting in a high country's trade deficit. Free trade has been shown to heighten the negative trade balance for total export-import of goods as well as for trade balance of agri-food products. The trend of agri-food import to the other Westtern Balkan countries has been stagnant over the past years, while the trend of agri-food export to the Western Balkans has been decreasing, as shown in Figure 5. The export of agri-food products to the Western Balkan region was 60% of the total agri-food export in 2017, while the import was 37% of the total agri-food import.

Figure 5. *Agri-food trade in Kosovo*[9*]

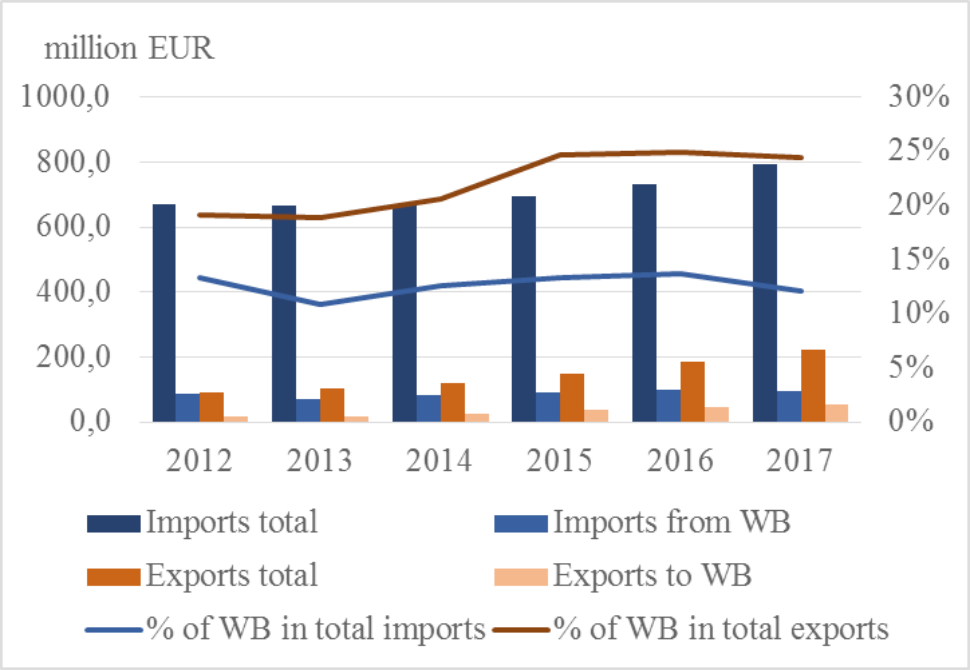


Source: *Agricultural Policy Plus South Eastern Europe*

Albania is increasingly integrated into regional and international markets, as proved by increasing import and export flows. The agriculture sector reveal increasing trade deficit, due to the fact that the increase in import has been faster than increase of exports. The agri-food trade with the Western Balkans has been quite stagnant in the past years, resulting in 12% in total agri-food imports and 24% in total agri-food exports, as shown in Figure 6.

9 * This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence

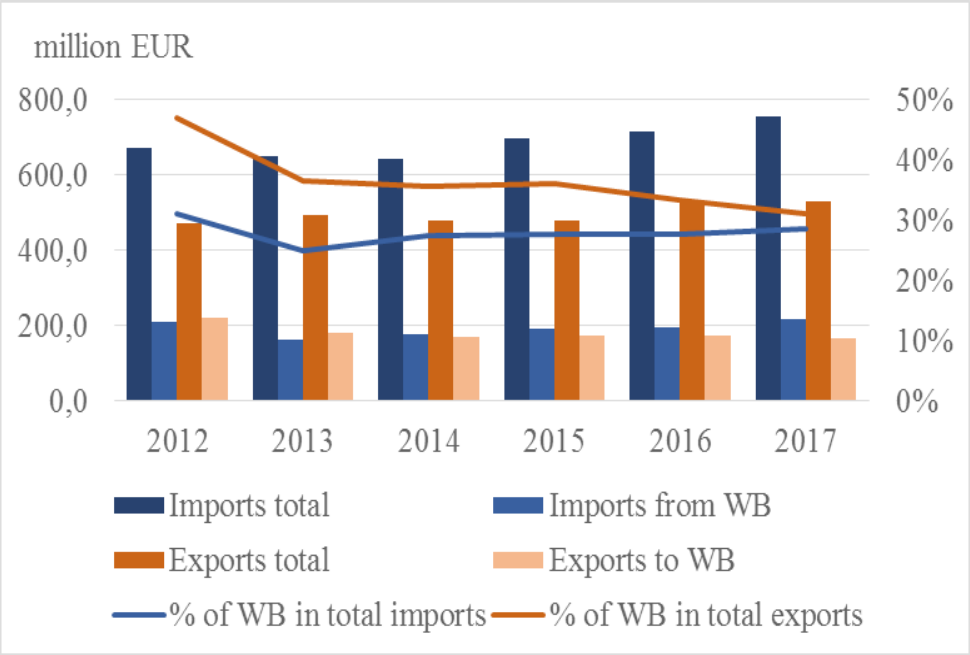
Figure 6. *Agri-food trade in Albania*



Source: *Agricultural Policy Plus South Eastern Europe*

Considering the higher exports than imports in the trade of agri-food products, Macedonian trade balance is negative. It shows a steady declining trend of the agri-food export to the Western Balkans, and stagnant trend of the agri-food import from the Western Balkans. The export of agri-food products to the region amounted 31% in 2017, while the corresponding imports represent a share of 29% in the total agri-food imports, as shown in figure 7.

Figure 7. *Agri-food trade in Macedonia*



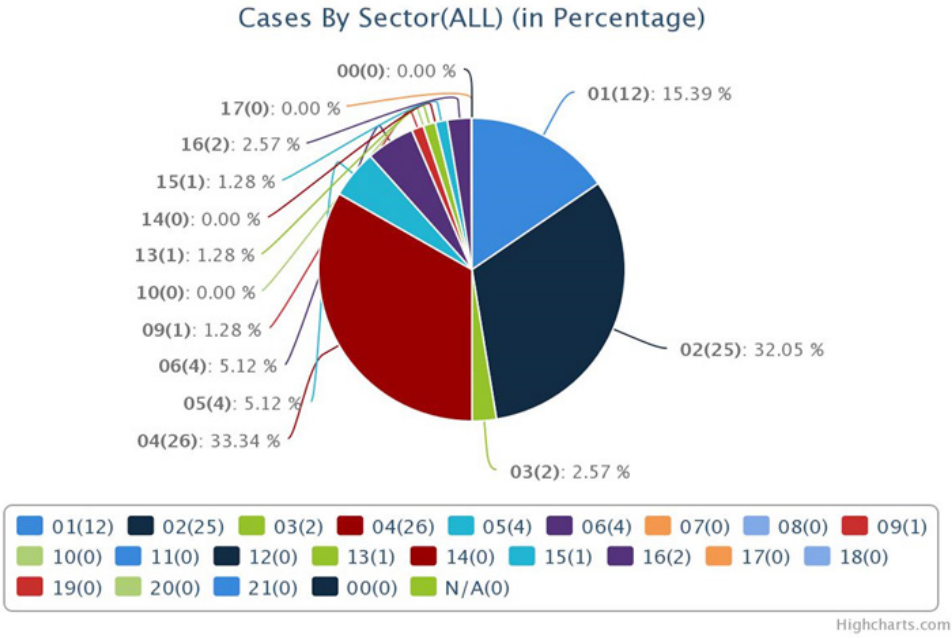
Source: *Agricultural Policy Plus South Eastern Europe*

The charts above show a downward or stagnant trend in the agri-food trade among most of the Western Balkan countries/territories. Having in consideration that substantial progress has been made on reducing tariffs on agricultural goods under CEFTA, there should be another reason for such a trend in the agri-food trade. Namely, according to Kaloyanchev et al (2018) non-tariff barriers continue to act as an impediment to the free flow of goods across borders. They fall into three categories: i) technical barriers to trade; ii) sanitary and phytosanitary measures; and iii) administrative barriers to trade.

Non-tariff barriers as an impediment to the free trade

In order to detect the significance of the non-tariff barriers in the agri-food trade the CEFTA tool pack was used.

Figure 8. *Cases of market access barriers among CEFTA countries by sector, 2009-2016*

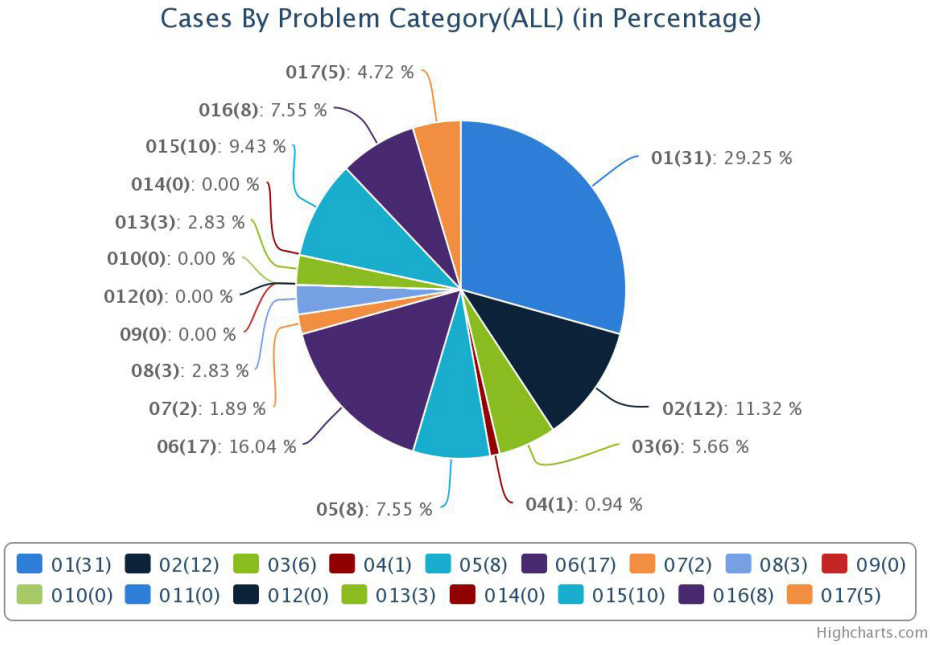


Source: *CEFTA Transparency Pack*

Note: *01 - Live Animals; Animal Products; 02 - Vegetable Products; 03 - Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes; 04 - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; 05 - Mineral Products; 06 - Products of the Chemical or Allied Industries; 09 - Wood and Articles of Wood; Wood Charcoal; Cork and Articles of Cork; Manufactures of Straw, of Esparto or of Other Plaiting Materials; Basketware and Wickerwork; 10 - Pulp of Wood or of Other Fibrous Cellulosic Material; Recovered (Waster and Scrap) Paper or Paperboard; Paper and Paperboard and Articles Thereof; 13 - Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials; Ceramic Products; Glass and Glassware; 14 - Natural or Cultured Pearls, Precious or Semi-Precious Stones, Precious Metals, Metals Clad with Precious Metal and Articles Thereof; Imitiation Jewellerly; Coin; 15 - Base Metals and Articles of Base Metal; 16 - Machinery and Mechanical Appliances; Electrical Equipment: Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles; 17 - Vehicles, Aircraft, Vessels and Associated Transport Equipment.*

Figure 8 shows that more than 83% of the reported cases of market access barriers in the period 2009 – 2016 have been in the area of agri-food trade.

Figure 9. *Cases of market access barriers among CEFTA countries by sector, 2009 - 2016*



Source: *CEFTA Transparency Pack*

Note: *01 - A Sanitary and phytosanitary measures; 02 - B Technical barriers to trade; 03 - C Pre-shipment inspection and other formalities; 04 - D Contingent trade protective measures; 05 - E Non-automatic licensing, quotas, prohibitions and quantity control measures other than for SPS or TBT reasons; 06 - F Price control measures including additional taxes and charges; 07 - G Finance measures; 08 - H Measures affecting competition; 09 - I Trade-related investment measures; 010 - J Distribution restrictions; 011 - K Restriction on post-sales services; 012 - L Subsidies (excluding export subsidies under P7); 013 - M Government procurement restrictions; 014 - N Intellectual property; 015 - O Rules of origin; 016 - P Export related measures; 017 - N/A.*

Figure 9 shows that the highest share of cases of market access barriers in the period 2009 – 2016 have been related to sanitary and phytosanitary measures (29%), followed by price control measures (16%) and technical barriers to trade (11%).

According to Bijelic (2016) prevailing issues related to non-tariff measures in the region are:

- Non-recognition of certificates for wine and beer, creating a problem of double testing of consignments, in all CEFTA parties;
- Discriminatory and high excise duties (in BiH, Albania and Kosovo*);
- Labelling issues (in Serbia, BiH and Albania);
- Radioactivity Tests on beer barrels (in Montenegro).

When it comes to trade facilitation issues, the most important ones are:

- Delays in clearance and release of goods
- Transparency, lack of consultations and time to adapt to new laws and regulations

Focus groups results

In order to discuss these findings and its consequences and to elaborate on possible solutions, two focus group discussions were organized with relevant stakeholders from the Western Balkan countries/territories (food safety authorities, private sector representatives, as well as academia). The focus groups participants determined that the main stakeholders in improving agri-food trade among the Western Balkan countries were: ministries of agriculture, ministries of trade and border authorities/food safety authorities.
Key barriers in agri-food trade among the Western Balkan countries- territories identified by the focus groups were:

- Absence of mutual recognition of trade documents
- Differences in regulations and methods for conformity assessment
- Excessive sampling by border authorities

Some of the concrete country-to-country issues regarding the agri-food trade in the Western Balkans listed by the focus group participants were:

- Albania – Macedonia: the export from Albania to Macedonia is very complicated mainly due to the required lab tests from an accredited laboratory in Macedonia, which is seen to apply higher standards;
- Bosnia and Herzegovina – Serbia: Serbian authorities apply high frequency of checks on the consignments, and do not recognize the results from the accredited lab from BiH, which significantly prolongs the export procedure. In addition, there is a problem with a different interpretation of the same regulation that both countries have already transposed.

- Bosnia and Herzegovina – Albania: BiH is not included in the list of countries from which Albania can import live animals.
- Kosovo[10*] - Macedonia: the issue of Kosovo* is the long time that it takes Macedonian authorities to visit Kosovo* processor that intends to export to Macedonia. This mainly refers to the meat processors.
- Montenegro – Albania: Albania has very high excise duty, which prevents Montenegro wine producers to sell to Albania.
- Montenegro – Macedonia: Due to the technical barriers to trade Montenegro wineries are giving up of selling to Macedonia, too.

Recommendations for improved agri-food trade in the Western Balkans

According to Moise and Sorescu (2013) the policy areas that seem to have the greatest impact on trade volumes and trade costs, not only for imports but also for export performance, are the availability of trade-related information, the simplification and harmonization of documents, the streamlining of procedures and the use of automated processes. The combined effect of improvements in these areas is greater than the simple sum of the impact of individual measures, reaching almost 14.5% reduction of total trade costs for low income countries, 15.5% for lower middle-income countries and 13.2% for upper middle-income countries.

Bijelic (2016) have come to similar conclusions and has provided respective recommendations. In terms of non-tariff measures recommendation is that parties should agree on:

- what to test: common risk assessment criteria for wine, adopt the basic analysis parameters for quality of wine required by EU;
- how often to test: allow present regime of intraregional wine trade that allows testing of wine products every 6 months rather than individual shipments;
- who can test: it should be a laboratory on the EU list;
- adapt regulations in accordance with an explicit definition for "small and independent" companies, in line with its own market size and structure, and EU regulations;
- adapt legislation to simplify fiscal stamping process.

10 * This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence

When it comes to trade facilitation issues, recommended measures to be undertaken are:

- Advance Rulings – written decision prior to the import, on the treatment of the good regarding tariff classification and origin;
- Pre-arrival Processing – submission of the relevant declaration data prior to arrival;
- Post-Clearance Audit – examination of relevant books, records, business systems and commercial data;
- Authorised Economic Operators (AEO) – party involved in international movement of goods, approved by national customs administration;
- Single Window – system that allows one entrance for the submission and handling of all data

Other recommendations include:

- Harmonization of national legislation, building similar schemes or systems to the EU (e.g. for determining origin of goods);
- Regional synergies to implement different trade facilitation agreement (TFA) measures at regional level (i.e. publication of trade-related information);
- Pilot projects to implement few TFA measures with most relevant products;
- Capacity building for the private sector, especially SMEs;
- National Trade Facilitation Committees functional in all CEFTA parties to implement necessary TF reforms in a coordinated manner.

The ways forward identified by the focus groups were:

- Acceleration of harmonization with EU legislation
- Bilateral/Regional agreement about recognition of certificates
- Using risk assessment analyses for inspections
- Capacity building for relevant authorities.

More concrete measures recommended by the focus group participants were:

- Recognition of results from laboratories which are using accredited methods
- Standardization of lab procedures across the region
- Use referent laboratory in a case of a dispute
- Reduce the time for conducting a visit by the commission from the country of import to the processor in the country of export
- Revise regulations on excise duties
- In cases of differences in interpretation of the same regulations seek for interpretation from CEFTA Secretariat

- Ask CEFTA sub-committee on agriculture and SPS measures to initiate preparation of a program for solving the non-resolved cases
- Define channel for urgent communication among the SPS authorities of the region
- Avoid unnecessary sampling at the border – positive results should not be generalized to the entire country
- Capacity building for producers who do not meet the required standards
- Conduct timely visits and make assessment of the producers of live animals and animal origin products, which are or are not on the EU list
- Exchange of know-how and inter-laboratory testing among the SPS authorities.

Conclusions

Western Balkan countries are important trade partners with significant contribution of their mutual agri-food trade in the total amounts. Still, there is a notable downward or stagnant trend in the agri-food trade among most of the Western Balkan countries/territories. Having in consideration that substantial progress has been made on reducing tariffs on agricultural goods under CEFTA, non-tariff barriers continue to act as an impediment to the free flow of goods across borders. They fall into three categories: i) technical barriers to trade; ii) sanitary and phytosanitary measures; and iii) administrative barriers to trade.

Key barriers in agri-food trade among the Western Balkan countries/territories are:

- Absence of mutual recognition of trade documents
- Differences in regulations and methods for conformity assessment
- Excessive sampling by border authorities

The determined ways towards improving the agri-food trade among the Western Balkan countries/territories are:

- Acceleration of harmonization with EU legislation
- Bilateral/Regional agreement about recognition of certificates
- Using risk assessment analyses for inspections
- Capacity building for relevant authorities.

Such an improved market access for the Western Balkan countries would contribute to a positive environmental impact and therefore make an important contribution towards sustainable development, as per the UN Agenda 21 from 1992.

Improved agri-food trade among the Western Balkan countries would improve the access to food, as an important human need of the present and future generations, and one of the pillars of food security.
Finally, improved agri-food trade would contribute towards ending hunger, achieving food security and improving nutrition and promoting sustainable agriculture, as per the UN 2030 Agenda for Sustainable Development.

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ASSESSMENT OF QUALITY OF SERVICES IN RURAL REGIONS OF VOJVODINA[1]

Drago Cvijanović[2], Tamara Gajić[3]

Abstract

Vojvodina is a place rich in natural resources, which are the decisive factor for the existing and potential development of rural tourism. However, for decades, functional and structured problems have been summed up, which are the main impediment to the development of a rural tourism product. The authors of the research carried out research in 10 rural areas in Vojvodina, on several occasions during 2017. The aim of the research was to determine the quality of services provided in the rural areas of Vojvodina. The survey included a sample of 217 respondents. Data processing was performed in the SPSS version 20.0, and the descriptive statistical analysis of the grouped variables was presented in three groups. For the purpose of this paper, the authors highlighted the most important data in order to point out the advantages and disadvantages of the quality of services provided, which is certainly an indicator of the development of this activity in Vojvodina.

Key words: *rural tourism, quality, development, Vojvodina.*

Introduction

It is known that the development of rural tourism has positive implications for the growth of profitable values of all sectors of the economy, and of course contributes to the general benefit of local communities. Insufficiently developed areas, survival in the market, can be found by the exploitation of all natural resources, which they possess and the development of a rural tourism product. In addition to the mentioned benefits, rural tourism also affects the employment contingency, as a factor in increasing the number of employees, and the return

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2 Drago Cvijanović, Ph.D., Full Professor, Faculty for Tourism and Hotel Management, University of Kragujevac, Vojvođanska street no. 5a, 36210 Vrnjačka Banja, Serbia, Phone: +381 63 295 111, E-mail: drago.cvijanovic@kg.ac.rs dvcmmv@gmail.com

3 Tamara Gajić, Ph.D., Professor of applied studies, Novi Sad Business School, 21000 Novi Sad, Serbia, E-mail: tamara.gajic1977@gmail.com

of people from urban areas to rural areas (Fotiadis, 2011; Gajić et al., 2018). The impact of the development of rural tourism is also felt in the realization of invisible exports, stimulation of domestic work and production, inclusion in the development of small workshops and women's workforce, and thus the preservation of tradition, customs and the return of old forgotten crafts.

Autonomous Province of Vojvodina is the northern province of the Republic of Serbia and occupies an area of 21,500 km2, which is 24.3% of the total area of the Republic of Serbia. According to the 2011 Population Census, 1,931,809 inhabitants live in Vojvodina (Tourism Development Strategy of Serbia, 2015). Out of a total of 465 settlements in the Autonomous Province of Vojvodina, 415 settlements are of rural character, with about 43% of the total population of 1,916,889. On average, Vojvodina village has about 2,200 inhabitants, and 22.94% of them are over 60 years of age. It is a deceptive fact that 87% has a negative birth rate (negative in 38 out of 45 municipalities). Financial support funds are being reduced, and in some cases even abolished. Such a situation disrupts the work of small businesses and even allows them to disappear from the market (Gajić et al., 2017; Vujko et al., 2018). Measures of systematic linking of all interest groups in the development of rural areas are necessary, because if rural tourism employees are not informed about possible means, or do not know how to get them, then these kinds of state support will make no sense.

The quality of services is the main indicator of the achieved level of tourism development. Over the past three decades, the quality of service has been processed by scientists, businessmen and other researchers, due to the fact that it has a major impact on customer satisfaction and loyalty, price, business success and profitability (De Vellis et al., 2003; Wang et al., 2008, Blešić, 2010; Cvijanović et al., 2017a). The quality of tourist services is based on the material and non-material aspects of the tourist offer. The offer is conditioned by the demand for products and services in the rural tourism of Vojvodina. Such tourist demand is the main driver of consumer awareness and the local population's perception of the overall importance and development. The work on quality is the principle of the development of rural tourism in Vojvodina. Quality services are the answer to all the demands of consumers, both tourists and the local population (Lankford et al., 1994; Davie et al., 1988; Kunasekaran et al., 2011).

The authors of the work joined a survey of tourist visitors in 10 rural areas in Vojvodina: Neradin, Turija, Šašinci, Kačarevo, Rivica, Tavankut, Bački Brestovac, Omoljica, Debeljača, Silbaš. The research was carried out on several occasions,

during 2017. The sample included a total of 217 respondents. The authors of the paper, aware that the number of independent variables depends on the purpose of the research, were presented only by those who showed the applicability and purpose in this paper. All evaluated services are classified as variables in three factor groups. The data collected by consumer surveys in the given rural settlements were entered into the database, and all further analyzes were carried out using SPSS, version 20.0, Statistical Package for Social Science (SPSS).

The main goal of the research was to determine how satisfied the visitors were with the provided tourist services in the rural areas of Vojvodina and what are the possibilities for Vojvodina to strengthen the competition market as a destination for rural tourism, or to assess the current state of all those factors that can affect the competitiveness of rural tourism destinations in Vojvodina. Although the authors evaluated their research as preliminary, with the insistence on a longitudinal approach in studying this very important segment of tourism, the results they came to, can be said with certainty, very interesting and significantly contribute to the explanation of some aspects of tourism in Vojvodina.

Literature review

Rural tourism means staying in rural areas, and it relates to a number of special forms of tourism or special products: adventure tourism, sports and health tourism, hunting and fishing, special forms of tourism in nature, eco-tourism, hiking, riding, folklore heritage, and in some areas ethnic tourism.

Every form of positive influence of rural tourism in the local economy and the community is defined and followed by many researches (Fleisher et al., 1997; Page et al., 1997; Bramwel et al., 1994). Rural tourism describes it as a special multi-activity, not only as a passive stay in nature (Cvijanović et al., 2017b). Rural tourism is seen as a means by which the problem of weakening the agricultural potential of agrarian areas is solved, in order to provide additional income, which inevitably entails the expectation of certain services in relation to the delivered services (Davies et al., 1988). Many tourist destinations, of rural character, can form a specific tourist product specific to the ontario market (Pearce et al., 1989; Bramwell, 1994), which is primarily based on a small-scale economy, friendly to the environment, rich in ethnic elements, once the word, "sustainable environment". Rural tourism represents tourism in rural households, but also certain breaks and resorts in the nature of rural areas, as well as manifestations, festivals, recreation, production and sale of handicrafts, craft products and agricultural products (Košić, 2009).

Statistics in rural tourism are based on estimates, both for capacity and for traffic. Given that around 90% of Serbia is rural (Todorović et al., 2009), for rural tourism it can be assumed that a significant part of the night spent in mountain and spa centers, as well as other tourist and other places can be treated as an overnight stay in this segment offer (Petrović, 2013).

The largest percentage of the territory of the Autonomous Province of Vojvodina represents the rural area. Vojvodina has potential for the development of rural tourism, primarily due to the resource base: natural resources, traditional approach to agriculture, recognizable traditional gastronomic specialties, and opportunities for the development of complementary activities. Rural development in the area of Vojvodina faces numerous problems, and in the first place the decrease in the number of farmers is highlighted (the total share of the agricultural population in the total population is below 11%), the reduction of the agricultural land area under the influence of industrial development (Cvijanović et al., 2018). Regardless of all the changes that are taking place, both in Vojvodina, in the entire state of Serbia, the rural communities that have survived are still dependent on agriculture, which is their significant economic support, but which does not record adequate results. The basic characteristic of rural farms, in terms of ownership structure, shows that they are small and divided. Such a structure has a negative impact on the volume of agricultural production. The existing process of deagrarization and legal measures does not help much taking into account the inheritance and lease.

The development of tourism in rural areas can produce numerous positive economic and non-economic effects for agrotourism farms, but also for the entire local community (George et al., 2009; Latkova, 2012). The rural space is defined as an alternative place in relation to stressful urban centers, and is associated with silence, simplicity and authenticity. The benefits of visiting rural areas are mostly psychological in nature, such as relaxation, peace and quiet, and the possibilities of preserving good health.

In Europe, over 100,000 accommodation units with over 1.3 million beds are registered, bringing revenue of about 12 billion euros a year. The largest numbers of rural households engaged in tourism are in Austria (8%), France (6%), Ireland and Germany (3%), while in Italy this percentage is only 0.3% (Vujko et al, 2014). Rural areas occupy about 90% of Serbia and live in about 45% of the total population (Todorović et al., 2009). There are 6,158 settlements on the territory of the Republic of Serbia, of which 193 are urban (3,1%) and 5,965 settlements, which are considered rural, about 300 rural households with 8,000 beds provide catering services and realize more than 150,000 nights (annually).

Table 1. *Basic criteria for defining rural areas in different countries*

Country	Criteria for defining the rural area
Scotland	Areas with less than 100 inhabitants per km
Spain	Settlements with less than 10,000 inhabitants
Ireland	The difference between rural and urban settlements is 100 inhabitants
Norway	Anglomeration with less than 200 inhabitants
Switzerland	Parishes with less than 10,000 inhabitants
Austria	Cities with less than 1,000 people, with a population density of less than 400 inhabitants per km
Denmark	Anglomeration with less than 200 inhabitants.
Portugal	Cities with less than 10,000 inhabitants
Italy	Settlements with less than 10,000 inhabitants
England and Wales	Settlements with less than 10,000 inhabitants

Source: *Roberts, Hall, 2003*.

What makes Vojvodina special, and which gives it the opportunity to fight strong competitors, is the possibility of developing a supply, placing the farmers on the market, as an authentic form of a tourist product. They represent a picture of the former way of life and tradition, they can place Vojvodina tourism on a higher level in the demand market. The greatest disadvantage is certainly inadequate and insufficient valorization of given resources, but very often non-existent.

The universally accepted definition in the world for the concept of quality does not exist (Reeves et al., 1994), and different definitions are used in different contexts in which quality is observed. Product quality is a measure of its usefulness, its eligibility to satisfy customers' demands. For defining quality, one is safe, only quality is acceptable that meets all expectations of the consumer. Quality is the overall fulfillment of consumer demands, where it is precisely who decides whether its requirements are met (Keogh, 1990). What is nevertheless characterized by most definitions is that quality is considered a multidimensional concept, which implies that a portion of a product or service may have high quality, and the other may be of lower quality (Mason et al., 2000; Vesey et al., 2001).

Quality testifies about the position of the tourist product of rural tourism in Vojvodina. Quality is a determinant of the development of rural tourism and an indicator or indicator of potential development of this activity (Vesey et al., 2001; Wang et al., 2008; Sznajder et al., 2009). In order to progressively develop rural tourism and contribute to the promotion and diversification of the regional

economy, the growth of employment and the reduction of depopulation, it is necessary to determine the factors that influence the reduction or increase of the competitiveness of rural tourism in Vojvodina.

Methodology of research and hypothesis setting

Availability of data from secondary sources is very scarce. The authors of the work joined a survey of tourist visitors in 10 rural settlements in Vojvodina: Neradin, Turija, Šašinci, Kačarevo, Rivica, Tavankut, Bački Brestovac, Omoljica, Debeljača, Silbaš. The research was carried out on several occasions during 2017. The sample included a total of 217 respondents who voluntarily filled up the questionnaires, and the data were processed in the software program SPSS, version 20.0. The authors of the paper put a focus on the quality of tourist services in the villages. All variables (v1-v29) were grouped into F1-F3 factors, and descriptive statistical analysis confirmed the starting hypothesis of the study.

Descriptive statistics include methods and procedures describing a group of respondents, or a sample in the research. Procedures from the framework of descriptive statistics provide parameters such as statistical counting (frequencies and percentages used to describe the sociodemographic profile of the respondents in the research), the measure of the central tendency (mean or arithmetic mean), and the dispersion or deviation results of the results (interval of variation, mean absolute deviation, variance, standard deviation), (Brace et al., 2009).

The reliability of the measuring instrument was tested using the Cronbach Alpha (α) coefficient (Cronbach Alpha Reliability Coefficient). This measurement instrument is one of the most frequently used indices of an internal agreement on the scale, i.e. degree of similarity of objects from which it consists (Pallant, 2011). Ideally, the Cronbach alpha coefficient should be greater than 0.7 (DeVellis, 2003). A short scale (less than 10 items) often has a very small Cronbach coefficient (below 0.5). In this case, the value of 0.20-0.40 is recommended as the optimum range of correlations between items (Briggs et al., 1986; Pallant, 2011).

Bearing in mind the fact that the quality of the services provided is a significant overview of the achieved position and levels in the tourism market, the authors of the work have begun in the research from the hypothesis which reads: Tourists are mostly satisfied with the quality of services in the rural areas of Vojvodina, and the gap between perceived and obtained at the lowest level. Sub-station H1: assessment of the quality of services provided is a testimony of the current state of rural tourism in Vojvodina.

Results and discusion

In this survey participated 57.6% of men, and 42.4% of women. Of the total number of respondents in the survey, 35.5% belong to the age of 31 to 60 years, 38.7% over 61 years of age, and 25.8% of respondents ranged from 18 to 30 years of age. The highest percentages of visitors is with the middle level of education (40.6%), followed by 39.2% of those with higher education with faculties or higher schools, while 20.3% are the highest level of academic education. When looking at earnings, 41.9% of them said they had income ranging from 200 to 500 euros, and 38.7% more than 500 euros.

The model included a total of 29 questions or variables divided into three factor groups. The F1 factor group of the variables is named Quality of the relationship between hosts and tourists. The first assumption is, in fact, the questions or variables grouped into factor group F1, and concern the satisfaction of the visitor with the relationship of the hosts towards them. Factor group F1 contains a total of 13 variables.

The first factor F1, called the Quality of the host attitude towards tourists, explains 14,748% of the variance, which can be seen in Table 4. The value of the Cronbach alpha coefficient for the factor group F1, with a total of 13 variables, is 0.435, with a standard deviation of 3.840. These data indicate that the set model is divided and that the obtained results are scientifically corroborated.

Table 2. *Display Factor Groups with Variables*

Variable	Factors F1 – F3 with defined variables
V1-V28	**F1 - Quality of the relationship between hosts and tourists**
V1	The hosts are hospitable
V2	Meet all wishes, requirements and needs of the visitor
V3	Provide timely assistance
V4	They react to all the problems that arise during their stay
V5	They look after the pleasant atmosphere
V6	They treat each guest as an individual
V7	They do the job properly
V8	The hosts provide all the necessary information
V9	They are always present in households
V10	Always available to tourists

V11	They know a foreign language
V12	They play the roles of the guide
V13	They know all the foods
V14-V25	**F2 - Quality of services provided in households**
V14	Quality food
V15	Hygiene at a satisfactory level
V16	Domestic food and products
V17	Preserved furniture
V18	Authentic interior
V19	Rural exterior
V20	Secured security
V21	Marked rooms
V22	Animation of tourists
V23	Tasting domestic products
V24	Sports and recreational activities
V25	Field trips
V26-V29	**F3 - Marketing**
V26	Authentic marketing
V27	Price as a reflection of quality
V28	Innovative technology

Source: *author's research***.**

Table 3. *The value of the Crombach alpha coefficient for F1 (v1-v13)*

Mean	Variance	Std. Deviation	N of Items
23,79	14,748	3,840	13
Cronbach's Alpha ,435		Cronbach's Alpha Based on Standardized Items ,440	

Source: *author's research***.**

Table 4 gives a descriptive data analysis. Arithmetic mean values move at the level of total values within the defined factors. The lowest arithmetic mean is recorded with the variable v1, with a value of 1.54, while the highest value of the arithmetic mean is in the variable v6, in the value of 2.23.

Standard deviation shows the average measure of deviation of individual grades from the arithmetic mean. The standard deviation values for factor group F3 range from 0.546 to 0.753. Tourists were most satisfied with services such as direct hosts attitude toward them. Namely, the hosts showed great kindness and

hospitality, as well as readiness to always respond to consumer demands. The hosts solve all the problems that have arisen, and they are always available to tourists. However, tourists are less satisfied with the parameters of foreign language skills, and reduced participation of hosts in the role of tourist guides.

Table 4. *Descriptive statistical analysis of data for the factor group F1 - Quality of the relationship between hosts and tourists - (v1-v13)*

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
V1	217		2 1	3	1,54	,050	,739	,546
V2	217	2	1	3	1,82	,057	,846	,716
V3	217	2	1	3	1,91	,060	,891	,793
V4	217	2	1	3	1,80	,059	,869	,755
V5	217	2	1	3	1,79	,055	,817	,668
V6	217	2	1	3	2,23	,055	,816	,666
V7	217	2	1	3	1,70	,058	,855	,731
V8	217	2	1	3	2,02	,053	,778	,606
V9	217	2	1	3	1,64	,058	,850	,722
V10	217	2	1	3	1,72	,059	,876	,768
V11	217	2	1	3	2,10	,055	,804	,647
V12	217	2	1	3	1,94	,051	,749	,562
V13	217	2	1	3	1,59	,054	,801	,641
Valid N (listwise)	217							

Source: *author's research***.**

The value of the Crombach Alpha model for factor group F2 - The quality of services provided in households is 0.542, indicating that the obtained results are scientifically corroborated. The second factor F2, explains 9,731 variances.

Table 5. *The value of the Crombach coefficient for F2*

Mean	Variance	Std. Deviation	N of Items
14,93	9,731	3,120	9
Cronbach's Alpha ,542		Cronbach's Alpha Based on Standardized Items ,529	

Source: *author's research*

Factor group of issues grouped as F2, called Quality of services provided in households, includes a total of nine variables, and the analysis of data obtained by descriptive analysis is given in Table 6. the lowest value of the arithmetic mean is 1.48 for the variable v14, while the highest value of the arithmetic mean is recorded for the variables v17 and v22, and the amount is 2.25. The standard deviation ranges from 0.642 to 0.918.

Table 6. *Descriptive statistical analysis of data for factor group F2 - Quality of services provided in households - (v14-v26)*

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
V14	217		2 1	3	1,48	,048	,701	,492
V15	217	2	1	3	1,58	,056	,831	,690
V16	217	2	1	3	1,87	,060	,880	,774
V17	217	2	1	3	2,25	,047	,691	,477
V18	217	2	1	3	1,49	,056	,828	,686
V19	217	2	1	3	1,38	,044	,642	,412
V20	217	2	1	3	1,18	,033	,488	,238
V21	217	2	1	3	1,46	,050	,733	,537
V22	217	2	1	3	2,25	,058	,857	,734
V23	217	2	1	3	2,02	,062	,918	,842
V24	217	2	1	3	1,52	,058	,850	,723
V25	217	2	1	3	2,04	,047	,693	,480
V26	217	2	1	3	2,41	,054	,800	,640
Valid N (listwise)	217							

Source: *author's research***.**

Tourists were satisfied with the quality of food they received, as well as hygienic conditions. Also, satisfactory services were such as authentic interiors with preserved furniture, and rural exteriors. However, the worst were evaluated services related to participation in sports and recreational activities, organizing excursions and tasting of local products on site. These services are represented, but not in all facilities and in all rural areas where research is carried out.

The value of the Crombach alpha coefficient for the F3 group of variables is 0.734, while the standard deviation is 1.679. The third factor F3, called Marketing with a total of three variables, explains 2,819% of the variance.

Table 7. *The Value of the Crombach Coefficient F3*

Mean	Variance	Std. Deviation	N of Items
6,12	2,819	1,679	3
Cronbach's Alpha ,734		Cronbach's Alpha Based on Standardized Items ,740	

Source: *author's research***.**

A group of marketing-related questions is grouped into the Factor group F3, which is named Marketing, with a total of three variables that were explored.

Table 8. *Descriptive statistical analysis of data for factor group F2 - Marketing (v27-v29)*

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
V27	217	2 1		3	2,50	,041	,610	,372
V28	217	2	1	3	1,82	,049	,728	,531
V29	217	2	1	3	1,81	,050	,732	,536
Valid N (listwise)	217							

Source: *author's research***.**

Table 8 provides insight into descriptive statistical data analysis. Standard deviation values range from 0,610 to 0,732. The lowest value of the arithmetic mean has a variable v29 with a value of 1.81. The variable v27 in factor group F3 has the highest arithmetic mean value of 2.50. Tourists are generally not satisfied with the marketing that places these destinations on the market. When commenting on the prices related to the services provided, the views are divided. Many of the respondents felt that the price was not a reflection of quality, because what they got was not expensive, and it is good, according to their perceptions.

After analyzing the obtained data, the authors of the paper confirmed the initial hypothesis that tourists, who were a sample of the research, were mostly satisfied with the quality of services in the rural areas of Vojvodina, and the gap between perceived and received at the lowest level. Subhip: assessment of the quality of services provided by the witness is the current state of rural tourism in Vojvodina, also received its confirmation, after analyzing the data obtained by the authors.

Conclusion

An increase in demand for rural tourism is evident in almost all countries, and this increase is the result of two motives: the need for a better quality of life and authenticity. Contemporary professional literature differentiates rural tourism. Definitions are pointed out, from those they look at through the prism of space, to those that include a wide range of activities and elements of the entire product of rural tourism. Defining rural tourism, as a type of tourism taking place in a rural area, can not be adequate due to the complexity of this phenomenon. Among other factors, the division of your vacation into several short journeys is highlighted (the journey is no longer concentrated only on the summer period) and the advantage of traveling in shorter routes. The development of rural areas in Vojvodina faces numerous limiting factors, among which one can distinguish: scarce knowledge new approach to the development of rural economy; the lack of an institutional framework (special regulations) that would allow for coordination of the role of the state and greater involvement of local authorities in integrated rural development; insufficiently developed infrastructure; inadequate diversification of activities; dominance of sectoral policy, etc.

One of the leading problems of the ruining of rural areas throughout Vojvodina is the process that has affected the whole country, which is the depopulation of the village. There are more and more migrations, which involve the emigration of young people to cities, and the aging of the population occurs in the villages. The condition of this depopulation is certainly due to the negative migratory balance, aging of the population, and reproductive changes in society. Unemployment is also a problem that is seen in rural areas and creates additional problems in the development of tourism, and other economic activities. If there is employment, one can not talk about stable employment. Only investing in a more intensive and vital development of rural tourism brings both mitigation of these problems and a visible shift in the overall economic sphere of the economy. Rural tourism is a complementary activity, whose development is necessar-

ily conditioned by a positive profit growth in all other sectors of the economic structure. Primary activity, in Vojvodina, is still agricultural, but also within functional and structural problems. However, rural development is certainly conditioned by the support of all social structures, as well as work on improving the quality of existing services.

Quality is the fulfillment of customers' demands, where the consumer is the one who dictates requirements (Keogh, 1990). What is nevertheless characterized by the majority of definitions is that quality is considered a multidimensional concept, which implies that a portion of the product or service may have high quality, and the other may be of poor quality (Mason et al., 2000; Vesei et al., 2001). The work on quality is the principle of the development of rural tourism in Vojvodina. Quality services are the answer to all the demands of consumers, both tourists and the local population. More intensive development benefits all parties involved in this rural tourism development. Without the support of the local community, any idea of rural development can not have practical foundation, or some positive effects.

In domestic literature, the analysis of the quality of services provided was carried out at the level of individual rural tourist centers and at the level of the Republic, but very rarely at the level of Vojvodina as a destination for rural tourism. In this regard, the need for this kind of research has emerged, as the rural tourism product has been recognized as one of the key tools for the development of a region with low agroecological potential, underdeveloped agricultural structure and preserved natural resources. Based on the available literature and research, the authors of the work, based on basic assumptions, began to research the quality of services in rural areas in Vojvodina. They conducted a survey in 10 rural settlements in Vojvodina: Neradin, Turija, Sašinci, Kačarevo, Rivica, Tavankut, Bački Brestovac, Omoljica, Debeljača, Silbaš. The research was carried out on several occasions during 2017. All data obtained were analyzed by SPSS software version 20.0. The basic basis of research is the starting hypothesis H which reads: Tourists are mostly satisfied with the quality of services in the rural areas of Vojvodina, and the gap between perceived and received at the lowest level. Sub-station H1 was also set up: Assessment of the quality of services provided is a witness of the current state of rural tourism in Vojvodina. All questions, which were the topic of the research, as well as the factors determining the quality of the services received, were divided into three factor groups F1-F3, and within these groups they were distributed as variables.

By descriptive statistical analysis, data are processed, where the key determinants can be seen in the tables below, which show the real quality of the services provided. Assessing the quality of these services can be the basis for key strategic changes in business and potential massive development of rural tourism in Vojvodina. Now they are certainly showing the real situation in this part of Serbia. Tourists were generally satisfied with the host attitude toward them. The host was hospitable, ready to provide help and respond to all situations and changes that occurred. It is available at all times and provides all the necessary information. However, the hosts did not best show themselves in the role of a tourist guide. When looking at the quality of the services provided, the real situation is satisfactory. Namely, quality, home-made food and all accommodation conditions are on a good level. What is lacking are additional activities that would include tourists in their implementation. Marketing, as a means of business success, is rated poorer. The hypothesis that tourists are mostly satisfied with the quality of services they received in the villages of Vojvodina, has been confirmed.

Also, the goal was to point out the basic advantages of quality services in the development of rural areas, but also to the main shortcomings for the key changes, due to the large development of rural areas, and hence tourism as economic activities in this area. Vojvodina has good resource basics for the development of rural tourism, especially if all natural and anthropogenic resources, multiculturalism, heterogeneity of traditions, customs, different gastronomic offer, multiconfessionalism are summed up. The changes that are taking place in the development of a rural tourism product in Vojvodina, with tendencies of massive development, are the transformation of the farms and their placement on the market.

Rural areas of Vojvodina can come out of a bad position in which they are burning, if solutions for multifunctional development of all compatible activities, such as a large number of forms of tourism and other non-agricultural activities are found. By accepting the attitudes of the visitor as well as the local population about the quality of the services provided in the rugged areas, it will enable the positioning of products in the wider social context, but certainly also the understanding of development potential and possible and existing constraints. Increasing the quality of services requires work on diversification, and all resources enable and give all the conditions to achieve it. Unfortunately, the situation is not really the case. The facilities generally provide only two or three types of services. Rural areas significantly lag behind urban areas, and in order to develop tourism in rural areas, certain requirements need to be met. Although rural

tourism is one of the insufficiently affiliated forms of tourism in Vojvodina, it has been designated as a tourist product of exceptional potential in the Regional Spatial Plan of AP Vojvodina until 2020.

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THE EFFECTS OF DIRECT PAYMENTS ON ROMANIAN AGRICULTURE DEVELOPMENT

Florentina Constantin[1]

Abstract

This paper analyses how direct payments implemented under the Common Agriculture Policy have influenced the agriculture development in Romania in terms of agricultural production and farms incomes. There were presented the typology of direct instruments for supporting the agricultural market and the incomes, the amounts allocated to Romania for direct support before and after 2014, the structure of farms, the evolution of agricultural output, gross value added and factor income. The results show that, even if Romania recorded the lowest values for all indicators of agriculture productivity and occupy the last places in the European Union hierarchy, the direct payments have contributed to stimulate farm investments together with payments for rural development.

Key words: *Common Agriculture Policy, direct payments, gross value added, factor income, agriculture productivity.*

Introduction

From the beginning, the Common Agricultural Policy has set as the main objectives *increasing agricultural productivity by promoting technical progress* and *ensuring a fair level of living for farmers*, especially by increasing the income of people working in agriculture. These objectives have been achieved shortly after the launch of the CAP, through the implementation of a high level of indirect support materialized mainly through price support (intervention prices). This has led, on the one hand, to a significant increase in agricultural productivity and, on the other hand, to the increase of the income of Community farmers. The European Economic Community (EEC) has accumulated surpluses of agricultural products and has become the most important exporter on the world market (Alexandri, 2013).
By practicing a high level of indirect subsidies - mainly the guaranteed price sys-

1 Florentina Constantin, Ph.D., Associate Professor, Bucharest University of Economic Studies, Department of Agrifood and Environmental Economics, Mihail Moxa Street no. 5-7, 010961, sector 1, Bucharest, Romania, Phone: +40 21 319 19 00/int 342, E-mail: florentina.constantin@eam.ase.ro

tem - the substantial increase in agricultural productivity has been achieved, as well as the increase of the income of the Community farmers. This intervention system has caused serious distortions in the normal functioning of the domestic agricultural market and disruptions on the world agricultural market, mainly due to:

- the accumulation of agricultural surpluses due to the guaranteed price system, practiced under CAP mechanisms,
- the increase in budget costs as a result of the financing of surplus agricultural stocks and agricultural export subsidies,
- reducing farmers' incomes due to rising agricultural surpluses and falling prices.

Until 1992, the Common Agricultural Policy (CAP) paid particular attention to intervention policy on agricultural markets, and structural and environmental policy remained secondary.

In these circumstances, in 1992 the C.E.E. has adopted a radical reform package of the CAP called the Mac Sharry reform. This was the most radical reform until then, precisely because of the results achieved in: gradual reduction of guaranteed agricultural prices, diminishing agricultural stocks, separation of the price policy from that of income and reduction of export subsidies. Supporting farmers' incomes affected by price reduction was achieved by introducing a system of direct subsidies called ***compensatory payments*** per hectare and per animal. In addition, for the first time, it was established that one of the objectives of the reform protect the environment and develop the economic and social potential of the villages achieved through practicing extensive agriculture correlated with environmental protection measures (Alexandri, 2013).

Actions for the sustainable development of European agriculture were formulated in Agenda 2000, which continued reforming measures initiated in 1992. In this respect, it have been introduced measures to progressively reduce the intervention prices in 2000-2006 with 15% for cereals production, 20% for beef meet and 15% for milk (2006-2008) and guaranteeing agricultural income through compensatory payments other direct aids, the level of which will be increased to compensate the reduction of intervention prices.

These reforming initiatives have been continued, so that in July 2002 the European Commission presented to the Council and Parliament the document "Towards Sustainable Agriculture" which analyzed the CAP situation and proposed future

Reform directives so that the European Union can cope with the enlargement process generated by the accession of the Central and Eastern European countries. This document was the basis for the 2003 CAP reform. In the context of measures concerning the agricultural market, the reform of the Common Agricultural Policy initiated in 2003 established changes in the granting of direct support schemes for the agricultural sector. Mainly, two categories of direct payments are established for the EU Member States: ***Single Area Payment*** (New Member States except Slovenia) and ***Single Farm Payment*** (Old Member States) Thus, the majority of direct financial support is granted separately from the volume of production - *the principle of decoupling* and is conditioned by the obligation for farmers to maintain the agricultural land in good agricultural and environmental condition - *the principle of cross-compliance* (Cionga et al., 2008).

The 2013 CAP reform modified the direct support system from a single direct decoupled payment to a diversified payment system, thus ensuring a more equitable distribution of direct support, greening direct payments and better targeting of payments to support farmers' incomes (Koester, 2016). In order to achieve the objectives of the CAP reform, after 2014 Member States may implement six support schemes, some of them being optional, grouped as follows:

- Support scheme for farmers' income growth → ***Basic payments*** (Single Area Payments), ***Redistributive payments*** (support to small and medium size farms), ***Coupled support for production*** (support those sectors that facing difficulties)
- Support for increasing the sustainability of EU agriculture → ***Direct payment for agricultural practices beneficial for the climate and the environment***, ***Payments for areas with natural constraints*** (mountain areas or areas with difficult conditions for farming)
- Other support schemes → ***Payment to young farmers***, ***Payment to small farmers***.

Agricultural area and farm structure in Romania

In terms of agricultural resources, Romania has a significant potential, especially agricultural land and labor force. According to EUROSTAT, since 2007 Romania has around 7.5% of the total agricultural area of the EU 28, 8 % of the total arable area and 24% of the total labor force of the EU 28. In 2016 compared to 2007 Utilised Agricultural Area decreased by 9% (1.250.510 ha), the number of farms also decreased by 13% (509.320 farms) while the average size of farm increased

by 5,7% (from 3,5 ha to 3,7 ha). Of the total number of farms, only 1% represents farms with legal status and 99% are family farms. Also, the share of farms in which self-consumption represents over 50% of final production was 86% in 2016 (Eurostat-1, 2018).

Table 1. *Agricultural area, number of farms and average size of farm in Romania*

Year	Farm (number)	Utilised Agricultural Area (hectare)	Average size of farm (ha)
2007	3.931.360	13.753.050	3,5
2010	3.859.040	13.306.130	3,4
2013	3.629.660	13.055.850	3,6
2016	3.422.030	12.502.540	3,7

Source: *Eurostat-1, 2018.*

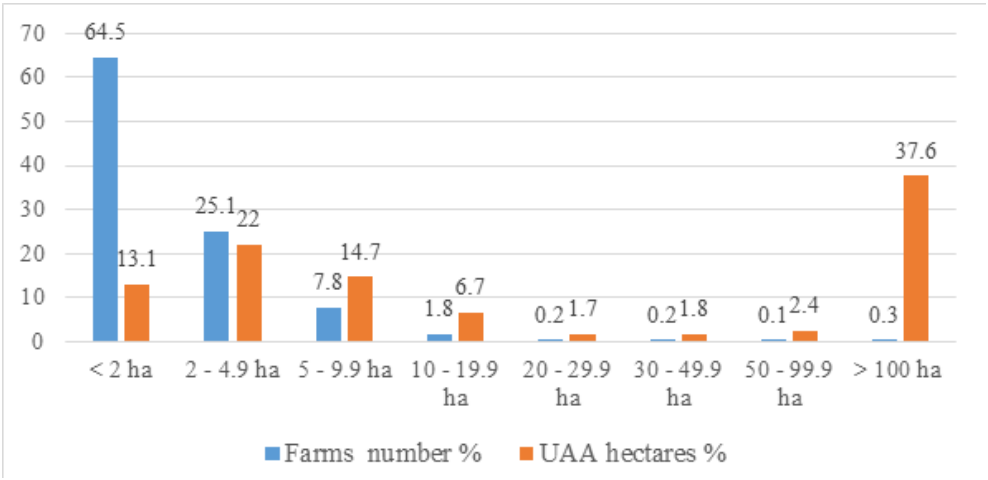
The total number of farms in Romania represents almost one third (32.7%) of the total number of farms in the EU28 and the average size of farm in Romania is 3,7 ha which means 4,6 times lower than the EU 28 average (16,6 ha).

Table 2. *Structures of farms by Utilised Agricultural Area in Romania*

Size class of farms	2007		2016	
	Farms (number)	UAA (hectares)	Farms (number)	UAA (hectares)
< 2 ha	2.565.130	1.807.510	2.480.770	1.539.790
2 - 4.9 ha	965.590	3.021.900	660.000	2.048.620
5 - 9.9 ha	300.000	2.017.540	194.200	1.304.360
10 - 19.9 ha	70.130	924.230	50.210	666.260
20 - 29.9 ha	9.550	230.100	10.990	262.970
30 - 49.9 ha	6.560	251.160	7.530	288.640
50 - 99.9 ha	4.740	328.250	6.010	418.450
> 100 ha	9.660	5.172.370	12.310	5.973.450
TOTAL	3.931.360	13.753.050	3.422.030	12.502.540

Source: *Eurostat-2, 2018.*

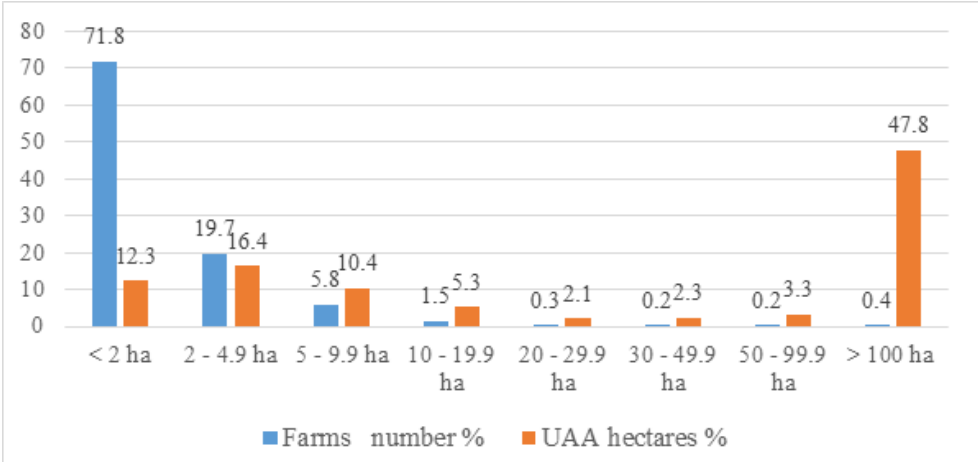
Figure 1. *Distribution of Romanian farms and Utilized Agricultural Area according to farm size, 2007*



Source: *own calculation based on the data retrieved from Eurostat-2, 2018.*

During the analyzed period (from 2007 to 2016), significant changes in the distribution of farms and the agricultural area used were registered for farms under 2 hectares whose share increased by 6.3% while the agricultural area used decreased by 0.8% and farms over 100 hectares whose share increased by 0.1%, while the agricultural area increased by 10.2%.

Figure 2. *Distribution of Romanian farms and Utilized Agricultural Area according to farm size, 2016*



Source: *own calculation based on the data retrieved from Eurostat-2, 2018.*

Most of the Romanian farms are small size, over the 70% has less than 2 ha (considered subsistence farm) and over 90% has less than 5ha. The farm less than 5 ha in size work 29% of the Utilised Agricultural Area, while 0,6% of farms more than 50 ha work a little over 50% of the total Utilised Agricultural Area. The farms between 5ha and 50 ha represent 7,8 % of total farm and work a little over 20% of the Utilised Agricultural Area. This contrasting distribution is due to the significant level of fragmentation of agricultural land in Romania generated since the early 90's with the implementation of the Land Law but also to the lack of involvement of public power in structural consolidation, and malfunctions of the land market.

Direct payments in Romania after accession to the European Union

Starting 2007, the direct support mechanisms and instruments under the CAP for agricultural producers in Romania, as well as the way of implementation and the eligibility criteria for the Romanian farmers, were established. Thus, direct payments granted from the European Agricultural Guarantee Fund, complementary national direct payments and other aid granted from the Ministry of Agriculture budget.

Programming period 2007-2014

Romania and most of the EU Central and Eastern European countries (except Slovenia) initially opted for the ***Single Area Payment Scheme*** (SAPS) for the first years, after which they can move to Single Farm Payment (paid in the old member countries of the EU). These direct payments per hectare consist of the granting of a uniform amount per hectare, payable once a year, decoupled from production.

The funding source for SAPS is provided by the European Agricultural Guarantee Fund. For 2007, the amounts granted for Romanian farmers were 25% of the level of payments in the EU 15, respectively about 50 euro/ha and until 2016 to reach 100% of the level of payments in the EU15.

These amounts have increased progressively. For 2008 the amount of direct payments per hectare was 60.75 euro, for 2009 it was 71.12 euro, for 2010 it was 80.36 euro. For the agricultural year 2011 was established the single payment per hectare of 100.65 euro for 2012 was 119.66 euro, for 2013 was 139.17 euro, reaching to 156 euro/ha in 2014. (National Legislation) The eligible agricultural area (arable land, pastures, meadows, vineyard, orchard, family gardens) must be at least 1 hectare divided by parcels of at least 0.3 ha. Agricultural areas must

be registered in the Farm Register of the Agency for Payments and Intervention for Agriculture (APIA) as the institution that manages and distributes SAPS and other direct payments.

In addition to the SAPS it was granted ***Complementary National Direct Payments*** (CNDP) over the period 2007-2014. The CNDP represented payments under Community support schemes and consisted in providing additional amounts per hectare for the crops and animal species approved by the Commission and laid down in the regulations in force.

The source of financing of CNDP in the crops sector is provided by the budget of the Ministry of Agriculture, within the limits of the approved budgetary provisions, and by the European Fund for Agriculture and Rural Development (EAFRD). Direct national complementary payments have been established for crops of national importance and some crops that facing difficulties but have favorable production conditions, such as: arable crops, fiber flax, hemp fiber, tobacco, hops and sugar beet (National Legislation)

Programming period 2014-2020

After 2014 Romania has implemented the direct support system established under the 2013 CAP reform for all Member States, The direct support system were modified from a single direct decoupled payment to a diversified payment system, thus ensuring a more equitable distribution of direct support, greening direct payments and better targeting of payments to support farmers' incomes. The system of direct payments is presented below (National Legislation).

The Single Area Payment Scheme (Basic Payment) is the direct payments per eligible hectare (declared by the farmer) totally decoupled.

Redistributive payment is an annual payment for farmers who are entitled to SAPS and is granted differentiated for the first 30 ha (one payment for 1-5 ha and another payment for 5-30 ha) of the agricultural holding, regardless of the area owned. The essential condition for granting this payment is that farmers do not create artificial fragmentation of farms.

Payment for agricultural practices beneficial for the climate and the environment (green payment) is granted to farmers for crop diversification, maintenance of permanent meadows and areas of ecological interest on agricultural land.

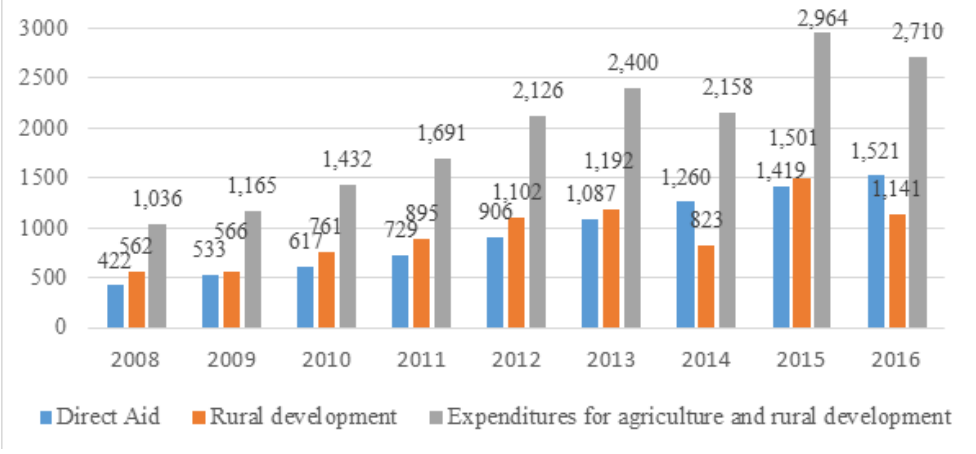
The payment for young farmers implies giving an annual payment to young farmers entitled to SAPS who are at most 40 years old and first settled on an agricultural holding as heads of the farm. The payment for young farmers is granted to each farmer for a maximum of five years.

Simplified scheme for small farmers who are entitled to SAPS and it is granted only in 2015 for a maximum period of 5 years and not more than 1250 euros. The payment shall replace the total amount of payments to be made to the farmer each year, which include single area payment scheme, redistributive payments, green payments, payments for young farmers and coupled support.

Coupled support for crop production are payments granted only in those sectors or regions that facing difficulties and are particularly important for economic, social or environmental reasons. Main sectors and productions concerned: protein crops (soya beans, beans, peas), hemp, rice, seeds, hops, sugar beet, fruit and vegetables, milk, sheep and goat meat, beef and veal meat.

Transitional national aids are payments that supplement SAPS, there are granted from the national budget to farmers who have benefited from complementary direct national payments in 2013 for crop and livestock production. The conditions for granting the transitional national aid are the same as those authorized for 2013 payments.

Figure 3. *Amount of direct aid granted to Romania from the European Union budget (millions euro)*



Source: *European Commission, 2018.*

For the agricultural year 2007, in Romania, the amount granted as direct payments from the EU budget were 25% of the payments granted in the EU15 countries, these amount increased progressively by 5% until 2009 and by 10% from 2010 to 2016, thus it had to reach the EU15 level in 2016. From the national budget were granted additional direct payments which accounted for a maximum of 30% of the EU level (the top-up mechanism) by 2016 when the full EU level of direct payments was reached. (National Rural Development Plan 2007-2013). From 2008 to 2016 the total amount of direct payments from the EU budget increased from 422 million euro to 1521 million euro. In the analyzed period, the share of EU direct aid in total expenditures for agriculture granted to Romania was 41% in 2008, 58% in 2014 and 56% in 2016 (own calculation based on European Commission, 2018).

Table 3. *Amount of Direct payments per hectare (euro/ha)*

Direct payments	2015	2016	2017	2018
The Single Area Payment Scheme	79,7	96,8	97,2	102,5
Redistributive payment:				
1-5 ha	5	5	5	5
5-30 ha	51	48,8	48,3	50,3
Green payment	59	57,3	51,1	58,2
The payment for young farmers	19,9	22,8	24,3	25,8
Transitional national aids	19,1	17,7	-	-
Total maximum amount	233,7	248,4	225,9	241,8

Source: *National Legislation*

For the 2014 agricultural year, considered the transition year, the direct payment system from the previous programming period was maintained. For the agricultural year 2015 and 2016, farms have received transitional national payments from the national budget that replaced the complementary national direct payments.

According to the diversification of the direct payments system, starting from 2015, small farms could receive between 85 euro/hectare and 120 euro/hectare, and medium farms size up to 30 hectares could receive maximum 242 euro/hectare in 2018, if they fulfilled all the grant conditions required for each direct payment. The situation at national level regarding the number of applications, potential eligible agricultural area, determined agricultural areas for Single Area Payment Scheme for the period 2007-2016 is presented in Table 3. During 2007-2016 there were

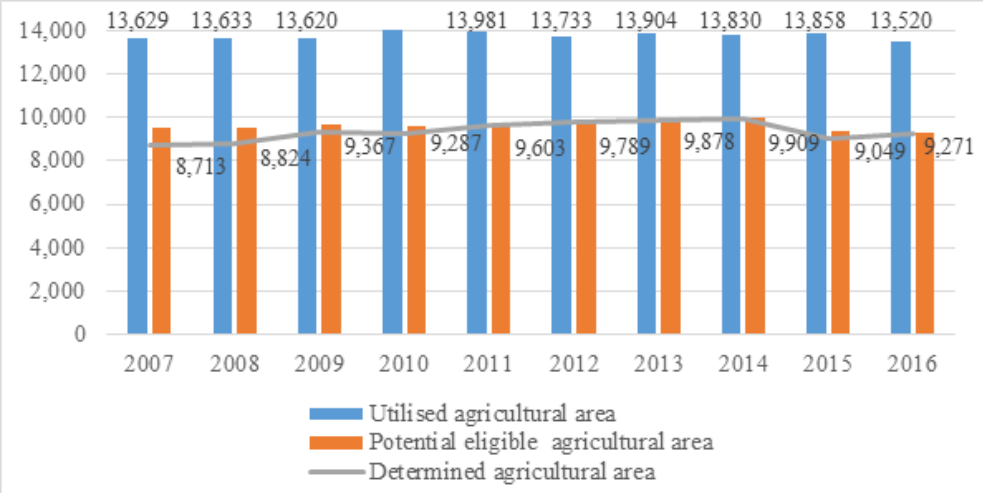
decreases in number of applications submitted, eligible beneficiaries and potential eligible area, while the determined area has increased for the single area payment scheme. Reductions of eligible beneficiaries and potential eligible area were mainly due to unclear legal situation of agricultural land, but also to lack of the cadastre.

Table 4. *Single Area Payment Scheme in Romania, 2007-2016*

Year	Number of applications submitted	Eligible beneficiaries farmers	Utilised agricultural area (ha)	Potential eligible agricultural area (ha)	Determined agricultural area (ha)
2007	1.241.751	1.159.700	13.629.810	9.542.439	8.713.809
2008	1.130.269	1.129.953	13.633.810	9.512.566	8.824.300
2009	1.121.768	1.119.836	13.620.860	9.710.896	9.367.787
2010	1.092.778	1.089.149	14.156.480	9.587.510	9.287.432
2011	1.088.674	1.083.358	13.981.620	9.759.269	9.603.400
2012	1.079.529	1.072.267	13.733.140	9.855.380	9.789.265
2013	1.048.650	1.040.407	13.904.640	9.950.226	9.878.358
2014	1.027.883	1.019.241	13.830.420	9.978.638	9.909.541
2015	943.452	879.225	13.858.420	9.368.205	9.049.184
2016	901.321	844.857	13.520.850	9.281.878	9.271.095

Source: *APIA, 2017.*

Figure 4. *Trend in direct payments area in Romania, 2007-2016 (thousands of hectares)*



Source: *APIA, 2017.*

The Potentially Eligible Area (PEA) of Direct payments has increased between 2007 and 2014 by 4,5%, then it declined by 6,7% between 2014 and 2016. The Potentially Eligible Area covered about 70% of the Utilised Agricultural Area (UAA) in Romania. The Determined Area (DA) has increased between 2007 and 2014 by 13,7%, then also it declined by 6,4% between 2014 and 2016. The Determined Area covered 91-99% of Potentially Eligible Area and 64-72% of the Utilised Agricultural Area.

At EU 28 level PEA of Direct payments covered about 90% of UAA and DA covered 97% of PEA as a result of the aims of the 2013 CAP Reform according to which the PEA should be covered as much as possible with direct payment entitlements.

Table 5. *Amount of direct payments and number of beneficiaries for 2007*

Range of expenditures (euro)	Amount of direct payments (1000 euro)		Beneficiaries (persons)	
	RO	EU 27	RO	EU 27
0 - 500	159.233	802.198	1.098.820	3.910.220
500 -1.250	26.217	1.106.307	36.460	1.383.010
1.250 - 2.000	10.629	862.507	6.760	544.160
2.000 - 5.000	24.963	2.751.400	8.160	855.920
5.000 - 10.000	27.441	3.847.588	3.880	541.240
10.000 - 20.000	40.637	5.963.482	2.880	419.350
20.000 - 50.000	62.452	10.605.684	2.060	345.730
50.000 - 100.000	34.463	5.940.044	510	88.570
100.000 - 500.000	27.822	4.486.486	160	26.870
> 500.000	8.464	1.254.557	10	1.300
TOTAL	422.321	37.620.253	1.159.700	8.122.680

Source: *European Commission, 2010.*

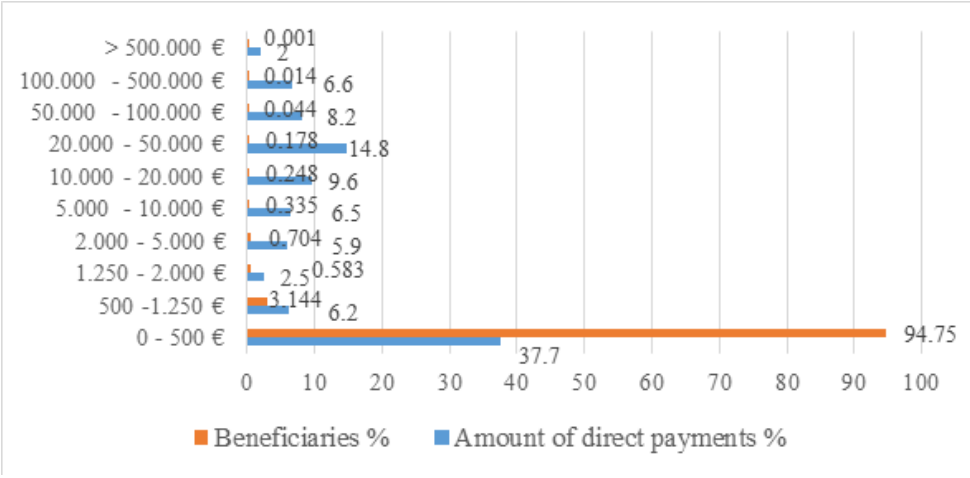
In Romania, for 2007 agricultural year, the distribution of direct payments according to the beneficiaries and the total amounts of direct payments granted, depending on the range of expenditures, was the following:

- 95% of the total beneficiaries were in the rage of *0-500 euro* and received 38% of the total amount for direct payments,
- 4,1% of the total beneficiaries were in the rage of *500-5000 euro* and received 16% of the total amount for direct payments,

- 0,8% of the total beneficiaries were in the rage of *5.000-50.000 euro* and received 31% of the total amount for direct payments and
- 0,06% of the total beneficiaries were in the rage of *50.000-500.000 euro* and received 15% of the total amount for direct payments (Figure 5).

The distribution of direct payments in the EU 28 is different, 48% of the total beneficiaries were in the rage of *0-500 euro* received 2% of the total amount for direct payments, while 17% of the total beneficiaries were in the rage of *5.000-50.000 euro* received 54% of the total amount for direct payments and only 1,4% of the total beneficiaries were in the rage of *50.000-500.000 euro* received 54% of the total amount for direct payments.

Figure 5. *Amount of direct payment and number of beneficiaries in Romania, year 2007 (% from total)*



Source: *own calculation based on the data retrieved from European Commission, 2010*

Table 6. *Amount of direct payments and number of beneficiaries in 2016*

Range of expenditures (euro)	Amount of direct payments (1000 euro)		Beneficiaries (persons)	
	RO	EU 28	RO	EU 28
0 - 500	156.677	558.198	567.837	1.789.788
500 -1.250	144.963	1.273.584	194.390	1.591.323
1.250 - 2.000	64.291	1.094.567	41.342	691.639
2.000 - 5.000	117.889	3.467.290	38.477	1.082.662

Range of expenditures (euro)	Amount of direct payments (1000 euro)		Beneficiaries (persons)	
	RO	EU 28	RO	EU 28
5.000 - 10.000	114.566	4.345.731	16.280	613.147
10.000 - 20.000	139.920	6.478.995	10.020	456.736
20.000 - 50.000	203.841	11.200.884	6.632	366.295
50.000 - 100.000	166.382	5.970.905	2.403	89.347
100.000 - 500.000	299.037	5.427.521	1.655	30.913
> 500.000 €	113.775	1.176.826	116	1.453
TOTAL	1.521.341	40.994.501	879.225	6.715.610

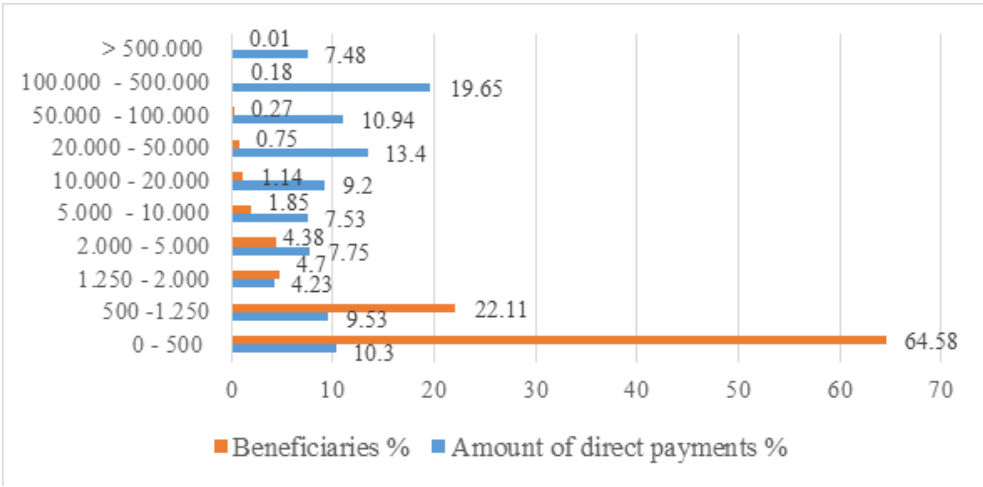
Source: *European Commission-1, 2017.*

For 2016 compared to 2007, the distribution of direct payments has changed, was follows:

- 65% of the total beneficiaries were in the rage of *0-500 euro* and received 10% of the total amount for direct payments
- 30,8 % of the total beneficiaries were in the rage of *500-5000 euro* and received 29% of the total amount for direct payments,
- 3,7% of the total beneficiaries were in the rage of *5.000-50.000 euro* and received 30% of the total amount for direct payments and
- 0,46% of the total beneficiaries were in the rage of *50.000-500.000 euro* and received 31% of the total amount for direct payments. (Figure 6)

It is noticed that significant changes occurred in range of 0-500 euro in the sense that both the share of the beneficiaries and the share of the amount for direct payments decreased considerably, while in the range of 500-5000 euro the shares increased considerably. The distribution of direct payments in the EU 28 according to the beneficiaries had changed. The beneficiaries in the rage of *0-500 euro* decreased to 27% of the total, while those in the rage of *5.000-50.000 euro* increased to 21,4%. The share of amounts of direct payments granted depending on the range of expenditure remained almost the same as in 2007.

Figure 6. *Amount of direct payment and number of beneficiaries in Romania, year 2016 (% from total)*



Source: *own calculation based on the data retrieved from European Commission-1, 2017*

Agricultural output

In the period between 2008 and 2017, in Romania, the Value of agricultural production (VAP) had an oscillatory evolution, with a slight tendency to decrease from 18.192 mil. euro in 2008 reached to 17.480 mil. euro in 2017 (-4%), excepting 2011 when the VAP was close to that of 2008.

The analysis of the Gross value added (GVA) in Romanian agriculture reveals a similar evolution as VAP, it decreased from 8.362 mil. euro in 2008 to 7.845 mil. euro in 2017 (-6%), excepting 2011 when the GVA was close to that of 2008. Unlike Romania, EU28 recorded a 13% increase of VAP and a 20% increase of GVA (Eurostat-3, 2018).

The VAP and GVA depend on the structural organization of agriculture (size and type of farms), agricultural infrastructure, quantity and quality of the production factors, investments level and capitalization level of farms.

Table 7. *Value of agricultural production and Gross value added*

Year	Value of production (euro/hectare)		Gross value added (euro/hectare)	
	RO	EU 27/28	RO	EU 27/28
2008	1.334	2.099	513	862
2009	1.038	1.819	469	721
2010	1.081	2.047	466	855
2011	1.291	2.241	580	918
2012	1.049	2.322	452	933
2013	1.277	2.402	548	964
2014	1.213	2.367	514	961
2015	1.116	2.331	469	945
2016	1.142	2.279	484	938
2017	1.307	2.423	586	1056

Source: *own calculation based on Eurostat-3, Eurostat-4, 2018*

For a better relevance of the analysis Table 7 shows the Value of agricultural production per hectare (VAP/ha) and Gross value added per hectare (GVA/ha). Thus, the gaps between Romania and the EU 28 average have been highlighted. In Romania VAP/ha followed an oscillatory evolution, with a slight tendency to decrease of 2% (from 1.334 euro/ha in 2008 to 1.307 euro/ha in 2017), as well GVA/ha followed the same evolution, but with a tendency to increase of 14% (from 513 euro/ha in 2008 to 586 euro/ha in 2017). For the two indicators the values achieved by Romania were slightly above the half of the average registered in the EU 28.

Agricultural income

According to the European Commission one of the most important indicators appropriate to assess the impact of direct payments and also to measure the agricultural performance is factor income. Agricultural factor income is define as the amount of money produced by the farm to pay for all factors of production (land, labour and capital) and it is calculated as: *Value of agricultural production - Intermediate consumption – Fixed capital consumption - Taxes on production + Subsidies on production* (European Commission, 2017). Factor income includes all direct payments on agricultural production (Koester, Loy, 2016).

In the following I analyzed the evolution of Agricultural factor income per hectare and per annual work unit as well as the share of EU Direct payments in Romanian Agricultural income.

In Romania, from 2008 to 2015, total factor income followed a fluctuating evolution, with decrease tendency mainly depending to the oscillating evolution of the value of agricultural production, given that intermediate consumption, fixed capital consumption and subsidies increased.

Table 8. *Factor income*

Year	Factor income* (mil. euro)		Factor income per hectare** (euro/hectare)		Factor income per AWU** (euro/AWU)	
	RO	EU 27/28	RO	EU 27/28	RO	EU 27/28
2008	6.705	142.027	492	782	3.116	12.470
2009	5.154	122.398	378	656	2.395	11.105
2010	5.254	142.003	371	794	3.206	13.997
2011	6.535	152.196	467	855	4.266	15.409
2012	4.930	152.104	359	860	3.134	15.476
2013	6.043	158.288	435	889	3.864	16.187
2014	6.117	159.243	442	893	4.269	16.364
2015	5.606	153.869	405	860	4.131	16.097
2016	6.831	155.396	505	869	4.326	16.384
2017	7.708	172.677	576	967	5.132	18.468

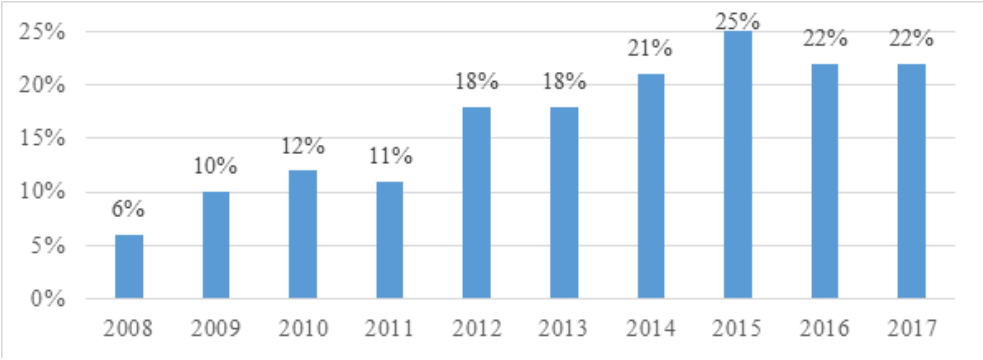
Source: **Eurostat-3 (2018), **own calculation based on the data retrieved from, Eurostat-4, Eurostat-5, 2018*

Agricultural income per farm (Factor income per AWU) recorded significant increases of 65% in the past 10 years (from 3116 euro/AWU in 2008 to 5132 euro/AWU in 2017), with the exception of 2009 when it decreased by 23% compared to 2008. These increases in agricultural income were rather due to the reduction of the labor force in agriculture and the increase in labor productivity over the analyzed period.

In EU-28, the total factor income has declined in 2009-2010 due to the 2008-2009 crisis, then it was at high levels until 2014 (it increased by 12% compared to 2008). In the next two years, 2015 and 2016, factor income dropped of about 3-4% com-

pared to 2014. In 2017 it recorded a significant increase of 8% compared to 2014 and of 11% compared to 2016. In the period between 2008 and 2017, the EU 28 average value of Agricultural factor income per worker registered a significant increasing trend, from 12.470 euro in 2008 reached to 18.468 euro in 2017, which shows an increase by 48%. This favorable trend was possible, on the one hand, as a result of the increase in the value of agricultural production at a higher rate than the increase in intermediate consumption and fixed capital consumption and, on the other hand, as a result of the increase in the amount of direct payments.

Figure 7. *Share of EU Direct payments in Romanian Agricultural income*



Source: *own calculation based on the data retrieved from Eurostat-3 (2018), European Commission, 2018*

The role of direct payments in supporting farm income becomes obvious when we take in account their share in Agricultural income (Factor income). Thus, in Romania, the share of direct payments in agricultural income started from 6% in 2008, it reached 25% in 2015, and then dropped to 22% in 2017. At EU-28 level, on average, the share of direct payments in agricultural income was over 31%, with maximum values of over 70% in Finland, Slovakia and Slovenia and minimum values below 20% in the Netherlands, Italy and Denmark. (European Commission, 2014)

Conclusions

Although the size structure of Romanian farms has changed slightly over the past 10 years, the small farms have remained predominant, 72% of farms have under 2 hectares and own 12% of the total agricultural area, while only 0.4% farms have over 100 hectares and own 48% of the total agricultural area. Of the total

direct payments, 65% of beneficiaries have received less than 500 euro/farm (10% of the total amount of direct payments), and just 0.5% of beneficiaries have received over 50.000 euro/farm (38% of the total amount of direct payments).

Throughout this period, the direct payments have ensured the survival of small farms and for medium and large farms they created real perspectives for economic development. Direct payments are perceived as the most important form of support for farmers' incomes. In the first years after Romania's accession to the EU, the direct payments accounted over 10% of total agricultural income, and after 2014 direct payments accounted over 20% of total agricultural income.

However, the introduction of the CAP direct support scheme in Romania led to an improvement in the economic situation of the agricultural sector. Thus, agricultural income (in terms of Factor income) has been increased with over 15% in the analysed period, on the one hand as a result of the increase in the direct payments amount and on the other hand, due to increased production and price levels. Nevertheless, the low values recorded by Romania both in terms of Factor income per hectare and Factor income per AWU, which represents just over 50% of the EU 28 average, ranked Romania on the last places in the hierarchy of EU member states.

Achieving benefits regarding agricultural income growth and welfare will depend on producers to fulfill the quality and environmental conditions for agricultural production established by the EU and the capability of administrations to access and obtain the support amounts.

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THE ROLE OF MARKETS IN DEVELOPING AGRICULTURAL RESEARCH[1]

Gabriel Popescu[2]

Abstract

Agricultural research is one of the oldest areas of interest in Romanian research. In the communist period this field functioned based on the relation of partnership between the grand research unity and the grand production unity, so that the research results would have direct appliance.

The post-communist period came along with a profound agricultural reform which caused the grand production unity to be shredded in small family farms. This fact was the beginning of the decline for the grand research unity because it remained without consumers for its research products.

This paper aims at presenting the main factors which stand against the development of agricultural research, and it offers some solutions for overcoming the current impasse of the domain.

Key words: *Agricultural research, reforms, capitalist market, research market*.

Introduction

Based on adopting capitalist market relations in agricultural research, after a long period of clear connections between the research unit and the production unit, the first one suffered a severe crush.

The communist period structured the agricultural research unit to respond to the large production unit, so its results had a clear correspondence and utility. The 1990's period that brought along the fragmentation of the large agricultural unit forgot about the correspondence with research and it based its production only on experience. With the changing of farmer generations, even that experience can be doubted.

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2 Gabriel Popescu, Ph.D., Full Professor, Bucharest University of Economic Studies, Faculty of Agro-food and Environmental Economics, Piata Romana no. 6, Bucharest, Romania, Phone/ Fax: +40 21 319 19 16, E-mail: popescug2004@yahoo.co.uk

The large agricultural research unit lost its prime consumer and couldn't find another one suited for its products. Yet, no major attempts of restructuring it in this thirty-year period can be recalled.

A short quantitative analysis of the agricultural research in Romania is following, as presented by Sin (in Popescu and Istudor, coord., 2018):

- at the level of property of agricultural research units, the total area is 35,000 hectares, of which: 3,000 hectares are non-productive land, i.e. yards and buildings; 24,000 hectares are field crops; 4,800 hectares are horticultural crops and 3,200 hectares are forage crops;
- the number of animals is divided as follows: 3,400 sheep heads and 7,800 goat heads. In the field of birds and pigs, there is no research activity in Romania due to the abolition of the profile entities. In relation to the technical endowment of the research units, some of them have a corresponding endowment to the activity they carry out.
- as far as staff are concerned, there are currently 2,880 people, of whom 1,100 are researchers, 600 have higher education.

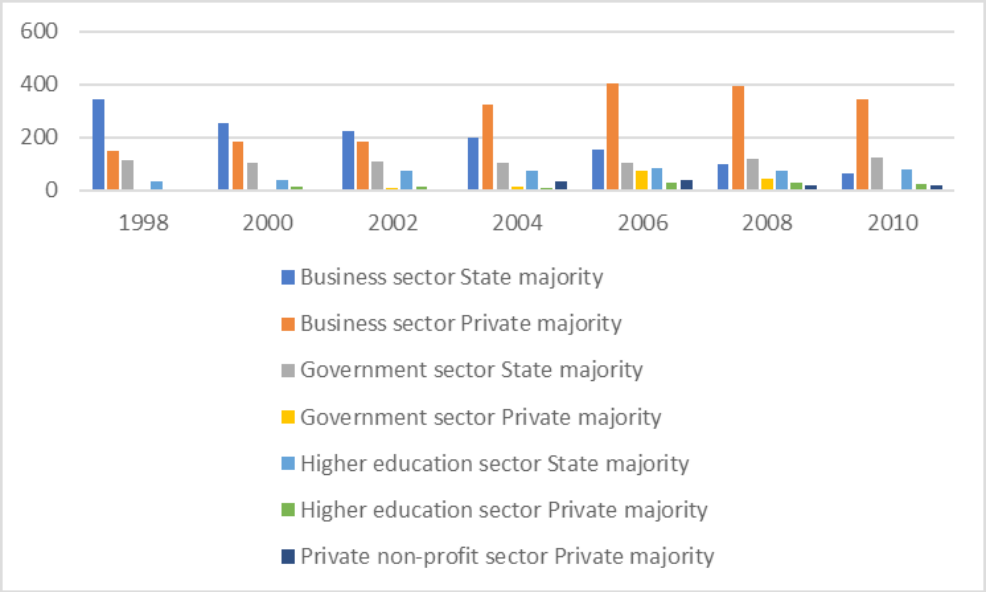
Compared to 1991, there is a massive decrease in the number of people with higher education in the field of agricultural research, from 3,020 to 600 people today. In Table 1 we may see the evolution of research unities in number in Romania in the 1998-2010 time-frame.

Table 1. *Number of active research and development entities*

Element		1998	2000	2002	2004	2006	2008	2010
Business sector	**State majority**	342	255	223	197	153	97	65
	Private majority	151	184	186	326	406	394	345
Government sector	**State majority**	113	105	107	106	105	119	124
	Private majority	1	5	7	14	72	45	5
Higher education sector	**State majority**	35	40	72	73	82	74	77
	Private majority	1	12	12	6	26	29	25
Private non-profit sector	**Private majority**	:	:	:	31	40	17	19

Source: *www.insse.ro, tempo online, last accessed November 2018, http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table*

Figure 1. *Evolution of research entities by form of property*



Source: *www.insse.ro, tempo online, last accessed November 2018, http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table*

One may see that the Government sector's involvement in the research and development sector has declined drastically, while the private sector has gained weight and in 2010 was the most important actor on the research market.

In Table 2, the evolution of the researchers' number, with an accent on agricultural researchers, in Romania, for the 1995 – 2017 time frame is presented.

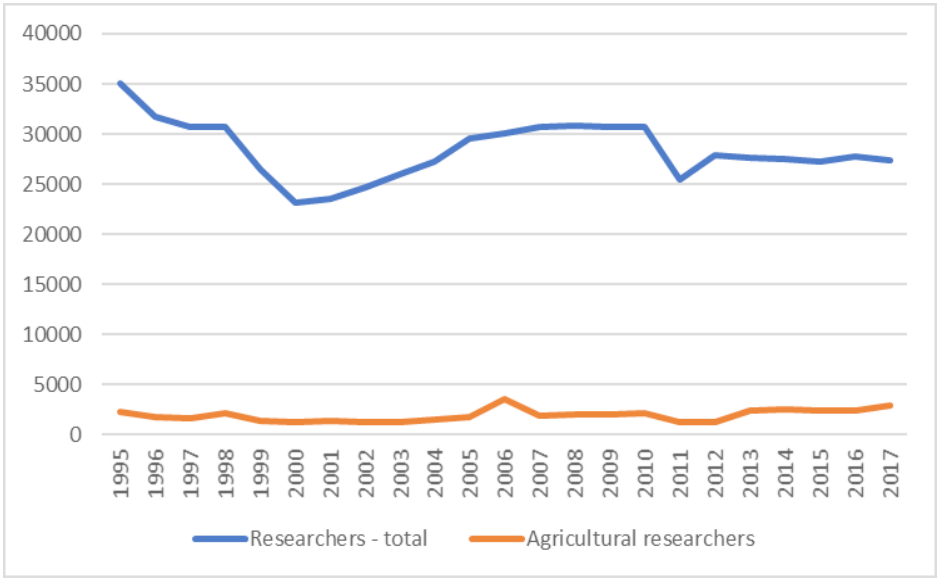
Table 2. *Evolution of researchers' number in Romania*

Element	1995	2000	2005	2010	2015	2017
Researchers - total	35,094	23,179	29,608	30,707	27,253	27,367
Agricultural researchers	2,339	1,244	1,770	2,154	2,396	2,914

Source: *www.insse.ro, tempo online, last accessed November 2018, http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table*

While the number of total researchers in Romania has declined with approximately 8000 people since 1995, the number of agricultural researchers has been declining until 2000 and then it started to rise slowly, in 2017 there were more agricultural researchers registered than in 1995. The evolution trend may be followed in Figure 2.

Figure 2. *Trend evolution of the registered researcher number*



Source: *www.insse.ro, tempo online, last accessed November 2018, http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table*

The above figure confirms that, even if small, the number of agricultural researchers follows an increasing trend, while the total number of researchers follows a descending one. Yet, considering the importance of agriculture in the state economy, the number of researchers in this field in infinitely small.

In Table 3 one may observe that the expenditures of the existing research and development units have declined drastically in the 1995 – 2017 time-frame. In this case, we may ask ourselves how performant can this units be?

Table 3. *Evolution of research units' expenditures*

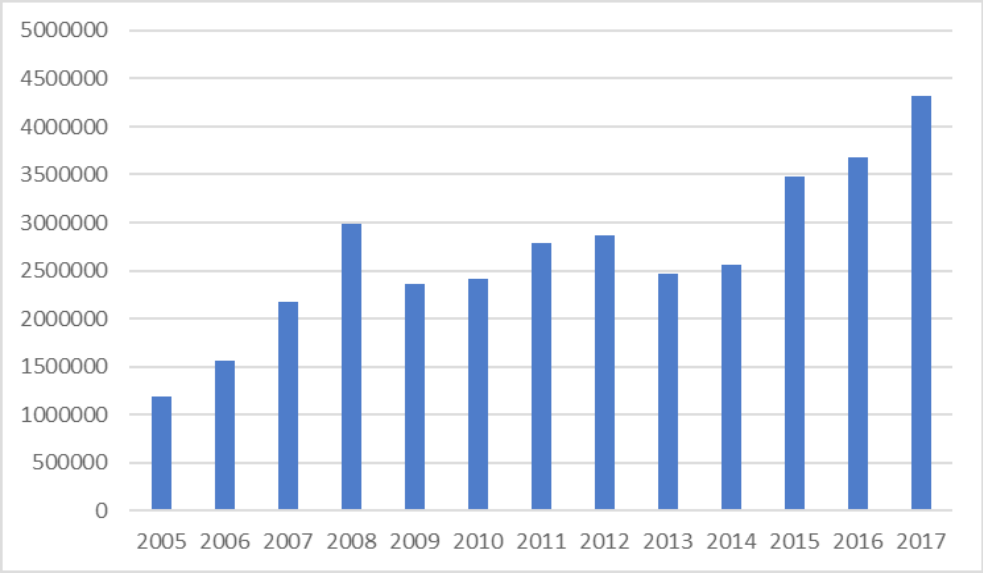
Element	1995	2000	2005	2010	2015	2017
	Mil lei	Mil lei	1000 RON	1000 RON	1000 RON	1000 RON
Total	577,148	2,962,046	1,183,659	2,413,467	3,476,933	4,317,086

Source: *www.insse.ro, tempo online, last accessed November 2018, http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table*

Note: *in 2005 there was a monetary policy that changed the national currency from lei to RON and it cut four zeros from the leu to make it a RON.*

Starting from a small sum in 1995, the expenditures made by the existing research units have increased considerably, even if the number of units has decreased. Yet, most of these expenses are for salaries and maintenance, while the investments are put aside.

Figure 3. *Trend evolution of the registered expenses from the research units between 2005 and 2017*



Source: *www.insse.ro, tempo online, last accessed November 2018, http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table*

The above figure shows that the expenditures from the research and development units have increased in the analysed period and they follow an increasing trend for the future. Yet, those expenses are the bare minimum for such a unit that should provide practical results for the interested market.

The aim of this paper is to present the main factors which currently stand against the development of agricultural research, and it offers some solutions for overcoming the current impasse of the domain.

Some limitations of this research may come from the closeness and experience of the author in relation to this topic and also form the lack of a detailed statistics on this area of interest.

The barriers of agricultural research development

Based on adopting capitalist market relations, agricultural research has faced:

a) A chronic under-financing of this sector;
b) Shortcomings in market relations;
c) Increasing aggressiveness of competition from foreign firms.

Chronic under-financing of this sector

Undoubtedly, the post-communist Romanian society has reduced the public funds granted to the research to near humiliation, because:

- It constantly faced profound economic and financial imbalances;
- A clear, coherent and predictable doctrinal and legislative line has not been identified, promoted and adopted.

Shortcomings in market relations

Agricultural research, since its institutionalization in the last century and up to the point of post-totalitarian reforms, has manifested itself in the market, in a partnership relationship, following the formula:

Figure 4. *Research – production correspondence in the communist period*

Source: *own representations*

After the collapse of communism, agriculture was given priority over the other sectors of the economy, in a vast and profound process of reform, after which, over a decade, the network of large production units, consisting of about 3000 cooperatives and almost 420 of state units disappear and in their place are re-activated small family-type entities counting around 4 million, as they were in 2000 (insse.ro, 2018). Today, there are around 3.4 million small farms that are supposed to be information consumers in agriculture.

For the research units in agriculture, even if they managed to go through the great reforming wave with little organizational structure, the collapse of the big manufacturing units in the branch meant the beginning of the decline and then of the functional and economic disaster.

In Table 4 the proportion of farms with only family workers may be observed. Romania has a much higher percentage that the EU average in 2013.

Table 4. *Distribution of the labour force according to the extent of the family labour force, 2013*

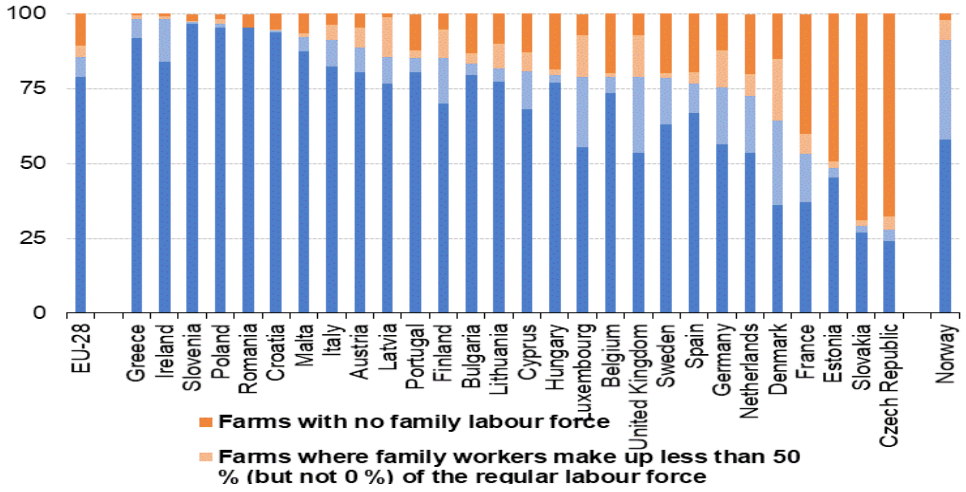
Element	Farms with only family workers	Farms where family workers make up 50 % or more (but not 100 %) of the regular labour force	Farms where family workers make up less than 50 % (but not 0 %) of the regular labour force	Farms with no family labour force
EU-28	78.8	6.7	3.7	10.8
Romania	95.4	0.1	0.0	4.4

Source: *Eurostat (Farm Structure Survey, 2013)*
Note: *based on annual work units (Annual Work Units)*

One may extract from this table that the availability of a family working in agriculture to spend money on research results is close to none. Even more, why should it spend money on them when they address the large agricultural unit?

In Figure 5, a comparison between the EU countries based on the family labour force places Romania in the category of countries that mostly use this type of labour force, while the salary labour force in insignificant.

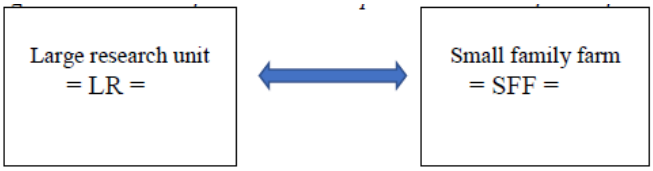
Figure 5. *Distribution of the labour force according to the extent of the family labour force, 2013*



Source: *Eurostat (Farm Structure Survey, 2013), available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Agriculture_statistics_-_family_farming_in_the_EU#Main_tables*

Now all research institutes and research centres have been faced with new market relations, which in their essence were imbalanced and incapable of generating functional progress factors, functioning on the following relations scheme:

Figure 6. *Research – production correspondence in the capitalist period*



Source: *own representations*

They were objectively economic non-functional relationships because they put in front of over 60 institutes and research facilities of agriculture and forestry the impossibility to economically relate to nearly 4 million small and very small, family-type productive entities.

Because the economy takes over and even copies the examples of nature, we could say, without exaggerating, and considering the opinion of the physiocrats that these relationships were like the crossing between a pureblood horse and a donkey, with the simple observation that the product of the two would always be sterile.

Increasing aggressiveness of competition from foreign firms

Romania's entry into the European structures, a process followed almost simultaneously by the liberalization of the markets, has made the results of national agricultural research less and less valuable for the demand of the domestic producers and for generating technical progress factors.

In fact, the struggle in the market with foreign firms was unequal, with losers being constantly the domestic actors. Both the research infrastructure and, above all, the decision-makers, as a rule and with indisputable scientific results, have hardly been able to cope with the foreign offensive, I dare to say, previously thought out and planned, based on the most cynical management rules and competitive marketing, but also on the long experience gained by them.

Retrospectively, and in summary, compared to what has been described above, research, as an agricultural policy issue, has multiple facets that demonstrate the crisis that this sector is undergoing.

It is a profound crisis that lasts for over a quarter of a century!

Contrary to what they wished to disappear, as has happened with many of the upstream agriculture-producing capacities, such as 'Tractorul Brasov', 'Combinatele chimice, Semănătoarea Bucuresti' and others, miraculously, agricultural research still exists and still does its duty, even if much lower than what it could normally give.

Here, the merit is of all those who have continued their activity in the research institutions, as much as they were left after the reforming wave of the economy.

The fact that these people continued to work despite minimum income and poor conditions, the loss of credibility of the system, diminishing public support, and others, supports many interpretations that can be motivated by various arguments, which are more of a personal, and less, of general, social, political or even economic cause.

Researchers' stubbornness to continue working in the system, although in many ways the results of their work support critical interpretations, is of special value. Through them, the flame of the creative power of this nation has survived!

Conclusions or possible solutions for reviving the agricultural research sector

We are in the period when agricultural research reached the point of maximum supportability by the forces that compressed its space of manifestation.

Such a phenomenon determines in physics the implosion of the whole, and in our case, the manifestation of a simple question, on the Hamletian formula "how long will it be able to resist or not?"

The key to returning to the functional parameters of Romanian research may result from:

1) Linking research to the market as a priority, and here one may talk about the knowledge market, and, second, about the intensifying efforts to increase budget allocations, a solution which, in the current economic and social context, and in the near and medium future is not able to provide an optimistic radius.

2) The increasing potential of agricultural demand for the progress factors, in which the results of research occupy a central place, amid the development of industrial farms, at a constant accelerated pace. However, the performance demonstrated by yield increases per hectare or per head of animal requires, above all, technical progress. From this point of view, we can say that there is real demand for the scientific product as the main factor of progress.

3) Taking the example of foreign, big companies providing progress factors. While these firms intensify contacts, in various forms with the farmers, through symposiums, seminars, round tables, work visits and others, agricultural research institutes and resorts are becoming more and more isolated. Because of this, the danger of gradual compression to the disappearance of native research is not a false alarm, a metaphor, it is a reality.

4) To study, evaluate and intensify the operationalization in the knowledge market of vectors, linking producers and consumers of information, namely research and farmers, because:

a) The vectors in question, with special references to education, consultancy, the media and others, do not belong to the producer or to the consumers of information, which is why they are outside the interests of the two actors.
b) A large part of the mentioned vectors is still in the responsibility of the public power, because it has been assumed that the promotion of the new branch must be in accordance with the national strategic interests, nor because of the particularities of the productive sector.

5) Dynamic energies in the knowledge market must come from information producers, as research goes from top to bottom, that is, it descends from those who generate it to those who need it. So, the first step is of the researcher, both in terms of production and dissemination of the result, and only afterwards comes the activity of the farmer as a consumer of information.

It is a relationship demanded by both sides, but with an initiative on the part of the offer. Without the effort of public research, the farmer may resort to an experience that is much easier, but traditionally and poorly productive, or resort to the market for foreign inputs of technological progress, but more expensive than domestic and risky commercial conditions.

6) Accepting that in the knowledge market, the highest costs are in the sphere of information consumers and not in the producers of information, respectively the research. The most often cited example here is the law of gravity. During the passage of Isaac Newton's formulation of this law, generations and generations of students have so far tried to understand and to know it.

It is clear that the efforts, at the knowledge level are much higher, immeasurably higher than those at the time of the law of gravity.

By extension, the previous example is also in agriculture, but on other themes. For example, to create a plant variety or a new breed of animals, much less is spent than with the efforts generated by their assimilation into production.

This phenomenon leads to the conclusion that efforts to support research must be conjugated to those intended to encourage consumption.

If one of the two segments in the market is supported and encouraged to the detriment of the other, or both are neglected, then naturally their activity is marginalized, according to the present situation.

7) Approaching production research by exploiting all possibilities that can form an effective link between the two components of the knowledge market. The solution, promoted by some circles in the sphere of legislative power poles, which understand the reinvigoration of agricultural research through the institutionalization of management as an intermediary structure between research and agricultural producers, is only to further drift apart the producers and the consumers of indigenous information.

The purpose of this proposal, if gained power by law, can only lead to a double failure: first of all, of the newly created structure and, together with it, the entire institutional scaffold that supports the current agricultural research.

Obviously, agricultural producers, especially those connected to high-performance inputs, will experience the shock of such a situation but it would not affect their functionality to a decisive extent.

8) In the civilized world, the research market is configured in more elaborate schemes that have proven to be functional.

Classical information producers, the same as us, delegate the responsibility of disseminating knowledge to territorial development centres. In turn, agricultural producers are organized in cooperative or associative structures with responsibilities in taking over and disseminating information from territorial centres.

This results in a functional market partnership, public and private, between medium-sized structures with flexible activities in which the objectives are compatible.

9) Knowledge, as a factor of production, will surely and not long be out of the scope, it will leave the abstract and acquire concrete valences when it will be found as an expense element in the cost of all products.

Under these circumstances, the centres of gravity in research funding will move from the public budget to the private sector, and the responsibility of the research will come mainly to economic agents.

10) Scientific knowledge, as a direct product of research, has a dual representation in the economy: first, it is an intangible asset, and secondly it is a production factor.

As intangible asset has some essential characteristics, namely: it is the part of the heritage with the highest dynamism; has a high degree of volatility, when it has the quality of public good because it escapes the control of the national authority; has a high speed of movement under current technical-scientific conditions.

The direct consequence of these features is that, as the globalization process intensifies, knowledge migrates from poor economies to developed countries. In other words, scientific production is naturally polarized by the rich world, which facilitates the migration of brains and ideas from countries of origin in formulas that go beyond boundaries of morals or value-equivalents.

Also, Bara (in Popescu and Istudor, coord., 2018) appreciates that by setting up or legalizing at the level of research and demand the institutes or research centres a "system of subscriptions to agricultural advisory services", it is possible to create real premises for reviving, on new bases, the connections between public research and the links between existing qualified human resources and small farms.

For starters, agricultural and forestry research institutes or plants, depending on the specifics of each individual, can design and place on their sites the kinds of services they can offer. In addition, after launching the system of subscriptions to agricultural advisory services, actions should be taken to raise awareness of potential beneficiaries through national and regional media.

Bara (in Popescu and Istudor, coord., 2018) considered that such an initiative is possible to implement, given the widespread use of social media devices, that in the present make everything interconnected and interdependent, and so our understanding of the world and the way we interact with each other has received new valences, contributing to the unified dissemination of knowledge even at the level of the agricultural producer.

The proposed solutions come from a direct implication in the agricultural research sector, and from witnessing what has happened in the last decades in this important area.

The author considers that any country that respects itself must have a resourceful research branch, in order to offer support in political decisions and to ensure the long-term development of the country.

There are also financial solutions for improving the quality of agricultural research that come from the EU's part, in the form of financing measures for SME's, for cooperation between farms and for public policy development (Popescu, 2018b).

In this context, the priorities of the European Commission for Innovation are, in fact, the synthetic expression of the needs described in the documents of the EU Member States, so also of Romania, and refer to:

- Support the development of innovation in priority areas and SMEs, mainly through the Horizon 2020 Program;
- Fostering the widening of the marketing of innovation in the EU, including through: public procurement for innovation; implementing innovation projects; developing appropriate policies to stimulate demand for innovation; expanding innovation in the public sector; the development of social innovation;
- Developing and implementing public socio-economic policies for goods and services as well as social innovation policies both for the purpose of modernizing Europe and accelerating the market penetration of essential generic technologies;

- Establishing "key methodologies" that consider the results of specialized surveys and the recommendations of the specialized institutions such as the European Innovation Observatory, on: the innovation process; access to finance; the socio-economic transformations induced by digitization; the existence of the European single market; intellectual property; standards;
- Supporting cluster development and cooperation to stimulate innovation across all business categories.

At national level, as prof. Sin (Sin in Popescu and Istudor, coord., 2018) observes from 2009 until the beginning of 2017, only two government decrees were issued regarding the land owned by research units, thus actually reducing the agricultural land managed by research units in Romania.

The lack of investments in research as a whole, and in agricultural research as a specific topic, both from national and European funding options, leaves Romania as an open market for private and expensive research.

The Romanian farmers are put in the position of not having a voice regarding what type of information they want, so the only information they receive is not cut out for their specific needs.
In this case, the demand and the offer are not correlated even more there is a severe disproportionality of power between them.

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ANALYSIS OF THE COMPETITIVENESS OF THE ROMANIAN PORK AND POULTRY MARKET

Georgiana Raluca Lădaru[1], Ionut Laurentiu Petre[2]

Abstract

This paper aims to analyse, from a macroeconomic perspective, the meat market competitiveness, especially for pork and poultry species. These two sectors have been established because, as can be seen in the content of the paper, meat derived from them is most often consumed in Romania. In order to determine the competitiveness of the producers, it will be analysed quantitatively and qualitatively, data recorded in the Structural Survey of Agriculture in Romania, which is carried out every three years. Data on the size and number of holdings will be analysed. Also in determining the competitive nature of these two markets, indicators such as meat consumption, import, export, trade balance, as well as the price level for these products will be analysed.

Key words: *pig, poultry, meat market, competitiveness*.

Introduction

The analysis of competitiveness is of great interest, as Penkovskii et al. (2018), which conducted a study on competitiveness on the heat market, but which can be appropriate for each market of goods and services, competitiveness is an important element of the economy because it increases the efficiency of the production of goods and services, improves their quality and reduces the price of products for consumers. According to Kuncoro et al. (2018), competition can be manifested in various forms: competition between producers (supply competition) or the entry of new competitors (competitive threat).

1 Georgiana Raluca Lădaru, Ph.D., Associate Professor, Bucharest University of Economic Studies, Department of Agro-food and Environmental Economics, Piata Romana no. 6, Bucharest, Romania, E-mail: raluca.ladaru@eam.ase.ro

2 Ionut Laurentiu Petre, Ph.Ds., Bucharest University of Economic Studies, Department of Agro-food and Environmental Economics, Piata Romana no. 6, Bucharest, Romania, E-mail: laurpetre15@gmail.com

We can consider that the term competitiveness could describe the ability to support, in a global economy, an acceptable increase in the real standard of living of the population, taking into account a fair distribution, while providing an effective degree of employment work for most people who can and want to work; all of which is done without reducing the potential for raising the living standards of future generations (Harpa, 2017; Hautz et al., 2014).

Macroeconomic competitiveness is defined as the ability of a country to produce goods and services that meet the criteria of international markets, while maintaining and expanding real incomes, as well as increasing the welfare of its citizens. In any case, the concept of "competition power" should not be fully explained solely on the basis of a country's production capacity; should be explained by the power of competition of firms as well as by the power of competition at the industrial level (Arslan et al., 2012).

According to Niculae et al. (2015), meat is part of the important products for human consumption, and the determination of its level is an indicator by which the level of living can be measured.

In Romania, annual meat consumption per capita was 65.5 kilos in 2016. Of this, more than half was the consumption of pork and 36.8% was the consumption of poultry meat. Therefore, in Romania, consumption of pork, together with poultry, accounts for about 87% of the total meat consumption. Starting from this situation, it was decided that for the analysis of the competitiveness on the meat market in Romania, the two livestock breeding sectors, namely the pig and poultry sectors, should be considered.

Although it is still said that the Romanian agriculture is fragmented, as confirmed by Alexandri et al. (2015) *„Romania is the country with the largest number of subsistence farms in the European Union. Practically, out of the 3.7 million farms from Romania, 3.3 million can be considered subsistence farms, having in view the extremely low value of the obtained productions".* However, the two pigs and poultry sectors are divided, either in subsistence farms or large holdings, in size. Consequently, in order to achieve the objective proposed by this paper, to determine the competitiveness of the market, for the two sectors, the above-mentioned holdings, respectively those for performance will be analysed.

Materials and methods

In order to determine the competitiveness of the meat market, both pig and poultry, it will be analysed firstly data processed from the National Institute of Statistics and from the Structural Agriculture Survey, about the number of farms that grow these animals, and their size, in order to determine the average size of a holding and its evolution. It also takes into account indicators such as meat consumption, export, import, but also the price of these products.

With the help of these indicators, both qualitative and quantitative analysis will determine the evolution of market competitiveness, but also the analysis of foreign trade that can influence this competitiveness. For this latter part, the Grubel-Lloyd indicator will also be calculated, which determines the external trade situation, ie the balance between exports and imports for the respective industry (Fukasaku, 1992):

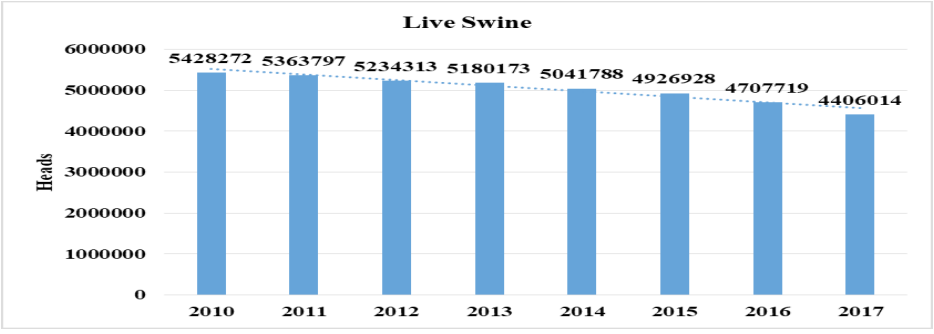
$$GL_i = 1 - \frac{\|X_{ij} - M_{ij}\|}{X_i + M_i}, \text{ where:}$$

X_{ij} represents the export value of the product i in country j
M_{ij} represents the value of imports of the product i in country j

Results and discussions

In order to be able to analyse the competitiveness of the pig and poultry meat market, it is necessary to consider the evolutions of livestock and productions first. Thus, in this first part, these two indicators will be analysed for the two sectors in order to form an overview for this sector.

Figure 1. *Analysis of the evolution of pigs in Romania, 2010-2017*

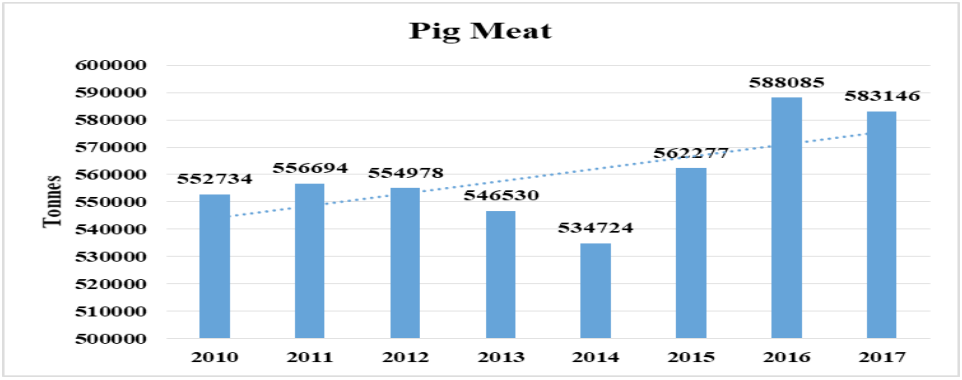


Source: *processing based on NIS data*

Figure 1 shows the evolution of pig population in Romania during 2010-2017. It can be seen that the national herd has a decreasing trend, with decreases in the number of animals from year to year. If in the first year of the period in Romania there were about 5.43 million pigs, in 2017 there were only 4.41 million heads, with over 1 million animals less and 18.8% respectively. As can be seen in the figure, the pig population is constantly decreasing from one year to the next, with an average decrease of 2.94%. These reductions in livestock can be attributed to the high costs for this species, the highest share being the cost of feed, but also the aging and migration of the rural population.

To analyse objectively and to assess possible discrepancies between livestock and production, Figure 2 proposes an analysis of the live quantity of pigs for slaughter.

Figure 2. *Analysis of weight evolution of slaughtered pigs in Romania, 2010-2017*



Source: *processing based on NIS data*

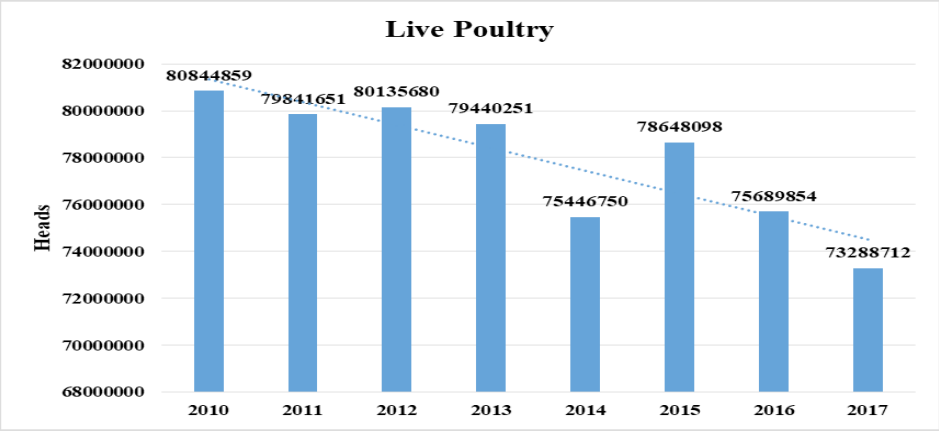
Figure 2 shows an oscillation of the quantity of pig meat destined for slaughter, but there is an increasing trend throughout the analysed period. In 2010, about 553,000 tons of meat was slaughtered, and in 2017 this quantity was 583,000 tons, 30,000 tons higher. It should be noted that, compared to the situation of the flocks, neither of these two ends of the analysed time interval was the minimum or maximum point, these was recorded in 2014 and 2016, respectively. In 2014, the minimum of the analysed period was recorded, the quantity given for slaughter being 535 thousand tons, this situation can be attributed to the Russian embargo on the European Union, when the trade between them was stopped. However, the situation has been balanced in the coming years, and pork production has risen, with a peak of 588 thousand tonnes in 2016. Thus, the average annual growth

rate for the whole period was 0.77%, and the live quantity of pigs for slaughter increased by 5.5%.

Taking into account both the evolution of pigs and the production of pigs, it can be considered to be an extensive behaviour, respectively the decrease in the number of flocks (and by slaughtering) can lead to this increase in production. However, given the average increase of only 0.77%, it can be assumed that there is some constancy of this quantity from one year to the other, namely a constant number of slaughtered pigs or holdings sacrificing these pigs.

Moving to the second category of animals, namely birds, in Figure 3 it is proposed to analyse the flocks for this category.

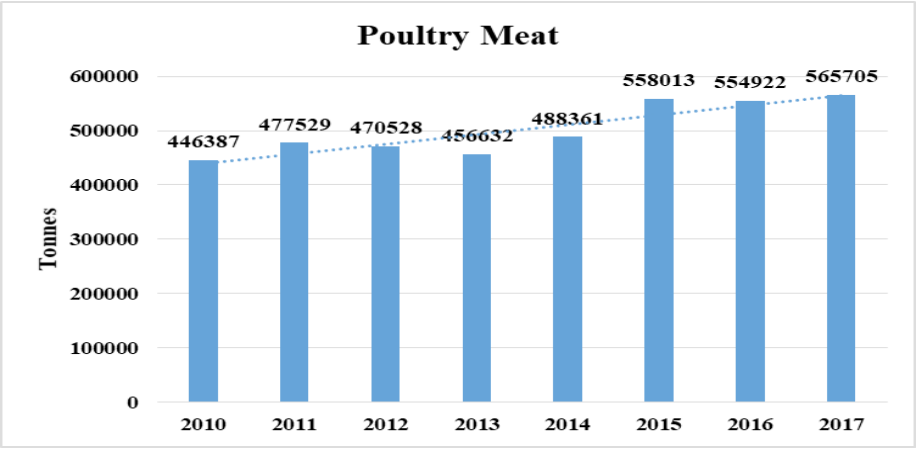
Figure 3. *Analysis of poultry livestock in Romania, 2010-2017*



Source: *processing based on NIS data*

As far as the evolution of poultry flocks is concerned, during the reference period it is decreasing. Although in the first part of the time span, the evolution of the number of birds has an oscillating character, increasing and decreasing from one year to the next, in the meantime the number of birds decreased considerably, if in 2010 there were about 81 million heads, in 2017, they were only 73.3 million. Similar to pork production, in 2014 there is a lower number of poultry in Romania, compared to previous and next years, of about 75.45 million heads. During the whole period there was a decrease of 9.35%, and the annual decrease was on average of 1.39%. These drops in poultry can be attributed to the aging population and the depopulation of rural areas, coupled with the increasing accessibility of the rural population to retail stores selling these products.

Figure 4. *Analysis of weight evolution of slaughtered birds in Romania, 2010-2017*



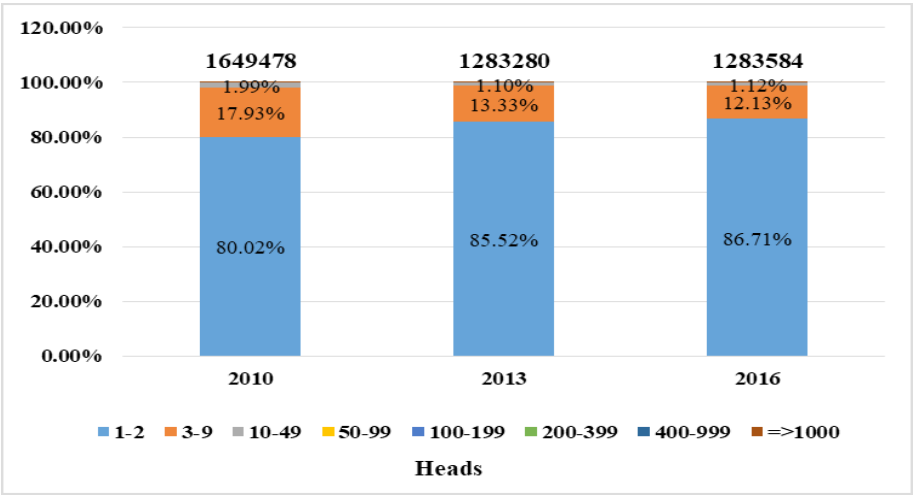
Source: *processing based on NIS data*

Analysing the evolution of the live weight of birds destined for slaughter can be seen in Figure 4, an increasing trend of this indicator. In 2010, about 446.4 thousand tons of poultry meat was sacrificed, and in 2017, 26.7% more, respectively 565.7 thousand tons, the highest increase in the 8 years analysed. On average, there is an average annual growth rate of 3.44%.

Considering this substantial increase in poultry production and comparing with the evolution of the flocks, it can be considered that besides the decrease in the number of flocks that can be sacrificed and thus contributing to the increase of the production, there are other factors that contribute to it. Considering that this species cannot greatly change the weight at the time of slaughter, an explanation for the increase in production may be that of increasing competition on the market, namely by setting up medium and large commercial holdings.

In order to be able to ascertain more precisely whether the aforementioned aspects are true, the evolution of the structure of the pig and poultry rearing farms will be analysed.

Figure 5. *Structure of pig holdings by size class, Romania, 2010-2016*



Source: *processed data based on GAC 2010; SSA 2013, 2016*

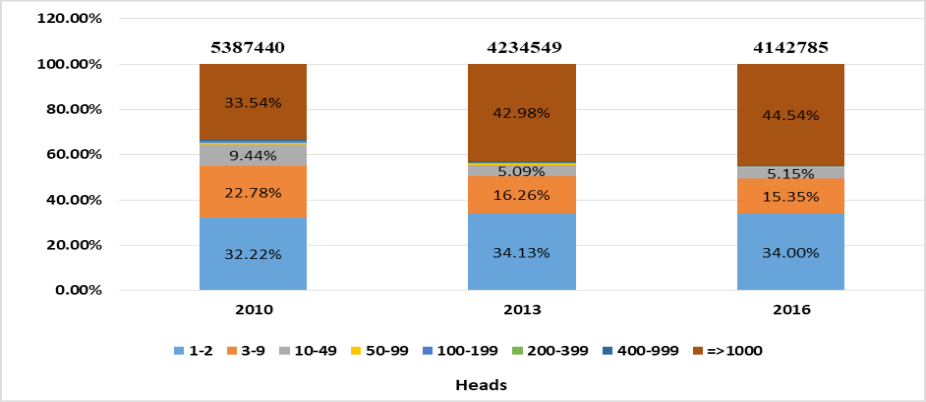
As can be seen in Figure 6, pig holdings have decreased in the past few years, analysing data from the General Agricultural Census and the last two Structural Surveys in Agriculture, we can see that from 1.65 million pig holdings (in 2010) it reached 1.28 million in 2016, a decrease of 22.18%; but with 300 farms more than in 2013.

If we structure these farms in their size class, it can be observed that for pigs, more than 80% of farms have a size of 1-2 heads, which defines an extensive character, ie farms of subsistence. Then, with a percentage between 12% and 17%, holdings ranging from 3-9 heads are ranked second. The next class, the 10-49 head, holds the third, but low, 1-2%. And the other classes comprise less than 0.1% of all holdings. Thus, holdings of over 50 heads are about 400 in 2016, 40% less than in the previous survey period (2013), when about 700 holdings of this size were registered.

Although the total number of pig holdings is reduced considerably, the only breed in which household increases are recorded is sub-intensity (1-2 heads), which, if in 2010, had a share of 80%, in 2016, it holds almost 87%.

This situation is not an encouraging factor for the competitiveness of the pig meat market, but the following figure will show the structure of the pigs kept by these farms according to the size classes.

Figure 6. *Structure of pig herds according to the size of the holding, Romania, 2010-2016*



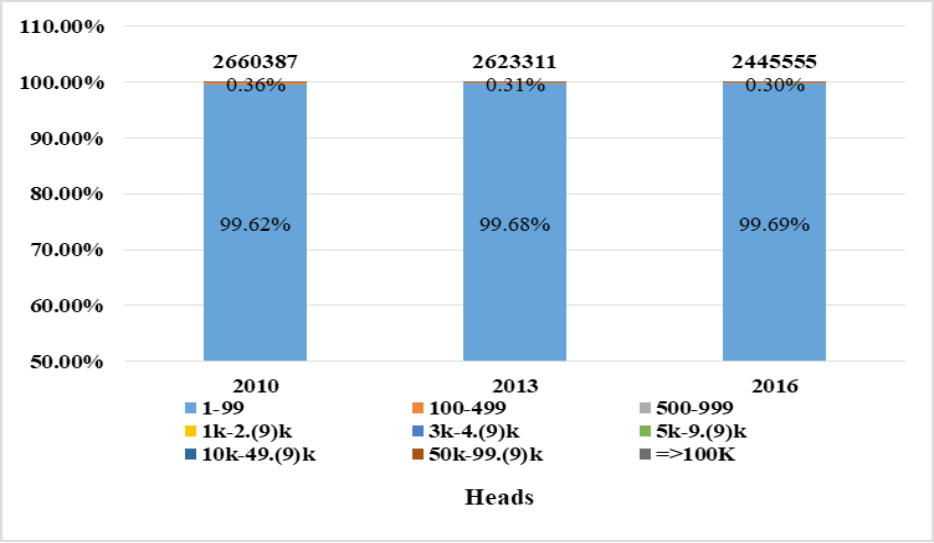
Source: *processed data based on GAC 2010; SSA 2013, 2016*

As the total actual animal indicator has already been analysed, and a decreasing trend has been determined, it is obvious that the total flock is decreasing too in this situation shown in Figure 7. However, it can be observed, considering their distribution by size classes, that this sector is divided into two branches respectively that of the small size classes (1-2 and 3-9 heads) and the second branch, respectively in the class of the largest size of over 1000 heads per holding. Thus, over 80% of holdings account for about 32-34% of livestock. The largest share of livestock according to the size of the breeding was in each period at holdings of over 1000 heads (between 34% and 45%). Therefore, the 400 holdings of over 50 heads of pigs hold almost as many animals (45%) as the other 1283100 farms up to 50 heads.

This encourages competitiveness in the pork sector in the sense that on the one hand there are subsistence and semi-subsistence farms that produce for self-consumption, and on the other hand there are large intensive farms that produce mass for the rest of the population. Competitiveness in this sector may also be encouraged by the fact that, although the national herd is reduced from one period to the next, the number from large commercial farms increases from 33.5% to 43% and then to 45%.

A similar analysis will be carried out for the poultry sector in order to determine the extensive or intensive nature of this sector and the level of competitiveness of holdings on the market.

Figure 7. *Structure of poultry holdings by size class, Romania, 2010-2016*



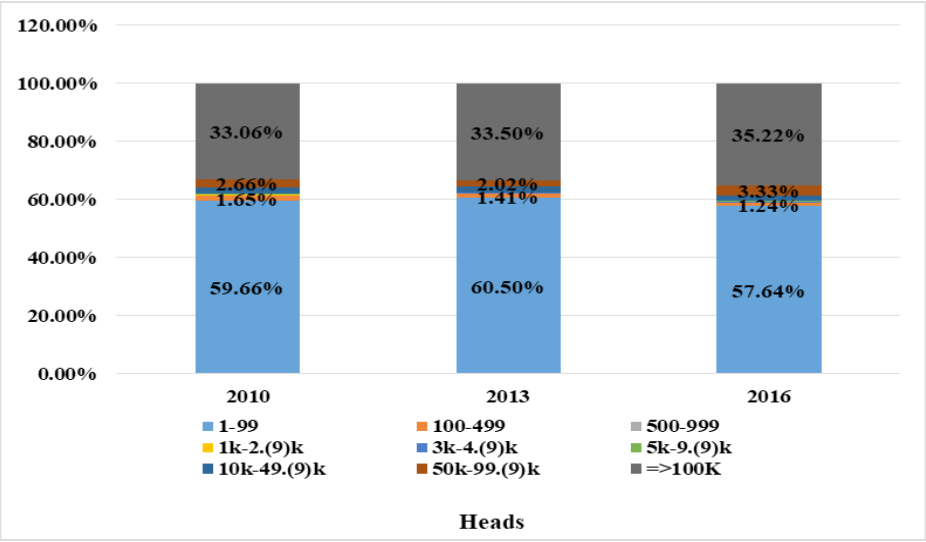
Source: *processed data based on GAC 2010; SSA 2013, 2016*

According to the data taken from the agricultural census and the agricultural survey, there is a decrease in the total number of poultry holdings in Romania. In 2010, there were 2.66 million farms, decreasing in 2013 to 2.62 million (1.39%), and in 2016 there were about 2.45 million poultry farms with 6.78% more fewer than in 2013.

Regarding the distribution of farms of the size class of these, an overwhelming share of over 99.6% of the holdings is in the size of 1-99 birds, and the rest of 0.3-0.4% of the farms places in the class of 100-499 head. Otherwise, by calculating holdings holding over 500 birds, there are 287 holdings out of 2.45 million in 2016, that is, about 0.012%. The majority of the Romanian poultry exploits are of small size, even the size of a household.

However, in order to determine the competitive nature of this branch of animal breeding, we will also analyse and structure the number of birds depending on the size class, especially for the 287 larger holdings.

Figure 8. *Structure of poultry flocks according to the size of the holding, Romania, 2010-2016*



Source: *processed data based on GAC 2010; SSA 2013, 2016*

As anticipated, the structure of poultry flocks according to the size of the breeding is slightly similar to that of the pig sector in the sense that there is a division of flocks, namely those in the size class 1-99 heads that hold weights between 58% and 60%, but there are also those in the large holdings of over 100 thousand heads, which account for 33-35%. It can be mentioned that, although the share of the lowest-class holdings has slightly increased, the share of the flocks has decreased by about 3 percentage points and the situation of large holdings is opposite to that presented. As a result of these data, we can say that both the pig and the poultry sector are divided into: small (semi-subsistence) farms with 55% of the pig population and 60% of the birds, and at the opposite pole there are large holdings (few in number), but holding the other share of livestock, namely 45% for pigs and 35% for poultry.

In order to determine the system of growth practiced for the two livestock sectors (pigs and poultry), the average size of a breeding farm was determined, according to the size class.

Table 1. *Analysis of the evolution of the average size of pig and poultry holdings, Romania, 2010-2016*

SWINE				POULTRY			
Size classes	**2010**	**2013**	**2016**	**Size classes**	**2010**	**2013**	**2016**
1-2	1.3	1.3	1.3	**1-99**	17.8	17.7	18.3
3-9	4.1	4.0	4.1	**100-499**	135.9	131.5	131.5
10-49	15.5	15.3	14.8	**500-999**	628.1	689.7	644.5
50-99	62.7	64.3	66.3	**1k-2.(9)k**	1597.9	1857.3	1831.0
100-199	125.3	114.3	120.3	**3k-4.(9)k**	3770.1	3811.1	3918.8
200-399	277.6	244.4	285.2	**5k-9.(9)k**	7105.3	6841.6	7076.0
400-999	667.2	699.5	685.0	**10k-49.(9)k**	26388.3	23078.5	24274.3
=>1000	12210.2	11818.4	13874.9	**50k-99.(9)k**	69852.4	67025.9	71482.6
AVRG.	3.3	3.3	3.2	**=>100K**	314124.1	375843.9	405827.6
				AVRG.	29.6	29.1	31.6

Source: *author's calculations*

For the pig sector it can be seen that the average size of a small holding (up to 50 pigs) does not suffer significant changes, especially for the first two size classes, where the average size of a holding remains the same. However, there are differences favourable or unfavourable to holdings of higher grades. In most cases (except for the 100-199 class), it can be noticed that the average size of a large farm is increasing in 2016 as compared to 2010. On average, at national level, given that small farms have the highest weights, the national average size of holdings decreases by 0.1 animals per holding, reaching 3.2 heads per farm. Similarly, the poultry sector is also positioned, meaning that for the first two classes, the size of holdings is similar in each period, and holdings over 500 heads record changes in the average size. For most size classes, the size of larger farms increases with a higher rate. The most significant increase is recorded in the last, and the highest class, the over 100 thousand heads, for which the average size in 2016 was 406 thousand birds for one farm, higher than in 2010 with 29.2%. And the country's average size has risen by 2 more birds than in the first year under review.

In order to determine the commercial character of these holdings, Tables 2 and 3 will also analyse their legal status in terms of both their number and the number of animals.

Table 2. *Analysis of the evolution of pig holdings and herds by legal status, Romania, 2010-2016*

SWINE	2010	2013	2016	2013/2010	2016/2013
Total Holdings	1649478	1283280	1283584	-22.20%	0.02%
Without legal personality	1648558	1282527	1283083	-22.20%	0.04%
With legal personality	920	753	501	-18.15%	-33.47%
Competitive holdings	247	221	185	-10.53%	-16.29%
Livestock					
Total	5387440	4234549	4142785	-21.40%	-2.17%
Without legal personality	3554025	2384662	2277560	-32.90%	-4.49%
With legal personality	1833415	1849887	1865225	0.90%	0.83%
Competitive holdings	1821616	1838791	1860849	0.94%	1.20%

Source: *authors calculations based on GAC 2010; SSA 2013, 2016*

As mentioned above, the number of pig holdings is decreasing and holdings with no legal personality tend to maintain the same trend, even the same percentage (because they account for more than 80% of the total). Analysing holdings with legal personality, there is also a tendency for decreasing, even successive and accentuated. The holdings named in this paper are competitive depending on those with legal personality, of which the ones that cannot be of a commercial character have been lowered; and they register a decreasing trend of their number, but lower (half) than the previous category.

By analysing the herds by the status of the holdings, surprising situations may arise. Thus, on a general level the flocks maintain the trend of the number of holdings, in addition to the percentage. The number of non-statutory holdings declines at a faster pace, and surprisingly, even if holdings with legal personality are fewer, they hold a larger number of animals, and those who are truly competitive are even higher in numbers. This is evidenced by the increase in the average size of strong market holdings, which has been previously analysed in Table 1.

The number of poultry holdings in general decreases in 2013 and 2016, and with the same percentage decreases the number of holdings without legal personality, a phenomenon explained by the fact that this category accounts for over 99.5% of total holdings. Also, the trend (decline) is maintained for holdings with legal personality, even at a faster pace. However, even if in 2013 the competitive holdings decrease the most, in 2016 they are recovering by an 8.29% increase over that period, which shows an increase in competitiveness on this market.

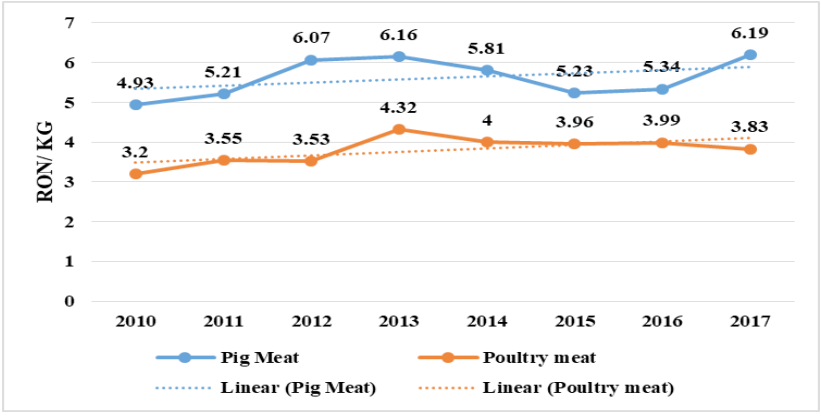
Table 3. *Analysis of the evolution of poultry holdings and herds according to the legal status, Romania, 2010-2016*

POULTRY	2010	2013	2016	2013/2010	2016/2013
Total Holdings	2660387	2623311	2445555	-1.39%	-6.78%
Without legal personality	2659327	2622377	2444751	-1.39%	-6.77%
With legal personality	1060	934	804	-11.89%	-13.92%
Competitive holdings	243	205	222	-15.64%	8.29%
Livestock					
Total	78866755	76301194	77195179	-3.25%	1.17%
Without legal personality	48593569	47377013	45595273	-2.50%	-3.76%
With legal personality	30273186	28924181	31599906	-4.46%	9.25%
Competitive holdings	30226995	28794588	31568848	-4.74%	9.63%

Source: *authors calculations based on GAC 2010; SSA 2013, 2016*

Regarding poultry flocks, they decrease in the first phase, but return with an increase of 1.17% compared to 2013. The number of birds in holdings without legal personality is constantly decreasing. On the other hand, the holdings with legal personality and the competitive ones (which belong to the previous category, but with some exceptions) tend to be similar to the number of competitive holdings. Thus, if in 2013, the number of poultry in these farms decreased by 4.5-4.7%, in 2016 it grew by 9.3-9.6%, as compared to the previous period. Therefore, both for the pig sector and the poultry sector, even if commercial holdings, defined as competitive, have diminished from the market, they managed, on average, more animals than the previous period, which still establishes the evolution of competitiveness on the meat market. According to the economic theory, this increase in competitiveness should have an effect on the price of these products.

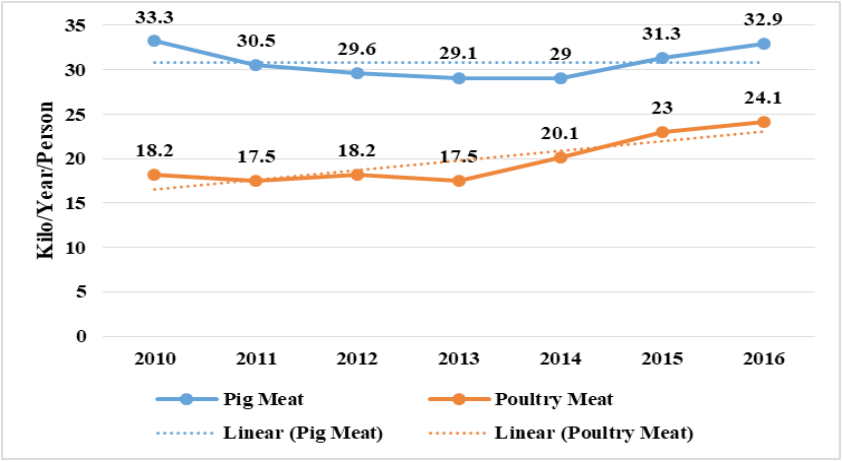
Figure 9. *Analysis of the evolution of the price of pork and poultry meat, live, Romania, 2010-2017*



Source: *own processing based on NIS data*

Although the competitiveness on the market of these two agri-food products is increasing, this price is generally increasing. For pork, live, an average price of 5.6 lei per kilogram is recorded, it recorded an annual average growth of 3.3%. For poultry meat, the trend is similar to that of pork, respectively growing, with an average annual growth rate of 2.6%, with an average price for the entire period of 3.8 lei per kilogram. The price may have this trend for at least two reasons, namely the level of inflation, or the level of market demand. In order to determine this second aspect, the level and evolution of consumption of pork and poultry will be analysed in Figure 10.

Figure 10. *Analysis of the evolution of consumption of pork and poultry meat, Romania, 2010-2016*



Source: *own processing based on NIS data*

According to the National Institute of Statistics, the consumption of pork is the highest in Romania, averaging 30.8 kilograms per inhabitant, for the analysed period. It can be seen that the trend of this indicator is slightly decreasing, with an average annual rate of -0.2%. Thus, it is not claimed that this demand is increasing in order to be justified and the increasing price, but on the other hand if we extrapolate to the population of Romania, we find that there is an average total consumption for this period of 615.8 thousand tons of meat, which far exceeds domestic production, so this situation can justify the price increase.

Concerning the consumption of poultry meat, this is in the second place in the Romanians' preferences, with an increasing consumption in this period, which reached in 2016 to over 24 kilos per capita. This increase in consumption can

put pressure on the price of poultry meat that has seen increases as seen in Figure 10. Relative to the whole population, the total average consumption of poultry meat amounts to 395.3 thousand tons, which is, in theory, covered by domestic production, but this can also interfere with foreign trade which affects the internal availability of poultry.

Table 4. *Analysis of foreign trade with pork and poultry meat, Romania, 2010-2017*

SWINE Meat								
TONNES	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
IMPORT	198914	157696	156454	150118	163559	188689	196966	232387
EXPORT	3875	5685	18337	14540	17909	17890	29422	32604
Trade Balance	-195039	-152011	-138117	-135578	-145650	-170799	-167544	-199783
POULTRY Meat								
TONNES	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
IMPORT	93528	90584	111046	96063	119009	124479	136563	142049
EXPORT	58580	75114	78447	69566	59044	66282	64621	59406
Trade Balance	-34948	-15470	-32599	-26497	-59965	-58197	-71942	-82643

Source: *own processing based on ITC*

As is normal, given that domestic production of pork does not cover consumption needs, the volume of meat imports is much higher than that of exports. On average, imported pork increased annually by 2.25%, reaching a volume in 2017 of 232.4 thousand tons. Although demand is not covered by domestic production, the volume of pork exports has increased considerably, which may be an argument to increase competitiveness in this market; thus, on average, the annual growth rate was 35.5%, during the period 2010-2017 the export registered an increase of about 8.5 times, from 3.8 thousand tons to 32.6 thousand tons. However, it is obvious that the trade balance of this species is deficient, with an average deficit of 163 thousand tons on average over the whole period.

Although demand in the poultry meat market is covered by domestic production, there is a high import volume exceeding the export volume. Thus, on average, during the period 2010-2017, about 114 thousand tons are imported per year and about 66.4 thousand tons of exports are exported annually, thus there is a trade deficit of 47.8 thousand tons. A reason for this situation can be found in the consumer's sphere, which may prefer other bird species than the most common in Romanian farms. And the second reason may be the average import price that

may be lower than the domestic price, because the level of intensity of this sector is low.

In order to determine the balance between import value and export value, the Grubel-Lloyd index, as shown in Table 5, was determined.

Table 5. *Determination of the Grubel-Lloyd index for trade in pork and poultry meat, Romania, 2010-2017*

Grubel-Lloyd Index	2010	2011	2012	2013	2014	2015	2016	2017
Swine	0.9921	0.9942	0.9952	0.9948	0.9947	0.9943	0.9941	0.9920
Poultry	0.9989	0.9990	0.9989	0.9996	0.9994	0.9997	0.9988	0.9988

Source: *author's calculations*

As can be seen in Table 5 for pork, the Grubel-Lloyd index varies between 0.992 and 0.995, so it can be interpreted that the import value is in balance with that of the export. For the poultry meat sector, it can be seen that the value of this index is closer to 1, varies between 0.9988 and 0.999, so the balance between the two values of the trade balance is closer.

Conclusions

In the present paper we wanted to analyse the competitiveness of the pig and poultry market, especially from the point of view of the new entrants, respectively from the commercial farms perspective.

Following the analysis of the evolution of livestock and their productions, similar situations can be observed for the two livestock breeds, so we can conclude that both pig and poultry flocks are reduced, given that the rural population is aging, and the young migrates, as well as the fact that the level of accessibility to these commodities is higher in recent times. Although the herds are reduced, the live weight of the animals given for slaughter increases, which is somewhat normal, if we correlate it with the reduction of the flocks, but not all were destined for slaughter, so it can be considered that there is an increase in farm output take the animals to the slaughterhouse.

Again, a similarity can be found between the two sectors, thus analysing the structure of farms and livestock distributed according to the size class of farms, although most farms (80% pigs and 99% poultry) are included in the smallest

category, they contribute with 35% and 55%, respectively, of total. The other half of the herds are supported in the market by large industrial holdings, which are fewer (less than 1% in weight). Thus, it can be appreciated that both the pork and poultry sectors are divided into semi-subsistence farms and competitive commercial holdings.

The increase in the above-mentioned meat production can be confirmed by the fact that the average size of a small farm remains constant and the average dimension of the commercial farms increases significantly.

Analysing from the point of view of the legal status of the farms, it is noted that the competitive ones are reduced in number, but they increase their efficiency from one period to the next, so even if this growth is an extensive one, it can still be considered a development of competitiveness on these two agro-food markets.

By this expansion of competitiveness, the price level was expected to decrease, but this did not happen, but on the contrary, and this was due to the level of consumption, namely for pig is high, the demand exceeds the domestic production, and for the bird, even if it does not exceed the demand, it puts pressure on price getting bigger.

In the end, imports of pork are needed to support consumption levels and that of poultry is attributable to diversified demand and to the average import price which is more competitive than that practiced at the level of the domestic market.

Both the pork and the meat sector have a competitive advantage on the market in terms of farms, even if they are extensive. Considering the large share of family type farms, one can conclude that there is "space" to further develop medium-sized farms, thereby increasing competitiveness also in this sector.

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TECHNOLOGY PRODUCTION BEANS AND GARDEN PEA ON THE PRINCIPLES OF ECOLOGICAL PRODUCTION

Gordana Dozet[1], Gorica Cvijanović[2]

Abstract

The last three decades have been a growing need for food that has high nutritional value without the risk of possible contamination of soil and water with excess nitrate ions from the production process. The advantage is given to the production of field crops and vegetable plants species from the family of legumes. Leguminoses have the ability to provide up to 70% of their nitrogen needs in the process of biological nitrogen fixation. The study of the case - experimental field experiment with beans and garden peas during 2016-2017 analyzed the influence of varieties and permitted fertilizers in cultivation according to the principles of ecological production. Variation analysis was used for data processing, and the least significant differences were tested with the LSD test. Tours were set up by split-plot design. The aim was to determine the interaction of different genotypes of varieties of both plant species with different organic fertilizers in different agroecological conditions. The beans were more suitable for 2016, while the garden peas in 2017. The highest yield was achieved in the bean with the use of Guanita, and in the garden pea the combination of Guanito + Nitragin + EM active.

Key words: *garden pea, ecological production, sustainability, beans*

Introduction

Primary agricultural production takes place in objective technological and natural conditions. The main objective of this production is to satisfy the needs of the population to export products, neglecting the relationship with the environment.

The consequences of the negative impact of agriculture on the pollution of all resources vital to the survival of humanity are global. This has led many coun-

1 Gordana Dozet, Ph.D., Associate Professor, Megatrend University Belgrade, Faculty of Biofarming, Maršala Tita no. 39, 24300 Backa Topola, Serbia, Phone: +381 24 712 209, E-mail: gdozet@biofarming.edu.rs

2 Gorica Cvijanović, Ph.D., Full Professor, Megatrend University Belgrade, Faculty of Biofarming, Maršala Tita no. 39, 24300 Backa Topola, Serbia, Phone: +381 24 712 209, E-mail: cvijagor@yahoo.com

tries in the last decades of the 20th century to greatly introduce programs and actions in the field of protection, renewal and improvement of the environment. It can be said that today's modern industrial agriculture contributes significantly to climate change releasing large amounts of gases that cause the greenhouse effect. According to the International Panel on Climate Change, about a quarter of greenhouse gases are caused by agricultural production. According to the International Association of environmental activists Greenpeace says that if the trend of agricultural production remains as it is now, in the coming decades to produce 52% of global greenhouse gas emissions, 70% of which comes from the sector of production of meat and milk. Also, excessive use of fertilizers poses environmental risks (excess nitrate in underground and surface flows). The European Community has adopted a number of directives in the field of environmental protection on residues from agriculture. Since the content of nitrate in water in some areas of the EU Member States is on the rise and already high enough to be comparable to the limit values set in Council Directive 75/440/EECU, the EU has adopted a directive binding on all Member States and referring to protection against pollution caused by nitrates from agricultural sources (91/676/EEC) (Council Directive of 12 December 1991 concerning the protection of water against pollution caused by nitrates from agricultural sources). Bertlin et al. (1992) observed the destructiveness that agriculture caused in water and soil.

The consequences that arise should be removed by applying measures in the technology of primary plant production to meet the food needs with the improvement of the environment and a good economic effect.

In addition to changes in the production system, soil cultivation is essential to introduce organic sources of nutrients for plants. According to Aubert (1981) fertilization, tillage and crop rotation are the three pillars of ecological agriculture. The introduction of legumes (field and vegetable) in the production system ensures the maintenance of quality, hygiene and health of the land. The advantage of cultivation of legumes is that they have a specificity of a symbiotic relationship with useful groups of microorganisms.

In today's conditions of production, it is necessary to apply different models of production, production management strategy, and the inclusion of many natural resources and organisms. Within the new technologies, different groups of microorganisms isolated from natural habitats can be included, and

which can be applied to the seed, to the soil or to the foliar through the leaf (Cvijanović et al., 2007; 2015).

Among the microorganisms - active biofertilizers, it is particularly important group of symbiotic nitrogen fixers and microorganisms living in association with plants. In this process, microorganisms fix inert atmospheric nitrogen by translating it into forms that are available for plant nutrition. Since these microorganisms that develop and live in soil associated with the root of plants with their activity stimulatively influence the development and yield of plants with products of their metabolic activity (hormones, vitamins, auxins, gyberellins), (Cvijanović, Dozet, 2017).

Significance and sustainability of breeding beans and peas according to ecological principles

Among the leguminous vegetable plant species that are important for the crop production in vegetable production, beans are of great importance (*Phaseolus vulgaris L.*) and peas (*Pisum sativum*). Both plant species have the ability to live in symbiosis with nodule bacteria and that up to 70% of its nitrogen needs from this relationship, which reduces the significant use of fertilizer in production. During the year, depending on the ecological conditions, the legumes in the community with the rhizobacteria fix up to 400 kgN.ha^{-1} (Wani et al., 1994). As a result, to nitrogen fixation in the course of growth and development of leguminous plants, the proportion of fixed nitrogen in the yield amounts to 10-95% or 20-400 kgN.ha^{-1} per year.

The effective nitrogen fixation between soil bacteria fam. Rhizobiaceae and leguminous plants (fam. Fabaceae) provide about 50% of the total amount of nitrogen that is fixed on Earth (Milošević, Jarak, 2005). Biological nitrogen fixation has only ecological and economic importance, as it can be used as a supplement or replacement of mineral fertilizers (Graham, 2004). Of the total amount of bound nitrogen in this way it is estimated that 25-30% remain in the ground which affects the growth of organic matter in soil and the best distribution of nitrogen for the next crop (Cvijanović et. al., 2013). Modern agricultural practices and technologies are largely concerned with the phenomenon of azotofixation and its frequent use, as well as the importation of other types of ecological microorganisms. The goal of organic production is its "biologization" (Đukić et al., 2007; Best, 2010). In this respect, the use of other types of effective mikoorganisms is particularly desirable given that microorganisms are the key and most important factor in the formation and maintenance of equilibrium in ecosystems (Parr et al., 1992).

Beans and peas are very important as functional food because they are rich in substances important for the preservation of human health. Grains of beans by chemical composition contain essential biological substances: proteins (26 %), carbohydrates (52 %), fats (2.1 %), then all essential amino acids, lecithin, potassium, etc. Pods of bean are rich in pectin, and thanks to a good combination of fiber and folic acid have a number of advantages in maintaining human health. Regular dry beans are the most important food product for direct consumption in the world (Jones et al., 1999). In the structure of total consumption in Serbia, beans participate with 4.3 %. Consumption of beans in Serbia per capita is 2.6 kg, although in central Serbia it is larger (5.7 kg) than in Vojvodina (4.3 kg). Consumption of beans in the world is lower (2.4 kg), while in Europe it is only 0.7 kg (Vlahović et al., 2010). As a culture with a long tradition of growing beans previously cultivated mostly as intercrop in maize. By changing the mode of cultivation of maize, due to the introduction in the production of hybrids that required a denser set of old varieties disappeared this possibility. Increasing the area under the main crop beans, changed the cultural practices and varieties (Lešić et al., 1981). The production of beans is most often without irrigation, especially for beans in clean crops and with little mechanized operations (Vasić et al., 2003; Todorović et al., 2003; Ćota, Elezović, 2005; Bošnjak, Vasić, 2006; Todorović et al., 2008). In the production of beans are frequent errors in agrotechnology (Vasić, 2003) affecting yield.

In the last ten years (2006 - 2015), a linear increase in the area has been recorded worldwide ($R^2 = 0.3756$) and yield ($R^2 = 0.6963$)[3], and in Serbia the reduction of areas ($R^2 = 0.7375$) and yield ($R^2 = 0.23$)[4]**.** Consumption of beans in Serbia is much higher than production. Market demands are much higher, especially produced according to ecological principles of cultivation (Hendrik et al., 1998) in relation to total production, so that beans are imported from various countries.

The total area in the certification process (counting the organic status of parcels and parcels in the conversion period) is 7998 ha in Serbia, without meadows and pastures. In 2014, vegetables accounted for only 2 % of all plant species that were subject to certification. The production of beans according to ecological principles (organic production) has a tendency to increase the area. In 2015, 15.64 ha of beans were sown in organic production, which is 10.71 % more than in 2014[5].

3 http://www.fao.org/faostat/en/#data/QC
4 http://webrzs.stat.gov.rs/
5 www.dnrl.minpolj.gov.rs/aktuelnosti/obuka-sept2013.html

Pea is a one-year-old plant from the family of legumes, and as a vegetable culture belongs to grain legumes (Gvozdenović et al., 2007). In addition to soybeans, beans and beans, peas are considered the most nutritious vegetables. In diet, his pods and green beans are used, and when ripe grains are maturing, they exceed the beans by their nutritional value. n green seed, there are easily digestible proteins, starch, sugar, vitamin A, B and C, as well as mineral substances of iron, potassium, sodium, calcium and magnesium. Due to its importance in preserving the biological activity of the soil for the last three decades, it is preferable to pea in relation to soy, so the area and yields are increasing from year to year (Kolak et al., 1996). The price of produced and processed beans by freezing, according to ecological principles is 107.5% higher (249.0 RSD) than in conventional (120.0 RSD), which are additional reasons for the organic green pea production[6,7]. Besides the price, consumation of organically produced products with an adequate label are also an imperative (Konstantinos, 2002; Thogersen, 2010).

In Serbia, there are no data on the areas under the ecological production of the garden garden peas.

Materials and methods in the realized experiment with beans and garden peas

In the experimental stady bean and garden pea in the open field, were used two varieties of beans - Zlatko and Maksa and garden pea - Tamiš and Kelvedon, from the Institute of Field and Vegetable Crops in Novi Sad. Varieties of beans have a determinative type of tree growth. Tamiš is a early, and Kelvedon is late in cultivation along the length of the vegetation. The seed was not treated with pesticides.

In the experiment, in an open field is applied pelleted organic fertilizer (Guanito), microbiological fertilizer with effective micro-organisms EM-aktiv and NS Nitragin for beans and peas. Guanito and EM-Aktiv are on the official list of allowed substances for use in organic production.[8]

Guanito is a pelleted organic fertilizer with the formulation of nutrients N:P:K 6:15:3 + 10 Ca + 2 Mg.

6 www.agromedia.rs/tagcloud/cene%20organskih%20proizvoda
7 www.navidiku.rs/firme/organska-hrana/grasak-smrznuti-350g
8 www.dnrl.minpolj.gov.rs/download/organska/2018/5%20Inputi%20u%20organskoj%20proizvodnji/Lista%20Sredstava%20za%20ishranu%20bilja%20i%20oplemenjivaci%20zemljista%20za%20organsku%20proizvodnju.pdf

EM active is a concentrate in a liquid state, in which more than 80 strains of the main anabiotics organisms that are naturally found in the soil are grown. The product does not contain genetically modified micro-organisms already strong community of aerobic and anaerobic microorganisms. Both regardless of the different forms of life, they live in one environment in the active food exchange mode, in such a way that the products of the metabolism of one group represent food to the other group, whereby the accumulation of positive traits of united microorganisms occurs. One of the most perspective directions of production development in the agrarian sector of the XXI century is the application of effective microorganisms (EM). The founder of EM technology is Japanese professor, microbiologist Teruo Higa. The scientist in 1988, managed to create a super complicated complex of beneficial bacteria, which he called the effective microorganisms (EM), from which the name - EM - technology. Origin from Japan, EM - technology is now recognized in many countries of the world and it is part of national policy.

The study was conducted during 2016 and 2017 at the experimental plot of the Faculty of Biofarming in Backa Topola. The experiment were set according to the design of the split plot, in four repetitions, where large parcels were varieties, as the first investigated factor, and subplots were variants with the use of Guanita, NS Nitragin, EM agents and combinations of all three fertilizers, including a control variant.

Seed sowing was carried out in four rows in the basic plots. The length of the rows was five meters in both vegetable crops with spacing between rows of 50 cm in beans, while in the garden pea 22 cm. The space in the order was 4-5 cm. In this way, the size of the basic platter in the bean was 10 m^2, while the garden pea was 4.4 m^2. There was a distance of 1 m between the repetitions, as well as around the entire essay. Size of the whole experiment with bean was 550 m^2, and the garden pea was 270 m^2.

In the control variant, there was no treatment. Guanito is entered on the sowing depth of 5 cm and in beans 500 g, and of the garden pea 220 g, thereby to ensure the 30 $kg.ha^{-1}$ of pure nitrogen that is required the plants in the early stages of development, while the plants do not create bacterial root nodules, after which they are supplied with atmospheric nitrogen in their growth and development. Nitragin is applied to the seed immediately prior to sowing. Em active was applied foliarly for 15 days of planting and at the beginning of flowering of beans and peas. According to the basic parcel in a single treatment, in beans is applied by foliar

application 6 ml of EM active diluted with 15 liters of water and 3 ml of pea with 15 liters of water. The foliar treatment was performed from the tergal sprayer.

The aim was to determine the sustainability of the breeding of beans and garden peas without irrigation, using the allowed inputs in cultivation technology according to the principles of organic production, analyzing agroecological conditions and yield.

Soil and agroecological conditions at the time of production of beans and garden peas

Table 1. *Basic agrochemical analysis of the soil*

Depth	pH in H_2O	pH in KCl	$CaCO_3$	Humus (%)	N (%)	P_2O_5 (mg/100g)	K_2O (mg/100g)
0-30 cm	8.12	7.58	11.74	2.36	0.14	38.25	39.40

The basic agrochemical analysis of the soil was done in the accredited laboratory of the Agricultural Expert Service of Backa Topola from Backa Topola.

Table 2. *Weather conditions in the production of beans and garden peas*

Month	Average air temperature °C			Sum of precipitation ($mm.l^{-2}$)		
	2016	2017	Multi year average (1962-2016)	2016	2017	Multi year average (1962-2016)
March	7.8	10.0	6.3	24,8	37.8	36,3
April	14.1	11.6	11.8	17.2	43.6	44.1
May	17.1	18.0	17.2	31.2	46.6	65.4
June	22.2	23.6	20.5	66.4	36.0	69.4
July	23.9	24.6	22.2	26.6	42.6	61.6
August	21.7	28.0	21.6	61.8	21.8	53.6
Average/ Sum green peas	13.0	13.2	11.8	48.4	128	109.5
Average/ Sum beans	84.9	23.6	20.4	186	147	250.0

Based on the soil classification according to the pH value (according to Thun), the soil on which the experiment was conducted is considered to be in poor alkaline soil, according to the content of $CaCO_3$ in high carbonate, as it contains > 10.1% $CaCO_3$ (Table 1). The same table shows the value of the humus content

of 2.36%, and on that basis (according to Gračanin), it is classified as low humic, while according to the security in the alkaline phosphorus and potassium (Manojlović et al., 1988) with 38.25 mg P_2O_5 and 39.40 mg K_2O per 100 g of soil in high security with phosphorus and potassium. According to Škorić (1986) based on the content of nitrogen, the soil is considered to be mediumly provided by the mentioned macroelement.

Beans during the vegetation period 2017 (23.6 °C), has a higher temperature of 2.4 °C as compared to 2016 (21.2 °C). Otherwise, in each month of the vegetation period the mean air temperature was higher compared to the perennial average (Table 2). In 2016, there was more precipitation compared to 2017, by 164.5 %, although this was less than the annual average by 16.9 %. This contributed to the fact that weather conditions in 2016 were more favorable for the production of beans under irrigation conditions.

In the vegetation period of the garden pea during the two-year experiment, the average temperature was (13.0 and 13.2 °C) somewhat higher than the perennial average (11.8 °C), while the precipitation was very significant in 2017 (128 mm.l^{-2}) compared to the perennial average (109.5 mm.l^{-2}), (Table 2). Based on the above, the 2017 vegetative year was more favorable for the production of garden peas compared to 2016.

The average yield of beans cultivated according to the principles of organic production for both research years was 2711 kg.ha^{-1}, while in 2016, which was more convenient for cultivation beans without irrigation, the yield of 3389 kg.ha^{-1} was measured in 2016 while in 2017 it was measured 2034 kg.ha^{-1} (Table 3). That was more by 66.7% in 2016, compared to 2017.

The average yield of beans in the examined agroecological area is low and ranges from 1-1.5 t.ha^{-1}. In this study the average yield was 2.7 t.ha^{-1}, which is higher compared to the average yield of beans in R. Serbia. Newly formed varieties of beans have potential for 3-4 t.ha^{-1} yields. So for the results we can say that they are genotypically conditioned for higher yield. Similar results have come from Vasić et al. (2007), Đumić (2014), Dozet et al. (2015).

The influence of the variety (genotype) was very significantly large because of the variety Zlatko in both years recorded a higher yield (3559 kg.ha^{-1} and 2136 kg.ha^{-1}) compared to the variety Maksa (3218 kg.ha^{-1} and 1932 kg.ha^{-1}). Variety Zlatko

achieved in 2016 a higher yield of 10.6% and in 2017 to 8.87% in comparison with the variety Max. That the genotype has a very important role in yield, but also the adaptability to agroecological conditions highlights Salva al-Bashir (2015)

Table 3. *Influence of variety and fertilizers on the yield bean (t.ha^{-1})*

Year	Fertilizer (B) Maksa	Variety (A)		$\bar{x}$ B
		Zlatko		
2016	Control	2950	3367	3159
	Guanito	3565	3967	3766
	Nitragin	3120	3450	3285
	EM active	3183	3480	3332
	G+N+EM active	3270	3533	3402
	$\bar{x}$ A	3218	3559	***3389***
2017	Control	1779	2020	1900
	Guanito	2139	2380	2260
	Nitragin	1872	2070	1971
	EM active	1910	2088	1999
	G+N+EM active	1962	2120	2041
	$\bar{x}$ A	1932	2136	***2034***
Average 2016-2017				**2711**

Year	LSD	Factor			
		A	B	AxB	BxA
2016	1%	271	598	931	657
	5%	201	481	592	401
2017	1%	203	350	347	295
	5%	175	275	277	201

The applied fertilizers were statistically significant for the yield of beans in both very different years from the aspect of temperature and precipitation in the vegetation period of beans. The lowest yield was recorded in the control variant (3159 kg.ha^{-1} i 1900 kg.ha^{-1}), while the highest was in the variant with the application of organic pelleted fertilizer Guanito (3766 kg.ha^{-1} i 2260 kg.ha^{-1}). This is in line with the conclusions they make Abbas et al. (2011). They found that the chicken dresser applied at different levels in three consecutive seasons showed a positive yield effect compared with the control variant and the variant of the application of mineral fertilizers.

The interactions of AxB and BxA were significant because within the same variety there were significant differences from the variant with the application of treatment versus control in both years. In the control and applied fertilization variants, a very significant difference was noted with the use of Guanito in comparison with control, and in the variant with the use of EM agents, a significantly higher yield than control was achieved. Other differences were not at the level of statistical significance.

Table 4. *Influence of variety and fertilizers on the yield of garden pea (t.ha^{-1})*

Year	Fertilizer (B)	Variety (A)		x̄ B
		Tamis	Kelvedon	
2016	Control	9.8	11.2	10.5
	Guanito	11.4	12.8	12.1
	Nitragin	10.5	13.7	12.1
	EM active	11.6	14.2	12.9
	G+N+EM active	12.1	14.8	13.5
	x̄ A	11.1	13.3	***12.2***
2017	Control	11.0	11.9	11.5
	Guanito	12.3	13.2	12.8
	Nitragin	12.0	14.2	13.1
	EM aktiv	12.6	15.1	13.9
	G+N+EM active	13.0	15.8	14.4
	x̄ A	11.0	14.0	***13.1***
Average 2016-2017				**13.3**

Year	LSD	Factor			
		A	B	AxB	BxA
2016	1%	1.7	1.4	1.9	2.1
	5%	1.4	1.1	1.5	1.2
2017	1%	1.9	3.1	2.3	2.6
	5%	1.5	2.1	1.9	1.4

Average yield of garden pea in both years of testing was 13.3 t.ha-1, while in 2016 it was 12.2 t.ha^{-1}, and in 2017 it was 13.1 t.ha^{-1} (Table 4). The influence of weather conditions during the vegetation period of peas was determined by other authors (Kalev, Narits, 2004; Narits, 2008; Kotlarz et al., 2011).

In 2016, a significantly higher yield with the Zlatko variety (19.8 %) was achieved, and in 2017, 27.3 % in relation to the Maksa variety. Differences between varieties are genetically conditioned. Also, the Kelvedon variety has a longer vegetation compared to the Tamiš variety, and has formed a large number of pods and grains per plant. Therefore, the measured yield was higher. In the research Dozet et al. (2011) make the same conclusions. Similar results are cited, Sureja and Sharma (2000), as well as Olle et al. (2015).

The effect of fertilization was statistically significant in relation to control. The best effect in both years of testing was achieved with the combined application of pelleted organic fertilizer Guanito, EM and Nitagin. Each of the variants of applied fertilizers contributed to increasing the yield of garden peas compared to control. Similar results in the use of fertilizers allowed in organic production state Dozet et al. (2018).

Conclusion

Weather conditions in the vegetation period of the research years were such that 2016 was more suitable for the production of beans than in 2017. For the production of garden peas, it was more favorable in 2017 due to the higher rainfall in the vegetation period compared to 2016 at the location of Backa Topola.

In both years Zlatko varieties evinced greater adaptability in irrigation conditions and achieved higher yield compared to the Makasa variety. In the case of peas, the late variety Kelvedon also had more yields in both years compared to the early varieties of Tamiš.

The applied fertilizers influenced statistically significant yields on beans and garden peas in both very different years. For beans, the highest yield was achieved with the use of Guanita, and in the garden pea in combination Guanito + Nitragin + EM active.

With properly selected cultivation technology, including a calculating approach, it is necessary to select the cultivation of legumes with the inputs allowed in organic production and achieve satisfactory yield.

The impact of climate change on the behavior of cultivated plants in the initial stages of growth and the development of grain yield is of great importance for

determining the most suitable production period so that the vegetation period is adjusted to the new conditions and that the production would be in the months with the lowest moisture deficit. It is recommended that there should be an irrigation system in order to be able to intervene depending on the weather conditions in the vegetation period of beans and garden peas. Sustainable production of beans and garden peas according to the principles of organic production in conditions of increased average air temperature and lack of precipitation in order to increase yields is possible.

Understanding agroecosystems is crucial for determining effective farming systems. Agronomic and ecological performance, biodynamic and agricultural systems are the future in the production of health-safe food that is produced by cultivation technology according to the principles of organic production. This affects the protection of water, the environment, the environment and humanity.

The ecological production of beans and garden peas with economic benefits is economically justified. Products from primary agricultural production must be adequately labeled in accordance with the Law on organic production.

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ENVIRONMENTAL KNOWLEDGE OF FARMERS IN VOJVODINA[1]

Jelena Karapandžin[2], Vesna Rodić[3]

Abstrakt

Environmental knowledge is an important component of environmental awareness. It is a precondition for the change of individuals' behavior towards environmental friendly practices. Therefore, for a sustainable agricultural development, it is important to measure farmers' environmental knowledge. In this research, the objective environmental knowledge of farmers in Vojvodina province has been measured. The obtained results show that farmers have knowledge of the environmental problems that humankind faces nowadays, but their knowledge of possible solutions is insufficient. Farmers with a higher level of education have better environmental knowledge, which is a proof of the importance of education for the development of environmental awareness. Also, higher environmental knowledge is shown by farmers who use computers and those who in the past have changed their behavior due to environmental concerns. Since environmental knowledge influences the adoption of sustainable behavior patterns, it is necessary to direct efforts to better education of farmers on environmental issues.

Key words: *environmental knowledge, farmers, sustainable agriculture, Vojvodina.*

Introduction

Literature offers numerous definitions and different classifications of environmental knowledge. For example, according to Pajvančić and Ristić (2011), environmental knowledge includes the awareness about the existing global, regional and local environmental problems, as well as about the specific processes that cause them (Pajvančić, Ristić, 2011). However, it seems that the term environmental knowledge most frequently implies the unity of the information one has on the

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2 Jelena Karapanžin, M.Sc., Assistant, University of Novi Sad, Faculty of Agriculture, Department of Agricultural Economics and Rural Sociology, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 485 34 20, E-mail: jelenak@polj.uns.ac.rs

3 Vesna Rodić, Ph.D., Full Professor, University of Novi Sad, Faculty of Agriculture, Department of Agricultural Economics and Rural Sociology, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 485 34 20, E-mail: rodicv@polj.uns.as.rs

problems of the environment (knowing what) and the knowledge about possible solutions of such problems (knowing how), (Frick et al., 2004).

There are numerous researches which have proved the impact of environmental knowledge on a pro-environmental behavior (Olli et al., 2001; Durpoix, 2010; Wang et al., 2014). Interest in topics concerning the protection of the environment, as well as dedication to them, have proved to be crucial in determining the relation between environmental knowledge and pro-environmental behavior (Zsóka et al., 2013). However, there are also authors who believe that expanding knowledge about the environmental problems could increase worry among people and environmental awareness, but that doing so does not necessarily result in changing their behavior (Kollmuss, Agyeman, 2002; Bamberg, Möser, 2007). Nevertheless, whether the environmental knowledge leads directly to an environmentally responsible behavior or not, it is necessary in order to promote environmental awareness and understanding how urgent the changes in previous behavior patterns are. In particular, this concerns farmers, whose numerous activities during performing agricultural work represent a pressure on the environment and natural resources.

It is well-known that agriculture is central to numerous problems that endanger the ecosystem (FAO, 2007). For this reason, it is imperative to change the existing agricultural practices and to modify them according to the environmental susceptibility without reducing the volume and quality of the products obtained by the sector. In order for the stable and permanent changes to happen in agricultural practices, it is fundamental to have the participants and direct performers of these changes, as well as the decision makers in the agribusiness, develop an appropriate level of environmental awareness. This emphasizes the significance of environmental knowledge, concerning the fact that the knowledge of any individual about environmental problems is essential for the development of environmental awareness (Kokkinen, 2013).

There are two types of environmental knowledge – the objective knowledge (which is related to the actual scope of knowledge one has on certain problems) and the subjective knowledge (which represents the individual assessment of the knowledge one believes one possesses about a specific phenomenon), (Vicente-Molina et al., 2018).

For the purpose of this paper, the objective knowledge that agricultural producers possess was assessed. The reason for this comes from the well-known fact that when surveying environmental awareness and some of its elements is concerned, the participants tend to give socially agreeable responses (Ewert, Baker, 2001; Olli et al., 2001; Pušić, Pajvančić-Cizelj, 2012; Wang et al., 2014). Thus, the assessment of the subjective knowledge of the agricultural producers included in the sample could result in a distorted image of the situation. Given that the basic hypotesis of the research is that the environmental knowledge is quite modest among the surveyed agricultural producers, the knowledge is measured by the number of expressed environmental problems humanity faces nowadays.

Methods and Data Sources

Given that the main aim of the paper is to determine the level of environmental knowledge of farmers in AP Vojvodina and to examine the influence of the selected variables on the environmental knowledge, the quantitative research method had been chosen as the dominant one. However, since we strived to understand and analyze the environmental knowledge in details, in addition to determining the statistical differences between the groups, the research employed the qualitative method, as well; i.e. the so-called mixed method was applied. Such approach is in accordance with the ever-spreading practice in more developed Western countries where the social sciences started applying the mixed method more frequently (Arriagada et al., 2009; Sekol, Maurović, 2017; Floress et al., 2018).

Such approaches are justified by the fact that knowledge obtained by applying the quantitative research methods could be too abstract and general for a practical application under specific conditions of certain situations, contexts, and among the individuals. Applying the qualitative method eliminates such impairment through the possibilities of creating research categories and meanings of each and every separate subject of the research. This method offers a possibility of explaining complex phenomena, understanding and describing personal experiences and phenomena with a plenty of details, in specific contexts, as well as of identifying those separate factors which influence the observed phenomena, but were not foreseen (Johnson, Onwuegbuzie, 2004).

With respect to the aforementioned, during this research, the so-called embedded mixed research plan was applied. In it, the research is based on one of the tradi-

tional methods (quantitative or qualitative), while another method complements it (Sekol, Maurović, 2017). The quantitative dominant method applied here had been defined by Johnson et al. as the "the type of the mixed research method which relies on a quantitative, postpositivist views of the research process, while concurrently acknowledging the benefit that the addition of quantitative data and approaches brings to a research project" (Johnson et al., 2007).

The quantitative and qualitative research was conducted simultaneously, during the period from April 2017 to January 2018.

A semi-structured questionnaire containing several sections was applied to a sample of 400 farmers in Vojvodina who cultivate more than 10 ha[4] of the arable land. The sample was formed in two steps. The first step included determining the share of the total number of farms with more than 10 ha of the arable land in each of the 46 municipalities of AP Vojvodina, according to the data of the Census of Agriculture (www.stat.gov.rs). After that, proportionally to the said part, the number of farms which were to be included in the sample from every municipality was determined (Table 1).

Concerning that, due to the Data Protection Law, we did not have an access to the only official database of agricultural producers in Vojvodina (Register of Agricultural Holdings) for the purposes of the research, which would enable us to create a simple random sample, the quota and referral sample was created. Such sample is often used in situations when the creation of a simple random sample is not possible or when it is estimated that, regardless of the non-probabilistic character, such sample would enable the aim of the research to be majorly accomplished.

4 The sample excludes those agricultural producers who possess less than 10 ha of the arable land because the research tended to question the agricultural producers who do not classify as the so-called part-time or hobby farmers.

Table 1. *Number of farms in municipalities of AP Vojvodina included in the quota sample*

Municipality	Farms with >10 ha		Respondents	Municipality	Farms with >10 ha		Respondents
	Number	Share in total number			Number	Share in total number	
Bačka Topola	702	2,78	11	Senta	422	1,67	7
Mali Iđoš	191	0,76	3	Čoka	210	0,83	3
Subotica	1.250	4,95	20	Žitište	755	2,99	12
Bač	428	1,69	7	Zrenjanin	1.281	5,07	20
Bačka Palanka	761	3,01	12	Nova Crnja	449	1,78	7
Bački Petrovac	356	1,41	6	Novi Bečej	618	2,45	10
Beočin	93	0,37	1	Sečanj	421	1,67	7
Bečej	630	2,49	10	Alibunar	888	3,52	14
Žabalj	517	2,05	8	Bela Crkva	396	1,57	6
Grad Novi Sad	677	2,68	11	Vršac	765	3,03	12
Srbobran	460	1,82	7	Kovačica	917	3,63	15
Sr. Karlovci	13	0,05	0	Kovin	749	2,97	12
Temerin	238	0,94	4	Opovo	307	1,22	5
Titel	345	1,37	5	Pančevo	935	3,70	15
Vrbas	399	1,58	6	Plandište	386	1,53	6
Apatin	206	0,82	3	Inđija	429	1,70	7
Kula	532	2,11	8	Irig	219	0,87	3
Odžaci	405	1,60	6	Pećinci	483	1,91	8
Sombor	1.435	5,68	23	Ruma	787	3,12	13
Ada	354	1,40	6	Sr. Mitrovica	966	3,83	15
Kanjiža	580	2,30	9	Stara Pazova	548	2,17	9
Kikinda	790	3,13	13	Šid	686	2,72	11
Novi Kneževac	274	1,09	4	Vojvodina	25253	100	400

Source: *www.stat.gov.rs*

Although it could be said that the referral sample in this research was a forced solution, the authors believe that it did not diminish the realization of the set goals, to say the least. Such belief is based on the fact that the agricultural producers in our country are traditionally very incredulous and they rarely agree to be interviewed willingly. Therefore, the satisfying level of cooperation can be reached only if the producers are contacted via someone they personally know (Rodić et al., 2014).

Results of the Research and Discussion

As mentioned in the introduction, environmental knowledge, as one of the elements of the environmental awareness among agricultural producers, was assessed by the number of the listed environmental problems, which the humanity is currently facing.

One producer listed a maximum of 9 environmental problems (Table 2).

Table 2. *Descriptive analysis of the farmers' objective environmental knowledge*

Characteristic	Value
Number of respondents	400
Middle value	2,64
Median	2
Modus	1
Standard deviation	1,65
Minimum	0
Maximum	9

Source: *The calculation of the authors*

The majority of the respondents (95%) enlisted at least one environmental problem that the humanity is currently facing. Half of them enlisted two or less than two environmental problems, whereas 5.00% of them did not enlist any problem.

Since the participants had complete freedom to enlist the environmental problems of nowadays that they find significant, a large number of replies was obtained. These can be categorized into 8 units[5] (Table 3).

The most frequent answer was **climate changes** and the problems that are directly or indirectly related to them. They were identified as natural disasters (in which the most commonly mentioned problems were **drought**, then **floods**, **strong winds**, **extreme temperatures**). The most transparent changes the farmers noticed in precipitation and temperature. An explanation for their distinguishing precipitation/drought as an important environmental problem might be found in the fact that the summer of 2017 (during which the survey was conducted) was one of the driest summers in Serbia (RHMZ, 2017)[6].

5 There are no clear boundaries between many enlisted environmental problems, so the classification was made based on the context in which certain terms were mentioned.

6 The summer of 2017 was the second hottest summer in Serbia with an average air temperature of 22.5˚C with 6 hot waves registered, a larger number of summer days, tropical days and tropical nights and with a sum of precipitation which in entire Serbia was below the average values compared to the norm for the referential period 1981-2010 (RHMZ, 2017).

Table 3. *Environmental problems that the respondents identified*

Climate changes	Waste management
Climate change Global warming Ozone holes CO_2 emission Glacier melting Greenhouse gases Rising sea levels	Waste Wild landfills Plastics Packaging Lack of recycling Nuclear and radioactive waste
Exploitation of the resources	**General pollution**
Consumerism Extraction of the resources and ore Exploitation of oil Shortage of water Overuse fossil fuels	Polluted water (rivers, canals) Polluted air Polluted soil Polluted food Destruction of the planet
Biodiversity	**Environmental problems related to agriculture**
Shortage of green surfaces Shortage of forests and trees Extinction of the species Woodcutting/ burning the forests Loss of biodiversity The disappearance of natural habitats Extinction of wildlife Overfishing Bee extinction	Pesticides Shortage of food GMO Animal waste Hormones Insect infestation Ambrosia Old mechanization (environmental unfriendly)
Natural disasters	**Other**
Droughts Floods Extreme temperatures Hurricanes Strong winds Mudslide Bad weather conditions Typhoons Earthquakes	Human negligence Nuclear energy Radioactivity Insufficient use of RES Cars Exhaust gases Factories and industry Lack of filters Allergies and diseases Hail Noise Population growth Lack of environmental awareness

Source: *Survey questionnaires*

The answers of the participants provide the best image on how they perceive the identified problems:

"*Earlier, we had snow 30 cm deep and now there is no snow at all. In just a short period of 20-30 years, there have been such great changes in climate; what will happen in the following 20-30 years?!*"

(male, 50, Banat)

"*Drought. More notable changes* [in climate]. *Temperatures vary from one extreme to another. We have to close the furrow* [because the moist remains in the soil]."

(male, 30, Banat)

From previous responses, we can see that the farmers not only feel the climate changes but they also, more importantly, understand the necessity of changing the previous activities (in this case, additional agro-technical operations of closing the furrow in fall) in order to adjust to the said climate changes. Salehi et al. (2015) emphasize that the climate changes are the most expensive environmental problem which the humanity is facing and that it is necessary to clearly understand the problems which they bring along in order to be able to cope with them successfully. Their unpredictable, but certain influence on the agricultural sector is the main reason why it necessary to engage the agricultural producers themselves in mitigating the climate change, protecting the quality and quantity of agricultural production and preservation of resources. This question demands the scientific and research circles to take an active part and point out to the particular activities which the agricultural producers should employ in their fields in order to minimize consequences of the climate changes in agriecological conditions in Vojvodina.

The second group of the identified environmental problems is related to managing waste. In other words, the problem of plastic packaging and unorganized waste management is frequently highlighted. The farmers stress the negligence of other agricultural producers who leave the waste in the fields, throw litter through their car windows by the roads and do not take care about the consequences which their negligence has on the environment.

"*They wash their tanks on the road. The waste is thrown across the district, in the canal. There are plastic bags on the corn* [the wind carries plastic bags from wild landfills]."

(male, 50, Banat)

"*The problem is the plastic packaging in the fields because the plastics never decompose*."

(male, 50, Banat)

"*Now, that is the problem* [disposal of pesticide packaging]. *We do not have an organized removal of the packaging waste. Earlier, I disposed of those in the bins with the communal waste, but the service now tells us they will not take it away. I don't know what to do with all the sacs filled with bottles. I don't want to throw them on the field and I don't want to burn them, either. I take them to the nearest landfill*."

(male, 43, Banat)

Also, one of the problems which the participants relatively often highlight is the management of the animal waste.

"*Disposal of litter and animal waste to the wild landfills, low percentage of recycling*."

(female, 46, Bačka)

Some farmers are not aware of the damage that some of the forms of packaging waste management make (they state that they do not have a problem with its disposal because they burn it in furnances or they take it to the communal landfill), while others are aware of the damage of some forms of waste disposal, but they feel incapable to take care of it in a proper manner.

In each of the cases, the basis of these problems is the lack of knowledge about proper ways of handling packaging waste. This is a consequence partly of inadequate levels of information they have, and partly of institutional disorganization.

It is encouraging that a certain number of participants do possess some knowledge about possible solutions for waste management, such as recycling. However, they include the lack of it in the list of environmental problems.

Although most of the answers from the farmers from the sample have a conspicuous external locus of control, there are those who consider themselves responsible, as well as their everyday activities and/or agricultural activities in general.

"*... we travel by cars a lot which represents a danger not only because of the exhaust gases, but also because of the* [car] *industry itself pollutes. Agriculture is such a great burden for nature*."

(male, 39, Banat)

Among the identified environmental problems, those which are related to natural resources such as water, air and soil are reoccurring. The fear that, in the future, there might be a shortage of water is notable.

"*Shortage of water is a big problem. We always drew water from the wells for watering, but now the level of water has dropped, so we couldn't*."

(female, 55, Banat)

The lack of green surfaces and forests, the disappearance of farmsteads (like green oases among the endless agricultural surfaces) were also marked as environmental problems by the respondents. The farmers noticed the extinction of game, birds, bees, fish fund in rivers and canals.

"*Nobody is planting the trees, and everybody uses them*."

(male, 63, Bačka)

Based on the numerous environmental problems that were noted by the farmers in their surroundings, as well as on a global level, we can conclude that the knowledge about environmental problems is not a limiting factor for the development of environmental awareness. However, a lack of knowledge about possible solutions for the identified environmental problems is observed, which represents a "weak link" that needs to be strengthened in order to enforce environmental awareness.

Factors affecting Environmental Knowledge

Given the fact that previous research have shown that certain personal characteristics of the respondents could affect the level of their environmental knowledge, in this paper we tested the knowledge of farmers in Vojvodina depending on their gender, level and type of education, computer literacy and cooperation with the Agricultural Extension Service (AES). The results are presented in Table 4.

In spite of the fact that the female participants exhibited greater objective knowledge about the environmental problems of contemporary society, the difference is not statistically significant (Table 4). The results deviate from the conclusions reached by Arcury et al. (1987), Diamantopoulos et al. (2003) and Salehi et al. (2015), who all claimed that men had wider environmental knowledge. One possible explanation of such results might lie in the insufficient percentage of women in the sample.

Table 4. *Mann-Whitney U test of the difference in the level of environmental knowledge depending on the demographic characteristics.*

Characteristic	Groups	n	Md	Mr	U	p	z	r
Gender	male	391	3	199,74	1463,00	0,378	-0,882	
	female	9	2	233,44				
Education	elementary school	44	2	137,82	5074,00	0,019	-2,355	0,13
	high school	294	2	174,24				
	elementary school	44	2	40,99	813,50	0,000	-3,596	0,35
	college/university	62	3	62,38				
	high school	294	2	172,02	7209,50	0,008	-2,636	0,14
	college/university	62	3	209,22				
Formal agricultural education	no	268	2	186,54	13946,50	0,000	-3,509	0,18
	yes	132	3	228,84				
	yes	325	2	192,78				
Computer literacy	no	67	2	164,93	8772,50	0,005	-2,814	0,14
	yes	333	3	207,66				
Cooperation with AES	slight to none	171	2	184,26	16803,00	0,013	-2,475	0,12
	frequent	229	3	212,62				
n = sample size; Md = median; Mr = mean rank; U = Mann-Whitney U test; p = probability level; z = z value; r = effect size								

Source: *The calculation of the authors*

Education has a key role in undertaking pro-environmental activities, not only because it enables and stimulates people to understand environmental problems, but also because it widens their environmental knowledge and promotes environmental responsibility (Chen et al., 2011). As can be seen from Table 4, there is a statistically significant (although not to a great extent) difference in the environmental knowledge of the farmers who had obtained a diploma of college or university compared to those who finished only high school or elementary school.

Understanding contemporary environmental problems demands a high level of knowledge about the environment (Tuna, 2004). Filson (1993) concluded that highly educated farmers, as well as those who intend to become highly educated, express a higher level of concern for the environment and an intention to protect it (Filson, 1993). Besides the level of education, environmental knowledge is affected by the type of education, as well. This is particularly related to the formal agricultural education (agricultural high schools or faculties). As the results of this research have shown, farmers who possess formal agricultural education had expressed wider objective environmental knowledge. This fact may be a commendation to the curriculums of the educational institutions in the field of agriculture, but also a monition to the rest of the secondary school institutions and universities that the topics about the protection of the environment which can enhance the knowledge of students are underrepresented.

A statistically significant difference in the level of environmental knowledge between the farmers who use the computer/Internet and those who do not has been determined (Table 4). This can be a consequence of the fact that the environmental problems occur and develop very dynamically, that the solutions of the said problems are intensively sought and suggested since recently, and that the information about them is the most updated on the Internet. Furthermore, this implies the conclusion that the information about the problems and possible solutions for the environment should be broadcasted through other media, as well, (television, press etc.) in order to reach those farmers who have no access to the Internet or who do not want to obtain the necessary information and knowledge in such a manner.

Cooperation with the Agricultural Extension Service (AES) is one of the factors which is frequently highlighted as crucial for the adoption of environmentally responsible practices by the farmers (Baumgart-Getz et al., 2012; Radjabi et al., 2014; Stuart et al., 2014; Saengabha, Srisopaporn, 2015; Abdollahzadeh et al., 2016). This is not surprising, due to one of the main roles of AES is to create and diffuse knowledge and information important for agricultural production. This is especially relevant for the AAS in Vojvodina because, by a larger inclusion of the topics related to the environmental protection in their work programs, they can influence the promotion of environmental knowledge among the farmers, which can, in turn, lead to the changes in their behavior.

Besides testing the differences in the level of environmental knowledge according to the demographic characteristics of agricultural producers, the aim of this research was to observe the relation between environmentally responsible behavior, or the intention to behave environmentally responsible, and the level of the objective environmental knowledge. In Table 5, there are the results of the testing differences in environmental knowledge between those farmers that had i) previously changed their behavior to take care of the environment, ii) undertaken environmentally responsible agricultural activities or iii) express an intention to apply them in the future and those who had not and have no intention to do so.

Table 5. *Mann-Whitney U test of the difference in the level of environmental knowledge depending on the environmentally responsible activities*

Characteristic	Groups	n	Md	Mr	U	p	z	r
Conducting a soil analysis	no	114	2	133,06	8613,50	0,008	-2,644	0,15
	yes	184	3	159,69				
The existence of the bushes and trees on the parcels or their brims	no	226	2	189,68	17217,50	0,030	-2,175	0,11
	yes	174	3	214,55				
Would you report on someone who burns crop residues on a parcel?	no	337	2	194,50	8593,50	0,014	-2,448	0,12
	yes	63	3	232,60				
Would you report on someone who throws the waste to a place not prescribed for such action?	no	274	2	188,28	13915,00	0,084	-1,726	0,09
	yes	114	3	209,44				
Have you changed your behavior to take care of the environment?	no	100	2	143,84	9333,50	0,000	-5,345	0,27
	yes	288	3	212,09				
n = sample size; Md = median; Mr = mean rank; U = Mann-Whitney U test; p = probability level; z = z value; r = effect size								

Source: *The calculation of the authors*

A statistically significant difference (though with a low level of significance) was observed in the level of environmental knowledge of the respondents that have the soil analyzed regularly and those who do not. It can be assumed that it was precisely the higher level of knowledge about the environmental problems that had led the farmers to conduct a soil analysis, which is the only authoritative guideline for the proper fertilization management. The similar was observed in the farmers who kept the bushes and trees on the parcels or their edges, who also shown wider environmental knowledge.

In addition to this, farmers who expressed willingness to implement environmentally responsible activities in the future, such as reporting those who undertake environmentally unacceptable practice (for example, burning crop residue and throwing waste to a place not prescribed for such purpose) also possessed wider environmental knowledge.

The connection between environmental knowledge and environmentally responsible behavior was further confirmed in the case of the farmers who had previously changed their behavior in everyday activities (recycling, avoiding driving cars, saving water and electricity, conscientious disposal of waste etc.) and those who had done no such thing.

The aforementioned determined differences are proof of the impact that the level of environmental knowledge has on environmentally responsible behavior, which is the ultimate goal of environmental awareness. Considering that the environmental knowledge can be most easily affected by education, not only through institutions, but also outside them, in the future, environmentally educational campaigns should be more related to the everyday activities of the rural population, with a greater inclusion of the citizens in that process, for the purpose of clearer understanding of the environmental problems and their possible solutions (Wang et al., 2014).

Conclusion

In order to ensure sustainable agricultural production, it is necessary to develop environmental awareness. One of the key elements of environmental awareness is environmental knowledge, which represents a starting point for the establishment of environmental values, attitudes and behavior. For this reason, it is important to assess the environmental knowledge of the farmers who make decisions and perform agricultural activities. The extent of the ecological footprint of the agricultural practices on the environment largely depends on their knowledge.

A detailed analysis of the gathered quantitative and qualitative data showed that the farmers identify the environmental problems of the contemporary era, but they do not have sufficient knowledge about the possible solutions for them. This might be a significant factor both for the underdeveloped environmental awareness and the willingness to undertake activities for the protection of the environment.

The results of this research confirm that the level of education positively affects the environmental knowledge of individuals. This highlights the role of the institutional educational system on all levels and emphasizes its responsibility for the influence which it has on the sustainability of all spheres of human activities, through creating syllabuses and curriculum.

Apart from the institutional one, non-institutional education and information gahtering, primarily through the work of the AAS, also has a positive effect on environmental knowledge. This fact must be taken into consideration by the AAS. They should make their fields of action "greener" with topics related to the protection of the environment, in spreading both knowledge about environmental problems and the possible solutions for them.

As the results of this research showed that environmental knowledge impacts the environmentally responsible behavior, as well as the intentions to practice it, this is a call for the relevant subjects to direct their actions toward creating, enhancing and diffusing environmental knowledge and information as widely as possible.

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ECONOMIC EFFECTIVENESS OF ECOLOGICALLY ACCEPTABLE PRODUCTION OF VEGETABLES IN PROTECTED AREA[1]

Jonel Subić[2], Marko Jeločnik[3]

Abstract

In the conditions of the growth of global population, among basic principles of agriculture, regardless of territorial level observed, the maintenance of food security, i.e. maintenance of sufficient quantity of food, at affordable prices, for each inhabitant, should be emphasized. Pressured with constant growth in the volume of industrial food production, the principle of food safety, i.e. maintenance of health-acceptable supplies of agricultural and food products to all categories of the population, is to some extent neglected. Whether organized in a protected area or in an open field, vegetable production is among the most intensive sectors of agriculture.

At the national level, for many years vegetable production has been characterized with the constant growth in the production volume. Consumer requirements that determine the demand for vegetable, from the aspect of the variety and quality of offered products, are increasingly being profiled as a factor of sustainability of vegetable realization at local markets. Due to this, the producers are faced with the task to, in addition to the quantities, the delivery continuities, and the technological quality of vegetables, focus more on the specific nutrition and health safety of fresh vegetables and their processed products.

Although the concept of vegetable production in line to environmental requirements is not of a recent date, up till today it hasn't been adopted to a greater extent by vegetable producers. Further development and strengthening of the presence

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2 Jonel Subić, Ph.D., Associate Professor, Principal Research Fellow, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 697 28 58, E-mail: jonel_s@iep.bg.ac.rs

3 Marko Jeločnik, Ph.D., Research Associate, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 697 28 52, E-mail: marko_j@iep.bg.ac.rs

of ecologically oriented vegetable production in the open field or in a protected area, should provide positive implications for national agriculture by providing sufficient quantities of quality and health safety vegetables, as well as creation of a recognizable image of domestic vegetable producers, from the point of consistent adherence to the principles of good agricultural practice in the regional framework.

According to basic goal of this paper, promotion of a health safe and ecologically acceptable vegetable production in a protected area, which provides economic benefits and the security of products realization for the vegetable producer, the research imposed the need to analyse the economic effects of ecologically acceptable vegetable production in relation to the conventional vegetable production. Accordingly, the necessary data were collected through an in-depth interview with members of selected family agricultural holdings specialized in the production of vegetables. Most of gained data are directly related to 2018, while some represent a reflection of the interpreter's assessment or scientifically verified standards in vegetable production. Starting from the fact that the basic representativeness of producers is provided by their long tradition in vegetable production, as well as their production orientation, selected agricultural holdings were categorized as family agricultural holding A (engaged in ecologically acceptable vegetable production) and family agricultural holding B (engaged in conventional vegetable production).

The results obtained from the analytical calculation based on variable costs show that positive contribution margins have been achieved (in the case of a family agricultural holding A: 27.815,00 RSD/are, or in the case of family agricultural holding B: 28.896,65 RSD/are). As opposed to conventional production, ecologically acceptable vegetable production (tomatoes) achieved better yields (total 1.170 kg/are compared to 1.130 kg/are) and higher sales prices on the market (average of 64,76 RSD/kg compared to average of 45,00 RSD/kg). On the other hand, conventional production is characterized by considerably lower variable costs which led to a better gross financial result, primarily due to the large share of laboratory analyses (52,13%) in the variable costs structure in ecologically acceptable vegetable production.

Key words: *economic effectiveness, ecological sustainability, vegetable production, protected area.*

Introduction

In an effort to intensify the linking between the development and environmental protection, national agriculture accepts the concept of sustainable development that requires the use of land and water resources without disturbing their ecological status.

In line with the concept of sustainable agriculture, the specificities of sustainable production in agriculture could be recognized *in the contribution to sustainable land management in agriculture and the preservation of agro-biodiversity, in accordance with the rules of Good Agricultural Practice (GAP),* (Vasiljević et al., 2010).

In accordance with the GAP Codex[4], efficient management of agricultural holding implies, above all, the application of standards that include[5]:

- Protection of natural resources;
- Environmental management;
- Safety of the workforce;
- Animal health and welfare;
- Food and feed safety;
- Health care.

As a modern concept of agricultural business, a GAP codex requires from the agricultural producers that everyone, in accordance with their possibilities, contributes to the preservation of the environment, soil fertility and potentials in food production, as well as to advancement of quality of agricultural products[6].

In order to improve the existing knowledge of agricultural producers along with other market actors, the promotion of health-safe and ecologically acceptable vegetable production is based, inter alia, on the importance and specificities of ecologically acceptable vegetable production in protected area. On the other hand, the cost-effectiveness of production and the security of products' realization impose the two crucial requisites:

4 The Codex of Good Agricultural Practice in the form of by-law is prescribed by the Minister of the Ministry of Agriculture, Forestry and Water Management, two years after the Law had been passed (Vasiljević et al., 2010).

5 http://istocar.bg.ac.rs/tic_inst/obuka02.html

6 http://cms.optimus.ba/Avanti_ApplicationFiles/122/Documents/kodeks_dobre_polj_prakse.pdf

- An analysis of the economic effects of the application of the concept of ecologically acceptable vegetable production contrary to the conventional vegetable production;
- Recording of all data related to production process within the Crop Record Book.

As a specific goal and result of this research, and in line with the abovementioned, the comparative economic analysis is set, i.e. making of analytical calculations based on variable costs (contribution margin) for the selected line of vegetable production in a protected area, organized in the systems of ecologically acceptable or conventional production. Through the obtained results for the contribution margin, in addition to the previously considered impacts of ecological and social sustainability of production, their economic importance is emphasized if they were applied by certain vegetable producers. In other words, it was attempted to demonstrate the potential economic benefit that could be achieved on family agricultural holdings specialized in the vegetable production (either in the open field, or in a protected area), in addition to the general (complete social community) and individual (consumers) health and ecological impact of the application of this method of vegetable production.

Simplification of the conducted analyzes and securing the significance of the comparability of the obtained results assumed the development of analytical calculations in both applied production systems only for one line of vegetable production (tomato production line) organized at selected agricultural holdings. Also, better comparability of the obtained results is ensured by presenting all incomes and costs within the observed productions per uniform unit of the production area (per are, or one hectare) in the national currency (RSD). The optimality of the adopted production technology was evaluated throughout the presentation of the structure of variable costs, while all results, in order to better transparency, were presented in form of table or graphically.

Methodology

According to the Census of Agriculture - 2012 (SORS, 2013), there are 290.233 *specialized agricultural holdings* in the Republic of Serbia (or 45,96% of the total number of agricultural holdings), out of which:

- 128.901 agricultural holdings (44,41% of the total number of specialized agricultural holdings) are specialized in crop production;

- 55.562 agricultural holdings (19,14% of the total number of specialized agricultural holdings) are specialized in pigs and poultry production;
- 52.905 agricultural holdings (18,23% of the total number of specialized agricultural holdings) are specialized in the breeding of grazing livestock (cattle, sheep or goats);
- 44.058 agricultural holdings (15,18% of the total number of specialized agricultural holdings) are specialized in growing of permanent crops (vine and fruits);
- 8.807 agricultural holdings (3,03% of the total number of specialized agricultural holdings) are specialized in vegetable, flower and other horticulture products production.

Beside the fact that in the category of *specialized agricultural holdings* in the Republic of Serbia, agricultural holdings oriented to vegetable production are at the bottom of the list, their presence within the group of *mixed agricultural holdings* for plant production (56.906 agricultural holdings, or 9,01% of the total number of agricultural holdings) leads to the conclusion that their number is not small, and it's close to 10.000 *agricultural holdings specialized in the vegetable production* (Vasiljević et al., 2018).

Based on the character of this paper, the following research was conducted:
- Analytical calculations based on variable costs for ecologically acceptable vegetable production in protected area (i.e., production of tomato in greenhouse) have been made;
- Analytical calculations based on variable costs for conventional vegetable production in protected area (i.e., production of tomato in greenhouse) have been made.

In both cases, the processed and presented data are directly related to the cycles of vegetable production organized in protected area (i.e., production of tomato in greenhouse).

The characteristic of agricultural production is that in a large extent it is dependent on the environmental factors, which is more visible in plant production than in cattle breeding (Devendra, 2012). Plant production organized in protected areas (greenhouses) is less susceptible to the impact of climate factors (FAO, 2013), but generates specific costs that need to be identified and which size has to be determined (Laate, 2013). One way for determining the production

costs present in all lines or segments of agriculture (including production in greenhouses) is the development of analytical calculations based on variable costs (contribution margin).

In conditions of transition, or frequent changes in business environment, agricultural producers begin to focus on profitable productions that enable the achievement of a positive financial result, i.e. that generate production value higher than the total costs of production (Subić et al., 2010).

Calculation of the coverage of variable costs (contribution margin) in the production of certain vegetables at the agricultural holding is calculated on the basis of the total realized incomes generated by the production of that crop, reduced for the total generated variable costs of mentioned production. Total sum of generated incomes includes the market value of the primary and by-products, increased by the subsidies for the observed line of production. In vegetable growing, the majority of used inputs have the characteristic of variable costs, e.g., seeds, seedlings, mineral and organic fertilizers, substrates, pesticides and growth bio-stimulators, fuels and lubricants, agricultural mechanization services, engaged labor (in certain cases work of members of the household), certain supplies and accessories, etc. (Subić, Jeločnik, 2016).

Analytical calculation based on variable costs could be expressed by next mathematical formula (Subić, Jeločnik, 2013):

$$PVT = Q - VT, \text{ while } Q = (q \times c) + p$$

Where analytical elements represents:
- PVT - Contribution margin (coverage of variable costs);
- Q - Achieved production value;
- VT - Gained variable costs;
- q - Volume of product per unit of production area;
- c - Price of product per unit of measure;
- p - Subsidies per unit of production area.

Most often, producers have a negligible impact on realized incomes (selling price of product), as they are primarily a result of confrontation of overall supply and demand on the certain market. However, by the adequate control of the production activities and reduction of justified costs, or elimination of needless costs, they can

have a great effect on total production costs and generating of cost price of their products (Subić et al., 2015/1).

By summing the contribution margins of all production lines that are carrying out at the agricultural holding, it could be obtained the total contribution margin that reflects rough valorization of complete business activity success. According to its value reduced for the total fixed costs realized on the agricultural holding, it could be calculated the gained gross financial result. Calculating the contribution margins for individual production lines leads to marking of those production lines that produce more favorable economic results (in case of equalized fixed costs), what represents a good base for decision regarding the future production orientation and further development of the certain agricultural household (Jeločnik et al., 2015). At the same time, it enables identification of certain cost's impacts on achieved production results, whose reduction could initiate advancement of household's business result (Jeločnik et al., 2013; Subić et al., 2015/2).

In plant production, the contribution margin is commonly calculated per unit of production area, previously aligned with the total surfaces under the grown crop. Therefore, the observed method could be also used for comparison of production results of individual culture produced within the different levels of production intensity (Ivanović, Jeločnik, 2016). Besides, method allows quick and simple insight into the business of agricultural holding derived from one production year or one production cycle, as well as calculation of achieved results after the change in scale of production, or change in practiced production lines (Subić et al., 2010).

By calculations based on variable costs it could be estimated the ability of producer to cover all variable costs after sale of the product, as well as to achieve a certain value that will be used for covering of fixed costs and possible gaining of profit (Andrić, 1998). Simplicity of application of mentioned method is quite important for agricultural holdings that are not pressured with required business recording and book-keeping (Vasiljević, Subić, 2010), as it creates a position for making of prompt insight into the financial result they generate. Method represents an excellent tool for supporting the decision-making process during the economic analysis of current state within organized production lines, since it provides an adequate assessment of the sustainability of adopted technical-technological approach and achieved results of production (Jeločnik et al., 2016).

In line to the significant influence of weather conditions (lead to oscillation in yields) and market conditions (changes in prices of primary products and used inputs) on the holdings' business results, it should be also done an analysis of production results in conditions of uncertainty. For this purpose, generally the method for determining the critical values of production is used (values that equalize the contribution margin with zero), that implies critical price, critical yield and critical variable costs. Calculation of mentioned indicators considers the following formulas (Nastić et al., 2014):

Critical price: $KC = (VT - p) / OP$
Critical yield: $KP = (VT - p) / OC$
Critical variable costs: $KVT = (OP \times OC) + p$

Where:
OP - Expected yield;
OC - Expected price;
p - Subsidy;
VT - Variable costs.

As well, in the conditions of uncertainty, a method of sensitivity analysis is used, by which is monitored the rate of change in contribution margin due to decrease in yield or selling price, or due to growth of variable costs of production (Subić, Jeločnik, 2012).

Research results with discussion

In accordance to previously set research goals, the analysis of economic effects of applying the concept of ecologically acceptable production of vegetable in protected area and their comparison with results obtained in conventional production, was preceded by the field research organized during the period January-October 2018. The research has involved production of tomato in protected area (greenhouse), in two different production systems (ecologically acceptable and conventional agro-technical approach).

The research has included collecting the necessary data throughout the in-depth interviews with the members of selected family agricultural holdings predominantly oriented to vegetable production. The most of obtained data are directly linked to the production cycles organized in 2018, while some are assessments of respondents, or scientifically verified standards in vegetable production.

Certain differences in mechanization costs are primarily reflection of the possession of partially different mechanization at the holdings (from the aspect of manufacturer and their general characteristics), as well as the influence of their age and technical condition on the energy consumption. Since the labour costs involve only the engagement of external labourer (the engagement of family members at the holding is just considered, but not included by the calculation), differences in the value of performed operations between the observed agricultural holdings are primarily caused by the number of family members, as well as level of training or working approach of externally engaged labourers.
In line to key element of agricultural holdings selection (implementation of certain production system in vegetable production), all holdings are grouped into the two categories. The first category represents the family agricultural holding (holding A) characterized by ecologically acceptable vegetable production in protected area, while the second category represents the family agricultural holding (holding B) characterized by conventional production of vegetable in the protected area.

Focusing to the family agricultural holding A, developed analytical calculation of contribution margin shows the production results gained in ecologically acceptable system of tomato production in protected area (Table 1-2. and Graph 1.).

Table 1. *Starting facts*

Greenhouse surface:	5 ares	**Agricultural holding:**	A
Production line:	Tomato - hybrid Viva	**District:**	Belgrade city
Type of production:	Vegetable production	**Statistical region:**	Serbia - North (Belgrade)
Unit of measure of production capacity:	1 are	**Production year:**	2018
Technological approach:	Production in greenhouse	**Exchange rate: 1 EUR**	118,24 RSD

Source: *Field research – required data-set for development of contribution margin calculation in vegetable production (Jeločnik et al., 2018).*

Analytical calculation based on variable costs applied to ecologically accepted tomato production in greenhouse refers to next results (Table 2.):

- It was realized a positive contribution margin (27.815,00 RSD/are) that should be large enough for covering of all fixed costs and profit gaining;
- Average selling price amounts 64,76 RSD/kg, and it was obtained according to formula: Total production value (RSD/are) / Total quantity of produced tomato (kg/are) = 75.775,00 / 1.170,00);

- Achieved incomes are for almost 1,6 times higher than generated variable costs.

Table 2. *Contribution margin*

Element	Quantity	UM	Price per UM (in RSD)	Total RSD/are	Total RSD/ha
1 – Incomes					
Tomato	1.170,00	kg	-	-	-
I class (85%)	995,00	kg	70,00[1]	69.650,00	6.965.000,00
II class (15%)	175,00	kg	35,00[1]	6.125,00	612.500,00
Insurance premium				-	-
Subsidies				-	-
Value of production (total 1)				**75.775,00**	**7.577.500,00**
2 – Variable costs					
Seed	260,00	seed	13,75	3.575,00	357.500,00
Seedlings	260,00	stalk	26,00	6.760,00	676.000,00
Manure	-	kg	-	-	-
Mineral fertilizers and bio-stimulators				2.106,00	210.600,00
Pesticides				-	-
Binder	0,80	hank	145,00	116,00	11.600,00
Mulch foil (stripes)	120,00	m	10,50	1.260,00	126.000,00
Laboratory analyses	1	set	25.000,00	25.000,00	25.000,00
Packaging (crates)	130,00	pcs	10,00	1.300,00	130.000,00
Drip irrigation tapes	120,00	m	4,30	516,00	51.600,00
Green market fee	-	day	-	-	-
Costs of mechanization				2.732,00	273.200,00
Costs of irrigation				1.440,00	144.000,00
Costs of insurance				-	-
Other costs				675,00	67.500,00
Engaged external labour				2.480,00	248.000,00
Variable costs (total 2)				**47.960,00**	**2.321.000,00**
3 – Contribution margin (1-2)				**27.815,00**	**5.256.500,00**

Source: *Field research – required data-set for development of contribution margin calculation in vegetable production (Jeločnik et al., 2018).*

Considering the structure of variable costs, ecologically acceptable tomato production in greenhouse is generally characterized with:

- Application of organic and mineral fertilizers, as well as bio-stimulators for plants growth during the phase of primary land cultivation (tilling) and supplemental plant feeding within the season of vegetation;
- Absence or ultimate rigidity in application of pesticides in production process;
- Plant breeding in greenhouse of contemporary construction, with possibility

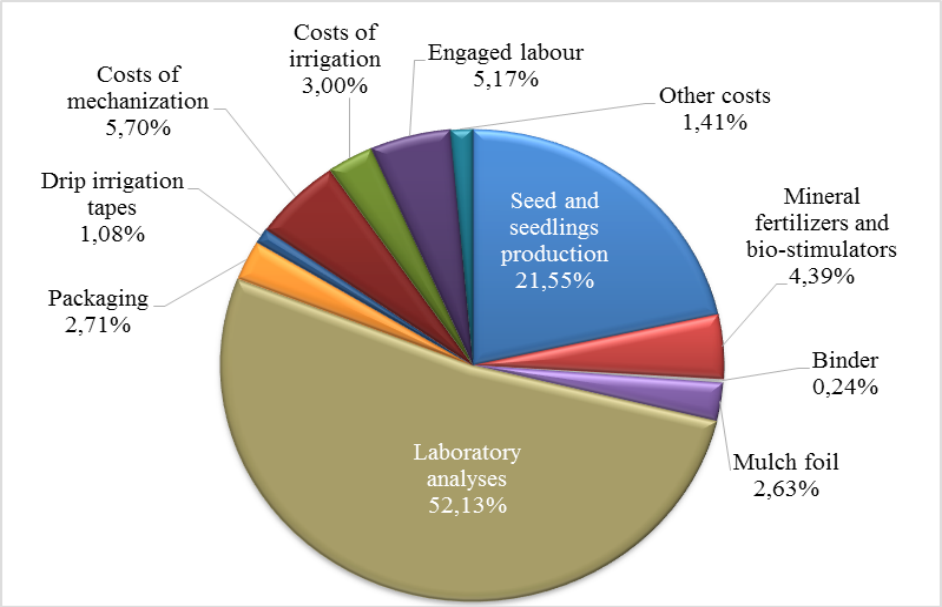
of opening of lateral sides in order to ventilate the production area. Its covered with double foil that is:

- UV rays resistant (there is no need for sun shade cover);
- With good level of heat isolation;
- Prevents moisture condensation and rejects the insects;

- Laboratory analysis set (with total value of 75.000,00 RSD) includes analysis of water, soil and produced fruit of vegetable. As during the production year, agricultural holding apply crop rotation that involves three crops, soil analysis is carried out every two years (before entering of the first and after the harvesting of the last crop), as well as water analysis. Fruit analysis is done for each crop after its harvesting. According to that, the total annual costs of laboratory analysis per grown crop amounts 25.000,00 RSD, or:
  - For fruit analysis 15.000,00 RSD;
  - For soil analysis 5.000,00 RSD;
  - For analysis of water for irrigation 5.000,00 RSD;
- Packaging (wooden crates that are, in order to preserve fruit characteristics, loading with maximally 9 kg of tomato);
- Use of drip irrigation tapes during the one production cycle.
- Family agricultural holding A has on disposal 5 labour active members. In line to fact that a quarter of totally required labour for the execution of all mentioned activities (at complete production area of 5 ares) is spent on the engagement of external labour, the labor costs are presented with the share of 25% of their total sum.

Within the structure of variable costs, the costs of laboratory analysis are dominating (52,87%). Relatively high share have the costs of tomato seed and seedlings production (21,86%), (Graph 1.).

Graph 1. Structure of variable costs – ecologically acceptable production



According to data obtained from the calculation of contribution margin, it could be made an assessment of production results under the conditions of uncertainty. In other words, it could be determined the critical values of ecologically acceptable growing of tomato in protected area (such are critical price, critical yield and critical variable costs), (Tabela 3.).

Table 3. Critical values of production

Description	RSD(kg)/are
Expected yield (OP)	1.170,00
Expected price (OC)	64,76
Subsidy (p)	0,00
Variable costs (VT)	47.960,00
Critical price: KC = (VT - p) / OP	**40,99**
Critical yield: KP = (VT - p) / OC	**740,53**
Critical variable costs: KVT = (OP x OC) + p	**75.775,00**

Note: *In line with fact that holding has been dividing the tomato into classes, expected price (OC) is an average price of sold kilogram of tomato.*

By determination of critical values of mentioned production, it could be shown the level of price, yield and variable costs at which the contribution margin equals to zero.

According to results of analytical calculation based on variable costs, it could be also done the sensitivity analysis of ecologically acceptable production of tomato in greenhouse. In other words, it is possible to show the degree of sensitivity (i.e. the level of change) of the contribution margin due to decrease in yields or selling price, or due to growth of variable costs of production (Tables 4-5.).

Table 4. Change in contribution margin caused by change (fall) in tomato yield or selling price

Fall of tomato yield or price (%)	Value of contribution margin (RSD/are)
5,00	24.025,19
10,00	20.236,49
15,00	16.447,80
20,00	12.659,10
25,00	8.870,41
30,00	5.081,72
35,00	1.293,02
40,00	- 2.495,67

Table 5. Change in contribution margin caused by growth of variable costs of production

Growth of variable costs (%)	Value of contribution margin (RSD/are)
5,00	26.719,00
10,00	24.383,00
15,00	22.047,00
20,00	19.711,00
25,00	17.375,00
30,00	15.039,00
35,00	12.703,00
40,00	10.367,00
45,00	8.031,00
50,00	5.695,00
55,00	3.359,00
60,00	1.023,00
65,00	- 1.313,00

The contribution margin in tomato production in protected area is more sensitive to the fall in value of production than to the growth of production costs. Margin equals to zero with the fall of value of production for 36,71% (each further decline in yield or products' price will induce a negative contribution margin), or with the rise of variable costs for 62,18% (each further growth of variable costs of production will generate a negative contribution margin).

Observing the family agricultural holding B, the analytical calculation based on variable costs relates to the production results gained in conventional system of tomato production in protected area (Table 6-7. and Graph 2.).

Table 6. *Starting facts*

Greenhouse surface:	1,28 ares	**Agricultural holding:**	B
Production line:	Tomato – hybrid Viva	**District:**	Braničevo District
Type of production:	Vegetable production	**Statistical region:**	Serbia - South (Southern and Eastern Serbia)
Unit of measure of production capacity:	1 are	**Production year:**	2018
Technological approach:	Production in greenhouse	**Exchange rate: 1 EUR**	118,24 RSD

Source: *Field research – required data-set for development of contribution margin calculation in vegetable production (Jeločnik et al., 2018).*

Analytical calculation based on variable costs applied to conventional tomato production in greenhouse refers to next results (Tabela 7.):

- It was realized a positive contribution margin (28.896,65 RSD/are) that should be enough for covering of all fixed costs and profit gaining;
- Achieved selling price amounts 45,00 RSD/kg;
- Achieved incomes are for more than 2,3 times higher than generated variable costs of production.

Observing the structure of variable costs, conventional tomato production in greenhouse is generally characterized with:

- Use of pesticides;
- Absence of any kind of laboratory analysis;
- Production in greenhouse of classic construction, without possibility for opening of lateral sides for ventilation, covered by single-layer foil:
  - Resistless to UV rays (there is need for sun shade cover);
  - With bad level of heat isolation;
  - That condense the moisture and does not reject the insects;
- Use of plastic packaging;
- Use of drip irrigation tapes during the few production cycles.

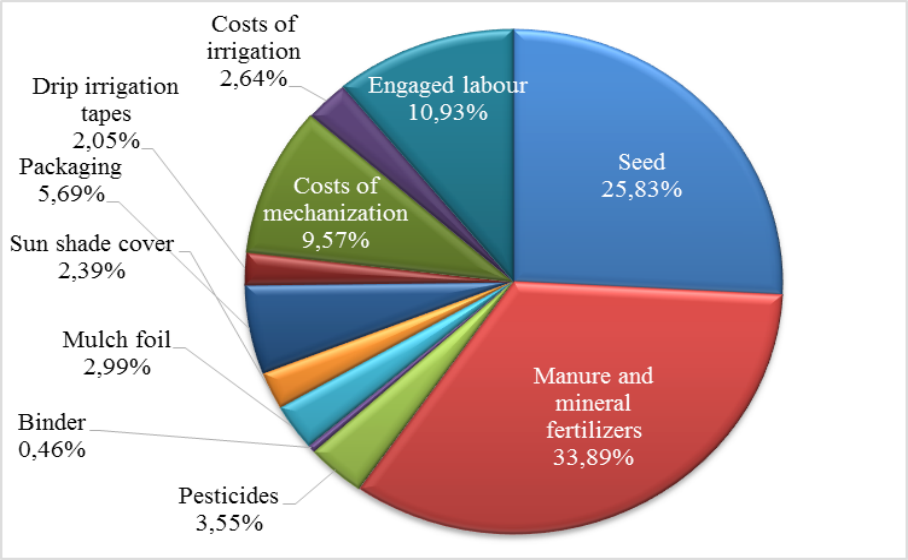
Table 7. *Contribution margin*

Element	Quantity	UM	Price per UM (in RSD)	Total RSD/ are	Total RSD/ha
1 – Incomes					
Tomato	1.130,00	kg	45	50.850,00	5.085.000,00
Insurance premium				-	-
Subsidies				-	-
Value of production (total 1)				**50.850,00**	**5.085.000,00**
2 – Variable costs					
Seed	315,00	seed	18,00	5.670,00	567.000,00
Seedlings	-	stalk	-	-	-
Manure	500	kg	1,00	500,00	50.000,00
Mineral fertilizers				6.940,20	694.020,00
Pesticides				780,40	78.040,00
Binder	0,70	hank	145,00	101,50	10.150,00
Mulch foil (stripes)	62,50	m	10,50	656,25	65.625,00
Sun shade cover	1	set	525,00	525,00	52.500,00
Packaging (crates)	125,00	pcs	10,00	1.250,00	125.000,00
Drip irrigation tapes	100,00	m	4,50	450,00	45.000,00
Green market fee	-	day	-	-	-
Costs of mechanization				2.100,00	210.000,00
Costs of irrigation				580,00	58.000,00
Costs of insurance				-	-
Engaged external labour				2.400,00	240.000,00
Variable costs (total 2)				**21.953,35**	**2.195.335,00**
3 – Contribution margin (1-2)				**28.896,65**	**2.889.665,00**

Source: *Field research – required data-set for development of contribution margin calculation in vegetable production (Jeločnik et al., 2018).*

In the structure of variable costs, the highest share have the costs of manure and mineral fertilizers (33,89%), followed by the costs of seeds and seedlings production (25,83%), (Graph 2.).

Graph 2. Structure of variable costs – conventional production



Relaying to data obtained from the calculation of contribution margin, it was done the estimation of production results under the conditions of uncertainty (determination of critical values in conventional tomato production in greenhouse), (Tabela 8.).

Table 8. Critical values of production

Description	RSD(kg)/are
Expected yield (OP)	1.130,00
Expected price (OC)	45,00
Subsidy (p)	0,00
Variable costs (VT)	21.953,35
Critical price: KC = (VT - p) / OP	**19,43**
Critical yield: KP = (VT - p) / OC	**487,85**
Critical variable costs: KVT = (OP x OC) + p	**50.850,00**

By presentation of critical values in conventional production of tomato are shown the exact price, yield and sum of variable costs that lead to equalization of contribution margin with zero.

Based on results gained from the analytical calculation, it could be also done the sensitivity analysis of conventional production of tomato in protected area (i.e. it could be shown the strength of impact of yield, selling price, or variable costs change to change of contribution margin (Tables 9-10.).

Table 9. Change in contribution margin caused by change (fall) in tomato yield or selling price

Fall of tomato yield or price (%)	Value of contribution margin (RSD/are)
10	23.811,65
20	18.726,65
30	13.641,65
40	8.556,65
50	3.471,65
60	-1.613,35

Table 10. Change in contribution margin caused by growth of variable costs of production

Growth of variable costs (%)	Value of contribution margin (RSD/are)
20,00	24.505,98
40,00	20.115,31
60,00	15.724,64
80,00	11.333,97
100,00	6.943,30
120,00	2.552,63
135,00	-740,37

As in case of first agricultural holding, the contribution margin is more sensitive to the fall in value of production than to the growth of production costs. It equals to zero with the decline in value of production for 56,83% (while any further decrease in achieved yields or products' price will generate a negative contribution margin), or with the rise of variable costs for 131,63% (while any further increase in variable costs of production will induce a negative contribution margin).

Conclusions

Focusing on the tomato production in the greenhouse (at the level of family agricultural holdings A and B), developed comparative analysis of the contribution margin points to the following conclusions:

- At both observed agricultural holdings specialized in the production of vegetables in protected areas (greenhouse), whether it is ecologically accepted production, or conventional production, a positive contribution margins have been achieved (in the first case, in the amount of 27.815,00 RSD/are, while in the second case, in the amount of 28,896.65 RSD/are). Besides, gained contribution margins leave enough space for covering of fixed costs of production, as well as for profit generation.

- Achieved incomes are higher than realized variable costs (in the first case, for around 1,6 times, while in the second case, for around 2,3 times).
- At both observed agricultural holdings, obtained critical values of production (values when the contribution margin equals to zero) leave enough space for business risk mitigation and prevention of uncertainty.
- Contribution margin in tomato production in protected area is more sensitive to the decline in value of production than to the growth of production costs. In the first case, the contribution margin values zero, with a fall of the value of production for 36,71%, or after a rise of variable costs for 62,18%. In the second case, the contribution margin equals the zero, if production value falls for 56,83%, or if variable costs of production increase for 131,63%.

Also, it should be underlined that in the structure of variable costs, in the case of ecologically acceptable production of tomato (agricultural holding A), the significant amount of costs refer to laboratory analyses (analyses of soil fertility, water used for irrigation and harvested fruits), around 25.000,00 RSD/are (i.e. 52,13%). Consequently, if these costs are included in the structure of variable costs generated in conventional tomato production (agricultural holding B), achieved contribution margin would be decreased for the same value, and become much lower than the contribution margin obtained in the ecologically acceptable production.

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SMALL AND MEDIUM ENTERPRISES IN SELECTED SEE COUNTRIES - A DRIVER OF RURAL DEVELOPMENT[1]

Jovan Zubović[2], Olivera Jovanović[3]

Abstract

Small and medium enterprises are an essential part of all business entities, especially regarding economic growth and regional inequalities in transition countries. Several researchers show that, over the years, the significance of SMEs is reflected not only on regional but also on rural development. The main aim of this paper is to determine the contribution of SMEs to rural development in selected SEE countries about institutional and government financial support.

Regional distribution of SMEs varies across countries and primarily depends on business attractiveness, employment conditions and institutional support for proper development of rural areas. Differences between poorer and richer regions lead to disproportions in some employers in small and medium enterprises, the value of net profits and the migrations of inhabitants from devastated areas. The research results which are presented in this paper show that SMEs, especially in agribusiness, are significant for sustainable rural development in selected SEE countries. Financial support is identified as a common barrier of successful business in all sectors as well as in agriculture.

Key words: *rural development, agribusiness, SMEs, SEE countries.*

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2 Jovan Zubović, Ph.D., Senior Research Associate, Institute of Economic Sciences, Zmaj Jovina street no. 12, 11000 Belgrade, Serbia, Phone: +381 66 357 000, E-mail: jovan.zubovic@ien.bg.ac.rs

3 Olivera Jovanović, M.A., Research Assistant, Institute of Economic Sciences, Zmaj Jovina street no. 12, 11000 Belgrade, Serbia, Phone: +381 11 26 35 823, E-mail: olivera.jovanovic@ien.bg.ac.rs

Introduction

The World Economic Forum is currently ranking 137 countries following several factors in the external business environment. Importance of those factors is different across countries as well as among business entities. Access to finance, ease of obtaining loans and the development of financial markets are factors recognised as the primary driver of the SMEs business results. The significance of these factors is not the same for all entities in the SME sector across the region. The latest data show that Southeast Europe economies' in 2017 are in bottom half of countries according to those factors. The standard offer of the banking sector in this region is still inadequate for small and medium enterprises, especially in the field of agriculture. Small and medium enterprises, as well as the entrepreneurs in agribusiness, are faced with high interest rates, expensive and complicated procedures and the lack of long-term and medium-term loans.

According to research by Jovanović (2016) overestimated funds of around one billion euros is still missing in Serbia for adequate financing of the entire SME sector, especially loans that can be granted in the medium and long term. The SEE countries are faced with a severe lack of financial instruments which can encourage the development of SMEs in the agribusiness sector. Several missing financial instruments are pre-capital funds, lease of equipment or factoring loans. Given that the SME sector is a driver of economic development in the Republic of Serbia due to its advantages over large companies, policy creators will need to consider ways to improve financial accessibility. The focus should not be only on loans and banking sector but on overall financing system including public institutions, funds, agencies and other. A similar situation exists in other countries in the region for many years, so the main obstacle for the progress of the SMEs is the lack of financial resources. On the one hand, the public policies' documents and strategies are focused on small and medium enterprises, especially in agriculture. However, on the other hand, inadequate financial system and institutional support lead to underestimating their possibilities and opportunities.

The development of small and medium-sized enterprises in the agro sector in Serbia is still far below its possibilities and opportunities. One of the opportunities for the SME is the utilisation of the high economic potentials of the agriculture which are still underestimated and unused. The effect can be reflected in the overall economy, especially in the domain of unequally regional development and lifestyle of inhabitants in villages and rural areas. This situation is not only characteristic for

Serbia but also for other low- and middle- income countries in this part of Europe. The significance of agriculture in the economic growth and development in the SEE countries observed in this paper can be analyzed through its participation in the structure of Gross Domestic Product (GDP). According official statistical data for selected countries, the contribution of Agriculture, forestry and fishing sector is quite stable over time. The total share is as follows: Albania - 20%, Macedonia 9.2%, Bosnia-Herzegovina 6% and Serbia 7.7% of GDP in 2016. The Agriculture sector is one of main generator of GDP in those countries, especially in Albania and Macedonia. Opportunities for small and medium enterprises are high, but difficulties to its development exist in all of the four observed countries.

The Republic of Serbia has extremely mixed terrain due to very different climate, geographic and socio-economic factors. Regional differences and problems of equal and balanced regional development are issues which are still needed to be solved, even if institutional framework and support have been significantly improved in recent years (Popović, Maletić, 2017). All support programs for regional development through utilization of agribusiness potentials are compliant with an institutional framework in the European Union. Statistical data show that the gap between developed and undeveloped areas increases over the years so that Serbia can be considered as one of the countries in the SEE region with the highest regional differences. Regional differences consequently lead to negative demographic trends in certain areas which mean intensive exodus between cities and rural areas. Years of negligent agriculture and demographic exhaustion of rural areas have resulted in very negative economic and social trends in agriculture which also affected the development of business activities in villages, farms and rural areas. The most important trends are non-competitive farms with inadequate equipment and knowledge, small production over a large number of farms, extensive and low technological level of production, insufficient or inadequate use of agro-technical measures, reduced productivity and poor management especially in the domain of using agricultural waste (Pantić, 2014). Low income and unprofitable production are results of current trends and cannot be desirable in sustainable development solutions.

The significance of small and medium-sized enterprises for regional development

Many small enterprises are newly opened as a result of business ideas of one or a few people, often owners, who take all risks of business failure, especially in

the case of agribusiness activities. Agribusiness mainly depends on geographical characteristics, climate and weather conditions during the year. Research results among several SEE countries like Albania, Bosnia-Herzegovina and Macedonia shows that support of new business ideas through adequate start-up support and policy will have a positive impact on employment growth in rural areas. In order to create a desirable environment for regional development, the government and relevant stakeholders should implement appropriate local strategies, policies and regulations especially in the domain of small enterprises and entrepreneurship. Entrepreneurial and individual knowledge of people often is corresponding with rural areas and environment development, so the institutional framework should follow significance between regions and implement policies in line with the degree of owners and employees knowledge. On the other hand, development strategies should provide knowledge programs capacity building specially designed for rural areas following individual characteristics of every rural area.

The importance of small and medium-sized business for the development of the South-eastern Europe region could be improved with the creation and implementation of policies divided into two groups. The first group of policies can provide greater profit to entrepreneurs and owners of farms or small and medium-sized business entities, e.g. using the fiscal instrument for reducing taxes. The second group of policies is dedicated to the greater success of SMEs business initiatives through the elimination of regulatory and administrative barriers, implementation of local programs for rural companies who currently use or will start using specific natural or human rural resources. The main aim of policies is to encourage the development of small and medium-sized enterprises in lower developed rural areas with specific resources. Lower developed rural areas in Serbia, but also in Albania and Bosnia-Herzegovina are areas with the small number of inhabitants, mainly older people or people with poor education compared to others, making them less attractive than other areas.

Highly educated and creative individuals tend to develop entrepreneurial initiatives in rural areas in advanced economies more than in economies with lower income. The role of human capital is significant for development of rural areas; several researchers analyzed the relationship between high quality of human capital and high development of entrepreneurial for rural economic growth. According to Lee et al. (2004) entrepreneurship have strong relationship with the quality of human capital in rural areas and changes in disposable income. Higher education leads to better quality of human capital which is often in line with higher disposable in-

come. The observed countries in this paper are part of Western Balkan region with lower level of disposable income, so governmental support is very important for development educational skills of inhabitants in the rural areas as way for increasing the quality of human capital. Developing specific public policies especially in the domain of taxes and subsidies, can encourage the opening of new enterprises in all sectors, mainly in the agro-business sector. Entrepreneurial skills exist among all working-age population, so institutional support is necessary to motivate inhabitants to take a risk and create their jobs and business entities. Given previous research results of authors, it can be concluded that entrepreneurs, small and medium-sized enterprises have a significant role in economic activities across the SEE region, in both urban and rural areas (Pantić, 2014). They provide an increase in production capacity, development and flexibility of rural areas according to trends on the market, give employment opportunities to local inhabitants and enrich the offer of products and services in local markets. In developed economies, where the transition process is already finished, the transformation of the rural economy is reflected in the reduction of the importance of agriculture and developing of the processing industry, agro-trade and providing agro services. In rural areas, small enterprises have a higher growth rate than foreign companies usually larger than domestic (Miller, 1991).

Recognising the importance of the sector of agricultural SMEs to achieve higher rates of regional as well as economic development, national institutional support in the SEE countries has been intensified in recent years.

The SMEs in agribusiness in Albania

The SMEs sector in Albania is recognized as a driver of regional and rural development, so the total number of small and medium-sized enterprises continued to increase during the last five years. In 2015, it increased by 25% as compared to 2012, while employment growth by nearly 20% during the same period. The ratio between SMEs and large companies is also growing. Even if the Albanian government significantly improved the business environment, several key components are still missing. Some of them are:

- learning about entrepreneurship and developing entrepreneurial skills in elementary schools at the same time;
- developing of different sources of financing (besides traditional);
- setting up specific bankruptcy procedures in order to improve business through programs of support, especially for enterprises who are facing financial problems.

Table 1. *The number of SMEs in Albania, sector Agriculture, forestry and fishing, 2013-2017*

Number of employees	2013	2014	2015	2016	2017
1-4	1,585	2,121	21,030	32,493	37,535
5-9	53	68	94	80	71
10-49	41	58	58	66	60
50+	11	13	12	20	18
Total	**1,690**	**2,260**	**21,194**	**32,659**	**37,684**

Source: *Institute of Statistics, Albania, 2018.*

Table 1 shows the total number of SMEs in Agriculture, forestry and fishing during the last five years in Albania. Albania has a robust agriculture sector, very important for overall economic indicators. According to official data are given by the Institute of Statistics, a dramatic change occurred in 2015. The total number of SMEs in this sector significantly increased and reached 21,194 enterprises. On the one hand, the largest share in total number of SMEs occupied those who have not more than four employed people.

On the other hand, the number of the largest companies in Albania (over 250 employed people) is very low compared to micro and small companies. While the number of small and medium enterprises was lower in 2016 and 2017, the total number of micro enterprises is increasing during the last years. In 2017, there were 37,535 micro companies, almost over 95% of the total number of companies in the Agriculture, forestry and fishing sector.

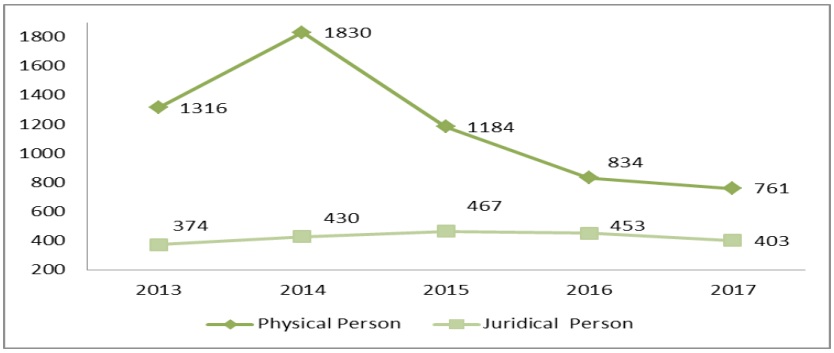
Table 2. *The structure of active SMEs in Albania by legal form, sector Agriculture, forestry and fishing, 2015-2017*

Element	2015	2016	2017
Physical Person	1,184	834	761
Juridical Person	467	453	403
Farmers	19,543	31,372	36,520
Total	**21,194**	**32,659**	**37,684**

Source: *Institute of Statistics, Albania, 2018.*

Active SMEs in Albania in the agriculture sector are divided into three groups according to legal form. There are physical, legal entities[4], juridical legal entities[5] and farmers. After 2015 the largest share of active SMEs has farmers, while significantly less legal entities are physical persons and juridical persons. The number of physical, legal entities, as well as the number of juridical legal entities, declined in the period from 2015 till 2017. However, at the same time, the number of farmers is significantly increased, from 19,543 in 2015 to 36,520 in 2017.

Figure 1. *The SMEs in Albania by legal form (2013-2017)*



Source: *Institute of Statistics, Albania, 2018.*

Figure 1 shows the number of physical and juridical legal entities in the Agricultural, forestry and fishing sector in the period 2013-2017. The number of physical, legal entities significantly decreased in the observed period, from 1,316 in 2013 to 761 in 2017, while the number of juridical legal entities was consistent over time. Changes in the number of entities in Albania occurred because the agricultural policy was significantly developed and implemented over time. Since 2005 the number of different agricultural policy instruments and measures were adopted (Zhllima et al., 2014). Some of them are:

- direct payment based on output;
- direct payment based on area/animal;
- on-farm investment support;

4 A physical person (natural person) - a human being, who is an individual being capable of assuming obligations and capable of holding rights (Quintana Adriano, 2015)

5 A juridical person is an organization, authorized by law with duties and rights, recognized as a legal person and having a distinct identity (corporations, government agencies, and NGOs). The rights and responsibilities of a juridical person are distinct from those of the natural persons constituting it (Quintana Adriano, 2015).

- food industry support;
- general support measures (mainly focused on food safety).

Effects of these policies can be found in the growing number of SMEs in agriculture, increasing in the number of employees and gross added values during the time. Because this sector is vital for regional and rural development in all, SEE countries as in Albania, creating new and improving current public policies is imperative for the future economic development.

The SMEs in agribusiness in Bosnia-Herzegovina

Bosnia-Herzegovina is one of the SEE countries which also has a strong relationship between economic development, agriculture and the SMEs sector. Because agriculture and SMEs have a significant contribution to regional and rural development, a particular focus of government policies is placed on o agricultural sector and small enterprises.

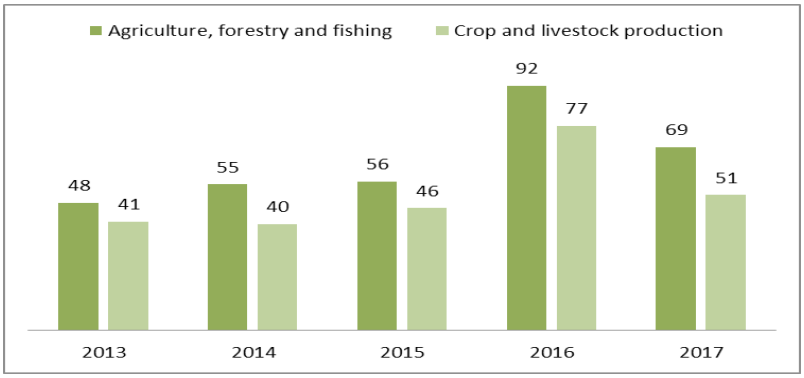
Table 3. *The number of active enterprises in Bosnia-Herzegovina, sector Agriculture, forestry and fishing, 2013-2018*

Element	2013	2014	2015	2016	2017	2018
Agriculture, forestry and fishing	881	862	787	826	854	893
Crop and livestock production	577	553	505	550	575	607

Source: *Agency for Statistics of Bosnia and Herzegovina, 2018.*

Table 3 presents the number of active enterprises in the period 2013-2018, in the sector Agriculture, forestry and fishing as well as a subsector- Crop and livestock production. Compared with Albania, who has many companies in the agricultural sector, Bosnia-Herzegovina has fewer enterprises which deal with this activity. During six years, from 2013 till 2018, the number of active entities in the Agriculture, forestry and fishing is consistent. The same is with the subsector Crop and livestock production - 577 enterprises were active in 2013, while in 2018 the share is slightly increased to 607 enterprises. It is good to mention that almost every year the number of newly opened enterprises in the first half of the year is increasing. It could be a result of implemented institutional programs of support to the SMEs in the Bosnia-Herzegovina but also improving the overall business environment.

Figure 2. *Enterprises opened in the first half of the year, period 2013-2017*



Source: *Agency for Statistics of Bosnia and Herzegovina, 2018.*

Figure 2 shows the movement of newly opened enterprises during the observed period. In 2013, 48 enterprises were opened in the first half of the year (till 30.06.) in the whole sector, but most of them were part of the Crop and livestock production. Continuous growth has been recorded over the years, so the number of enterprises who opened in the first half of 2018 was 68.

The main problem in Bosnia-Herzegovina is that large number of SMEs was shut down (or closed) in the first years of business operations (Petković et al., 2016). So the main focus of public policy makers is to create a quality measure or measures to ensure their survival, growth and development. According to surveys conducted in Bosnia-Herzegovina in 2015 and 2016, the main factors of SMEs business failure can be divided into four groups:

a) firm-specific (employees, strategies, modern production);

b) industry-specific (every industry has its activities which need to be implemented in a specific way);

c) macroeconomic indicators (good macroeconomic environment leads to quality business activities for SMEs) and

d) spatial or geographical factors. Maybe the most critical factor for Bosnia-Herzegovina can be geographical because agricultural production is highly dependent on the geographical conditions for cultivating crops or livestock as well as from weather conditions. If external financial support exists (especially in the domain of bank loans) that survival of the SMEs in the first years of business can be higher.

Table 4. *The SMEs in Bosnia-Herzegovina, sector Agriculture, forestry and fishing, by number of employees, 2013-2018*

Element	2013	2014	2015	2016	2017	2018
0 - 9	714	686	619	664	683	717
10 - 19	93	111	105	96	99	113
20 - 49	43	42	40	40	44	40
50 - 249	17	16	16	15	16	16
Total	**867**	**855**	**780**	**815**	**842**	**886**

Source: *Agency for Statistics of Bosnia and Herzegovina, 2018.*

Because the number of employees is one of the criteria for division of enterprises into groups, the number of SMEs according to this indicator is shown in table 4. It is evident that the largest share in the total SMEs sector has micro-entities which employed up to 9 persons during the year. In 2018 there were 113 entities which employed from 10 to 19 persons, while the number of those who employed from 20 up to 49 persons is less, only 40 enterprises. The smallest share is for medium enterprises during all observed years, but this share is relatively consistent over time.

Further simplification of business-related legislation could improve business performances of the SMEs in the agricultural sector in Bosnia-Herzegovina, especially for newly opened. Simplification can include lowering the number of authority fees and taxes, activities related to getting work permits but also better cooperation between education institutions and enterprises (practical education is good for all-students, schools and companies). Educational support maybe is crucial for SMEs development in Bosnia-Herzegovina because owners and entrepreneurs usually have good business ideas but lower knowledge about agricultural production and agricultural market. Also, access to finance should be improved as in the others SEE countries.

The SMEs in agribusiness in the Republic of Macedonia

The Republic of Macedonia is one of the SEE countries with high potentials for the development of micro, small and medium-sized enterprises. Agriculture, forestry and fishing sector is very significant for economic development, but the number of SMEs in the period 2013-2017 is slightly decreased. In 2013 there were 2,706 enterprises, but in 2017 that number decreased to 2,361. While the number of small

and medium-sized entities is stable over time, the number of micro-entities has decreased – from 2,608 in 2013 to 2,260 in 2017 (Table 5.)

Table 5. *The number of SMEs in Macedonia, sector Agriculture, forestry and fishing, 2013-2017*

Element	2013	2014	2015	2016	2017
1 - 9	2,608	2,625	2,477	2,393	2,260
10 - 19	35	37	47	45	41
20 - 49	30	35	31	35	36
50 - 249	33	27	26	25	24
Total	**2,706**	**2,724**	**2,581**	**2,498**	**2,361**

Source: *Statistical Office of the Republic of Macedonia, 2018*

Even the Macedonian government adopted new regulative measures to increase the number of newly registered enterprises; this was not the case in the agricultural sector. The main problem is the lack of financial funds and insufficient financial support from official institutions. Especially, micro and small companies are facing problems with regular access to finance. In line with crucial problems of their development, official institutional support should provide non-banking financial programs.

Special attention is dedicated to entrepreneurship in all sectors as well as in the agriculture. Several policy measures were adopted in this period especially to give support and to stimulate young entrepreneurs, also to provide funds for start-ups. Women entrepreneurship is also one part of long-term strategies for economic development, so the government implement unique services (education and advisory) for its advancement. All research about women entrepreneurs over the years, conducted in the SEE region, showed that women entrepreneurship is essential to overall economic development, with focus on rural areas where women are often marginalised, without quality and long-term jobs (Jovanovic, 2018). With the development of women entrepreneurship, not only in Macedonia but in the other countries position of women in business and society will be improved.

In order to provide all relevant information for owners, managers and entrepreneurs in agriculture, an online platform for knowledge exchange has been created. The effects are positive, costs of business activities are reduced, while the availability of information is increased.

Overall, progress in the SMEs environment has been made during the five years from 2013 to 2017, with the tendencies to become better in the following period. Significant changes occurred in the agricultural sector, so its contribution to regional and rural development is increasing.

The SMEs in agribusiness in the Republic of Serbia

Like in other SEE countries, SMEs have an essential role in economic development as well as in rural development of the Republic of Serbia. Agriculture in Serbia can provide significant opportunities and chances for business development and economic growth due to natural resources, geographical location, land quality and well-educated labour. Also, it has significant potential for the development of innovative products, which may imply in new start-up businesses and creating new jobs. Nevertheless, the agrarian policy was not well conceived during the 20th century, so the agrarian sector was neglected due to intensive industry development (Jovanović, 2016). Development programs were designed to improve and support state-owned companies while the private sector and commercially oriented agriculture holdings stagnated during years. With the beginning of the economic reforms and structural changes, the agro-business sector increased its importance for overall economic growth. Policymakers created institutional support in line with market demand, so governmental support was redirected to primary agriculture production instead of industry and development of entrepreneurship and small and medium enterprises instead of large state-owned companies. Effects of these changes in economic (and agriculture) policy can be found in the new structure of business entities observed by size (number of employees, annual turnover) and legal, organisational form. Table 6 shows units of classifications by legal, organisational form essential for agriculture development.

Table 6. *Units of classification by several legal (organizational) forms in Agriculture, forestry and fishing, 2013-2017*

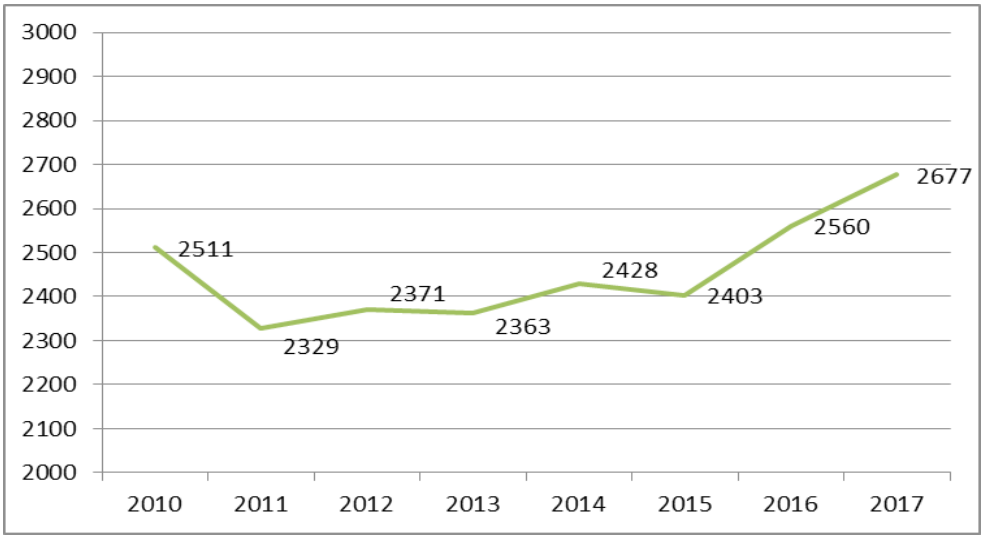
Element	2013	2014	2015	2016	2017
Partnerships	99	93	92	91	84
Limited Partnership	21	21	20	19	19
Limited Liability Company	2,552	2,739	2,894	3,054	3,181
Joint Stock Company	48	44	37	33	27
Public Joint Stock Company	98	94	89	85	81
Public Enterprises	6	6	6	7	6

Element	2013	2014	2015	2016	2017
Corporative and associations of cooperatives	1,497	1,505	1,510	1,528	1,628
Socially owned enterprise	37	34	34	33	33
Entrepreneurship	2,363	2,428	2,403	2,560	2,677
Total	**6,734**	**6,977**	**7,095**	**7,420**	**7,749**

Source: *Statistical Office of the Republic of Serbia, 2018.*

Majority of enterprises, including an overall sector of the SMEs, are organised as limited liability companies (LLC). The number of LLC is increased, so 3,181 units in 2017 were classified to have this legal, organisational form. The next one is Entrepreneurs which in 2017 counts for 200 entrepreneurs more than in 2013. The effects of the structural changes in the Republic of Serbia can also be resulted in increasing the number of cooperatives, especially in Agriculture. In 2013, there were 1,497 cooperatives while in the 2017 number increased up to 1,628. During the five years, the number of socially owned enterprises and public enterprises was consistent.

Figure 3. *Entrepreneurs in Serbia in agriculture, forestry and fishing sector in the period 2010-2017*



Source: *"Enterprises by size and Entrepreneurs in the Republic of Serbia, 2010-2014" and Statistical Office of the Republic of Serbia, 2018*

The development of entrepreneurship in agriculture is not possible without adequate institutional support. Institutional programs can establish a better market position for entrepreneurs, especially with creating new financial support programs that can encourage and improve agricultural production and stimulate the export of agricultural products.

Agriculture is the only branch of the Serbian economy that has a positive foreign trade balance, so it is very important to ensure its sustainability in development (Subić et al., 2015). Rural areas in Serbia have been neglected for many years. Uncontrolled exodus on the route between villages and cities led to the migration of a large number of young people into industrial and commercial areas, leaving behind the tremendous natural resources and potential that villages have. A potential solution for creating new jobs in rural areas can be a higher number of entrepreneurs, but the government still need to implement several programs more in order to create an adequate business environment for them. If the government creates programs that can provide professional and advisory assistance in agribusiness by official Agencies or Institutes, as well as including educational institutions such as the Economic or Agriculture Faculties, the motivation of young people to stay in villages and to develop their own business can be higher. Figure 3 shows the number of entrepreneurs in the period from 2010 up to 2017. During this period, institutional support to agriculture and SMEs has been changed (Jovanović, 2016). However, despite that, the increase in the number of entrepreneurs as well as the SMEs has not been noted. Table 7 shows the number of micros, small and medium enterprises in Agriculture, forestry and fishing.

Table 7. *Number of micro, small and medium enterprises in Agriculture, forestry and fishing in the Republic of Serbia, 2013-2017*

Element	2013	2014	2015	2016	2017
Micro	2,947	2,925	2,905	3,080	3,233
Small	372	360	367	368	363
Medium	104	97	95	94	88
Total SMEs	**3,423**	**3,382**	**3,367**	**3,542**	**3,684**

Source: *SMEs report for Serbia for the period from 2014 to 2018, Ministry of Economy*

The largest share in the structure of the SME sector in the Agriculture, forestry and fishing in 2017 has micro-entities (less than ten employed people).

Small enterprises (between 10 and 49 employed people) have an incremental decline during years- from 372 enterprises in 2013 to 363 in 2017. The number of medium enterprises (between 50 and 249 employed people) declined for 25% during this period, from 104 entities in 2013 to 88 entities in 2017.

Table 8. *Number of employees in micro, small and medium enterprises in Agriculture, forestry and fishing in the Republic of Serbia, 2013-2017*

Element	2013	2014	2015	2016	2017
Micro	4,652	4,513	4,674	4,728	4,687
Small	8,186	8,174	8,153	8,126	7,874
Medium	10,241	9,298	8,590	8,451	7,812
Total SMEs	**23,079**	**21,985**	**21,417**	**21,305**	**20,373**

Source: *SMEs report for Serbia for the period from 2014 to 2018, Ministry of Economy*

One of the indicators essential to analyse the development and growth of the SME sector is the number of employees. Even government create a new type of institutional support, the number of employed people in the micro, small and medium-sized enterprises in the Agriculture, forestry and fishing declined between the years 2013 and 2017. The reason for 12% decline during the five years can be found in the modernisation of agriculture production, enlarging farms or agriculture households, as well as in particular characteristic of agriculture. Thus, agricultural production often does not require the same number of employees during one year, because of strong seasonal, so the total number of employees can vary more than in other activities or sectors.

Conclusion

Analysis based on results of this research lead to conclusion that small and medium enterprises, as well as the entrepreneurship are very important for economic development in selected low and middle-income countries over the SEE region. They are not important only for increasing economic growth, but also for achieving higher level of development in all rural areas. Significance of agribusiness is noted in all four countries which are the subject of this paper- in Albania, Macedonia, Bosnia-Herzegovina and Serbia. A common feature for all countries is that the most numerous entities by size is micro enterprises in the Agricultural, forestry and fishing sector during period 2013-2017. The total number of entities in the SME

sector increased in Albania, Serbia and Bosnia-Herzegovina, while in Macedonia slightly decreased. Because Agriculture sector has high contribution to the GDP creation, especially in Albania, using available opportunities like natural resources and geographical advantages can create new jobs, new enterprises and consequently- a higher living standard and balanced regional development. Main obstacle for it is luck of financial funds and inadequate financial offer by banks, usually adapted for larger companies and activities with lower risks. Institutional support is needed, so the policy makers should create adequate financial programs for the SME and entrepreneurs in agribusiness to use all its potentials and advantages.

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FEMALE ENTREPRENEURSHIP - A PATH TOWARDS SUSTAINABLE RURAL RESTRUCTURING[1]

Jovana Čikić[2], Marina Nedeljković[3]

Abstract

Economic sustainability is one of four pillars of sustainable rural development. In order to achieve it, rural economy restructures which, among other, means that it develops on locally embedded activities. Sustainable rural restructuring very much depends on entrepreneurial capacities of various actors. We focus on gender-specific capacities as gender biases are one of the most persistent barriers in achieving rural sustainable development. Thus, we have analyzed rural women entrepreneurial experiences based on data collected in a survey on a sample of 503 rural women living in 14 villages in Vojvodina. The aim is to address two research questions: a) are there any differences among rural women, whether or not they have an entrepreneurial experience and b) are there any differences among female rural entrepreneurs, according to their business domain. Despite several limitations of the study, results can be useful as a baseline for more in-depth research of female rural entrepreneurship.

Key words: *female rural entrepreneurship, economic sustainability, gender mainstreaming, Vojvodina.*

Introduction

Although sustainability has been criticized over the last couple of decades (Lélé, 1991; Berke, Conroy, 2000), both as a concept and a practice, it is still present in scientific and, especially, policies discourses. Sustainability encompasses social, environmental, cultural, political, but also economic daily practices and developmental choices. Economic sustainability refers not only to achieving economic growth, but also welfare and its fair distribution. Sustainable economic growth is

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2 Jovana Čikić, Ph.D., Assistant Professor, University of Novi Sad, Faculty of Philosophy, Department of Sociology, Zorana Đinđića street no. 2, 21000 Novi Sad, Serbia, Phone: + 381 64 285 07 27, E-mail: jovana.cikic@ff.uns.ac.rs

3 Marina Nedeljković, M.A., Researcher Assistant, University of Novi Sad, Faculty of Philosophy, Zorana Đinđića street no. 2, 21000 Novi Sad, Serbia, Phone: + 381 65 204 81 85, e-mail: marina.nedeljkovic89@gmail.com

based on redefinition of the resources' use while economic welfare is essentially connected to a social dimension of sustainability, especially goals like equal access to various types of capitals, right to participation and empowerment of marginalized social groups (Čikić, Petrović, 2010).

Accomplishment of economic sustainability necessarily entails significant structural changes. Such covers organizational adjustments, technical and technological innovations, development of human capital, etc. In terms of development of rural areas, we argue that economic sustainability denotes rural restructuring as a process of intertwined modifications, primarily in rural economy. Reshaping rural economy towards global trends refers to well-known processes - diversification, commodification, (re)branding. Also, rural restructuring includes development of entrepreneurship. By rural entrepreneurship we understand all economic and non-economic activities that are locally embedded, thus primary based on locally available rural capital - rural landscape, biodiversity, geological diversity, air quality, rural settlements, historical sites, infrastructure, water resources, rural culture and rural way of life (Garrod et al., 2006). As Korsgaard, Müller and Tanvig wrote (2015:13) "*rural entrepreneurship, as it is defined here, engages with its location not primarily as a space for profit but with 'place' as a location of meaningfulness and social life… (it) involves new combinations of place-based or localized rural resources that create value not solely for the entrepreneur but also for the rural place."* Being developed based on "*location-specific advantages*" (Korsgaard et al., 2015:13), rural entrepreneurship goals, by default, aim towards sustainability – in terms of various rural capital that are being used, but also consequences for the rural community.

Analyzing and achieving sustainability is not likely without questioning equal opportunities to participate in development activities, but also to experience positive and negative development effects. Thus, we argue gender dimension to be one of the main topics in addressing sustainable rural restructuring as gender biases are one of the crucial and the most persistent barrier towards rural sustainable development. Development of female rural entrepreneurship is considered an important step headed for not only making rural economy sustainable, but also in creating more socially, culturally, environmentally sustainable rural communities.

Participation of rural women in rurality reproduction in Vojvodina/Serbia – why we need a gender mainstreaming?

There are plentiful research papers, master/PhD theses and reports on current state of affairs in rural structure and development in Vojvodina/Serbia, written from the different perspectives (spatial/geographic, demographic, economic, sociological, legal, political, etc.). Regardless to unalike standpoints, four major and mutual findings stand out in aforementioned numerous analyses – a) rural depopulation[4] (Čikić, Jovanović, 2015), b) underdeveloped infrastructure[5] (SORS, 2013) and lack of social services[6], c) rural unemployment (Cvejić et al., 2010) and d) partially modified traditional rural gender regime (Blagojević, 2010; Čikić, 2017). Those rural structure`s features are cornerstones of rural women`s capacity to participate in rurality reproduction. In terms of their participation in biological/demographic reproduction, rural women are still significantly (self)perceived as mothers and wives. Their participation in biological reproduction is understood and expected, even though it is carried out on the expense of their role in rural economy and participation in rural social community. Rural women`s participation in economic reproduction of rurality is greatly limited by the very characteristics of rural economy itself - according to Bogdanov (2007), Serbian rural economy still significantly depends on agriculture, which indicates its insufficient diversification, while Čikić and Jovanović (2015) have identified several major obstacles regarding inefficiency and structural discrepancies within farming sector in Vojvodina/Serbia. Also, characteristics of rural women as labor force are considered important obstacles in their employability – lack of specific knowledge and skills, unwillingness to commute, non-formal employment at the family farm, restricted access to various forms of capitals (Babović, 2014;

4 Despite regional differences, rural areas in Vojvodina/Serbia in general have been facing decrease in population since 1960s. Three main demographic factors contribute rural depopulation: a) negative net migration rate, b) low reproductive norms of rural population and c) increased rural ageing. Rural depopulation has significant impact on fragmentation of rural settlements. Also, due to the depopulation, rural settlements have been losing their significance in settlements networks.

5 According to the last Census (2011), $^{1}/_{5}$ of rural dwellings in Serbia have no access to water supply system of any kind (public or local) and more than ¾ of rural dwellings have no access to public sewerage (SORS, 2013). Overall, 2% of total rural dwellings have no public/local installations at all (SORS, 2013). The situation is especially difficult for the homes in remote rural areas.

6 We think of services such as kindergartens, small rural primary schools, ambulances, pharmacies, general stores. Deficiency in those services is a result of rural depopulation and lack financial support.

Bogdanov, 2011; Čikić, 2018), etc. Thus, rural women (like rural youth) are at the high risk of unemployment (Cvejić et al., 2010; Bogdanov, 2011; Petrović, Čikić, 2018), especially long-term one. Even though we now speak of partially modified traditional rural gender regime in contemporary Serbian society, it still continue to reproduce gender biases which are visible in everyday life practices of rural men and rural women, their statuses within rural families and communities and their overall capacities to take part in social actions. Nevertheless, in the absence of sufficient resources to provide subsistence and in order to accomplish development goals, even limited rural women`s capacities are being used. To sum up, rural women in contemporary Serbian society face multiple restraints regarding access to various assets, as individuals or as a social group. They also experience contrast in their roles and statuses in rurality reproduction while women`s presence in each type of rurality reproduction varies – their participation in the biological/demographic reproduction is the most evident, while they are least visible in the social reproduction. Thus, rural women (especially married, with children or middle aged ones, non-formally employed) continue to struggle their participation in rurality reproduction on daily basis.

As we have argued, gender dimension is one of the main topics in addressing sustainable rural restructuring. In order to achieve gender-balanced rural development, numerous communities/societies have introduced gender mainstreaming as one of the lead policy strategies (for example EU, UK, Egypt, Turkey, Morocco, etc.). By gender mainstreaming we understand strategy which enables making gender issues more socially visible by implementing gender equality principles and gender specific targets and capacities into the design, implementation and evaluation of various development policies. Regarding sustainable rural development goals, mainstreaming means a promotion of gender equality in access to various capitals that facilitate participation within biological, economic and social reproduction of rurality.

EU rural development policy has introduced gender mainstreaming more than a decade ago (Shortall, Bock, 2015). Nevertheless, the results of its implementation are ambiguous, depending on the implementation level and specifics of the national/regional context. Franić, Dwyer and Lewis (2015) wrote of gender mainstreaming being efficient on horizontal level, but not in terms of eliminating structural causes of gender inequalities. Shortall (2015) has also been sceptical about efficiency of gender mainstreaming in development of agriculture as well as Černič-Istenič (2015) who analyzed gender mainstreaming in rural develop-

ment policy in Slovenia – she emphasized that demographic and economic performances of the family farms were improved, but there was no significant advance in gender balanced decision-making and labor division. However, despite listed difficulties, gender mainstreaming and gender management still remain main policy means in promotion of female rural empowerment in a sustainable manner. One of the policy areas gender mainstreaming is often been applied is rural restructuring, especially entrepreneurship development.

Female (rural) entrepreneurship in Vojvodina/Serbia – current state of affairs

According to Popović-Pantić (2014:153), female entrepreneurship in Serbia has occurred in the beginning of the 1990s. Considerable increase of female businesses happened "*after 2000, especially after 2004*", while in the last decade there is a "*decline in starting female enterprises, in line with the general downward trend in economic activity*" (Popovic-Pantić, 2014:154). Female entrepreneurs in contemporary Serbian society, especially rural women are facing difficult economic, but social position as well (Blagojević, 2010; Babović, Vuković, 2008; Cvijanović et al., 2011; Čikić et al., 2011). According to Babović (2012), women are mainly small entrepreneurs, orientated on local markets, specialized in trade and service sector. To be more specific, female entrepreneurship (especially, rural) is mainly focus on traditional female activities such as food preparation, care providing, flower/vegetable production, traditional crafts, hospitality services, etc. Women`s enterprises are at greater risk of being shut down.

Most importantly, (rural) female entrepreneurs face several difficulties when starting and developing their businesses. When speaking of 'external' difficulties for rural female entrepreneurs, we think mainly of characteristics of rural structure, especially those regarding underdevelopment of infrastructure, lack of social services, inefficient rural economy, lack of entrepreneurial tradition. In addition, in external obstacles we include insufficient policy support. Internal obstacles entail characteristics of rural women derived from the features of rural gender regimes. Those obstacles are evident in the gender biases within decision-making processes, women`s insufficient entrepreneurial knowledge and skills, lack of various forms of capital, etc. As Babović (2012) has emphasized, limitations for development of female entrepreneurship in general originate in the very attributes of gender roles – women are perceived as less competent, successful and adequate to be business creators and leaders. On the other hand, Blagojević (2010) wrote of rural women`s

enthusiasm for entrepreneurship – according to the author, rural women (especially, young ones) would like to have a business endeavor of their own, but only if certain conditions are previously fulfilled.

In order to contribute to the analysis of female rural entrepreneurship, we have focused our research on two major issues:

- first, are there any differences among rural women, according whether or not they have an entrepreneurial experience – by differences we understand variations in demographic, socio-economic and socio-cultural characteristics of women;
- second, are there any differences among female rural entrepreneurs, according to their business domain - by differences we understand not only demographic, socio-economic and socio-cultural characteristics variations among rural entrepreneurs, but also differences in their entrepreneurial motivation, business obstacles and available support.

Methods and data sources

The analysis of female rural entrepreneurship is based on empirical data from the research aiming to address several issues regarding participation of rural women in all three dimension of rurality reproduction. The research was conducted on sample of 503 women living in 14 rural settlements in Vojvodina[7]. The sample consisted of rural women older than 20 years of age as we intended to analyze respondents with relevant life experience and attitudes towards all dimensions of rural reproduction (biological, economic, social). We have applied proportional stratified sample, with strata formed by age.

Data were collected in a face-to-face survey. Questionnaire consisted of 121 questions divided into eight batteries of which one regarded entrepreneurial issues. It consisted of 16 questions relating entrepreneurial preferences and opportunities of rural women, their entrepreneurial motives and experiences, obstacles and support in entrepreneurial endeavours.

7 Novi Žednik, Donji Tavankut, Doroslovo, Bački Brestovac, Bačko Dobro Polje, Maglić, Laćarak, Jazak, Padina, Pavliš, Ravni Topolovac, Banatsko Karađorđevo, Mokrin, Đala.

Characteristics of rural women according to their entrepreneurial experience and business domain

Research results have shown that rural women can be categorized into three types according to their entrepreneurial experience (Table 1). First category consists of those who have already started their business. This category consists of the least rural women - only 32 out of 503 respondents (6.4%). Rural women who have already started their business are mostly young ones (in their 20s or 30s). Majority has a secondary education. In contrast to other categories, among rural women who have already started their business, there are the most women with the urban social background and married ones. As it was expected, among female rural entrepreneurs there are almost four times more those who claimed to have a very good living standard as a result of their participation in profit-making. Interestingly, almost half of the women that have started their own business live in least developed municipalities which lead us to a conclusion that those women`s entrepreneurship is sought as a solution for insufficient job offer at the rural labor market. In other words, those rural women started their own business as a result of their economic deprivation.

Second category consists of respondents who only have considered starting their own business. This category is more numerous that previous one as it encloses 19.1% of the total number of respondents. Significant difference between number of rural women considering starting personal entrepreneurial endeavor and those who have already started it indicates major disparity between rural women's entrepreneurial aspirations and behavior. There is no statistically significant difference among characteristics of female rural entrepreneurs and those who have only considered starting their own business. Nevertheless, among women who have considered starting their own business there are more those with tertiary education and living in mixed income households.

Third category refers to rural women who have never considered nor have started their business – ¾ of total number of respondents belong to this category. Women in this category are mainly elderly, with unfavorable education structure.

Table 1. *Socio-demographic characteristics of rural women, according to their entrepreneurial experience*

Characteristic of rural women	Women who have started business	Women who have only considering starting their business	Women who have not considering starting their business nor have started it
% of women living in settlements in least developed municipalities	46.9	27.1	27.5
average age	37.8	37.5	44.7
% of those with tertiary education	21.8	34.4	16.0
average household size	3.7	3.9	3.6
% of those living in mixed income households	37.5	40.6	40.3
% of those with urban social background	15.6	12.5	13.1
% of those having very good living standard	12.5	3.1	3.5
% of married	75.0	63.5	60.3
average number children per women	1.7	1.4	1.7
average number of employed members of the household	2.2	2.4	2.1
% of women who are house owners	18.8	9.4	25.1
% of women who own agricultural land	6.3	12.6	14.4

Source: *research results.*

Three types of business emerged in female rural entrepreneurship in Vojvodina – agriculture/farming, service sector and trading (Table 2.). Two thirds of female rural entrepreneurs have spotted their job opportunity in service sector. Their businesses are mainly located in least developed communities which indicate: a) previous deficiency of services in those communities and b) underdeveloped rural economy. Majority of female entrepreneurs in services are middle-aged (60%) and every fourth rural women in this group was previously employed. Middle aged, previously employed women are considered main `losers` of the transitional economic restructuring. After having found themselves in `no man`s land` situation on labour market (not quite employable, but also not suitable for pension), some of those women have taken bold step into the rural entrepreneurship. Being aware of the `pros and cons` of living in a rural community, they reached out for businesses

that would fill up lack of available services in combination with their personal skills and hobbies (cooking, baking, providing care, knitting, photography, etc.) and household labour. Research results have indicated that rural women mainly opt for typical female services (beauty salons, catering, children care, elderly care).

Table 2. *Socio-demographic characteristics of female rural entrepreneurs, according to business sector*

Characteristic of rural women	Business sector		
	Agriculture	Services	Trading
% of women living in settlements in least developed municipalities	42.9	47.6	33.3
average age	33.8	38.6	36.0
% of those with tertiary education	42.9	19.1	0
average household size	3.7	3.7	4.0
% of those living in agricultural households	14.3	4.8	0
% of those with urban social background	28.6	9.5	33.3
% of those having very good living standard	14.3	9.5	0
% of married	57.1	76.2	100.0
average number children per women	1.4	1.7	2.0
average number of employed members of the household	1.1	1.2	1.6
% of women who are house owners	0	28.6	0
% of women who own agricultural land	0	4.8	0

Source: *research results*

Less than one quarter of female entrepreneurs (22.5%) has started business related to farming. Like in the case of service sector entrepreneurs, female entrepreneurship in agriculture is typical for the women living in the least developed rural communities. Research results indicate several major attributes of female rural entrepreneurs in agriculture. They are younger than female rural entrepreneurs in service sector or trading, which signify their primary employment focus on both entrepreneurship and agriculture. Nevertheless, we argue that such orientation is more a result of forced necessity, rather than personal aspiration. It is forced in due to the characteristic of rural labor market. Lack of sufficient job offers and lesser

labor market attractiveness of young rural women (because of motherhood role) make them more inclined to provide livelihood in self-employment. As 60% of those women already live on family farms, personal business in agriculture imposed itself. However, none of the women that have started their business in agriculture is a farm holder or a single owner of the farm land. Interestingly, among female entrepreneurs in agriculture there are the most women with tertiary education, comparing to other groups of female entrepreneurs. Nevertheless, those women lack agricultural education - only two out of seven entrepreneurs in this category have formal education in farming, of which one woman has a diploma of faculty of agriculture. Lack of formal education in farming can also be a sign of those women's forced-in orientation on business in agriculture. Like in the case of female rural entrepreneurs in service sector, women engaged in agriculture have also started their business in domain of female farming activities (poultry, fruit growing).

Only three out of 32 rural women have started their business in trading. Among them, there are no women living of family farms. Like female rural entrepreneurs in farming, women with businesses in trading do not own any property (house, land).

Motivation, support and obstacles in female rural entrepreneurial endeavors

Entrepreneurial motives are quite diversified – from profit making, adventurism, through independency and personal satisfaction of self-fulfillment to balance between work and family, etc. Research results have shown that female rural entrepreneurs are mainly driven by three motives (Scheme 1.). One motive stands out – it is a need to contribute to the family livelihood. Two third of female rural entrepreneurs have marked this motive as crucial in making decision to start their own business. The highest rank of financial motive can be explained by unsatisfactory living standard and (long-term) unemployment of rural women. Entrepreneurial endeavors are sought as a means to fight economic deprivation and social exclusion in general.

One fifth of the female rural entrepreneurs explained their primary motivation for starting their own business by desire to merge business and pleasure. They desire to be engaged in doing business they are passionate about, but also wish to reconcile economic activities with other social roles they carry out – role of a mother, a

spouse and a housewife. Such motive is recently recognized as primary in a specific type of lifestyle entrepreneurship.

Scheme 1. *Differentiation of entrepreneurial motives, according to the type of business*

Rank of motives	Agriculture	Service sector	Trading sector
I	Finances	Finances	Finances
II	Business & pleasure	Business & pleasure	Business & pleasure
III	-	Independency	-

Source: *research results.*

Every eighth woman has emphasized independency as her key entrepreneurial motive. For those women, independency relates not only to autonomy in decision-making, but also to a financial self-sufficiency. It is a way to prove themselves to others, foremost family and/or community members. Such can be of great importance to rural women as their work (especially in the household and on family farm) is often socially "invisible", unrecognizable and considered implicit. Also, independency as main motive can be explained in terms of rural women`s self-esteem booster.

There is no significant difference in motivation of female rural entrepreneurs according to the type of business. However, only female rural entrepreneurs in service sector have emphasized independency as an important entrepreneurship driver. As majority of them live in least developed communities, the significance of such motive can be understood in terms of their aspiration to finally be able to break the vicious circle of social exclusion.

On the other hand, entrepreneurial motivation is not sufficient for starting a business. It has to be backed up with various types of material and non-material support such as financial capital, family support, local community assistance, relevant policy measures, etc. The majority of the female rural entrepreneurs (60%) have relied only on family assets when starting their own business. Tangible family capital is very important for the rural women as they usually have no assets of their own which is a result of ever-present patriarchal model of rural property transfer (from father to son) and patrilocality as a principle in household formation. For every sixth women family financial capital has not been sufficient enough to start a business, so they opt for a combination of family assets and bank loans. Few female rural entrepreneurs used their social capital to seek

for the necessary financial means - they have borough money from relatives or friends. Also, some women have used non-refundable aid from the government programs for entrepreneurial and/or rural development. Non-material support often has the same (if sometimes not even greater) importance to rural women when starting their own business. This especially refers to the support provided by the family members and the local rural community in general. All female rural entrepreneurs reported that family members have supported them when starting a business. However, several women testified having only partial family support. On the other hand, local rural communities have not been very supportive – only 10% of interviewed rural female entrepreneurs reported having help from the local authorities and organizations such as assistance with the administrative procedures, non-refundable aid, free advertising on local media, etc.

There are differences in support scheme according to the type of business (Scheme 2). Female rural entrepreneurs in service sector have used the most diversified support scheme, both material and non-material. Their rich support scheme may indicate that rural women engaged in service sector are more versatile, more familiar with various information sources on available aid, but also more eligible for available entrepreneurship development grants.

Six out of ten women reported having experienced obstacles when starting their business. This is typical for women active in agriculture, while those who have started businesses in service sector reported having the least troubles. Several problems stand out: lack of financial resources, difficulties with administrative procedures and troubles with payment collection – those are the problems most female entrepreneurs are dealing with. Other obstacles concern inadequacy of production technology / resources, lack of business premises, unfair competition and high taxes. Female entrepreneurs in farming and service sector have reported lack of financial capital as their main difficulty which can be explain by their lower living standard[8], but also more capital consuming entrepreneurial endeavors. Also, women in farming and service sector have emphasized complex administrative procedure as an important obstacle. On the other hand, women active in trading are more concerned with the high taxes and problems with payment collection.

8 Among those women, 42.9% reported having a poor or very poor living standard, comparing to 33.3% of women active in trading.

Scheme 2. *Available support, according to the type of business*

Type of support	Type of business		
	Agriculture	Services	Trading
Material support			
- Family capital	XX	XXX	XXX
- Loans from relatives, friends	-	X	-
- Bank loans	XX	X	X
- Non-refundable government aid	-	X	-
Non-material support			
- Family members` support	XXX	XX	XXX
- Local community support	-	X	-

Legend: *XXX = main, XX – often used, X – rarely used, - = no support*
Source: *research results*

As we have argued, gender mainstreaming is one of the important means in promoting rural female entrepreneurship. Just a quick look at the available national strategic framework reveal two major difficulties regarding improvement, but also research of female (rural) entrepreneurship – first, there is no specific strategy aimed towards improvement of female entrepreneurship (SSMEEC, 2014), even though it is considered important in achieving (rural) economic growth and (rural) women empowerment. However, several other strategic documents point out the significance of female entrepreneurship - *National strategy for improvement of women`s status and progress in gender equality* (2009), *National strategy for employment 2011-2020* (2011), *Strategy for support of the SMEs development, entrepreneurship and competitiveness 2015-2020* (2014), *Agriculture and rural development strategy 2014-2024* (2014). In *Agriculture and rural development strategy 2014-2024* (2014), female rural entrepreneurship occurs only as a vaguely concept[9]. It is mentioned as a measure 12.9. within 12th priority section (Improvement of social structure and strengthening of social capital) which refers to "*affirmation of entrepreneurship of women and youth in rural areas*" (ARDS, 2014). In contrast, within *Strategy for support of the SMEs development, entrepreneurship and competitiveness 2015-2020* (2014) and supporting *Action plan* (2014), development of female entrepreneurship is clearly visible as one of the main strategic goals. It is especially elaborated within the sixth pillar and

9 It is a measure 12.9. within 12th priority section (Improvement of social structure and strengthening of social capital) which refers to "*affirmation of entrepreneurship of women and youth in rural areas*" (ARDS, 2014).

includes two main measures:[10] a) improvement of research and data base on female entrepreneurship and b) development of tangible support measures (financial support, mentoring).

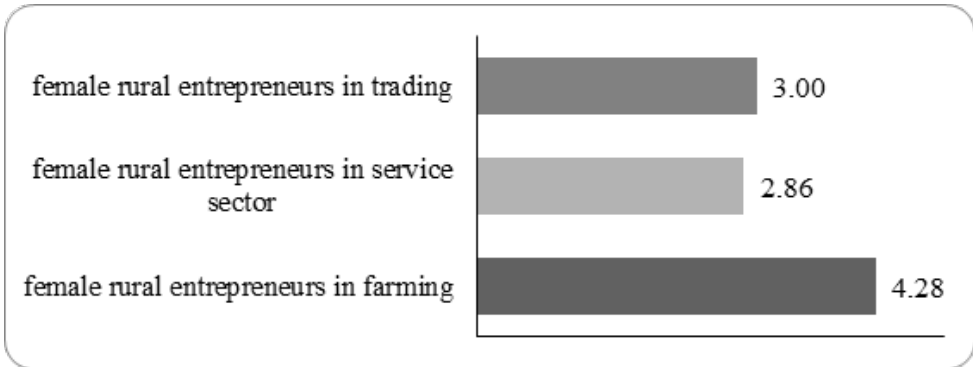
Second problem concerns lack of systematic data on female (rural) entrepreneurship. Although, there are some available data (for example, Business Registry Agency), they are not quite gender sensitive (SSMEEC, 2014: 51). As Popović-Pantić wrote (2014:154) "*public data show how many women are in formal status of entrepreneur, but do not show how many women among registered entrepreneurs actually manage enterprises*". Thus, available data are only partially applicable in researching, planning, monitoring and evaluating gender mainstreaming policy measures.

Unclear position of gender mainstreaming in farming/rural development policy, especially when speaking of rural entrepreneurship, is huge obstacle for rural women to address relevant institution seeking for support. In our research, only two female rural entrepreneurs have addressed relevant government departments for support – one when starting business in farming and other in service sector[11]. Other 30 female rural entrepreneurs have never contacted any governmental institution in order to attain support for business development, mainly due to lack of knowledge and information, but also due to the lack of property ownership as a necessary guarantee for getting a loan. Even though most of female rural entrepreneurs have no personal experience in cooperation with the government departments, they consider institutional and policy support important for business development. This is particularly characteristics for female rural entrepreneurs in farming – they see state support as crucial for female rural entrepreneurship development (Chart 1).

10 Those are improvement of research and data base on female entrepreneurship and development of tangible support measures (financial support, mentoring).

11 Both of them are highly satisfied with the cooperation with the representatives of the government departments.

Chart 1. *Average mark of importance of institutional and policy support for female rural entrepreneurship*



Legend: *1=not important, ..., 5= the most important*
Source: *research results*

Conclusion

As female rural entrepreneurship has been only a segment in our complex effort to analyze women's participation in rurality reproduction in general, we are fully aware of several limitations in our research. Such limitations are mostly concentrated around the issues of small subsample of female rural entrepreneurs (only 32 women). Moreover, as women`s motivation, capacities and obstacles for entrepreneurial behavior were only a segment of our research, we have not gained more detailed data on entrepreneurial experiences, even though it would be interesting and very useful to have a deeper insight.

However, our research results have proven several differences between rural women, according to their entrepreneurial experience – those are mainly concentrated around the issues of age, social background, property ownership. Also, results have indicated financial motivation to be crucial for starting a business. Although few present, female rural entrepreneurs are not homogenous group – those women differ in socio-demographic, socio-economic and socio-cultural characteristics, but also in type of business they have started and type of support they used to develop and sustain enterprises. Research results have also indicated that female rural entrepreneurship is useful in improving rural livelihood, particularly in at least developed communities. It also can to contribute to diversification and advance of services offer in rural communities.

Female rural entrepreneurs perceived institutional/policy support as very important, as they have limited access to necessary capitals. Despite presented

constraints and not so successful experiences, energetic introduction of gender mainstreaming principles into national rural development policy is currently the best top-down option in making female rural entrepreneurship in Serbia more sustainable. Moreover, public recognition of significance of female rural entrepreneurship for sustainable rural restructuring in general could also have positive impact on transformation of rural gender regimes.

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THE ECONOMIC POLICY AND SUSTAINABLE DEVELOPMENT STRATEGY OF AGRICULTURE IN SERBIA

Jugoslav Aničić[1], Dušan Aničić[2]

Abstract

During the period of transition, the outcomes of the economic policy of Serbia were less than satisfactory, especially knowing the potentials of Serbian economy. It is seen in low GDP per capita, high unemployment rate, foreign trade deficit and consequently low living standards. The adoption and implementation of the National Sustainable Development Strategy means that Serbia is obliged to apply the principles and requirements of sustainable development, which includes economic aspects of development as well as social and environmental aspects. In the transition period, the agriculture sector lost its major agriculture and food systems as well as agricultural cooperatives, which used to be the key actors of development. The Agriculture development strategy for 2014-2024 is based on modern management system of public administration, in accordance with the EU Rural Development Policy. It is supposed to provide adequate solutions to national and foreign challenges and to ensure that agriculture becomes efficient and highly competitive sector that will significantly contribute to the overall agricultural development of the country.

Key words: *sustainable development, agriculture, economic policy, competitiveness.*

Introduction

The economic policy of Serbia in the period of transition failed to increase low competitiveness of economy and get closer to more developed countries. Because of this, the main indicators of development are still extremely low, in spite of two decades of transition. This led to low living standard and high unemployment rate. Reliance of foreign investments and constant borrowing in order to

1 Jugoslav Aničić, Ph.D., Associate Professor**,** Union-Nikola Tesla University, Cara Dušana Street no. 62-64, 11000, Belgrade, Serbia, Phone: +381 64 247 71 99, E-mail: ajugoslav@yahoo.com

2 Dušan Aničić, Ph.D., Assistant Professor, Union-Nikola Tesla University, Cara Dušana Street no. 62-64, 11000 Belgrade, Serbia, Phone: +381 64 408 26 92, E-mail: anicic.dusan@yahoo.com

balance the budget, along with neglecting national investments and supporting export-oriented companies, has pinned the country in the corner when it comes to the most important development criteria.

Accumulation of foreign debt (external loan) is to be stopped and it is the main long-term challenge that the future economic policies are going to face, since the foreign loans, used in order to finance expenditures, are unsustainable in the long term. Primarily, it has to be focused on the investments aimed to increase production and export – comparative advantages of the country. There is no doubt that the sector of agriculture significantly contributes to the growth of the gross national income and decrease of foreign trade deficit of Serbia. Yet, the potentials of the Serbian agriculture have not been fully explored.

The National sustainable development strategy of the Republic of Serbia defines the growth of competitive market economy and balanced economic growth, infrastructure development and balanced regional development, as well as environmental protection and rational exploitation of natural resources. Based on European experiences, environmental protection does not contradict economic growth and development, since healthy environment is impossible without a healthy economy, and vice versa. Also, Serbia has adopted The Agriculture and Rural Development Strategy of the Republic of Serbia for 2014-2024 (Official Gazzete RS, no. 85/2014), which is the foundation of new agricultural policy in accordance with the principles of modern public administration management. It also represents the final objective of the state institutions to gradually adopt the model of the European support to agriculture development. This strategy defines the frame of political and institutional changes that contribute to more efficient development and increase of agricultural sector competitiveness, as well as to the well-being of rural areas' inhabitants.

Therefore, the objective of this paper, based on the indicators of economic development of Serbia in the transition period, is to point out the wrong starting points that represent the foundation of the economic policy of Serbia in the entire period of transition, and provide the creators of the economic policy with other development priorities aimed to increase the economy competitiveness, ensure the growth of the gross national income, decrease the unemployment rate and help the country leave the group of underdeveloped and heavily indebted countries. Such policy is supposed to create long-term foundations for sustainable development oriented to economic, social and environmental protection goals.

The mentioned results will be achieved more easily if adequate agriculture development strategy is applied. Not only does this strategy aim to decrease the unemployment rate and poverty, but it also contributes to the decrease of foreign trade deficit.

The economic policy of Serbia in the transition period

The results that agriculture in Serbia achieved in the transition period are considerably weaker in comparison to the developed countries as well as the surrounding countries. At the end of 2017, Serbia still had a high unemployment rate (13.5% according to the Labor force survey), the average salaries of about 400 euros, low GDP per capita, and it all pointed to the low level of living standard for the population. According to the NBS data, the country's external debt is 25630 million euros, which is very high considering the structure of the economy and slow GDP growth during the period. According to the World Economic Forum report for 2017, Serbia is in the 78th place in the competitiveness list (out of 137 countries observed). All these facts indicated that the economic policy in the transition period caused very poor results, regardless of the low starting position in 2000.

After the political changes in 2000, the conditions are created for the country's inclusion in the international integration, following the isolation and sanctions in the last decade of the twentieth century. The reforms began in several areas: social policy was removed from the companies and transferred to the government, non-tariff restrictions were cancelled, employment conditions were liberalized, anti-monopoly legislation was adopted, etc. (Devetaković et al., 2009). Important institutional and legal adjustments have been made: a number of laws have been adopted for market system regulation and EU regulations harmonization. Real and financial system has been largely reformed due to these laws, as well as public sector to a lesser extent.

Our country, as well as other socialist countries in the transition period towards market economy, has been affected by the so-called transition recession, reflected in living standard decrease, inflation increase, exchange rate instability, foreign trade deficit increase, unemployment growth and other economic indicators with an exclusively negative tendency. The urgent problem in the transitional countries is certainly a growing unemployment caused by the collapse of the companies in state and social ownership (Leković, 2017).

Small enterprises cannot solve all the problems that hit our economy, since a considerable part of their activities depends on large corporations that can gather even a few thousand small subcontractor-suppliers. A well-balanced economic development policy oriented towards all parts of the economic structure represents a leverage of power, large company recovery and restructuring included, which will create a healthy foundation for the economic recovery as well as the national economy stabilization.

The economic policy of Serbia in the transition period can be evaluated as unsuccessful because it has not led to the achievement of the basic goals, and they are unemployment reduction as well as population living standard improvement. The economic policy elements are its goals, subjects and instruments. Traditionally, there are four main goals of the economic policy: economic growth, full employment, market and price stability, and the balance between the exchange and financial transactions with other countries (Marsenić, 1996). Four basic areas of the economic policy can be singled out, and they are: balancing area (maintaining the macroeconomic balance), allocative area, distributive area, and development area focused on economic development direction and economic growth provision (Madžar, 2001).

According to the aspirations in the world, in Serbian academic community as well as the among the economic policy creators, entrepreneurship is considered as one of the key factors of the economic growth and employment generator. The Republic of Serbia government adopted the Poverty Reduction Strategy in 2003, where entrepreneurship development is labelled as an important element of the economic development and poverty reduction in Serbia, while self-employment and 'start-up' are defined as the key segments in entrepreneurship development. In the National Sustainable Development Strategy (2008) competition market economy and balanced economic growth are labelled as the priorities, while small and medium enterprise development, innovation encouragement and entrepreneurship promotion are stated as some of the main activities for their achievement. Finally, the year 2016 was declared the year of entrepreneurship (Aničić et al., 2017*)*, and all of these facts indicate the strong awareness about its importance in the future.

Young population migration from rural and less developed regions is the problem that the economic policy of the government highly underestimated in the transition period. Thus, for example, according to the 2012 census data, there was a decrease of 10.9% in rural population in comparison to 2002, or even

18,7% in the regions of Southern and Eastern Serbia. Unfavourable demographic trends were caused by numerous factors such as undeveloped infrastructure, lack of good quality social life in rural areas, inability of proper education for the population, low level of health services, dominant primary agriculture production, inability of agricultural produce placement, etc. The result of such population migrations is extremely unfavourable age structure where one in five village residents is older than 65, one in four in Southern and Eastern Serbia (Aničić et al., 2017).

According to Arsić (2016), after two and a half decades of transition, Serbia is in a small group of Central and Eastern European (CIE) countries that have not yet reached the development level from the pre-transition period. Thus, for example, GDP in Serbia was 25% lower in 2015 than in 1989, while CIE countries increased their GDP for almost 60% in the same period. CIE countries were on average 85% more developed than Serbia in 2015 as a result of the divergent development in the period described, although Serbia was at the average level of this group of countries in 1989. The lower development level also implies a lower level of population standard, while GDP decrease directly influenced unemployment increase.

The above mentioned data show that Serbia did not use the transition period to catch up with the developed economies, on the contrary, the results were more than modest which resulted in weaker relative position of our economy in comparison to the pre-transition period. The economic policy concept of Serbia in the transition period was based on high imports, foreign debt increase and inefficient privatization which led to the negative change in the economic structure. The transition process towards open market economy was marked by the reform concept (liberalization, privatization and deregulation) and the wrong development strategy, without the creation of conditions for highly competitive and export-oriented industry development as a traditional carrier of the economic development.

That is why the basic tasks of the economic and development policy in the following period are macroeconomic and market stability, sustainable economic development based on the industrial production and export growth, employment increase, foreign debt and negative foreign trade balance reduction. Serbia needs much faster GDP growth and industrial production recovery in comparison to the average growth rates of these aggregates in the world economy in order to

restore the relative position of the development from the 1980s. It is necessary to redirect the investments into the companies dealing with the production and the export of higher processing level products through the development policy, with the orientation to the strategic sectors that will contribute to the stable and dynamic economic development as well as the achievement of the country's economic policy goals.

Due to all of the above mentioned, it is prohibited, in terms of economy, for Serbia to direct most of the debt into budget and non-productive expenditure through further borrowing, without the effect on the economy development, and to let further generations pay for such a policy. The strategy of public debt management must be adopted and adhered to in order to avoid the negative consequences of the over-indebted countries.

Table 1. *Serbia and CIE countries: GDP structure according to expenditure, average for 2014 – 2017.*

	Personal consumption	Government expenditure	Investments	Exports	Imports
Participation in GDP					
Serbia	73,7	16,5	17,7	48,1	57,4
CIE (weighted average)	57,8	17,7	21,2	60,9	58,6
Surrounding countries	60,7	16,7	22,0	56,1	56,5

Source: *Eurostat, 2018.*

The results presented in Table 1 indicate structural problems present in Serbian economy for a number of years because the participation of investments and export in GDP is considerably lower, while private consumption participation is much higher than the average of the countries mentioned. It is obvious from the data that further GDP growth cannot be based on expenditure increase because it is already oversized compared to production. The main carriers of the economic development should be investments and exports, while expenditure must increase slower in relation to GDP. There are possibilities for investment and exports increase, and some of them are: public investments by the government with a positive effect on the growth of other branches of the economy, public company reform, corruption reduction, state administration efficiency increase, etc.

Taking all of the above mentioned into account, there is a real danger for the current economic policy to stabilize the country at a low GDP and high unemployment levels, with the low labour cost and poor working conditions in numerous privatized companies as well as those with foreign ownership. This situation is the result of non-existent economic development strategy during the complete transition period. There are neither efficient investments nor independent development without domestic banks oriented towards development financing, independent monetary policy, credit control and loans oriented towards local companies on the basis of clear strategy and priorities.

Table 2. *Basic macroeconomic indicators*

DESCRIPTION	2017	2016
Gross domestic product (millions of dinars in current prices)	4.464.628,9	4.261.927,4
Gross domestic product growth rate	1,9	2,8
Exports (millions of euros)	15.047,1	13.432,1
Imports (millions of euros)	19.418,6	17.067,9
Number of employees (thousands)	1.977	1.921
Net earnings (dinars)	47.893	46.097

Source: *Business Registers Agency, 2018*.

According to the data in Table 2, we can see the key macroeconomic indicators for 2017 and the previous year; we can see that GDP growth rate was too low for a faster exit from the group of non-developed countries, that the import is considerably higher than the export which further deteriorates the conditions of the foreign trade balance and the country's indebtedness, especially since net earnings are extremely low, which indicates poverty and low living standards for the population.

EU sustainable development concept and rural policy

Sustainable development represents a harmonious relationship between economy and ecology, which is a prerequisite for saving our planet's natural resources for future generations. It is a tendency to create a better world through the balance of the economic and social factors with the environment protection. A constant tendency for the economic growth puts a strong pressure on environment, with a possibility of causing negative consequences for the future of mankind. This is why the concept of sustainable development is introduced into all areas of hu-

man life, and world organizations, politicians, economists, various civil society organizations deal with these issues. According to these world tendencies, government of the Republic of Serbia adopted National Sustainable Development Strategy in 2008.

It becomes mandatory for all the countries to adjust their development to sustainable development principles and goals, new development strategies and development policies that will put long-term, complete and balanced needs and interests first, for the present and future generations. The main aspects the sustainable development concept is based on are balanced economic growth (the economic aspect), social aspect and environment protection and preservation (ecological aspect). The starting point of the sustainable development concept is based on the interrelations between development and environment, their interdependence as well as complementary development policy and environment protection with respect of the environmental principles.

Natural resources and environment protection are priceless for the present as well as future generations, and therefore all the countries should adjust their development to sustainable development principles and goals. This adjustment, in the short term, can slow down the economic growth, but in the long run it has better effects because its results are better life quality in addition to the economic growth. Therefore, the preservation of nature and its resources is imposed as the primary goal of all development efforts, before production, economic, regional and others (Pokrajac, 2009).

The concept of sustainable development is globally accepted after the 1992 UN conference on Environment and Development in Rio de Janeiro called the 'Earth Summit'. The conference defined the meaning of the 'sustainable development' syntagm as the compatibility of the economic growth on one hand, and the rational natural resource usage on the other. The results of the conference were, among other things, Agenda 21 (the program for the 21st century) – a global plan on how to make development sustainable in terms of environment, economy and society – and the Convention on Biological Diversity – one of the most important international agreements on the protection of nature (Jakšić-Frajman et al., 2010).

Sustainable development concept is based on three main aspects: equal economic growth (the economic aspect), environment protection and preservation (the

environmental aspect) and social and human rights respect and improvement (the social aspect). The definition of sustainable development stated in 'Our Common Future' Report by the World Commission for Environment and Development (Brundtland Report) from 1987 is: 'Sustainable development is the development that satisfies the needs of the present generations, without endangering the possibilities for the future generations to satisfy their needs.'

Sustainable usage of natural resources in economy should enable that the used factors aggregate productivity growth exceeds the losses due to resource exploitation, as well as their possible replacement by other resources due to the exhaustion (Goodstein, 2003). The starting point of the sustainable development concept is based on development and environment interrelations, their interdependence, as well as complementary development policy and environment protection, with the respect of environmental principles. According to Giddens (2007), sustainable development implies that the growth relies on physical resource recycling, with minimum environment pollution, whereby the balance should be established between the economic and social goals with environment protection and natural resource goals.

The Rio Declaration with Agenda 21 can be considered as the starting position for the definition of the sustainable development characteristics that separate it from other development paradigms. This interpretation of sustainable development highlights two key principles:

1) the integration of the economic, social and environment protection principles and
2) a wide participation of interested parties in the development process.

Agenda 21 encourages the initiatives for development interest and environment protection union, living standard improvement for all people, higher safety level and ecosystem preservation achievement, natural ecosystem yield increase and consensus for global sustainable development achievement (Nello, 2005).

The Republic of Serbia government adopted the National Sustainable Development Strategy for the period from 2008 to 2017. This strategy defines sustainable development as goal oriented, long-term, uninterrupted, comprehensive and synergetic process that influences all aspects of life (economic, social, environmental and institutional) at all levels. The National Sustainable Development Strategy goal is to lead to the balance of the three pillars of sustainable develop-

ment: sustainable economic growth, economic and technological development, sustainable development of the society on the basis of the social balance, and environment protection with the rational natural resource disposal, connecting them into a unity supported by the appropriate institutional framework.

The basic sustainable development goals according to the Strategy are the essential transformation of the national economy in the direction of strengthening the place and role of the most successful sectors, meaning service and industry sector domination based on the innovative activities of the entrepreneurial individuals and the provision of high investment participation in GDP allocation, primarily on the basis of the national savings increase. The priority is also to build a modern and efficient educational system that can be a support to future efficient and competitive economy based on knowledge as well as successful accomplishment of the Program for innovative and entrepreneurial behaviour encouragement, and entrepreneurial culture development among the population.

The National Sustainable Development Strategy defines, among other things, competitive market economy development and balanced economic growth, infrastructure development and balanced regional development, as well as environment protection and preservation and rational usage of natural resources as the national priorities. European experiences show that environment protection does not contradict the economic growth and development because there is no healthy environment without sound economy and vice versa.

The development of agriculture in modern global environment is caused by natural, economic and political factors. The importance of agriculture is increased in the total national and global economic development system, primarily due to the increasing numbers of human population that will be over 10 billion people at the end of this century according to the United Nations evaluations (UN, 2013). Modern world is faced with numerous problems such as: economic and financial crises, population increase, inequality, poverty, terrorism, migrations, environmental problems, over indebtedness, unemployment, etc. Global environmental problems are caused by the economic development which influences the changes in climate, water cycle and biodiversity.

Sustainable development is based on technology usage in order to maximize productivity and simultaneously minimize the negative effects on natural (soil, water and biodiversity) and human resources (rural population and consum-

ers). Sustainable agriculture accepts social cohesion with the aim of the most efficient usage of resources. Thus, for example, the priority of EU agriculture is sustainable agricultural and rural development that implies natural resource management and preservation as well as technological and institutional changes direction in order to provide achievement and continuous satisfaction of present and future generation needs. It is all according to the EU strategy for sustainable growth and workplaces, („Europe 2020, A strategy for smart, sustainable and inclusive growth").

Sustainable rural development is an important part of the total EU policy, where agriculture and forestry are crucial for soil usage, natural resource management in rural EU areas and the platform for the economic diversification in rural communities. Three basic principles defined back in 1962 as the basis of the common agrarian policy and common market organization are: a) singular market, b) Union priority (giving priority to agricultural produce from the EU in relation to import and internal market protection from various disorders) and c) financial solidarity.

The basic goals of common agrarian EU policy are (Nello, 2005):

1. the increase of productivity in agriculture;
2. providing the appropriate level of living standards for the employed in agriculture;
3. price fluctuation decrease;
4. providing consumer supply at acceptable prices.

The characteristics of EU policy for rural development are 'continuity and changes'. It continues to provide a series of measures in the context of integral rural development programs, and it changes in the way that these programs are developed through the strategic content and sustainable development of rural areas. This is why rural development policy is focused on three essential goals, and they are (Ristić, 2014):

- to focus co-financing on the agreed priorities for all three axis of the rural development policy, simultaneously leaving enough flexibility for the member countries and regions to find the appropriate balance between the sector dimensions (agriculture restructuring) and the territorial dimensions (soil management and social and economic development of rural areas),
- competition improvement in agriculture and forestry,
- proper soil management and environment improvement support,

- life quality improvement and economic activity diversification encouragement.

The strategy of agricultural development in Serbia

The foundations of new agricultural policy in Serbia are defined according to the principles of modern public policy management, on the line of the clear commitment of the Ministry of agriculture and environment for gradual acceptance of the European model for agriculture development support. They are determined by the Strategy for agriculture and rural development of the Republic of Serbia for 2014 – 2024 period (the Official Gazette no. 85/2014). This strategy defines the framework for political and institutional changes that contribute to more efficient agricultural sector development and welfare of the rural population. In order to achieve all that successfully, the government is in obligation to react to numerous challenges through long-term, stable and efficient policy.

The creation of the strategy is motivated by the need to use a new agricultural policy concept to react to internal and external challenges, such as:

- the need to reduce the technological development lag behind the competitive countries and to enable more efficient confrontation of the agricultural sector with climate change effects;
- the necessity for efficiency increase in the food chain as well as agricultural and food sector competitiveness;
- stable income and business environment provision for farmers and other entrepreneurs;
- the achievement of the economic, environment and social sustainable development goals, where multifunctional agriculture and rural development have a special place;
- the willingness to respond to the demands arising from the World Trade Organization and European Union accession process.

According to the Strategy, the vision of agriculture and rural areas development predicts agriculture in the Republic of Serbia to be the sector whose development is based on knowledge, modern technologies and standards in 2024, the sector offering innovative produce to local as well as demanding foreign markets, providing sustainable stable income for the producers. Also, the goal is to manage the natural resources, the environment and the cultural heritage of rural areas according to the principles of sustainable development in order to make

rural environments an attractive place for life and work for young people and other residents in rural areas.

In order to achieve these results, sustainable agriculture should be the main orientation of the agricultural policy. Also, the polycentric development should be based on production system specific points respect as well as agricultural household types ensuing from various geographical, natural, social, economic and other characteristics of rural areas. The implementation of the Strategy goals is closely linked to the necessity for modernization of efficient public policy management bodies and organizations. In addition to all of the above mentioned, the agricultural budget should be sufficient to support all the reform processes in order to achieve the agriculture sector competitiveness.

The structural changes in agriculture in Serbia ensued as a consequence of various external (globalization, liberalization, technological progress, climate changes, limited possibilities for natural resource usage, demographic changes...) and internal factors (the size of agricultural households and sector structure, productivity growth sources and technology usage, knowledge and information...). Regardless of many difficulties accompanying the agriculture in the transition period, this sector achieves positive foreign trade results and contributes to total foreign trade deficit reduction.

The data in Table 3 show that Serbia achieved surplus in agriculture produce foreign trade during the period observed, and that surplus amount ranged from 785 million euros in 2010 to 1624 million euros in 2016.

Table 3. *Foreign trade commodity exchange of agriculture and food produce for the period from 2010 to 2016 (millions of euros)*

DESCRIPTION	2010	2011	2012	2013	2014	2015	2016
Agricultural exports	1.688	1.937	2.106	2.104	2.315	2.819	2.898
Agricultural imports	903	1.010	1.163	1.227	1.310	1.950	1.275
Surplus	785	927	943	877	1.005	869	1.624
Imports coverage by exports in percentages	186,9	191,8	181,1	171,5	176,6	144,5	227

Source: *Statistical Office of the Republic of Serbia; Serbian Chamber of Commerce, 2018;*

There are great possibilities for structure improvement on the side of export in terms of higher participation of final processing produce with higher added value

compared to the primary produce. The characteristics of imports are a frequent import of suspicious quality and lower price produce although there is a production surplus in domestic market (meat, milk, corn, certain vegetable produce, etc.).

According to the Serbian Chamber of Commerce data, the structure of created value in agriculture production consists of 70% crop farming and 30% livestock breeding. For comparison purposes, 70% of EU agriculture production comes from livestock breeding and 30% from crop farming.

Agriculture competitiveness improvement with the simultaneous natural resource preservation and renewal is a necessary condition for total national economy competitiveness improvement. The priority task of Serbian agriculture is an increase in general level of competitiveness, finding new markets, international rule and standard adjustment, new knowledge and technology acquisition. Space for competitiveness increase lies in significant natural resources available in Serbia, in the area of quality standard and production improvement, faster innovation acquisition and stronger production chain, as well as significant human resources available in agriculture.

Agricultural production in Serbia is significantly aggravated by insufficient financial means, therefore it frequently works within a vicious circle of low income, insufficient savings and low investments, which unconditionally leads to the creation of dependence on government aid. Most agricultural producers have no access to financial institutions in order to enlarge their households and modernize production. Financing through financial institutions is quite a complex issue because most financial mediators operate in highly competitive environment and therefore takes care of credit facilities and the safety of credit repayment in case of loan approval for the sector of agriculture (Sogo-Temi, Olubiyo, 2004).

Rural infrastructure contributes to the strengthening of agriculture foundations, which, on the other hand, determine the pace of the county's economic development. Rural areas with better connections are more competitive compared to others in business. Therefore, the investments in agriculture are crucial for the stimulation of its further development. Their growth requires a strategy which implies a careful subsidies reduction and better planning in order that the government can redirect those funds into capital investments within fiscal restrictions (Sharma, Gulati, 2005). On the other hand, public investment growth would also encourage private investment growth in agriculture with respect to their complementary relations.

In general, agriculture will be exposed to the increasing demands for food production in the world in the future. In addition to this requirement, agriculture is also expected to contribute to overall economic development and poverty reduction, face the increasing competition in alternative usage of limited land and water resources, adjust to climate changes and contribute to biodiversity preservation and sensitive ecosystem restoration, etc. The response to these requirements will be more efficient through private and public sector coordination, public and private partnership projects, producer associations, etc.

Agriculture production development in Serbia must be based on small and medium agricultural households in the future, as well as large agricultural households specializing in certain types of agricultural production. A favourable circumstance is government institution support for '500 cooperatives in 500 villages' project which needs to prevent the ruin of cooperatives and make a turning point in terms of cooperative sector revitalization in Serbia, meaning profit for all involved: reduce unemployment and migrations from rural areas into the cities, increase agrarian production and competitiveness, create conditions for manufacturing production development based on agriculture produce processing, create produce of higher processing stages, increase exports and improve foreign trade balance, etc.

Conclusion

After the 2008 economic crisis, the growth of the GDP in Serbia is low, in comparison to both developed countries and neighbouring countries. Also, the main characteristic of the whole period is foreign trade deficit along with the unfavourable structure of export and import. The unemployment rate is also high, which points out wrong and inefficient economic policy during the period of transition and unfavourable economic structure that failed to provide an adequate solution to external influence. These trends have been existing for too long, thus preventing the country from cutting its dependence on external financing resources and high external debts, which inevitably leads to negative consequences of being heavily indebted.

The adoption of the National sustainable development strategy implies that Serbia is obligated to adjust its development to the principles and goals of sustainable development that is oriented toward long-term and balanced requirements of the present and future generations. Also, the national strategy of agriculture

development is based on the latest development concept that is supposed to provide efficient solutions to numerous internal and external challenges during the process itself. The vision of the agriculture and rural areas development predicts that 2024 will be the year in which the development of agriculture is based on knowledge, skills, modern technologies and standards, innovative and competitive products that will ensure sustainable and stable income for agriculture producers.

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FROM CONVENTIONAL TO MULTIFUNCTIONAL FARMING IN BULGARIA: CHALLENGES AND OPPORTUNITIES

Julia Doitchinova[1], Kristina Todorova[2]

Abstract

The report presents the theoretical foundations of the transition from a conventional to multifunctional farming and assesses its development and challenges in Bulgaria over the past fifteen years. Particular attention is paid to the ecosystem approach, its characteristics and opportunities for transition to a multifunctional model of agriculture. The report has the following structure: theoretical aspects of the transition to multifunctionality; ecosystem-based approach in the context of multifunctionality; the multifunctional farm; methodological framework; assessment of multifunctionality in farms in Bulgaria; and Conclusion. Analyses and assessments are made on the basis of official statistical and other reporting data of the Ministry of Agriculture, Food and Forestry in Bulgaria.

Key words: *multifunctional agriculture, ecosystem approach, multifunctional farm*.

Introduction

The purpose of the report is to clarify and further develop the methodological problems of the transition to multifunctional agriculture and to evaluate its development in Bulgaria.

Theoretical Aspects of the Transition to Multifunctionality

The European model of agriculture at the end of the 20th century is based on the productive farming regime. Its characteristics - the strictly defined position of the agriculture in the community, the industrialized and specialized production under the conditions of a protectionist agrarian policy towards production and property

1 Julia Doitchinova, Ph.D., Full Professor, University of National and World Economy, Business Faculty Economy of Natural Resources Department, Sofia, Bulgaria, E-mail: juliadoj@abv.bg

2 Kristina Todorova, Ph.D., Assistant Professor, University of National and World Economy, Business Faculty Economy of Natural Resources Department, Sofia, Bulgaria, E-mail: ktodorova@unwe.bg

rights - have become one of the main reasons for the negative trends in the socio-economic, ecological, demographic and other processes. These effects of the productive regime, according to some authors (Willson, 2001) created prerequisites for a transition to the so-called "post-productivism". The concept explains the change in the focus of agrarian policy on agricultural production to the needs of higher quality of life in rural areas, ecosystem services and the preservation of the cultural landscape (McCarthy, 2005; Wilson, Rigg, 2003; Wilson, 2007), as well as new ways of decision-making for rural development, social and economic changes both within and outside the farm (Evans et al., 2002). Some authors (Markey et al., 2008; Halseth, Manson, 2008; Mather et al., 2006) define the trajectories of the transition to post-productivism as a change in "nature and type of production (transition from raw materials to non-standard products), multidimensional goals connected to landscape and resources (including ecological) and increasing if the importance of governance (representing the diversity of actors and institutions) in land-use decision-making (Markey et al., 2008, p.410). These opinions lead to the conclusion that post-productivism is a complex concept that according to Wilson (2001) covers ecological, economic, social and cultural dimensions, thus covering several disciplinary areas.

The multifunctionality of agriculture and rural areas emerged as an alternative concept of post-productivism to describe the ongoing changes in rural areas. Just as "post-productivism", "multifunctionality" has different definitions depending on the context (agriculture, rural development). In the scientific literature there is no generally accepted understanding of the essence of multifunctionality. Depending on the purpose of the research, the authors perceive one or another treatment of the multifunctionality. Even the most commonly cited definition, the working definition of the Organization for Economic Cooperation and Development (2001), does not reflect the essence of the phenomenon, but rather its two main characteristics. According to this definition, "the key elements of multifunctionality are the existence of numerous market and non-market results that are jointly produced in agriculture" and "the fact that some of the non-market results are in their essence public goods, and markets for these goods don't exist or are poorly functioning "(OECD 2001). In practice, the concept of multifunctionality highlights the positive effects and impacts of agricultural production (Doitchinova, 2005). In the context of the rural landscape, multifunctionality refers to the idea that rural landscapes have a variety of commodity and non-commodity values, and that policy must recognize and protect the whole set of values (McCarthy, 2005). In addition, Woods (2011) argues that when expanding beyond a differentiated agricultural economy,

multifunctionality "refers to a multitude of agricultural outcomes that include not only food and other resources but also social and environmental benefits" (p. 80). He emphasizes that the decision on "the question of what is happening with farms that cannot be maintained via the free market of agricultural produce "is what distinguishes the multifunctionality from previous approaches (p. 81-82). In this case, "multifunctionality" recognizes "the value of these farms for rural areas. According to other authors (Marsden, Sonnino, 2008), multifunctional agriculture can be defined in three ways: developing further the activity within an agro-industrial model; a strong reduction in the importance of agriculture in a post-productive era; part of the sustainable development paradigm that sees the future of agriculture, integrated with the future of rural communities and the wider economy (Morgan et al., 2010). In this way, they determine the direction and purpose of the transition to this pattern of development, which makes the concept particularly used in political discussions. The concept of multifunctionality is logically linked to the objectives of sustainable rural development and the strengthening of the multifunctionality of the regions themselves. Some authors (Potter, Tilzey, 2005) link the concept of multifunctionality to social well-being and the need to diversify additional functions of agriculture such as biodiversity, landscape, cultural heritage, etc. Other authors (Romstad et al., 2000) reasonably consider multifunctionality as "a series of interconnected outputs, where some of the goods are private and some are public." Another understanding is that multifunctionality requires reconfiguration of economic relations and the construction of new networks of relationships at all levels - from the farm to the regional, national and international level (Knickel, Schramek, 2000).

It can be summarized that the multifunctionality of agriculture is a concept that: clarifies the ability of agriculture to produce, within the same production process, associated commodity and non-commodity goods, as well as private and public goods; expresses the multilateral role of agriculture in providing high-quality food, rural development and improving living conditions, and so on; creates prerequisites for the convergence of the positions of the different groups of society - farmers, rural and urban inhabitants, etc., for future development of the agrarian sector and rural areas.

Ecosystem-based approach in the context of multifunctionality

The Convention on Biological Diversity (CBD) defines the ecosystem approach as "a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable

way". This definition serves only as a basis, and is far from exhaustive. Later on, twelve defining principles (the 'Malawi Principles') (CBD Decision V/6) were adopted which basic idea was considering, conserving and managing ecosystem services. As the latter are basically the core of the ecosystem-based approach, it was not a surprise that a new term was developed as a synonym to the ecosystem approach – ecosystem services approach. This is because the ecosystem-based approach uses ecosystem services as a strategy or as a means in dealing with biodiversity loss, climate change, natural disasters, as well as food provision, which naturally placed the concept of ecosystem services under the attention of academics and policy makers. Another similar term, the ecosystem-based management, which emerged during 1980s, put focus on the notion that ecosystems should be managed on a landscape-scale with understanding that the ecosystem itself is not being managed, but it is the human activities that affect and shape the ecosystem (Layzer, 2012).

The concept of ecosystem services was primarily used by biologists to a great extent in order to highlight the benefits they provide to society as well as to show the merit between human welfare and the natural environment. In the 1990s, a number of key publications have contributed to making the concept of ecosystem services take its place in the policy arena (The Millenium Ecosystem Assessment reports). The earliest references to the concept were back to the mid-60s (Carson, 1962) and 70s (Fisher et al., 1975). In 1981, Ehrlich (Ehrlich et al., 1997) noted that the most important reason for the anthropocentric conservation of biodiversity is the role of microorganisms, plants and animals for the provision of free ecosystem services, without which society cannot exist and highlights the social value of nature. The term ecosystem service is gaining more prominence with publications under the Millennium Ecosystem Assessment, which present a conceptual framework for assessing the relationship between ecosystem services and social welfare. Ecosystem services are defined as those that contribute to dealing with pests, pollination, climate regulation, water retention and flood control. The MEA defines ecosystem services as "the benefits provided by ecosystems to humans, which contribute to making human life both possible and worth living" (MEA, 2005, p. 23), as the categories defined by the assessments are: provisioning services (e.g., material goods such as food, feed, fuel, and fiber); regulating services (e.g., climate regulation, flood control, water purification); cultural services (e.g., recreational, spiritual, aesthetic); and supporting services (e.g., nutrient cycling, primary production, soil formation).

As often there are tradeoffs between the natural environment and socio-economic sphere, when speaking of ecosystem services, one must also takes in mind who will provide them and how. Raising socio-ecological conflicts mainly due to the degrading environment led to policy initiatives to reduce the impact from human economic activity. Agricultural activity is considered in having large impact onto the environment which had led to increased decision-making and policy reformation in direction to nature conservation within farmland. As Zhang et al., 2007 noted, agriculture is the largest engineered ecosystem which is embedded into a web of natural ecosystems. Tracing the development of one of the most notable policy – the CAP - we can observe a shift from focusing primarily on food production towards an increased emphasis on environmental issues. This could be traced out following the program period from 2007, until now and the CAP after 2020, where farm support is gradually linked with environmental conservation practices. The multifunctional role of agriculture become even more recognized, as the multifunctional agriculture and ecosystem services are both anthropogenic concepts that focus on human benefits (Rovai, Andreoli, 2016). The pressure on agroecosystems from postwar 'production orientated' agriculture has led to overexploitation of soil, contamination, compaction and biodiversity loss. However, the agricultural policy began to change reflecting the concerns of the society, which was also changing, paying more attention to food safety, animal welfare and environment conservation. Gradually the CAP was also changing, where subsidies put a new emphasis on the multifunctionality of farming and the role of farmers for provision of ecosystem services and public goods. Many benefits provided by multifunctional agriculture (MFA) can be considered as ecosystem services (ES) such as food and water; regulatory services such as flood regulation, pollination, nutrient cycling, drought, land degradation and disease control, soil formation, biological pest control, etc. Multifunctional agriculture turns on the idea that farms and farmed landscapes can produce more than just food and fiber, but also valuable ecosystem services and non-commodity goods. As explained previously, the connection between farming and ecosystem services is interconnected and interdependent. From one hand, farming activity depends on the ecosystem functions for the production of food and fiber, which in some cases result in environmental degradation, overuse of resources, contamination, etc. On the other hand, ecosystem functions and resources may be enhanced and improved with specific agricultural practices, which makes farmers key stakeholders in the management and provision of ecosystem services. The latter can be a joint result from the farming activity, or a separate economic activity, which main goal is provision of ecosystem services (Rovai, Andreoli, 2016). According to some authors, distinction can

be found in that the provision of goods and services in multifunctional agriculture is a result from agricultural activities, while the ecosystem services derive from the ecosystem functions, which are influenced by agricultural practices. In the earlier research the ecosystem services approach was exceptionally oriented toward ecosystem conservation, accusing agricultural intensification as one that damage ecosystem functions. However, at some point the ecosystem approach started to take into account the fact that the agriculture in not only a consumer of ecosystem services, but also a provider (Huang et.al 2015). As Costanza et al. (1997) noted the ecosystem services have ecological characteristics, functions, or processes that directly or indirectly contribute to human well-being. In most cases, ecosystems services in the form of public goods are not entirely natural in their essence, which is the case of agricultural landscape provision, which depends on agricultural and forestry land management (Rovai, Andreoli, 2016). Some authors believe that the level of multifunctionality influences the attitude and willingness of farmers to provide ecosystem services (Mills et al., 2016). Moreover, as ecosystem services cannot be measured through the market, other incentives to promote their supply must be identified. Ecosystem service payments are one example for the provision of a certain level of ecosystem services, and through this mechanism the benefits to society are internalized by offsetting the one that creates them (the supplier). Muradian et al., identify PES as a transfer of resources between social actors that aims to create incentives to bring individual and / or collective land use solutions in line with social interest in managing natural resources (Muradian et al., 2010). The nature of ecosystem services as public goods raises the problem of their maintenance and production, which confronts the interests of private entities such as farmers. Ecosystem services on agricultural land determine, on the one hand, their importance for the whole society, but on the other hand the impossibility of part of them being provided through the market mechanism (Todorova, 2017). Currently, the most used mechanism at EU level for payments for ecosystem services is the Common agricultural policy. Using Pillar 2 – Program for development of rural areas – the policy agenda for involving the main stakeholders for conserving the environment in agriculture reaches its goals. Some of the schemes, which are the case with organic farming are more of a result-based option which is connected with the private good value chain. In this case the producer of organic good delivers ecosystem services, while profiting from this. Another case for provision is through the agri-environment schemes, where a certain level of compensation is provided to farmers who engage in environmental conservation. This mechanism is practice-based where there is no expected private benefit for the farmer and the ecosystem service delivered to society takes the form of a public good. By using

the concept of ESS it is possible to get an indicator for long-term sustainability of agricultural production balancing between ESS demand and supply, making the concept of ecosystem services approach integral part of multifunctional agriculture (Björklund et al., 1999).

The multifunctional farm

Against the backdrop of a significant number of publications on the multifunctional model of agriculture, the problems of multifunctionality at the individual level (within the farm itself) are considerably limited. Some authors (Belleti et al., 2002) define a multifunctional farm as in this in which "multifunctionality is a structural principle, a network of rules that generate short-term and long-term decisions." Such an interpretation of multifunctionality gives grounds for concluding that all or many farms have some degree of multifunctionality. At the same time, very few of them have embraced multifunctionality as a structural principle, so that it can be defined as multifunctional. From here, the Italian authors logically also draw the distinction between the multifunctional process and the multifunctional economy. This is how the multifunctionality of the agricultural production process is included in entrepreneurial values and knowledge. At farm level, the farmer can work in different ways by combining resources, knowledge, and more, in order to obtain the value of the multifunctional effects generated in the production process carried out on the farm. In this sense, the multifunctional farm uses resources more efficiently than the conventional one in economic, social and (or) environmental context. The multifunctional farm not only increases the revenue from its activity by realizing additional products, but often contributes to the higher quality of the environment, the attractive landscape, etc. Moreover, the utilization of the additional product becomes a prerequisite for the development of new activities and (or) involvement in collective forms of organization of production. The multifunctional farm uses scientific excellence, aiming at high quality not only of the products but also of the environment in which it operates, combining the interests of producers, rural residents and consumers of healthy agricultural products and a clean environment. Based on the complexity of the activities and the system of scientific knowledge, concrete (often unique) combinations of activities and effects of established relationships are achieved.

In their attempts to determine the essential characteristics of the multifunctional economy, researchers most often compare it to the conventional one. Authors such as Brunori (2002) interpret the development and changes of a conventional

farm to multifunctional on the basis of the theory of farm entrepreneurship. In the famous model of Van der Ploeg (2006), the position of the farm is determined threefold by: its commercial links with regard to agricultural products and its place in the agro-industrial chain; the way in which an agricultural holding is linked to the region in which it operates; ways of organizing its internal resources such as knowledge, labor, land, capital, machinery, animals, and so on. With regard to the agro-industrial network, the position of the farm is determined by its degree of integration with the other actors involved in the processing and marketing of agricultural and food products. Depending on its specialization, it participates in a variety of contracts and organizations, building and maintaining permanent relations. The second side of the triangle, the local regional context, expresses the way the farm is linked to its local environment. Its position depends on how it uses local natural, social, cultural and other capital and how the farm reproduces it through its activities. By applying good manufacturing practices developed under high environmental standards, it contributes to improving the environment in all its components. This is one of the main ways for creating public goods. The internal resources of the farm are allocated and used in a way that ensures its functioning by constantly adapting to environmental changes. In the household, which combines agricultural and non-agricultural activities, conditions are created for a complex and varied organization of labor. This not only increases household income, it achieves a higher relative share of the household in the added value, as well as extends the network in which the farm is included. The latter also leads to increased connections and contacts with potential new customers.

Classified by two criteria - an opportunity for market realization and effects for the farm itself and its surroundings, the results of the multifunctional farm are diverse. The direct results for the farm itself are mainly related to the higher prices of the differentiated product with specific characteristics and (or) geographical area, as well as increased employment in and outside agriculture and the stabilization of incomes of rural households. The significance of non-market side effects for the farm is related to an increase in the quality of life of the household. Particularly important in terms of the decline and aging of the rural population and the deteriorating qualification structure, there is an increase in the social status resulting from the diversification of the professional realization, the higher incomes and the reduction of the stress for the future functioning of the household. The effects of the multifunctional farm on the community in which it operates are reduced to its contribution to improving its economic, environmental and social condition. The new model of agriculture much more than conventional activity is related to the

evolution of labor patterns and in particular to the development of new knowledge and professional abilities, reorganization of the work of the household and increased satisfaction with the labor realization. The strategic role of farmers and their local development decisions is related to a number of reasons, three of which can be identified as fundamental. First of all, farmers are owners of the land, buildings, animals, etc. on the territory of the rural areas. This gives them the opportunity to combine the resources held in different ways according to their current and future goals. The decisions of the owners determine the multi-purpose use of resources. Secondly, more and more farm families are aware of the lagging behind of their farms and their way of life from the processes of modernization of society. The latter is a strong incentive to seek new resource-intensive solutions to increase income and quality of life, especially from younger or more educated members of the household. In third place, the inclusion of farmers in new practices leads to increased satisfaction with the labor, as this enables them, together with increasing their welfare, to preserve the farm. In this way, opportunities are created to preserve farm-related lifestyles and family traditions.

In conclusion, it could be summarized that agriculture has always have multifunctional character, although it was only in the 21st century that this role became the center of the public debate in the World Trade Organization, the European Union, etc. The concept of multifunctional agriculture is the theoretical basis for justifying the transformation of agrarian policy towards new social dimensions which ensures their legitimacy.

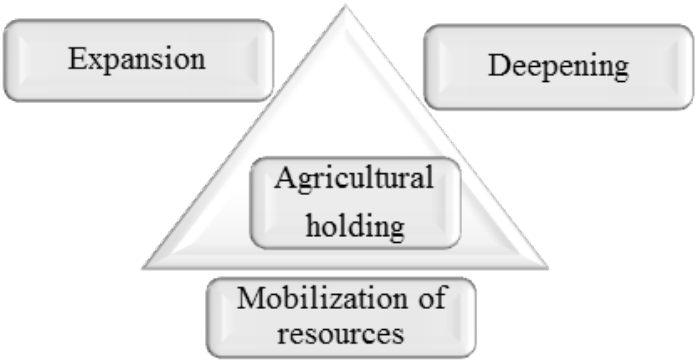
Methodological framework

The transition to a multifunctional farming model is assessed by analyzing trends in the development and distribution of farms with other activities since 2003. Change to multifunctionality at farm level is linked to the three sides of the Plogue triangle (Figure 1). In the direction of the agricultural side there is a deepening of the existing activities. The goal is to achieve higher prices based on product differentiation, such as traditional, organic, etc. In the direction of the regional position of the farm there is a process of expanding the operation of the farmer in the area (where he operates) and adding new activities to agriculture to increase the value of the household's work. Traditional enlargement trajectories include agrarian tourism, nature and landscape management, development of new agricultural activities and diversification (Knickel, Renting, 2000). All these activities require intensive use of natural, social and cultural capital and at the same time contribute to

its reproduction and improvement of its quality. At the same time, they change the appearance of the rural area itself. The latter is confirmed by some authors (Knick, Renting, 2000) that characterize new activities as "multi-faceted, multifunctional and highly integrated" as they perform a number of functions not only on farms, but also on rural households and others.

Estimation of the distribution of multifunctional activities was carried out after classification and grouping. For this purpose the approach of Doitchinova et al. (2009) is used in the first survey of the multifunctional economy in Bulgaria. The deepening activities such as mechanized services, the processing of agricultural products, and the extension in a regional context of activities such as: wood processing; rural tourism; handicraft; fisheries and aquaculture; production of renewable energy and other gainful activities.

Figure 1. *Aspects of development of the multifunctional farm (The Plogue triangle)*



Source: *Adapted by Van der Ploeg et al., 2002.*

The ecosystem approach applied by part of the farms to other activities creates prerequisites for mobilizing resources and increasing the degree of exploitation of the potential of natural resources on farm land. Its implementation is assessed by analyzing information on the implemented projects and the activities carried out in the agri-environmental measures in the first Rural Development Program implemented in Bulgaria (2007-2013) and the change in the distribution of organic farming in our country.

Assessment of multifunctionality in farms in Bulgaria

Multifunctional activities on agricultural holdings in Bulgaria are registered at the first census in 2003 following Eurostat methodology. Other profitable activities indicate 4.41% of the total number of farms, but they are 63% of the total number of registered agricultural producers. Agricultural holdings processing agricultural products (47.33%), followed by producers offering mechanized services (33.54%), are the largest in this period. At third place are those, developing other gainful activities - 12.64%. This data does not include information about organic farms, as well as for those farmers who make direct marketing. For organic farms the expert assessments by certification bodies for 2004 are for 351 producers with 14320 ha or 0.3% of the utilized agricultural land. Bulgaria lags behind this indicator from the rest of the countries of Central and Eastern Europe, where this indicator is in the range of 0.6% in Romania and 1.0% in Poland to 6.0% in the Czech Republic. At the same time, the number of organic farms in Bulgaria has grown more than twice.

The second place is for the producers who have chosen different ways to use the resources of the farm and their household - 36%. These farmers develop activities such as rural tourism, wood processing, renewable energy production, fish farming and aquaculture, crafts and more. Together with other gainful activities (12.64%), these farms are at the heart of diversifying the rural economy, diversifying sources of income for their own households, and providing a number of services needed by the society. In the structure of agricultural holdings with multifunctional activity, the share of those in the South Central Region and the North-East Region is the highest, respectively 22% and 21%. Almost two times less are those in the Northwest and South Central Planning Regions - 9% and 12%. The planning regions differ in the importance of farmers with different multifunctional efficiencies. The North-Central, South-East and South-West regions are dominated by farms that are deepening their activities towards processing agricultural products, fish farming and aquaculture. In the South Central and Northeastern regions the largest is the distribution of producers, which expand their activity through diversification of the agricultural holding in crafts, rural tourism and others.

The state of multifunctional activity in our country is comparable to that of other EU countries – 33,7 [3] %. According to data from the Rural Development Report in 2005 in 27 countries, the relative share of agricultural holdings with multifunc-

3 Also included are farms with household income from non-farm employment.

tional activity is 36.4%. The most significant is the presence of such farms in the rural areas of Sweden and Finland, Southern Germany, certain regions of the UK and others. Similar holdings have been spread in Portugal, Greece, Western Spain, France, most of Italy, Belgium, the Netherlands and others. Of the new Member States, more multifunctional farms operate in Slovenia, Romania, Cyprus, etc., and their presence in some regions of Bulgaria, Latvia, Lithuania and others is relatively limited.

Significant reduction in the number of agricultural holdings in Bulgaria also affected the reduction of multifunctional farms. Table 1 shows that at the end of the first programming period the total number of farms with other activities has decreased almost 10 times.

Table 1. *Changes in the distribution of farms developing other gainful activities in Bulgaria (2003-2013)*

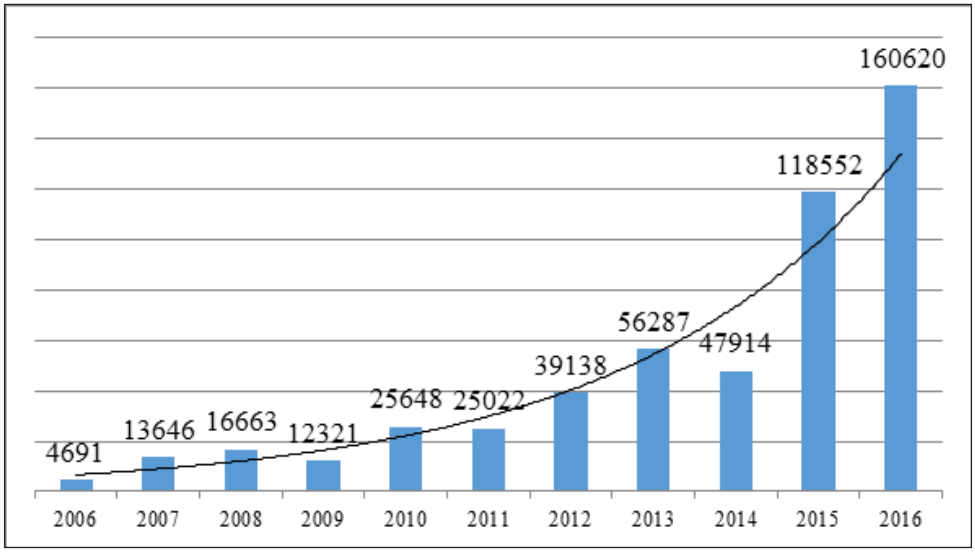
Types of non - agricultural activities	Number of agricultural holdings			Chan-ges 2013/ 2003	Struc-ture 2003 (%)	Struc-ture 2013 (%)
	2003	2010	2013			
Mechanised services	9684	2902	2201	22,73	33,54	70,97
Processing of agricultural products	13665	307	376	2,75	47,33	12,12
Wood processing	115	12	8	6,95	0,4	0,26
Rural tourism	338	145	106	31,36	1,18	3,42
Handicraft	290	45	11	3,8	1,00	0,35
Fisheries and aquaculture	1064		98	9,21	3,68	3,16
Production of renewable energy	66	5	33	50	0,23	1,06
Other gainful activities	3647		268	7,35	12,64	8,64
All	28869	3416	3101	10,74	100,0	100,0
Share of farms	4,41	0,96	1,22	x	x	x

Source: *Ministry of Agriculture, Food and Forestry, 2005, 2012, 2015.*

In 2013 only 10.74% of farms continue to operate compared to 2003. To this percentage should be added 26418 farms with direct marketing, which covers more than half of their production. A significant change is also observed in the structure of the performed activities - farms performing agricultural mechanized services (70.97%) predominate, followed by those who process their output (12.12%).

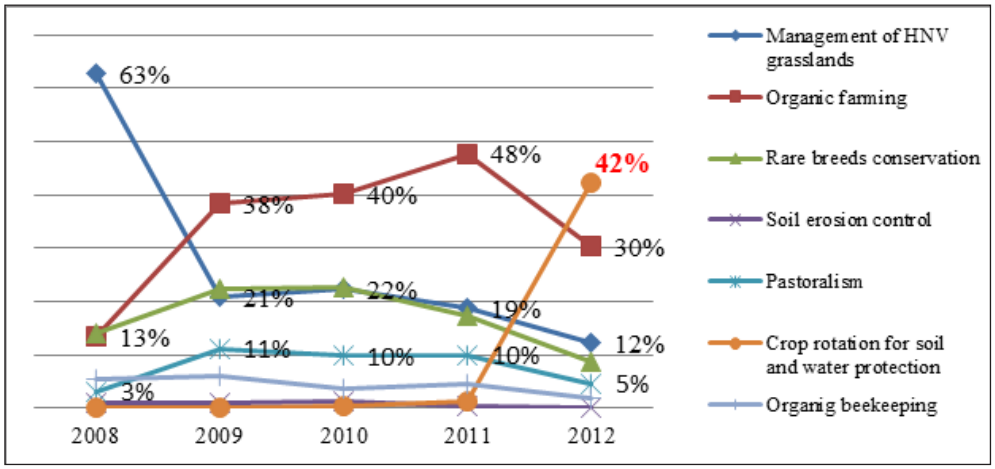
A notable increase of the land converted to organic farming for the last three years (see Figure 2), as for years 2015 and 2016 there is a sudden increase in the agricultural land which certified, or being under conversion. For the year 2016 compared to 2010 there is an increase with almost six times. This is also valid for the number of register organic farmers where in 2016 their number is 6964 which is almost nine times higher compared to 2010. As part of the environmental payments, organic farming occupies the highest share between 30-50% in the first period of the Program for Rural Development 2007-2013.

Figure 2. *Converted and under conversion to organic farming (ha) in Bulgaria during 2006-2016*



Source: *Author findings*

Figure 3. *Payments as a share of total Organic farming and Agri-environment measures in Bulgaria*



Source: *Author findings*

Compared to the agri-environmental measure for crop rotation, in 2012 organic farming occupies only one third of the payments, but this is due the huge amount of compensations, which were paid under the Agri-environmental scheme. As can be seen from Figure 3, the other practices from the scheme have a tendency to decline as share of the total payments. Still, the total share of payments, apart from those for organic farming, covers a satisfactory percentage from the total. Almost four times is the increase in the area under agri-environmental practice, as in 2008 it was 48 491 ha and in 2012- 199 942. Again, this is mainly due to the sudden uptake of the practice for crop rotation in 2012.

Conclusion

Agriculture is and must continue to be the main tangible point between people and the environment, with farmers having an obligation to be the main resources managers and custodians of the environment. The opportunities for the agricultural process to produce a variety of interconnected products and to carry out simultaneously other functions related to our environment are part of the prerequisites for the creation of the concept of multifunctionality of agriculture. The concept of multifunctionality to a great extent specifies and instrumentalizes the approaches to achieving sustainable development in rural areas. The multifunctionality of agriculture is reflected in the functions that are immanent for the industry. The production function, the provision of nutrition, the social function, the

employment of the territory and the impact of the surrounding environment are among the widespread directions of the analysis of the multi-directional impact of the agriculture on the environment.

The structural changes in the Bulgarian agriculture continue. The reduction in the total number of farms is accompanied by an increase in the interest in organic farming, agri-environment and ecosystem services. Regardless of the measures of the Rural Development Program, there is still limited participation of farmers in producer organizations and other network structures of association. Poor connections between agricultural producers and processors are the cause of a long chain from producer to consumer and the monopoly situation of a number of processing and trade organizations. The development of rural tourism and other activities in a regional context is unsustainable, with a number of guest houses, services and other non-agricultural activities ceasing to exist after the expiration of the five-year period of implementation of the project. The organic farming, although a small percentage of the total utilized are compared to other European countries, have a notable and steady increase the last 5 years. However, the other conservational approaches such as implementation of agri-environtmental measures, is not at satisfactory level. It can be summarized that the transition from conventional to multifunctional agriculture in the Bulgarian context is relatively slow, mainly under the impact of the Common Agricultural Policy and the regional priorities of the respective areas and municipalities.

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RENT-SEEKING AND PARADIGM OF SUSTAINABLE AGRICULTURAL DEVELOPMENT: POLITICAL RENT IN SERBIAN AGRICULTURE

Koviljko Lovre[1], Tatjana Brankov[2]

Abstract

Rent-seeking behaviour is the activity of influencing the political process to obtain favourable outcomes or to avoid unfavourable ones. In other words, groups in search of economic benefits offer incentives to politicians to provide these benefits. Politicians, in turn, respond positively if it is in their own best interests to do so. Therefore, rent-seeking behaviour is generally viewed as wasteful activity. But, some rent-seeking activities may actually increase of overall welfare. If an economy has no distorsions, rent-seeking activity will result in inefficiencies. However, if distorsions do exist, it is possible that rent-seeking activity can improve economic efficiency.

The concept of rent was introduced to the economic literature by the D. Ricardo, who referred to the scarcity of land as a factor of production in the face of rising demand for food. The modern concept of rent also encompasses the benefits arising from the possession of other limited resources. This rent obtained in a natural way, namely in the market through the competitive (price) mechanism, is called economic rent. On the other hand, rent obtained in an artificial manner, namely by way of political mechanism and government decisions, is called political rent. This is a form of benefit resulting from the employment of limited resources in activity that does not increase the quantity of products or services, but only leads to the transfer of income between economic entities.

Intention of this paper is twofold: first, to extend the paradigm of sustainable agricultural development and concept of political rent; and second, to present the results of the empirical research about political rent in Serbian agriculture as sector supplying public goods.

Key words: *economic rent, political rent, public goods, rent-seeking, sustainable development*

1 Koviljko Lovre, Ph.D., Full Professor, University of Novi Sad, Faculty of Economics in Subotica, Department of Agricultural Economics and Agribusiness, Segedinski put no. 9-11, 21000 Subotica, Serbia, Phone: +381 64 144 18 29, E-mail: klovre@ef.uns.ac.rs

2 Tatjana Brankov, Ph.D., Assistant Professor, University of Novi Sad, Faculty of Economics in Subotica, Department of Agricultural Economics and Agribusiness, Segedinski put no. 9-11, 21000 Subotica, Serbia, Phone: +381 64 102 16 96, E-mail: tbrankov@ef.uns.ac.rs

Introduction

Why would governments want to redistribute income? One traditional explanation is that governments want to maximize some aggregate utility function, whereby different weights are attached to each individual's utility function.[3] These weights may give rise to the desire to redistribute income to maximize the societal-objective function. An alternative hypothesis, which fits into the theory of public choice, is that economic rent exist and can be transferred among individuals, creating the incentive for groups to organize to capture these rents. Because exist special interest groups, policies may be introduced that facilitate the transfer of economic rents among members of society. This action is called rent-seeking behavior. Rent-seeking is not a new phenomenon in economic reality and economic literature.[4]

Rent-seeking behavior is generally viewed as wasteful activity (Tullock, 1967). Interest groups will take resources from other productive endeavors and spend them on rent-seeking activities, decreasing overall economic efficiency. There is an asymmetry of information between the government and interest groups with respect to public preferences or the specific effects of certain regulations. Thus, some rent-seeking activities may actually increase overall welfare. We can draw a distinction between productive and non-productive rent-seeking behavior. If an economy has no distortions, rent-seeking activity will result in inefficiencies. However, if distortions do exist, it is possible that rent-seeking activity can improve economic efficiency.[5]

There are many special-interest groups involved in agricultural policymaking other than just agricultural producers. Agribusiness, which includes upstream

3 One argument that favors government intervention is that there is a need to reduce resource misallocation, societal losses, and market failure resulting from the fixity of agricultural resources. Agricultural interventionism is often justified on ideological bases, with reference to the objectives of food security, food self-sufficiency, food safety and natural resources protection.

4 The term was first defined by Krueger, A. (1974), although the phenomenon had been considered previously by Tullock, G. (1967).

5 Rausser, G. (1982) splits rent-seeking behavior into two categories: rent-seeking behavior that that is purely an economic transfer, which he calls political-economic-seeking transfers (PESTs), and rent-seeking behavior that seeks to correct some market distortion, which he calls political-economic-resource transactions (PERTs). Rausser, G. (1992) points out that, in the United States, commodities with the most inelastic demand curves and inelastic supply curves have the most unproductive rent-seeking behavior. Supply-managed commodities, which are protected by tariffs and import quotas, have mostly PEST rent-seeking behavior, while commodities that are traded in the world market more closely fit the PERT category.

and downstream sectors, is also involved, but the interests of these sectors can conflict with those of farmers.

While governments may have laudable objectives[6] for intervening in the marketplace, government policies can also fail.[7] Governments are limited in their ability to maintain long-term contracts with farmers. However, farmers were faced with increased government-induced uncertainty. This government failure was costly to farmers who committed resources to their agricultural production. Thus, farmers make production and marketing decisions under policy uncertainty.

From land rent to political rent in sustainable agriculture

Since the early days of economics, economic rents have been linked to the land factor. D. Ricardo developed a theory of differential rents relating to the fertility of land; the theory of absolute rent emphasized the monopoly of ownership rights to land; marginal economics addressed the issue of location rents; and in neoclassical economics rents were ascribed exclusively to the inelasticity of the supply of land. Something that economic rents and the land factor certainly have in common is that both fail to fit the neoclassical models of equilibrium. Economics textbooks list three production factors – capital, labour and land – but many economists would immediately add that the third of these, land, is a constant. Blaug M. states that "modern economics has abandoned the notion that there is any need for a special theory of ground rent. In long-run stationary equilibrium, the total product is resolvable into wages and interest as payments to labour and capital – there is no third factor of production..." (Blaug, 1997). If so, then the resources and inputs of agricultural land should be subject to the optimizing mechanisms of the market – but why, then, is agriculture such a problematic sector of the economy? Economic rent is the excess income which provides incentive for a production factor to provide services. It arises in a situation of persistent scarcity of resources, or the im-

6 Defining country's objectives for agriculture is not straightforward. These, usually, include plentiful, healthy food at reasonable and stable prices, family-farm ownership and operation, equality agricultural and non-agricultural income, and conservation of land and water resources. These objectives are likely to be expressed in any statement of agricultural policy intent. To achieve an appreciation of the policy objectives one needs to go beyond these universally desired aims, because the real objectives often remain unstated. Many policy objectives are implicit and may be recognizable only through analysis of the policies themselves and of the motivations of the policymakers at the time they introduce the legislation.

7 Government failure is a new area of study in agricultural policy; therefore, literature considering this question is sparse.

possibility of a resource being valued by the market and taken into account ex ante in the economic calculation. If a resource is valued by the market, and its relative supply can be increased, then the economic rent vanishes and becomes a cost. In the case of land rent the rewarded factor is agricultural land the supply of which is limited, even though its production capacity can be increased thanks to technical progress. Since the 18th century there has been no agreement among economists as to the sources of land rent. Simplifying to a large degree, the problem can be reduced to the question of whether the substance of rent is created by the productivity of the land, or by a subjective perception of the exchange value of that resource, which results exclusively from the scarcity of the land factor. Regardless of the answer to this question, land rent is taking on an ever greater importance in agricultural economics, because it conditions the processes of extended reproduction in agriculture and the restructuring of that sector. According to many authors, the contemporary agrarian question can be reduced to the problem of the realisation of land rent in agriculture. This importance is underlined by the strong upward trend in prices of agricultural land in the countries of Central and Eastern Europe. In market conditions the reduction of the land rent to zero, or any long-term downward trend, would appear to be impossible, because growing demand for land in the long term will, in the author's view, ensure the absolute scarcity of that resource. Land ownership fulfills too many non-production functions, historically rooted in people's mentality – it is a determinant of the territorial sovereignty of nations, a measure of social status, the most durable form of accumulated property. Expectations of an upward trend in land prices in the long term can therefore be considered rational. Land fulfills the three economic conditions ensuring growth in the price of a resource in the long term – it is useful, it is scarce, and there are no substitutes for it. Land rent, in view of its permanence, may become a fundamental source of comparative advantages of the agricultural sector, which might be protected from the process of economic globalisation. The contemporary importance of the category of land rent is not reflected in academic work on the subject. The theory of land rent developed rapidly in the 18th and 19th centuries, with key chapters of scholarly works being devoted to it – this even made it possible to talk about the question of land rent, being a fundamental source of economic surplus, for example with reference to F. Quesnay's theory of pure product. The scarcity of the land factor attracted the attention of economists in the early 18th century, particularly among the physiocrats, who considered land rent to be the only type of pure product created by farmers and realised by landowners in the form of leasing payments from tenants. The physiocrats' theory includes the assumption of zero accumulation by the "sterile class", in which average profits were reduced through

competition to zero, and rents did not occur. The physiocrats, however, merely stated the fact of the existence of land rent in agriculture, without attempting to explain its source. Moreover, the concept of the *produit net* of agriculture as the sole source of income was not treated seriously by classical economists. Contemporarily, as we know, the table of inter-sectoral (input-output) flows is a foundation stone of well-known and useful models of prediction (Galbraith, K. 1995). In a certain sense, history has come full circle. Bearing in mind the great importance that developed countries currently attach to agriculture, it can be seen that mainstream economics has been guilty (not for the last time) of the sin of immodesty in the face of the unknown. The physiocrats, however, did not attempt to analyze the situation in which the agricultural producer is also the landowner and does not realize a rent. Who then takes over the rent, and what are the economic consequences of this for agriculture and for the economy as a whole? These are among the key dilemmas encountered by the theory of land rents, and it must be noted that today they are taking on an ever greater significance. In the 20th century, however, all that happened was a review of the phenomenon of the occurrence of land rent, according to either the neoclassical or Marxist theory. Keynesian economics disregarded the problem entirely, accepting the existing theories wholesale.[8] The institutionalism of the 1930s did not make any attempt to modify the existing theories, and broad mainstream economics emphasised the marginalist or neoclassical concepts. Economists who addressed the agrarian question – K. Kautsky and E. Bernstein in the early 20th century, T.W. Schultz in the 1950s – considered the problem of land rent very widely, but within the Marxist paradigm[9]. Similarly, in New Classical Economics and the neo-Keynesian theory no separate analyses are made of rents of the land factor. At present, economics textbooks generally present the Pareto concept of land rent (reformulated by P.A. Samuelson) or else omit the question entirely. A characteristic view is the one of M. Blaug, cited above, that there is absolutely no need for a special theory of land rent (Blaug, 1997). Such a vision of the functioning of the economy is based on a fully predetermined model, in which it is stated from the outset how market players adjust their decisions and how the resulting allocation of resources changes over time. In this model no account is taken of individual creativity, structural changes, the evolution of needs, and especially the possibility of reversing the hierarchy of values on which choices are based. In the light of this, that the product of the land in the long term melts away

8 In his "General Theory of Employment, Interest and Money", Keynes referred only to a "quasi-rent" as a reward for the postponement of consumption (Keynes, 2003).

9 An exception is the work of T. W. Schultz (1953), who showed that the importance of land rent as an element of inputs would rise despite the process of industralisation of agricultural production.

into pay and interest represents the realistic assumption that human labour (including capital) is capable of satisfying all human needs, given. The issue of land rent was again overlooked in the discussion on the economic role of the state, which took place in the mainstream of economics following the departure from the Keynesian doctrine in the 1970s. Like the earlier belief in the "tuning" of the economy using instruments of fiscal and monetary policy (see Heilbroner, Thurow, 1981), similarly the mainstream negation of the active role of the state was total in nature, in the sense that it applied to all production factors, including land. No consideration was given to the case of specific external effects and public goods produced in agriculture, which would have justified the application of discretionary national policy with respect to that sector. In consequence, in the history of economic thought one can identify four alternative concepts of land rent: the Ricardian differential rents, the "Marxist" absolute rents (referring to Adam Smith), the residual rents of H. George (viewed as marginal rent of scarcity), and the neoclassical rents of inelastic supply of land.

It is the author's view that in the current era of transformations in the model of agriculture there is a need for a new concept of land rent, which can be constructed based on the methodology of contemporary institutional economics. The neoclassical theory of rent generally presented in the literature is insufficient to describe reality, because it reduces the sources of land rent to the inelasticity of supply of land and treats it as a constant in economic models.

Land rent took a permanent place in the annals of political economy through the agrarian question and the resulting need for the retransfer of income to agriculture. The main symptom of the agrarian question is the disparity in the incomes of the agricultural population, linked to the low productivity of the factors of production, particularly labour, and the insufficient elasticity of productive structures in terms of adjustment to changing market conditions. In the induced development model, Y. Hayami and V. Ruttan nonetheless attempted to show that such adjustments take place as a result of dynamic interactions between agriculture and related sectors, triggered by innovations which upset equilibrium prices. As a result of technological development, there are changes in real prices which "induce" the adjustment of productive structures in agriculture, because agricultural producers are guided by rational criteria (Hayami, Ruttan, 1985). In this way, agriculture theoretically has the ability to participate in both the feeding of sources of economic development, and the division of the benefits, but this does not happen if imperfections of the market (such as price flexibility) deform market signals. The scale of market im-

perfection is closely linked to a country's level of economic development. Partly because of this, in the early stages of economic development agriculture co-finances the development of the national economy as a whole, in the sense that a significant part of the added value produced in that sector flows out to non-agricultural sectors. At more advanced stages, at first a equalisation of the streams flowing out of and into agriculture occurs, and later it becomes a net beneficiary, taking over part of what has been accumulated from nonagricultural sectors.

The thesis of "surplus drainage" from agriculture is commonly put forward in the countries of Central and Eastern Europe. An undoubted weakness of such claims of "surplus drainage" is that they can be verified only on the basis of input-based theories of. How is it possible to define the part of the surplus which flows out of agriculture, the difference between "realised production" and actual output, or even the actual disposable income of a farm (after payment of all production factors)?[10] At most one can attempt to value the inputs provided (paid for in agriculture out of the surplus), namely own labour and the costs incurred "for the land", and then compare their value with the realised surplus. Such an approach has two defects: firstly, in a market economy the output is generally not the sum of the inputs; and secondly, the land factor is deprived of its "subjectivity" when its value is defined on the basis of labour and capital inputs. This is analogous to the thesis, known from the history of economic thought, that "capital is objectified labour" – but even less realistic. Is it possible, then, to prove the claim of "surplus drainage" in a more objective manner, and consequently to provide justification for the necessity and scale of budgetary retransfers to agriculture? There is a significant gap in economic theory here, because despite the symptoms of depreciation of agriculture relative to other sectors, difficulties arise in precisely defining and quantifying that mechanism. There is therefore a lack of an adequate theory of land rent, which as we can see, has no wish to "melt away into pay and interest". The excessive simplification contained in this reasoning results from the fact that the utilities supplied by land do not necessarily come from labour. If that were so, M. Blaug would be entirely right, and the reference point for an "optimum" level of surplus in agriculture would be the average productivity of labour in the economy. The key to solving this problem is therefore assigning to the land factor its own "subjectivity", namely the ability to create certain utilities by itself without the involvement of labour or capital. In this way, it would be shown how land is genuinely distinct from the other productive factors. The paradigm of sustainable

10 The problem arises here of the valuation of own labour and land rent, which in individual agriculture are paid out of the surplus.

development is helpful here, which in fact accepts such an approach. Sustainable development is a concept of order integrated in the environmental, social, economic, spatial and ethical planes, which assumes the maximisation of benefits from economic development subject to ensuring the durability and protecting the utility of natural resources in the long term. This concept identifies natural resources as an independent production factor, which is subject to different criteria of effective allocation than labour and capital, at the very least because it does not produce private utilities, only public and common ones. These are inseparably connected with the land factor, which at the same time constitutes a potential resource for agricultural production. From the point of view of sustainable development, over time those functions should become complementary, which requires the development of new theoretical frameworks for the economics of the land factor, and in particular a new theory of land rent. This theory should explain the relationships between the agrarian question, including the phenomenon of rent drainage, and the new integrated functions of the land factor in the context of the sustainable development paradigm. Existing theories of land rent value the rent in a manner that is not adequate to the contemporary utilities of land, and as a result do not enable an objective estimation of rent "drainage".

To sum up, the motives for rent seeking and related actions in the agri-food industry may be efficiency-related, serving to produce savings of transaction costs. From a theoretical standpoint, the mechanism operates as follows: an economic rent occurs if average productivity is higher than marginal productivity. In the market for final goods the average takings are higher than the marginal value, and the sale price is higher than the equilibrium price. Classically, this phenomenon is explained by a monopoly rent. However, if it is assumed that the lower marginal cost results from the optimisation of transaction costs (and an increase in efficiency), the producer realises a rent. Transaction costs are not, by assumption, subject to market valuation. In terms of factors of production, if the average product of labour is greater than the marginal product of labour (equal to the unit price of inputs), then either we are dealing with the rent of a monopsony, or we explain the phenomenon by a fall in transaction costs.

The above considerations also imply that, regardless of the motivations, rent-seeking does take place in the agri-food industry. The accumulation of market imperfections in agriculture means that this involves the seeking of land rent. The market environment, in view of the rigidity of demand and supply in the agricultural sector, takes over the effects of the growth in the real productivity of agriculture, thus realising economic rents. Perhaps these compensate for higher transaction

costs which are not subject to market valuation. It may also be disputed to what degree rent- seeking is stimulated by inappropriate national regulations rather than market inefficiencies. It is nonetheless a fact that the process of the creation and division of economic rents in the agri-food industry is determined by the land rent. Other rents in the system of the agri-food industry outside agriculture undoubtedly also occur, but they are short-term in nature. Only land rent is a timeless phenomenon. For this reason the process of its creation and division deserves to be given particular attention.

A model of the flow of economic and political rents in Serbian agriculture

The concept of political rent is based on the theory rent-seeking behavior and it is inextricably linked to wastage of resources and to exclusive benefits provided to select social groups at the expense others. Rent-seeking is not new phenomenon in economic reality. It involves economic entities striving to obtain benefits by exerting influence on relevant institutions. The political rent market is formed on the one hand by those demanding the desired regulations and on the second hand by responding to the demand of supply created by policy. What occurs, then, is kind of political economic transaction. Precisely, it can be concluded that political rent most often occurs in the transfer of income from certain entities to others, through the use of mechanisms of political power. The concept political rent serves to explain why economically-ineffective instruments and measures are put in effect even when they cause obvious harm to well-being of society.

In the literature, particularly in the field of political economy, political rents are considered widely, in terms of both the mechanisms for seeking (competing for) them, and their consequences for market processes and well-being. There are various theoretical and empirical approaches to the concept of political rent, particularly those which shed a new light on the problem of rent seeking in relation to agricultural policy. The following hypotheses may be ascribed to these approaches: (1) political rents deform market mechanisms and prices; (2) rent seeking creates entry barriers to new firms; (3) the occurrence of natural resources as production factors encourages rent-seeking; (4) market imperfections determine the distribution of political rents; (5) rent-seeking may be complementary to an increase in production (the theory of complementarity between rent seeking and production);(6) lower income leads to more risky attitudes in rent-seeking.

Analyzing voluminous literature we can draw the important conclusion that political rents in agriculture diverge from the essence of the concept of rent-seeking: (1) If the resources devoted to rent seeking even partly serve to produce public goods, then that part cannot be regarded as wastage (according to the theory of complementarity of rents and production); (2) If the payment of political rents to agriculture results in the delivery of any public goods, then these benefits are not exclusive; (3) If market imperfections in sectors related to agriculture cause rents and economic surplus to be captured by other entities, then it is even more the case that these benefits are not exclusive.

The best-developed line of empirical research is that concerned with the effect of imperfections of the market (imperfect competition) and of agricultural policy (imperfect implementation) on the distributional effects ("incidence) of agricultural policy (Alston, James, 2002; de Goorter, Swinnen, 2002). They found that small part of total market and price support in agriculture creates a net surplus in agriculture, while the remainder flows out agriculture out to related sectors. This phenomenon is referred as a "surplus drain" from agriculture, and is particularly marked in Central and Eastern European countries.[11] This means that market imperfections in agriculture affect not only the division political rents (if such exist), but also the division of the surplus resulting from increasing total agricultural productivity. The question arises of whether it is possible to speak of a "negative economic rent". This would be either a negative difference between actual income or the income which persuades factors to provide services, or a long-term payment which is lower than the alternative costs. Economic rents in agriculture, whether positive or negative, are therefore essentially rents of price flexibility. They take positive values in conditions of decreasing supply of agricultural products, and negative values when supply is increasing. In this latter situation, the negative rents of agriculture correspond to positive rents of other sectors (including consumers) in agri-food chain.

In order to model the flow of rents of price flexibility in agribusiness, it is necessary to separate the processes of production and changes in real productivity from changes in prices of products and inputs. Changes in real productivity in agricultural sector are calculated based on changes in Total Factor Productivity (TFP) and Hicks-Moorsteen methodology (HM-TFP index, Coelli at al., 2005). The method was initially developed by Lecomteand Louis 1974., who called it *the global pro-*

11 Lovre, K. (2013) estimated for Serbian agriculture, in time span 2001 to 2011, that 30.4% of the amount of subsidies flows from agriculture to the related sectors and consumers.

ductivity surplus accounts. The advantage of using such TFP calculation is that it helps to evaluate the monetary size of a change in productivity and the "treadmill effect", and separates the part of economic surplus that flows out of agriculture as a result of price flexibility.

Changes in real productivity are defined as follows:

$$\Delta TFP = (Q_t \cdot P_{t-1} - Q_{t-1} \cdot P_{t-1}) - (F_t \cdot R_{t-1} - F_{t-1} \cdot R_{t-1}) \quad (1)$$

The symbols denote:

ΔTFP – changes in real factor productivity;
Q_t – volume of production;
F_t – amount of purchased external input;
P_t – price of agricultural products;
R_t –price of external input;
t – time.

The flow of rent, which is exclusively the result of a change in prices of agricultural products and prices of purchased inputs of non-agricultural origin, is defined as follows:

$$\Delta A_t = \left(\frac{Q_t \cdot P_t}{HICP} - Q_t \cdot P_{t-1}\right) - \left(\frac{F_t \cdot R_t}{HICP} - F_t \cdot R_{t-1}\right) \quad (2)$$

where:

HICP – inflation rate;
ΔA_t – changes in economic rent in the agricultural sector (outflow or inflow of economic surplus through price mechanism);

other symbols denote the same meaning as in equation .

One can prove mathematically that changes in total factor productivity and changes in economic surplus of products represent real changes in agricultural income, i.e. $\Delta TFP + \Delta A_t$.

The suggested method should be used with caution because of its limitations. For example, if stationary equilibrium is established, both the volume of production and prices change. However, the model implies the static equilibrium as a result of adaptive expectations in agriculture. In addition, having in mind that the model measures the changes in economic rent with regard to TFP, the implicit assumptions that there is a price balance between the agricultural and non-agricultural sector in the first year of the analysis, which is unrealistic.

In contemporary economic literature there is neither theoretical nor empirical agreement among economists with regard to rent outflow in agriculture. There is agreement concerning rent realization in agriculture, but not regarding rent appropriation. Despite disagreement, the problem of rent distribution has practical importance - in the case of rent appropriation by non-agricultural sector, the process of agricultural restructuring and resource concentration in agriculture is hampered. There is no doubt that the agricultural sector is in relative decline, but the experience of developed countries demonstrates that it does not weaken. The controversy of the argument arises over the causes of outflow of surplus from agriculture and the proposal of solutions to this problem. Economists mostly share the opinion that the core of the problem lies in inherent features of the market economy, which means that the supply and demand mechanism depresses the sectors which contain market imperfections, which is manifested in slowing down of the process of adjustment, immobility and indivisibility of resources, transactional costs, the existence of monopolies and monopsonies, etc. These issues are characteristic of the agricultural sector and are especially noticeable in times of a political transformation. In such conditions, the mechanism of market allocation cannot be efficient, and prices lose equilibrium features. All mentioned above requires a state intervention so as to correct imperfections of the market mechanism in the sector through income retransfer and fiscal and monetary policies, with the aim of achieving optimization of flows between agriculture and its related sectors. The resulting outcome of state intervention is a political rent that is realized in agriculture, but not necessarily appropriated by agriculture.

The value of the political rent can be calculated as follows:

$$\text{If } \Delta A_t < 0$$
$$PR_t = S_t - VPG_t + \Delta A_t \qquad (3)$$

$$\text{If } \Delta A_t \geq 0$$
$$PR_t = S_t - VPG_t \quad (4)$$

where:
PR_t – political rent;
S_t – total amount of subsidies paid to agriculture;
VPG_t – amount paid for public commodities to agriculture;

Presentation of the overview of the results of calculation for agriculture in Serbia needs to be preceded by a few methodological remarks. The sizes of production volume and externally purchased input are expressed in constant prices from 2010, while price indices are implicit deflators of the given sizes. Subsidies are expressed in current prices, according to relevant documents by the Ministry of Agriculture, Forestry and Water Management. General price index is used as a deflator. The same applies to a part of subsidies allocated for public goods. Public goods comprise: public infrastructure, agricultural-environment-climate-animal welfare, subsidies to sustain plant and genetic resources, payments for research, development and advisory services, and payments for food safety and quality. In order to gain results which are comparable with the results of calculations for the EU, all values are converted into Euros according to the middle exchange rate of the National Bank of Serbia.

By applying the methodology presented above, we calculated the political rent for agriculture in Serbia for the period from 2008 to 2017. One needs to point out that the calculated values represent a part of agrarian subsidies which are not objectively justified. They do not represent the payments for public goods which are produced in agriculture, nor the compensations for market imperfections that unfavorably affect the agriculture. The political rent in the examined period amounts to 410,356,9 million dinars (in constant prices from 2010), which accounts for 8.24% of GDP from agriculture (Table 1).

Table 1. *Political rent in agriculture in Serbia from 2008 to 2017.*

Year	Political rent (mil. din.)
2008	36.327,1
2009	26.426,5
2010	31.324,1
2011	37.703,8

Year	Political rent (mil. din.)
2012	31.189,8
2013	-171.548,2
2014	-216.027,6
2015	-190.702,2
2016	-207.990,7
2017	-168.464,4
Total	**-410.356,9**

The fact that this amount (almost 4 billion Euros) was drained from agriculture and directed towards other participants in the food chain is startling. Agriculture had a positive political rent between 2008 and 2012. Following this period (which overlaps with fiscal consolidation), the political rent was negative.

For the sake of comparison, in the period between 2005 and 2012 the EU 27 agriculture had a positive political rent of 349,4 billion Euros, which accounted for 13.6% of the EU 27 agricultural income.[12] One needs to mention that in the period examined, the total economic rent that was drained from Serbian agriculture amounted to 928,355,2 million dinars, which represented 18.65% of GDP from agriculture.

A negative political (and economic) rent means that the subsidies which do not refer to payments for production of public goods could not absorb negative effects of market imperfections. Naturally, indirect consequences of such state in agriculture means relative reduction in income and standard of rural population, depopulation of rural regions and the lack of opportunities to intensify agricultural production.

Conclusion

Although there are certain limitations of the calculation method, the results still indicate the ways to improve the allocation of budgetary support to agriculture. Quantifying the political rent means more rational and socially acceptable distribution of support to agriculture, which is in line with the established goals of the agricultural policy in Serbia. Also, the results undoubtedly point to the existence of a deeply rooted monopoly in the food chain. Temporal dimension of realizing and appropriating the political rent indicates that it largely coincides

12 B. Czyżewski, A. Matuszczak (2017).

with political cycles. Therefore, the measures and instruments of the agricultural policy are devised in such a way that a certain number has pro-cyclical and destabilizing effects. The case of Serbian agriculture also confirms the existence of the developmental rule - developed countries allocate subsidies to agriculture, while undeveloped countries tax it, and the King's effect, according to which a significant portion of subsidies is not capitalized in agriculture, but appropriated by other parties in the food chain. Finally, one does not need to emphasize that there is an urgent need to achieve socially more acceptable distribution of budgetary support to agriculture.

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THE ROLE OF THE STATE IN THE PRIVATIZATION OF THE AGRICULTURAL SECTOR[1]

Ljiljana Rajnović[2], Snežana Cico[3]

Abstract

The Republic of Serbia is in the final phase of the transition, favorable to the world economic trends, in particular the World Bank, the International Monetary Fund (IMF), which was completed by all other countries of Eastern Europe, parts of Asia, South America and parts of Africa, where the business activity was predominantly performed in the form of various economic entities in which it transposed state or social capital.

The transition includes comprehensive changes in the country of origin, including the privatization of state capital, means, companies that have agricultural land on their property that represents good of general interest in Serbia. The buyer of capital in the process of privatization has the undoubted interest, for the good engagement of the company that it purchases in the privatization process, in order to achieve its own economic goal, the maximization of the profit of the company, for the return of invested funds, first of all, obtain own earnings, but also payment of the deserved indication to all other entities, to whom he directly or indirectly operated with.

Beside the responsibility for the successful operations of the majority owners of capital, the burden of responsibility for the operations of a privatized enterprise that owns agricultural land in a certain sense, has a state also, taking into account responsibility of the state for performing activity of general interest, primarily for the use of goods of general interest and performance of activities of general interest the choice of the manner of privatization and the choice of the buyer, as well as the permanent control of the performance of the obligations of the buyer from the privatization contract.

Key words: *transition, good of general interest, privatization of the agrarian sector, conditions for privatization, majority shareholder, responsibility for performing activities.*

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2 Ljiljana Rajnović, Ph.D., Research Associate, Institute of Agricultural Economics, Volgina no. 15, 11060 Belgrade, Serbia, Phone: +381 63 273 237, E-mail: rajnoviclj@gmail.com

3 Snežana Cico, Ph.D., Severtrans ad, Sombor, Serbia, E-mail: snezanacico@gmail.com

Introduction

Agriculture undoubtedly is a very important activity in the Republic of Serbia, which as a branch of activity is given priority in the strategic development plans of the Republic of Serbia, the amendments to the Law on Agricultural Land define the concept of agricultural land as a natural resource and a good of general interest for the Republic of Serbia. Agricultural land is used for agricultural production and can not be used for other purposes, except in cases and under the conditions specified by the law, which is a specialist law for this matter, is otherwise regulated[4].

In the Republic of Serbia, most of the agricultural land has been privatized in accordance with the regulations on privatization, but the majority of contracts on these privatizations have been terminated by the state, because they were not only manually managed and manipulated enterprises. Everything was financed by the expulsion of other players from the company. Jobs are ruthlessly cracked, many workers have been left unemployed, and then re-employed as non-unionized with lower wages and fewer workers' benefits, and wage growth is reduced or prevented. Under the pressure of corporations, or in conjunction with them, corporate income tax is reduced. All this led to an increase in inequality of income, one of the most prominent features of globalization.

Throughout the world, for over a century, there is a permanent tendency to research and define the best solutions for regulating the management and use of agricultural land and adopting numerous rules on the best agroeconomic practices and the principles on which the activity in this sector should be based. These regulations mostly focus on the role of policy makers in the country and the majority of existing rules have a national reach. Legal solutions should in fact encourage and encourage active cooperation between the state as owner of agricultural land and other persons interested in leasing agricultural land in creating wealth, employment and sustainability of financially healthy participants in agricultural sector.

In 2004 and 2007, ten and two countries respectively acceded to the EU in its enlargement with countries in Eastern and Central Europe. Until 1989, the agricultural sector in these countries was regulated by the state and dominated by large-scale state farms that cultivated state-owned land or by collective farms that typically used land that was still in private ownership on paper

4 Law on Agricultural Land (Official Gazette of the Republic of Serbia, no. 62/06, 65/08 - other Law, 41/09, 112/15 and 80/17).

but over which the landowners did not have any decision rights as to its use or allocation. There were only two exceptions, Poland and the former Yugoslavian countries, where collectivization largely failed, such that a considerable share of agricultural land was already being used by individual farmers during the communist era. After 1989, land reforms were introduced and land was restituted to the former owners or distributed among the workers at the state farms. In addition, farm restructuring resulted in the introduction of hard budget constraints. The implementation of farm restructuring and land reform processes was difficult, and in some countries land reforms are still not yet fully completed (Ciaian, Swinnen, 2006).

In general, the sale of agricultural land is considered superior to land rental because 1) land sales transfer full ownership rights to the new users, 2) sales are more likely to increase access to credit, since owned land can be used as collateral, and 3) sales provide optimal incentives for investment by entailing the permanent security of rights. In most EU member states, however, the rental market seems to be more important than the sales market and a large share of the agricultural area is rented, although there are substantial variations in the shares of rented land. In the old member of European Union, the share of rented land ranges between 18% in Ireland and 74% in France, while in the new member of European Union it ranges from 17% in Romania to 89% in Slovakia (Ciaian et al., 2012).

Role of states in privatizing agricultural land

Diverse agricultural extension funding and delivery arrangements have been undertaken since the mid-1980s by governments worldwide in the name of "privatization". This chapter reviews these actions and their implications (Amanor, Farrington, 1991). When agricultural extension is discussed, privatization is used in the broadest sense - of introducing or increasing private sector participation, which does not necessarily imply a transfer of designated state-owned assets to the private sector. In fact, various cost-recoveries, commercialization, and other so-called privatization alternatives have been adopted to improve agricultural extension.

The evolution of public agricultural sector arrived at a worldwide turning point in the 1980s, one that represented the end of a major phase in the growth of publicly funded extension in both the developed and developing world (Birkhauser et al., 1988). In developed industrialized countries, which often provide models for extension service delivery elsewhere, the declining relative importance of agriculture for economic growth, the increasing education and affluence of smaller populations of rural producers, and the increasing use of externally purchased inputs have changed the nature of publicly funded extension services and led to a questioning of the means of delivery of extension services by governments (Bunney, Bawcutt, 1991). In developing countries, where publicly funded extension is often more important, there has been considerable questioning of the structure and forms of extension delivery.

Global Competition

The consequence of the ratification of the General Agreement on Tariffs and Trade (GATT) is that countries will have to more actively develop comparative agricultural advantages in the production and marketing of food and fibre. Coincidental with a shift toward more conservative political ideologies and free-market economics, global developments suggest increased competition in agriculture. While countries will focus more on their comparative advantages, they also, in many cases, still face national food security concerns and abject rural poverty.

Reassessment of Public Extension

Against this background, governments in recent times have found that they are less able to continue providing all the services previously provided. With costs rising, limited resources available, and changes in the prevailing philosophy of the appropriate extent of government intervention, governments have been slow to increase appropriations for many publicly funded activities. Some functions of government have been curtailed, and others have been privatized. Such changes have been particularly significant in the formerly centrally managed economies.

While the unit cost of extension staff in many countries is low, large staff sizes translate into large government outlays. As a result of financial concerns, many countries have examined alternative structural arrangements, including the feasibility of reducing public sector extension expenditures (with associated staff reductions), changes in tax raising, charges for government extension services, and

commercialization and privatization (Howell, 1985). A number of countries have moved towards reducing, recovering, or shifting the burden of the costs associated with provision of public sector agricultural extension, particularly transferring "private good" functions to private industry.

Concerns about the costs of extension need to be judged against the economic and social returns associated with successful extension. While more research is needed on measuring the economic payoff from investment in public sector extension services, available research tends to indicate, in contrast to some current criticisms, that extension in many instances provides high rates of return and is, therefore, a profitable public investment. In addition, not all extension expenditure can be measured by benefits from technology transfer; the benefits of extension concerned with human development are difficult to quantify in the short term.

Strategies for change

Public agricultural sector, facing criticism for its cost and its lack of efficiency and for not pursuing programs that foster equity, is confronted with a number of possibilities for change.

There has been a trend, perceptible throughout various extension systems undergoing adjustment, of greater flexibility and multiple partners in funding agricultural advisory services (OECD, 1989; Le Gouis, 1991). Le Gouis observed three major policies adopted by government and farm organizations regarding privatization of extension:

1. Public financing by the taxpayer only for the kinds of services that are of direct concern to the general public
2. Direct charging for some individual services with direct return (in the form of improved income)
3. Mixed funding shared between public and private professional association contributions for some services where the benefits are shared.

A pervading development in new forms of financial support for extension is the trend to mixed sources of funding, reflecting strategies to gain access to additional sources of funding. In several developing countries, public-private extension coordination is already established. Alternative patterns indicate a fostering of private corporate initiative, encouraging cooperative ventures by farmers, coordinating public-private extension services, and privatizing the public system.

Cost Recovery

Other public extension systems have moved toward cost-recovery approaches. Mexico has developed a fee-based system among large-scale farmers in the northwest region and plans the development of a similar arrangement among small-scale farmers in the south central region. The Agricultural Development and Advisory Service (ADAS) in England and Wales, notionally "commercialized," operate on a partial cost-recovery basis. Clients of ADAS pay a fee for advice which formerly was free of charge. This process of cost recovery, introduced in 1987, was directed towards the agency receiving 50 per cent of its income from commercial fees by 1993-94.

Gradual Privatization

In 1990 The Netherlands "privatized" approximately one-half of its public extension service by transferring field extension personnel, with initial government financial support, to the farmer associations. The elements of the extension service responsible for linking research and the privatized extension services, policy preparation, implementation, and promotion and regulatory tasks remained under the aegis of the Ministry of Agriculture. The "privatized" extension service is governed by a board on which farmers' organizations and the governments are equally represented.

Dutch farmers make a partial contribution to the cost of the new organization through membership subscriptions to farmer associations, as well as through direct payment for individual analyses. Farmers will eventually contribute 50 per cent of the cost of the service: special services such as individual analyses will be fully paid for by the farmer clients. The Dutch government has established new government-funded structures for integrating subject-matter specialists into extension teams to facilitate the transfer of information and knowledge and for the provision of information on government policy.

In order for rural industry organizations to take a greater responsibility for technology transfer, the Victorian government has proposed "outsourcing" for delivery of future extension programmes. Outsourcing means that the government extension agency will retain a core pool of extension project staff and "buy in" private sector professional services with skills that the agency considers unnecessary to maintain. Agricultural consultants and contract staff will be employed to help deliver

services in specific projects funded by rural industry and the federal government. Such projects are likely to be broad and industrywide and not tailored to individual farm circumstances.

In most cases, governments have not actually "privatized" their agricultural extension services. In its pure sense, privatization implies a full transfer of ownership (usually by way of sale) from government to a private entity, with that entity meeting all costs and receiving any profits. In the case of extension, governments have followed a number of distinct pathways such as commercializing the service while retaining it as a public agency, shifting public sector delivery services to private sector delivery of the service while maintaining oversight and basic funding of delivery, or pursuing cost-recovery measures to pay for the service. Thus the phrase "privatization of agricultural extension" generally is misleading.

Other Arrangements

Some countries have never developed public agricultural sector, leaving the function of agricultural sector to private sector commodity enterprises or industry agencies, albeit often with some government financial subsidy. In France, while chambers of agriculture and private sector companies provide extension services, the former are substantially supported financially by public funds. In New Zealand, extension services to the dairy industry for many years have been delivered by the Dairy Board consulting service, financed by the dairy industry.

In other cases, nongovernmental organizations have been used to supplement public sector extension services, especially in the area of rural development. This arrangement has certain advantages for increasing extension coverage and encouraging farmer participation in technology systems, but it also has certain inherent limitations.

In most countries, private sector companies are already important contributors to technology transfer and the advancement of agricultural development through, mainly, contract arrangements with farmers. Rightfully, the private sector has come to be acknowledged as a major information provider to both large and small farmers involved in monocropping (Cary, 1993). The characteristic of "privatized" extension systems is a focus on commercial farms. It is salutary to state the obvious in relation to decisions regarding private and public provision of extension: when extension is delivered privately, it represents a commercial decision; when exten-

sion is delivered publicly, it is a political or bureaucratic decision. In determining whether to privatize, it is important, in the first instance, to establish whether an extension programme is designed to help commercial enterprises or small-scale farming and rural development.

Alternative funding and delivery

Diverse directions have been taken and multiple means of payment (public and private) have emerged as governments have opted for alternative financial and delivery arrangements to pay for and deliver public sector agricultural extension services. Extension provision is often multi-institutional and organized in ways that are not necessarily independent.

Where the public sector provides extension, the alternative funding arrangements include:

1. *General tax-based public funding* for agriculture, including funding of agricultural extension services, that is, the traditional public sector mode of funding extension
2. *Commodity tax-based public funding* (through cess or parafiscal tax), for example on an agricultural commodity such as coffee, as in El Salvador
3. *Fee-based public funding,* in which fees are charged, usually to large farmers for extension service, for instance in Mexico's grainrich northern region
4. *Contract-based commercialisation of public services,* whereby contract-based arrangements are made between farmer and public sector extension services, as in New Zealand

Where the *private sector* provides extension, the alternative funding arrangements include:

1. *Government revenue-based vouchers,* provided to farmers who then contract with private sector agents for extension information provision, as in Chile
2. *Public credit revenue-based coupon schemes* attached to agriculture loans, obligating the farmer-borrower to use a percentage of the loan for extension advising purposes
3. *Membership and fee-based, including commodity tax-based funding,* whereby farmers pay member ship and service fees, and the private organization (e.g., a chamber of agriculture) also receives funds through a public cess or parafiscal tax charged on agricultural commodities, which funds are then transferred to the private sector organization; the private sector then provides

the extension services - although public sector officials generally sit on the chamber's governing board

4. *Membership fee plus commercial sponsorship by groups of input suppliers,* where farmer groups are provided nonadvisory, educational extension services by a consortium of privately employed agricultural consultants with partial financial support from rural sector commercial sponsors - such groups can operate on a large scale, with coordinated extension objectives[3]
5. *Privatization,* whereby provision and, eventually, agent salary payments are shifted to a farmers' association or other private entity.

The Privatization Debate

There are two themes in the broader privatization debate: first, a "political economy" consideration of the role and size of government in an economy, which focusses on whether or not there is a failure of private markets; and, secondly, an expressed need to reduce government outlays. While many reassessments of publicly funded extension have reflected the second theme, it is worth considering the rationale for public versus private activity in an economy.

In mixed economies, the prevailing economic justification for government involvement in an activity such as agricultural extension is market failure, whereby the market mechanism alone cannot perform all economic functions for appropriate resource allocation. Market failure may arise because some goods or services are public goods (such as publicly funded agricultural research knowledge) which can be consumed in a nonrival fashion by all members of society without any individual's consumption reducing the amount available for other individuals. Because the benefit of providing such goods cannot be appropriated by individuals, individuals generally will not provide such goods in a society even though there may be significant gains for producers and consumers. Some extension activities are clearly concerned with public goods subject to market failure. Other activities (such as individually tailored advice) confer appropriable private benefits which could be adequately supplied by private markets.

Private goods sometimes are subject to market failure, whereby the operation of private markets does not provide certain services at a socially optimal level or where external costs or benefits are accrued by others rather than the provider of the goods. Market failure also may arise when current generations place insufficient value on preservation of resources for future generations. These latter

circumstances are particularly characteristic of land and water degradation. Publicly funded conservation extension is often directed to overcoming such market failures (Cary, Wilkinson, 1992).

Government support for the provision of extension services may reflect that such services would be inadequately provided without intervention or, for reasons of equity, because services would not be available to the extent thought socially desirable. Some situations for agricultural extension clearly reflect private goods; other situations clearly are characterized as public goods. There is a lot of fuzzy ground in the middle where it is not particularly clear that an extension activity is conferring a public or private good. In such situations, the extent of publicly funded extension is likely to be determined by the political influence brought to bear by relevant interest groups (Cary, 1993).

The philosophical thrust of the general privatization debate has centred, on the one hand, on whether certain government activities could be performed more efficiently by private agencies operating in private markets and, on the other hand, on whether inequities may arise because not all individuals have access to resources to purchase privately supplied services.

The Debate with Respect to Extension

While much of the public policy debate related to extension has focused on so-called privatization or commercialization as means of reducing government outlays, other aspects need consideration. The commercialization experience of Agriculture New Zealand (Walker, 1993), while not without its problems, provides examples of some of the arguments for commercialization. Commercialization is perceived to have had a positive effect on moving "beyond the farm gate" into an involvement of the extension staff in the entire production-processing-transporting-marketing chain. There also has been the shift in focus to a client orientation and a concern to identify and produce results rather than simply to engage in activities.

In economically developed countries with a predominance of larger-scale commercial farming, increasingly the technologies of modem, industrialized farming are being developed by nongovernment industrial institutions; such technologies are appropriable for private marketing and generally have little need for government extension. In developed economies, it is more difficult to argue for publicly

funded extension for rural industries containing fewer producers who are closely linked and integrated with research systems.

The weaknesses of privatization are more apparent in the context of developing countries, where the situation may be quite different. For instance in African agriculture, funding by user fees may not be viable. An erroneous assumption may be that recipients of government services are generally being subsidized by the government (Leonard, 1985). This is far from the case with African agricultural producers, who instead are usually subsidizing the rest of society. The most obvious shortcoming may be the difficulty of collecting user fees and establishing cost-accounting procedures to set charges at appropriate levels. The subsistence nature of most African farming leads to a much stronger case for state intervention in support of food production than in developed countries.

Institutional Considerations

The search for appropriate institutional arrangements for different situations echoes the larger debate currently under way on creative use of the private sector for supplanting or supplementing public services. Privatization represents one position in the debate over how public functions should be organized. Wise has observed that "privatization... is not necessarily a simplifying strategy... the responsibilities of public organizations does not disappear, they merely change." The primary issue may not be whether a certain function should be entrusted to public or private organizations, but, rather, what configuration of organizations, both public and private, is needed and what arrangements between them provide the most effective outcomes. In some instances, central government bureaucracies are seen as unresponsive and inefficient, and the diffusion of responsibility arises out of a concern that the public sector should be reduced in size. In other cases, however, the emphasis is less on reducing the size of the public sector and more on sharing authority among different units. The question of what role the government should play within an increasingly complex institutional arena is itself complex and not one to which, necessarily, there are simple answers (Wise, 1990).

Summary of Rationales

The rationale for private sector provision of agricultural extension services is generally based on an expectation of increased efficiency with the operation of private markets and with the resulting efficiencies contributing to the growth of a coun-

try's GNP. In contrast, the rationale for public provision of agricultural extension services is based on the following points: (1) much agricultural information is a public good; (2) only government extension services are likely to promote concern for natural resources management; (3) public sector extension may enhance the education of farmers who often lack adequate access to educational institutions; (4) the public service often provides information that reduces risk to farmers; (5) the service may provide information that reduces transaction costs; and (6) an extension service may be concerned with community health issues related to possible human hazards such as accidents and poisonings linked to agricultural chemicals. The argument for privatization is based upon:

- More efficient delivery of services
- Lowered government expenditures
- Higher quality of services

Privatization may have some attendant disadvantages because of unequal access to resources and because of a diversity of "agencies" and the associated difficulty of coordinating external groups and other government departments. Private delivery agents will be less responsive to government policy direction, and there may be linkage problems with public applied research organizations.

While the process of information transfer amongst farmers traditionally has been characterized by a cooperative, free exchange of information, industrial information traditionally has been a private good characterized by patent rights, process licensing, the use of paid consultants, and differentiated production and marketing processes. In developed economies with commercialized agriculture sectors, many of these features of industrial information transfer are becoming more common in agriculture. The trend to privatization will be stronger the more such circumstances exist. The range of different circumstances prevailing in agricultural extension worldwide suggests that a wide variety of approaches should prevail.

Implications of extension privatization

In general, a more commercialized approach broadens the focus of extension personnel and makes an extension service more responsive to client needs and changing economic and social conditions. But other immediate implications of privatization appear to include (1) the tendency toward a reduction of linkages both among organizations and among farmers in the exchange of agricultural and other relevant information; (2) the tendency to enhance large-scale farm enterprise to the detriment

of small-scale farming; (3) the diminishing emphasis on public-good information and the advancement of knowledge as a saleable commodity; and (4) the trend toward agricultural development services that cater primarily to large-scale farming.

The Netherlands' experience in moving to a partially privatized system highlights some of the implications for agricultural extension, particularly in developed countries. The Netherlands' approach reduced government outlays as well as the government agency role conflict between concern for farmers' interests and the implementation of increasingly stringent environmental policies. With farmers paying for an increasing share of the extension services, their representatives have more influence on the direction of the extension service. New organizational structures and linkages have had to be established to link the "privatized" and private extension services with the research institutes, experiment stations, and regional experiment farms.

Consequent upon, or in parallel with, the changed Dutch arrangements, other changes have taken place in the Netherlands' extension system. There is some evidence, at least for the vegetable greenhouse sector, that the high level of cooperation among extension information organizations in both the public and private sectors no longer exists (Huang, 1992). The more commercial orientation of the system appears to be creating tensions between extension workers and their clients in a less "open" knowledge and information system, with farmers who used to share information during study-group meetings now being more reluctant to do so.

Those extension services that have adopted a commercialization or privatization strategy most vigorously have traditionally employed an advisory approach to extension delivery. The advice given is more likely to be a private good. As well, the extension advisers are more likely to be able to adapt to providing services commercially. However, some staff will not make such a transition easily, new commercial skills will be required by newly commercialized advisers, and the dynamics of any change will have to be planned carefully. Le Gouis (1991) has noted that government "commercial" fees should be set at the market rate so as not to compete unfairly with existing private consultants.

Institutional Implications

The new developments highlight greater institutional pluralism. Extension, interpreted broadly, now is often a mixed system or a "complex" where services are provided by private and public sector entities. The larger context in which a mix of

public and private services operates presents a new challenge with new potential roles and responsibilities for the public sector. A major premise of this chapter is that policy makers must consider the entire agricultural extension complex when planning to allocate funds or seeking alternative funding arrangements for the public sector.

State interest

Responsible business of companies is one of the key solutions for achieving sustainable development, it is the right balance between economic interests, as the main driver of development and the interests of the society as a whole. According to the well-known principles of corporate governance, adopted in most countries of the world, the achievement of the company's target function - maximization of profit, that is, company value is the imperative of every company. The imperative of the corporation and its administration is a constant increase in profit, as it maintains a safe life of the corporation. Everywhere in the world companies perform a very important function for every state and society as a whole, they have a great influence on the community, so they have an obligation to act in the general social interest, respecting the good rules of socially responsible business. Jobs are ruthlessly cracked, many workers have been left unemployed, and then re-employed as non-unionized with lower wages and fewer workers' benefits, and wage growth is reduced or prevented. Under the pressure of corporations, or in conjunction with them, corporate income tax is reduced. All this led to an increase in inequality of income, one of the most prominent features of globalization.

The concept of corporate social responsibility was created primarily on the basis of voluntarism, which later turned into a field of legal obligation somewhat. At the same time, there exist the notion that, being socially responsible does not only mean fulfilling legal orders, but also to go "beyond" that companies are obliged, for example, increased investment in protection of human rights from the legally prescribed minimum of protection, greater protection of consumers from the legal minimum protection, higher investments in environmental protection, greater protection of other stakeholders besides the owner (employees, creditors, administration, local community, state). This approach also has its direct starting point in increasing the productivity, profit and competitiveness of the company. In this way, the demands of the state regarding the company's commitment to social responsibility, from the idea that it was originally con-

ceived, applies only to the largest multinational corporations, extended to small and medium-sized enterprises.

In support of the concept of social responsibility, the reasons for ethics and the reasons for marketing point out, but because both have their own economic expression in increasing profits. It is considered to be a kind of investment, so-called, socially responsible investment, not the cost so that it has the impression that, as such, they are not enough. Namely, it is about the real condition without which there is no sustainable development of the company in the long run, nor the development and stability of the society and each individual state.

Conclusion

This chapter concludes with a recommendation for consideration of the various "privatization" arrangements mentioned herein, but also stresses the importance of individual country situational analysis and independent political and technical determinations, not the use of implantation or formulas, in developing funding and delivery arrangements to provide for agricultural extension. The diverse financial arrangements adopted in the last two decades by governments worldwide to fund agricultural extension services provide a valuable menu of options for consideration by other countries confronting the "privatizing" of public sector services.

Still, several countries have resisted the trend toward privatization of agricultural sector, concerned perhaps by the implications reviewed in this chapter. In both developed and developing countries, renewed debate and experimentation around extension is certainly needed, but not only around allocation decisions and how best to develop cooperative arrangements with the private sector. In most countries, government-funded extension is likely to focus its activities more selectively on public-good activities which exist and on areas where the marketplace is unlikely to provide services at a socially optimal level. Such areas will include "broad" rather than "specific" technology transfer, dissemination of environmental and resource technology, and human resource development.

The move in the public sector toward privatization and efforts to decentralize government functions can serve to highlight the continuing and key role of the public sector and focus the operative question on its responsibility as a coordinating agent. Its roles of regulation and providing service for priority audiences unserved by the private sector will be undiminished.

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CONSUMER MOTIVES AND ATTITUDES TOWARD THE PURCHASE OF ORGANIC PRODUCTS IN VOJVODINA

Maja Ćirić[1], Jelena Vapa Tankosić[2]

Abstract

The purpose of this research is to identify consumer preferences in the consumption of organic products, in comparison to conventionally grown products, in Vojvodina. Namely, it is necessary to determine whether there are differences between consumers of organic and conventional products according to the irdemographic, economic, sociological and geographical characteristics. In addition, special emphasis is placed on determining the consumers' attitudes and motives towards the purchase of organic products.

The research has been undertaken in 50 towns and villages in the territory of Vojvodina. The research has been conducted in the period from January to June 2017. The research sample consisted of 750 randomly selected respondents. The survey method has been applied in the research.

The obtained results shall provide an insight intothe organic products consumer profiles and, furthermore, into the consumer attitudes and motivestowards the purchase of organic products in Vojvodina. These findings are important for creating an adequate marketing strategy for increasing market share and improving the sale of organic products.

Key words: *consumer preferences, consumer attitudes, consumer motives, organic products, marketing strategies.*

Introduction

Based on data from the Ministry of Agriculture, Forestry and Water Management - Group for organic production, which administers the database on organic production, pursuant to the annual reports of authorized control organizations, the

1 Maja Ćirić, Ph.D., Associate Professor, Faculty of Economics and Engineering Management, Novi Sad, Serbia, Phone: +381 21 400 484, E-mail: majaciric79@yahoo.com

2 Jelena Vapa Tankosić, Ph.D., Associate Professor, Faculty of Economics and Engineering Management, Novi Sad, Serbia, Phone: +381 21 400 484, E-mail: jvapa@libero.it

organic production in the Republic of Serbia in 2015 has recorded total growth in the organic production area as well as in the number of animals and in the number of producers. The production has occupied a total area of 15298 ha (with meadows and pastures), including areas that are fully converted and under conversion. Compared to the year 2014 (9547.8 ha), the total area has increased by 60.25%, which represents quite an increase, while in the course of 5 years it has been increased by 261.3%. The percentage of organic cultivable land in total arable land in Serbia has been increased to 0.44%. Despite significant advances in recent years, with a significant increase in organic production being registred, the domestic market for organic products is still underdeveloped, despite significant advances in recent years. Consumer awareness has been increased, but mainly in large urban market environments where the organic products are mostly present, predominantly in Belgrade and Novi Sad (Simić, 2017).

Considering the significant potential that the region of Vojvodina has in developing organic production, it is necessary to simultaneously implement appropriate strategies and actions, besides further development of organic production that will contribute to the development of the domestic organic product market. In order to define the appropriate marketing strategy with an aim to increase the consumption of organic products on the market of the Vojvodina region, it is necessary to conduct a comprehensive research of consumers, their habits, motives and attitudes towards organic products. In addition, it is important to identify the profile of organic food consumers in the territory of Vojvodina, since the scientific research conducted in different countriesup to this moment has shown that consumer profiles can share similar characteristics, but also can differ, depending on the country or area in which research was carried out. It is therefore necessary to determine aconsumer profile, as well as consumer habits, motives and attitudes towards organic food consumptionin the territory of Vojvodina.

Research on consumer's behavior, motives and attitudes, and the creation of marketing strategies and marketing programs, based on information obtained by research, shall not necessarily bring market success. However, it shall greatly reduce the risk of errors and increase the chance that a product or service is accepted by consumers and thus allowing producers to achieve adequate market share and profit (Ćirić et al., 2015).

Profile of organic products consumers

Consumer profiling is type of procedure that describes the specificities of consumers in the target market segment. A consumer profile is a description of relevant traits found in an average consumer at the time of purchasing a particular product or service. Consumer profiles in a particular market segment have a significant impact on the demand for company's products and/or services. Although consumers behave differently during purchases of products and services, in diverse situations in the market, it is possible, according to consistency in consumer behavior, to classify consumers according to some general (common) characteristics (Maričić, 2008). Since organic food is becoming more and more popular, there is a growing demand for academic research on the profile, habits and attitudes of consumers towards organic foods (Shepherd et al., 2005). The structure of consumers and their behavior are considered essential and must be studied in sectors such as economics, marketing, management and psychology. It is important to understand the consumer's profile and their behavior, and accordingly create a personalized approach (Kranjac et al., 2017).

Most studies show that consumers that are active in the organic market are highly educated, have a relatively high income, live in cities and are concerned about their health. In the United States, many organic consumers are parents of small children and infants, and this characteristic is considered to be the reason for the growth of the organic food market (Lockie et al., 2004). Research on sociodemographic profile organic products consumers in China, has shown that is female-dominated. Consumers aged 18 to 25 shows the highest inclination towards purchase of organic products, followed by consumersaged 26 to 35. Households with children are more likely to buy organic products (Gan, et al., 2014). In the United Arab Emirates, research shows that men have a more developed awareness of organic products than women (Muhammad, 2016). In Romania, the results of study showed that organic food consumers are educated people older than 35 who are aware of the effects of their nutrition on their health (Oroian, 2017). Based on a market survey conducted by the National Association Serbia Organica (NASO) in 2016, the average organic product consumers in Serbia are women aged 25 to 45 years old, with patients and convalescents being in the second category (Simić, 2017).

Motives and attitudes of consumers of organic products

In order to plan the company marketing activities it is important to determine and explain what motivates the consumers to act and behave in a particular way during

the purchase. Research has shown that consumer behavior is based on the same or similar needs and motives, but during the purchase, they are manifested in a different way. The purpose and goal of consumers' behavior is to satisfy needs and desires. In order to meet the needs, they have to be translated into desires. The task of marketing is, to initially start from the needs and motives of the consumer, and create a desire and offer a product or service that will best satisfy the consumer. That is the reason why the consumers motivation has been studied, ie the causes (motives) of consumers' behavior are being investigated (Novaković Rajčić, 2005).

The attitudes are very important because they, under certain circumstances, led to the recognition that specific behaviors, as it has been pointed out by numerous authors (Fazio et al., 1981; Fazio, 1990; Maričić, 2008; Novaković Rajčić, 2005). The attitude is a very complex concept that consists of more structural components, therefore there are many definitions that are trying to explain it. Conventionally, attitudes are defined as psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor (Eagly, Chaiken, 1993).

Previous studies have provided a general analysis of the main motivators of the consumers' behavior towards the purchase of organic food. In addition to environmental issues and animal welfare, many studies have shown that health problems are the main reason for the purchase of organic food, and that health attributes have become as important as sensory ones during the buying decision-making process (Aygen, 2012; Gil et al., 2000; Meixner et al., 2014). The results of the research conducted in China (Gan et al., 2014) have revealed that taste, knowledge, income, convenience, health and ethics have a strong impact on the consumer's tendency to buy organic products. On the contrary, environmental impacts, environmental protection, food safety and lifestyles have less impact on consumers' decision to buy organic products. In addition, it has been established that the reason for not buying organic products is the lack of understanding of the concept of organic and distrust whether products sold as organic are actually produced in an organic way. Russian consumers show a relatively low interest in the environment, while health problems and lack of synthetic inputs are the main reasons for buying organic food (Meixner et al., 2014). According to a survey conducted in Thailand, Thai consumers have put on the first place the health aspects of organic food, followed by local origin, environment, food safety and animal welfare (Ueasangkomsate, Santiteerakul, 2016). Market surveys conducted by NASO in 2016, as well as interviews with various participants in the sector, have shown that the average consumer from Serbia links the term organic product with health and perceives organic products as

natural and pesticide-free, as well as those cultivated in garden in a traditional way. Consumers are not sufficiently informed about the concept of organic production certification, as well as what 'certified organic' label guarantees, and do not know how to recognize organic products. On the other hand, there are consumers who consider organic production as faddishness and who do not have confidence in the certificates (Simić, 2017).

Research methodology

The objective of this paper is the research of consumers' preferences in the region of Vojvodina regarding the consumption of organic products in comparison to conventional products. Namely, it is necessary to determine the percentage of respondents consuming organic products and whether there are differences between consumers of organic and conventional products according to their demographic, economic, sociological and geographical characteristics. In addition, this paper seeks to determine the purchasing habits of organic products consumers in terms of the frequency of purchases and household expenditure for the purchase of organic products. This paper shall also investigate the consumers' motives for the purchase of organic products and the reasons why, in the light of the current situation, there have not been more organic products purchases.

The aim of the paper is to identify organic products consumers, based on the analysis of purchasing habits, motives and attitudes of consumers in connection to demographic, economic, sociological and geographical consumer's characteristics. Understanding consumer profiles can provide valuable guidance to organic product producers with an aim to create an appropriate marketing strategy and marketing program. In the research on consumer behavior, the authors have used the quantitative method in order to perform statistical analysis and generalize the results obtained to a wider population. The method that is applied is the survey method.

The research was carried out on the territory of Vojvodina in 50 towns and villages (Ada, Bački Jarak, Bačka Palanka, Bačko Gradište, Bačkopolje, Banoštor, Bečej, Begeč, Beočin, Beška, Bezdan, Bođanovci, Bukovac, Crvenka, Čerević, Čoka, Čonoplja, Čurug, Dobrinci, Đurđevo, Futog, Gospođinci, Inđija, Irig, Kać, Kikinda, Kisač, Kljajićevo, Novi Bečej, Novi Sad, Pećinci, Petrovaradin, Ruma, Rumenka, Sajilovo, Senta, Sirig, Sombor, Srbobran, Sremska Kamenica, Sremska Mitorvica, Sremski Karlovci, Stanišić, Subotica, Šabac,

Šid, Temerin, Veternik, Vršac, Zrenjanin,). The research has been conducted in the period from January to June 2017. The research sample consisted of 750 randomly selected respondents. After rejecting incomplete questionnaires, the sample amounts to 745 respondents. A random sample method was used to select a representative sample.

The data has been collected by telephone and e-mail.The survey was anonymous. The authors have prepared a list of specially formulated questions for the surveyin line with the aim of the research. The survey has included open and closedquestions.Descriptive statistics was applied and the results of the research are expressed numerically and are shown a tabular format.

Results and Discussion

Since it is important to understand the external and internal factors that affect consumer behavior, the author's haveperformed the analysis of external impacts, i.e. we have examined the demographic, economic, sociological and geographical characteristics of consumers. The authors have subsequently analyzed a part of the internal factors, that is, their motives, attitudes, and the established purchasing habits.

Based on the data presented in Tables 1 and 2, we can conclude that amongnon-consumers of organic products in Vojvodina, both men and women are equally represented. The most represented group in the sample is from 20 to 40 years old, while theleast represented groupare respondents over 60 years and up to 20 years. Regarding the educational structure, a large majority of respondents has a high school degree, followed by persons with college degree and bachelor's degree, while the smallest groups of respondents are persons with elementary school, then masters, masters and doctors of science. As per the family size, four-member, two-member, three-member households are the most represented size group. The highest percentage of respondents live with parents in the household (young people), followed by families with a spouse and wife with children, then the families that consist of a husband and wife, while the other family size structures are less represented. As per the household income, the families that have an income between 20000 and 40000 dinars, from 400001 to 60,000 dinars and from 60001 to 80000 dinars, are equally represented. The familes that has an income over 80001 dinars are less represented (24, 90%). Although this group of consumers does not buy organic products, most of them occasionally engage in physical activity and generally take care of health. A higher number of respondents live in the city.

Table 1. *Demographic and economic characteristics of the surveyed sample of non-consumers of organic products in Vojvodina*

	Question	Answer	Number	Percentage
1.	**Gender**	Male	150	51.90
		Female	139	48.10
2.	**Age**	Up to 20	22	7.61
		21-30	98	33.91
		31-40	67	23.18
		41-50	36	12.46
		51-60	47	16.26
		Over 60	19	6.57
3.	**Professional qualifications level**	Elementary school	22	7.61
		High school	130	44.98
		College degree	61	21.11
		Bachelor's degree (graduated)	60	20.76
		Other (master, master, doctor of science)	16	5.54
4.	**Number of household members**	1	38	13.15
		2	72	24.91
		3	60	20.76
		4	80	27.68
		5	22	7.61
		Over 5	15	5.19
5.	**Members in your household:**	I live in the household	38	13.15
		I live with my husband in the household	46	15.92
		I live with my wife and child in the household	25	8.65
		I live with my wife and children in the household	54	18.68
		I live with a child/children in the household	10	3.46
		I live with my wife, children and parents in the household	15	5.19
		I live with my parents in the household	80	27.68
		Other	21	7.27
6.	**The total average income of your household is:**	Up to 20 000	9	3.11
		20 000 - 40 000	55	19.03
		40 001 - 60 000	60	20.76
		60 001 - 80 000	67	23.18
		80 001-100000	48	16.60
		Over 100000	24	8.30
		I don't know	26	9.00

Source: *authors' elaboration on the basis of the survey*

Table 2. *Demographic and economic characteristics of the surveyed sample of non-consumers of organic products in Vojvodina*

1.	**Do you engage in physical activities?**	Yes, I do	66	22.84
		Most of the time I do	61	21.11
		Sometimes	79	27.34
		Seldom	53	18.34
		Not at all	30	10.37
2.	**Do you take care of your own health?**	Yes, I do	64	22.14
		Most of the time I do	113	39.10
		Sometimes	73	25.27
		Seldom	27	9.34
		Not at all	12	4.15
3.	**Place of living**	City	182	62.97
		Village	107	37.02

Source: *authors' elaboration on the basis of the survey*

Table 3. *Demographic and economic characteristics of the surveyed sample of organic products consumers in Vojvodina*

	Question	Answer	Number	Percentage %
1.	**Gender**	Male	185	40.57
		Female	271	59.43
2.	**Age**	Up to 20	10	2.20
		21-30	130	28.57
		31-40	127	27.91
		41-50	100	21.98
		51-60	61	13.41
		Over 60	28	6.14
3.	**Professional qualifications level**	Elementary school	15	3.30
		High school	190	41.76
		College degree	93	20.44
		Bachelor's degree (graduated)	124	27.25
		Other (master, master, doctor of science)	34	7.45
4.	**Number of household members**	1	41	8.99
		2	71	15.57
		3	139	30.48
		4	129	28.29
		5	51	11.18
		Over 5	25	5.48

	Question	Answer	Number	Percentage %
5.	**Members in your household:**	I live in the household	41	8.99
		I live with my husband in the household	55	12.05
		I live with my wife and child in the household	91	19.96
		I live with my wife and children in the household	105	23.03
		I live with a child/children in the household	18	3.95
		I live with my wife, children and parents in the household	34	7.46
		I live with my parents in the household	83	18.20
		Other	29	6.36
6.	**The total average income of your household is:**	Up to 20 000	15	3.30
		20 000 - 40 000	77	16.92
		40 001 - 60 000	105	23.08
		60 001 - 80 000	113	24.83
		80 001-100000	62	13.63
		Over 100000	52	11.43
		I don't know	32	7.01

Source: *authors' elaboration on the basis of the survey*

Based on the data presented in Tables 3 and 4, we can analyze the characteristics of consumers using organic products. According to the gender, the number of female consumersof organic productsis significantly higher than of male consumers. According to the age structure, the most represented group in the sample are the respondents aged between 20 and 40, with a significant share of people aged 40 to 50, which significantly differs from the age structure of non-consumers of organic products. Regarding the educational structure, the respondents with a high school degree are the most represented group, but the percentage growth of respondents with college diploma, bachelor's and master's degrees, doctorate in comparison with non-consumers of organic products, is quite noticeable. This leads us to the conclusion thatas education levels increase the higher the tendency towards the purchase of organic products. As per the family size, four-member and three-member households are the most represented category, in which respondents live with their spouse and a child or children, or in regard to a younger population, they live with their parents. In comparison with the consumers who do not consume organic products among which there are also households in which husband and wife live alone, it is noticeable that in the group of consumers of organic products households with one or two children are the most represented group.

Table 4. *Sociological and geographical characteristics of the surveyed sample of organic products consumers in Vojvodina*

	Question	Answer	Number	Percentage %
1.	**Do you engage in physical activities?**	Yes, I do	122	26.75
		Most of the time I do	83	18.20
		Sometimes	160	35.09
		Seldom	65	14.25
		Not at all	26	5.71
2.	**Do you take care of your own health?**	All the time	140	30.70
		Most of the time I do	186	40.79
		Sometimes	115	25.22
		Seldom	13	2.85
		Not at all	2	0.44
3.	**Place of living**	City	201	44.07
		Village	255	55.92

Source: *authors' elaboration on the basis of the survey*

In regard to the income level, household with income range of 40000 to 80000 dinars are the most represented group, while the percentage of those who have an income over 80000 is only 25.06%. Therefore, there are no significant differences between theincome level and purchase of organic products, with only a small percentage of respondents having an income range of 20000 to 40000 dinars, which can be reflected in higher prices of organic products than of conventional products. The majority of consumers of organic products are occasionally and continuously engaged in physical activity, and most of the time and all the time take care of their health.In relation to consumers who do not buy organic products, there is a noticeable increase in the percentage of consumers who are engaged in physical activity and who take care of their health. Regarding the place of residence, we can observe that, in a slightly higher percentage, the consumers who buy organic products live in rural areas. This can be explained by the fact that the rural population has more opportunities to acquire the products directly from the neighboring organic producers, or produce the products by themselves, and thus the organic food is more represented in their consumption.

Table 5. *Purchasing habits of organic productsconsumers in Vojvodina*

	Question	Answer	Number	Percentage %
1.	**Do you consume organic products?**	Yes	456	61.20
		Not	289	38.80
2.	**What kind of organic products do consume?**	Fruits	360	27.95
		Vegetables	369	28.65
		Meat and processed meat	169	13.12
		Eggs	241	18.71
		Milk and milk products	138	10.72
		Other (bread, cosmetics)	11	0.85
3.	**Do you buy organic products for personal consumption or for other members of the household?**	For me	113	24.78
		For my children	26	5.70
		For my parents	5	1.10
		For the whole household	312	68.42
4.	**How often do you consume organic products?**	Every day	121	26.53
		Several times a week	246	53.95
		Once a week	58	12.72
		Once a month	23	5.04
		Less than once a month	8	1.76
5.	**What is the share of organic products in relation to conventional products in your nutrition (or other household members) in percentages?**	Less than 10%	15	3.29
		10%	38	8.33
		20%	98	21.49
		30%	129	28.29
		40%	64	14.03
		50%	67	14.69
		More than 50%	45	9.88

Source: *authors' elaboration on the basis of the survey*

Based on the data presented in Table 5, we can conclude that there isa higher percentage of organic productsconsumers than of non-consumers of organic products. However, we can conclude that the percentage ofnon-consumers of organic productsis38.80%, which points to the fact that the purchase of organic products, by consumers in Vojvodina, has still not reached a satisfactory level.

The consumers were able to encircle more than one answer in regard totypes of organic products that they buy. The data presented in Table 5, shows that in the highest percentage of purchases are in the category of vegetables and fruits, followed by eggsin the second place, in a much lower percentage, and then by meat and meat products, milk and milk products, bread and cosmetics (as other).

The highest percentages of organic products consumers buy organic products for the consumption of the whole household, althoughthere isa significant percentage of those consumers who buy organic products for their own consumption.

The highestpercentages of organic products consumers consumeorganic products several times a week, with asignificant percentage of those who consume organic products every day. The percentage of respondents who seldomly consume organic products is significantly lower.

The majority of organic products consumers have declared that the share of organic productsin theirnutrition, in relation to conventional products, amounts to 30% and 20%, while only 9.88% of respondents have declared that the shareof organic products in theirnutrition is more than 50%. This indicates a relatively modest share of organic food productsin relation to conventional products, even in those households that do consume them.

Table 6. *Motives and attitudes of consumers of organic products in Vojvodina*

1.	**Why do you buy organic products?**	I think they are healthier than conventional products	330	39.23
		I think they guarantee highestquality	84	9.99
		I think they taste better than conventional products	141	16.77
		I think they are better looking than conventional products	8	0.95
		I buy them because they have a better image than conventional products	4	0.47
		I buy them because I know the producer personally	129	15.34
		I buy them because I know they are domestic (produced in my country)	124	14.74
		I buy them because organic production contributes to the protection of the environment	2	0.24
		Other (I am an organic producer, out of curiosity)	19	2.27
2.	**Why are you not using more types and a greater amount of organic products in your nutrition?**	Because I can not find all types of organic products on the market	152	28.14
		Because I'm not sure that the product is really organically produced	146	27.04
		Because I consider that some conventional products are as good as organic products	50	9.26
		Because I'm not sure what's better and so I use both organic and conventional products	17	3.15
		Because of the high price	156	28.89
		Other (poor offer, mistrust)	19	3.52

3.	**How do you to make a decision to buy organic products?**	I make a decision spontaneously without thinking	111	21.94
		I make the decision on the basis of the information I obtain from sellers of organic and conventional products	219	43.28
		I make a decision based on the recommendation of acquaintances, friends, parents	33	6.52
		I make a decision based on the recommendation of professionals, doctors, advisers	99	19.56
		I make a decision based on information on the Internet	18	3.56
		I make a decision based on the information in the media	21	4.15
		I make the decision on the basis of the information I obtain from sellers of organic and conventional products	5	0.99

Source: *authors' elaboration on the basis of the survey*

The main motives for purchasing organic products relate to the consumers'attitudes pointing outthat the organic products are a healthier choice, thatthey tastebetter and that they know the producers who produce them and have greater confidence in domestic products. Attributes such as appearance, image, environmental protection and quality as a general determinant have no motivational power, that is, they do not motivate consumers to buy organic products.

The most common reasons why consumers do not purchase organic products regardthe consumers' attitudes pointing out to high price,not being able to find all types of organic products on the market, as well as their doubt that the product is truly produced in compliance with organic production. The remaining responses refer to insecurity in regard to which products are better and the consumers' perceptions that certain conventional products are as good as organic products.

By analyzing the manner in which consumers make decisions on the purchase of organic products, we can notice that decisions are primarily based on their own experience, then spontaneously without thinking (e.g. routine purchases) and based on the recommendation of friends, acquaintances and parents. Sincewe have observed a very low percentage of the influence of Information obtained from sellers, professionals like doctors, media and the Internet on the organic products purchase, we can conclude that it has almost negligible impact on consumers' decisions on the purchase of organic products.

Conclusion

On the basis of the conducted research, we came to the conclusion on the characteristics of consumer profiles that prefer organic in comparison to conventional prod-

ucts. According to the gender, the number of female organic products consumers is significantly higher than of male consumers. According to the age structure, the most represented group in the sample are the respondents aged between 20 and 40, with a significant share of people aged 40 to 50, which significantly differs from the age structure of non-consumers of organic products. Regarding the educational structure, the education levels increase the tendency towards the purchase of organic products. As per the family size, four-member and three-member households are the most represented category. In regard to the level of income, household incomes ranging from 40000 to 80000 dinars are the most represented group, while the percentage of those who have an income over 80000 is only 25.06%. We would like to emphasize that there is a small percentage of respondents with an income range of 20000 to 40000 dinars, which can be reflected in higher prices of organic products than of conventional products.Regarding the lifestyle, it is noticeable that respondents who prefer organic in relation to conventional products are more likely to engage in physical activity and to take care of their health. As per the place of living, we observed that consumers of organic products, in a slightly higher percentage, live in rural areas than in the city.This can be explained by the fact that the rural population has more opportunities to acquire the products directly from the neighboring organic producers, or produce it by themselves, and thus the organic food is more represented in their consumption. Observed demographic, economic, sociological and geographical characteristics of organic products consumers represent the starting point for the creation of marketing strategy and marketing mix for the organic products that shall be placed on the market in territory of Vojvodina.

In addition, it should be borne in mind, that even though in the sample there is a higher percentage of respondentswho consume organic products compared to conventional, 38.80% of the respondents do not consume them at all. Thelargest share of organic products in the nutrition, of consumers of organic products, amounts to 30% and 20%, in total consumption. The reasons for this fact can be explained by the high priceof organic products, as well as the uncertainty of consumers in whether the products they buy are actually produced in an organic way. These consumer attitudes are very important when creating pricing and promotional strategy for organic products.

The main motives for the purchase of organic productspoint to health, better taste and greater confidence in domestic products. Product attributes such as appearance, image, protection of the enviroment and quality, as a general product deter-

minant, do not have motivational power. These motives are of special importance when creating promotional activities, especially advertising appeals to retain existing and attract new consumers.

A long-term market positioning of producers of organic products can be achieved only with a planned marketing strategy and with a marketing mix that is based on the characteristics oforganic products consumer profiles and on the understanding of consumer's attitudes and motives.

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SUSTAINABLE FOOD SUPPLY CHAIN - THEORETICAL APPROACH[1]

Marija Jeremić[2]

Abstract

As the result of globalization process, agriculture has undergone significant changes, and one of the most significant occurred in food supply chain. That is, changes that occurred in participants of supply chain have a bad consequence on the environment. Having in mind that agriculture is very complex process that uses considerable amount of natural resources, and that food industry includes wide spectra of activities that in different ways affect the environment, it is very important to provide sustainable development of food supply chain in order to preserve natural resources for the future generation.

Key words: *sustainable, supply chain, food, environment.*

Introduction

The basic task of the agricultural production and food industry is the production of sufficient amount of food necessary for the maintenance of human life. According to FAO, it is expected that the number of people on earth will be around 9 billion by 2050 (FAO, 2017). An increase in the number of inhabitants, on the other hand, means increased production and consumption of food, which requires greater use of renewable and non-renewable natural resources. Also, increased production and consumption of the food lead to increased amount of waste[3] and environmental pollution. At the same time, global trends in production, trade and consumption of food considerably affect all food supply chain participants. Namely, as a result of the globalization process, changes occur in all areas of human activity and in the agricultural sector as well. One of the most significant changes occurred in

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2 Marija Jeremić, Ph.D., Teaching Assistant, Department of Agricultural Economics and Agribusiness, Faculty of Economics in Subotica, University of Novi Sad, Segedinski put no. 9-11, Subotica, Sebria, Phone: +381 24 628 065, E-mail: knezevicm@ef.uns.ac.rs

3 Agricultural wastes are the residues from the growing and processing of raw agricultural products such as fruits, vegetables, meat, poultry, dairy products, and crops.

the food supply chain (Kennedy et al., 2004). Major changes the food supply chain undergone since the 1990s, which significantly affected the way in which all the participants in the chain operate. One of the most obvious changes was the increase in the number of activities performed by the participants in the chain, and especially the number of activities performed by the retail sector (OECD, 2006).

In the domain of agricultural production, although large farms provide a significant part of the output, smaller agricultural holdings are still prevalent. In the processing sector, there is increase in concentration especially in the mill-bakery industry and the meat industry. The wholesale sector, which was once the largest link of food supply chain, is gradually losing its significance. At the other end of the chain there is a retail sector characterized by market dominance of a small number of participants (Coleman et al., 2004). The increased the concentration in of the retail sector led to the growing concerns over the possibility of abuse of their market power in relation to other participants in the chain that have a smaller market share (OECD, 2006).

Also, according to Fritz and Matopoulos (2008) changes in the consumer's consumption patterns have significantly influence on the food supply chain. Namely, consumers demand a wide choice of products out of season. Because of that, local products are complemented with food products from export. Having in mind that environmental pollution can occur at each stage of the supply chain and that in last few decades there have been raising concerns on environmental pollution, one of the field which is very important to understand from the perspective of sustainability is food supply chain. Therefore, it is important that all participants of food supply chain recognise their responsibilities and to strengthen their links in order to satisfy consumers need and reduces the negative effect on the environment.

The paper is structured as follows: a brief background was given on the defining the concept of food supply chain and sustainability, as well as on identifying the most important dimension of sustainability. Following part gives an overview of economic and ecological criteria for sustainable food supply chain. In the last section of the paper the final conclusions were given.

The sustainability of food supply chain

The defining the food supply chain concept

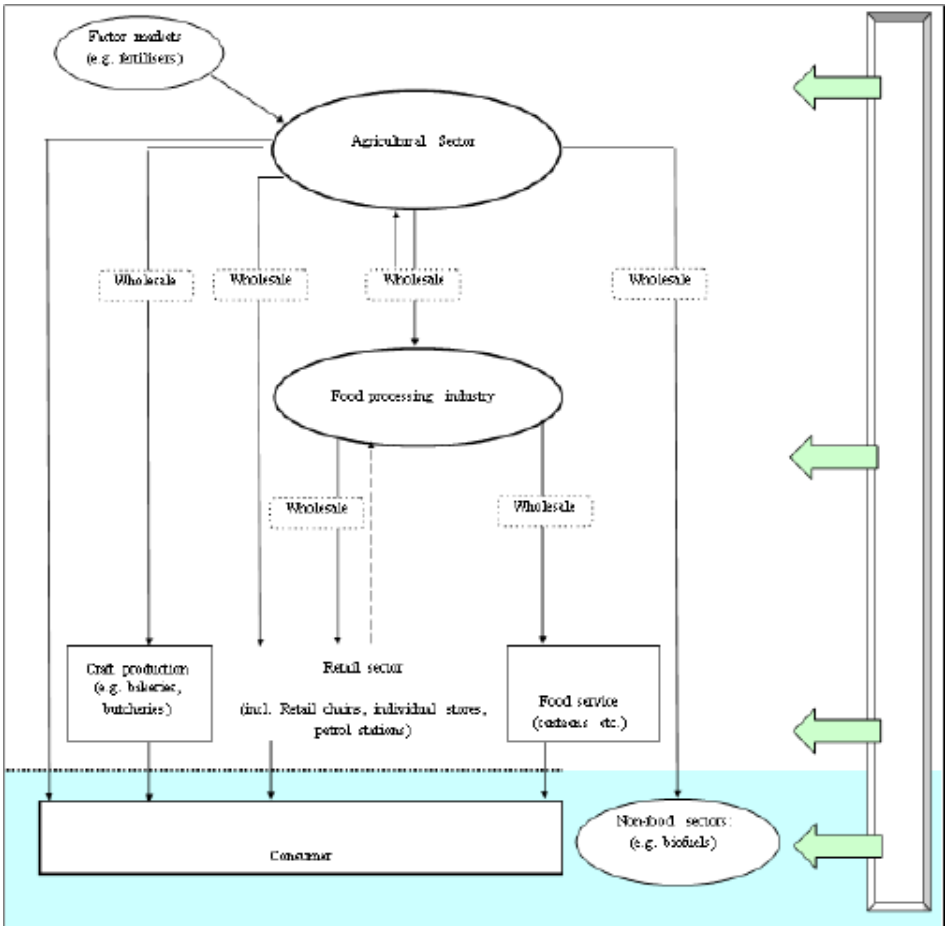
Food supply chain is a phenomenon that refers to the movement of agro-food products from agricultural producers to end-consumers. Eastham, Sharples and Ball (2003) consider that food supply chain is link between agricultural producers, the food industry and the distribution sector, or wholesale and retail trade. Bukeviciute, Dierx and Ilzkovitz (2009) assert that "the food supply chain is composed of a wide diversity of products and companies which operate in different markets and sell a variety of food products". These authors claim that food supply chain include three main sectors: agricultural sector, processing industry and the distribution sector (Figure 1). The activities of the agricultural sector include crop and animal production. The participant of the agricultural sector mostly sells their products to processing industry. However, one of the main characteristic of agricultural sector is that it sells their products direct to retailers as well. The processing sector comprises of number of activities such as: milling, slaughtering, refining etc. At the end of the chain, there is distribution sector which is directly connected to the consumers. Yakovleva (2007) asserts that "the food supply chain is seen as a network of organizations, which through economic relations with each other enable the functioning of the supply chain for the production and distribution of the food". According to Xiao-Hui and Jun (2012) „the food and drink supply chain has been a linear relationship involving the primary producers, or farmers, the manufactures or processors who fabricate the food for the table, and the retailers who gather a range of such products and sell them to the consumer".

Depending on the approach used for defining the food supply chain, the number of participants in the chain is different. That is, the food supply chain consists of several levels, and each level consists of one or more participants depending of the level of the chain integration[4]. Regardless of the number of participants in the food supply chain, activities of the chain are numerous and have a very strong influence on the environment. At the same time, actor (s) (in) of the chain became aware of the consequences which their activities have on the environment. Because of that, concept of sustainability is very important for the food supply chain. Being sustainable is considered to be a source of competitive

4 Namely, in different countries in past period the food supply chain consisted of similar number of level. However, over the past several decade changes that occurred in the relations between the participants in the food supply chain have reflected on the level of chain integration.

advantage and became quite important especially in the food industry that is in the food supply chain (Xiao-Hui, Jun, 2012). Therefore, in order to analyse sustainable development of the food supply chain this paper will consider only the participants of the chain which can be generalized in majority of country (agricultural sector, processing industry and distribution sector).

Figure 1. *The food supply chain*



Source: *Bukeviciute et al., 2009, pp. 5.*

The defining the concept of sustainability

The term sustainability has been defined in a many different ways (Wallerstein, 2004; Dickens, 1997; Schnaiberg, 1980; Mol, Sonnenfeld, 2000; Rosa et al., 2010; Krstić, Krstić, 2017), but in general, the term sustainability regarding balance

between three main dimension, economic, social and environment (Figure 2), in the long run. According to World Commission on Environment and Development (WECD, 1987) sustainability is „development that meets the needs of the present without compromising the ability of the future generations to meet their own needs" (mentioned at European Commision, 2001). European Commission (2001) considers that the concept of sustainability is multidimensional, and that includes three main dimensions: ecological, social and economic. Those three dimensions are intricately linked and interdependent, their relationship are numerous and strong and they can, to a certain degree to develop synergies. On the other hand, according to IUCN (2006), although there is a interdependency between those three dimension, they are not always supportive and can compete with each other, so the sustainable development has to provide the balance between them.

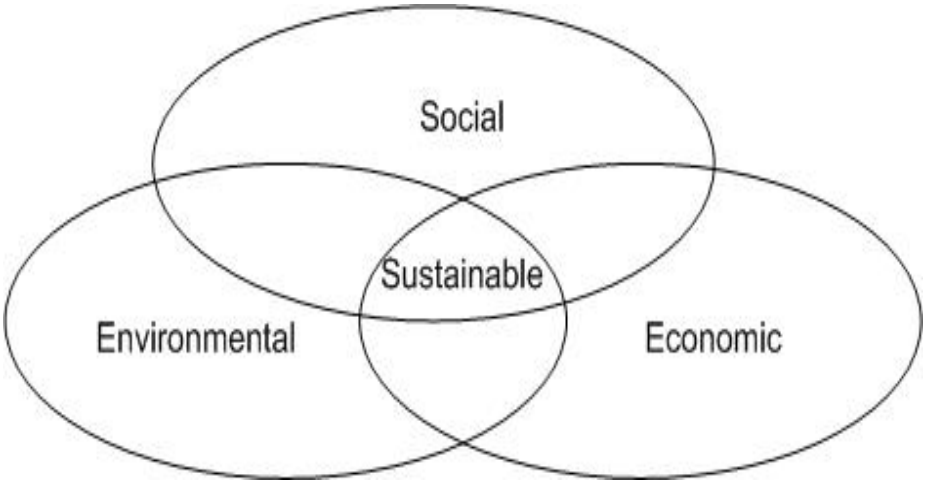
According to Yakovleva, Sarkis and Sloan (2012), European Commission (2011) and Basiago (1999), assert that:

1. Environmental dimension takes into account environmental protection and reduction of resource use. Also, it includes protection of the landscape, habitats, biodiversity and saving quality of water and air.
2. Economic dimension includes promotion of economic growth, changing consumers patterns and encouragement of competitive economy. Also it refers to the efficient use of the resources.
3. Social dimension indicates on the creation of productive employment and creating equality, extinction of poverty, maintain the strong society as well taking care of human rights and suitable working condition.

When considering sustainability of food supply chain, it is possible to analyze the sustainability of whole chain or some of its parts. That is, according to Yakovleva (2007), the focus of discussion about sustainability has often been fixed on agricultural production. Mannin and Soon (2016) consider that "sustainability should therefore first be determined at the highest level and then proceeds downwards". Authors claim that sustainability of a food supply chain doesn't have to be dependent on every sub-system within the food supply chain and that the food supply chain sustainability reflects the sum of the whole[5].

5 Also, depending on whether sustainability is analyzed at the level of whole food supply chain or at the level of one of the chain participants, different indicators and different methods for sustainability assessment can be used. Also, indicators and method selections depend on the dimension of the sustainability that will be considered.

Figure 2. *The three element of the food supply chain*



Source: *Fritz, Matopoulos, 2008.*

When it comes to food production, the environmental pollution and generation of waste is a common feature for three major participants. But, the most damaging impact has the activities of the agricultural sector and food industry. Certain type of waste that arises in the process of food production can be very dangerous for the environment and human health and require appropriate measures of control. Also, it is important to know that environmental pollution and waste generation is not the same at each stage of the food supply chain, and it depends on the type of the activity. Obi, Ugwuishiwu and Nwakaire (2016) claim that agricultural development is accompanied by waste that arise as a consequence of intensive farming methods, and abuse of chemicals which affect on the environment. According to Grujić, Odobašić and Grujić (2012) in the food supply chain 21% of total waste production belongs to agricultural production and 7% of waste materials are generated in the processing industry. They claim that waste that arises in the agricultural sector can be in solid, liquid and gas state and that solid waste had influence on the agricultural land, liquid on agricultural land and water, and gas waste on air pollution. The solid waste, produced in agricultural sector, include by-products from crop and animal production. In the animal production, most of waste came in the form of manure, and also in form of animal carcasses. The crop production waste considers corn stalks, sugarcane bagasse and drops from fruits and vegetables. The liquid waste in agricultural production include fuel and oil residues, silage effluent, pesticides and waste water, and the key types of gas-state waste in agriculture are ammonia and suspended particles. On the other

hand, although the food processing is an important branch of industry, the waste that it's generate in different ways affect the environment. The greatest impact of the processing sector on the environment is achieved through generation of waste, water and energy use, and one of the most significant polluters in food industry are meat and milk industry.

Due to all these negative environmental impacts, it was necessary to apply the concept of sustainability on the food supply chain. According to UK Sustainable Development Commission sustainable food supply chains are those that:

1. Produce safe, healthy products in response to market demands and ensure that all consumers have access to nutritions food and to accurate information about products.
2. Support the viability and diversity of rural and urban economies and communities.
3. Enable viable livelihoods to be made from sustainable land management, both through the market and through payments for public benefits.
4. Respect and operate within biological limits of natural resources (especially soil, water and biodiversity).
5. Achieve consistently high standards of environmental performance by reducing energy consumption, minimizing resource inputs and using renewable energy wherever possible.
6. Ensure safe and hygienic working environment and high social welfare and training for all employees involved in the food chain.
7. Achieve consistently high standards of animal health and welfare.
8. Sustain the resource available for growing food and supplying other public benefits over time, except where alternative land uses are essential to meet other needs to society" (mentioned at Smith, 2008).

This paper consider only economic and environmental dimension of sustainable food chain.

The economic and environmental criteria of sustainable food supply chain

According to Rmuš (2012), economic criteria for sustainable food supply chain include: equity between supply and demand, food prices, maximization on return of investment, marketing and competitiveness (Table 1). Equity between supply and demand as economic criterion means that rising awareness of sustainability increase demand for the sustainable products. Consumers, on the demand side,

want to know the origin of their products. Namely, nowadays, besides for prices, consumers are interested for quality and traceability of the products which they are buying. On the other hand, participants of the food supply chain which present supply side must to behave in sustainable manner in order to be able to meet growing demand and to achieve a balance between supply and demand because that balance is precondition for stable market and economic growth.

Food prices have changed considerably in last decade, and these changes happened in all stages of food supply chain. Five different pricing aspects in food supply chain can be considered: price levels and profit margins, price changes, price structure, non-price aspects and price risk. The main issue when it comes to food prices is the price transmission mechanism. Bearing in the mind that price is one of the basic mechanism that connect the actors of the chain, one way to analyze the food supply chain is to look at the way in which prices are transferred between certain participants in the chain. When considering the price transmission in the food supply chain it is possible to consider a different aspects of transmission such as: speed, magnitude and direction of transmission (Rmuš, 2012).

In order to achieve sustainable food supply chain, it is necessary to provide investment in it. The most important factors which affect on the investment in more sustainable food supply chains are: products, culture, vision and resources. Economists expect that food supply chain to ensure ***maximization of return on investment.*** Namely, the main goal of food supply chain actors is to provide a sustainable product for their consumers, but at the same time they also want to increase value for their stakeholder by maximizing the return on investment. Some of the ways to provide this is minimizing the time required for converting orders into cash, improving visibility and quality, reducing costs, improving services (Rmuš, 2012).

Considering the fact that the food supply chain actors are work according to high environmental and social standards, sustainability of food supply chain can reprezent ***competitive*** advantage in the next period. Also, consolidation, and concentration can affect on the competitive advantage of actors in the food supply chain. But, when it comes to consolidation and concentration the participants of the food supply chain should bear in mind that negative effect (abuse of market power) do not outweigh the positive ones. Likewise, the access to market information, consumer behaviour and bargaining power largely affect the competitiveness of the food supply chain (Rmuš, 2012).

Marketing is very important as a economic criterion of a sustainable food supply chain. Namely, marketing consists of numerous strategies that influence on the consumers behaviours and attitudes. Because of that nowadays, it is very important that food supply chain participants have close relationship with consumers in order to understand how consumer are making their decisions about food purchase, and afterwards use those information for their marketing strategies (Rmuš ,2012).

Table 1. *Economic criteria for sustainable food supply chain*

Criteria	Mean features	Issues
Equity between supply and demand	• Paradigm shift: from supply – oriented and quantity-driven agriculture towards a quality-driven demand and market-driven food chains • Supply side actors: conventional agriculture, processing industry, food retails • Demand side actors: consumers	• Awareness towards sustainability triggers the demand • Suppliers are a major source of opportunity both in leveraging performance across the supply chain and as a source of innovation • „produce what you can sell“.
Food prices	• Pricing in food supply chains: ▪ Price levels and profit margins ▪ Price changes ▪ Price structures ▪ Non-price aspects ▪ Price risks	• Price transitions: ▪ Pass through from agricultural commodities prices to producer prices ▪ Pass through from producer prices to consumer prices ▪ Imperfect price transmission
Maximization on return of investment	• Building of sustainable food chains requires investments • Actors of the supply chain aim to maximize their value by maximizing return on investment of their investors • Factors affecting food business investment	• Strategy for maximizing the return on investment: ▪ Minimizing the time required for converting orders into cash ▪ Improving visibility ▪ Improving quality ▪ Reducing costs ▪ Improving services
Marketing	• Key role for consumer decision on moving towards sustainability • Implementing the concept of sustainability into company's strategies throughout the whole supply chain • Commitments towards sustainability in attempt to differentiate business from competitors and strengthened brand name	• Promoting sustainability • Promoting sustainable patterns of consumption • Involving consumers directly into the process
Competitiveness	• Sustainable food chain as competitive advantage • Consolidation and concentration for stronger competitive position	• Bargaing power • Consumer behavior • Access to market information

Source: *Sustainable food supply chains (2012), pp. 10-11.*

When it comes to ecological criterion, according to Diaz (2012) four criteria of environmental sustainability of food supply chain are: regeneration, substitutability, assimilation and maintance of critical natural capital (Figure 3).

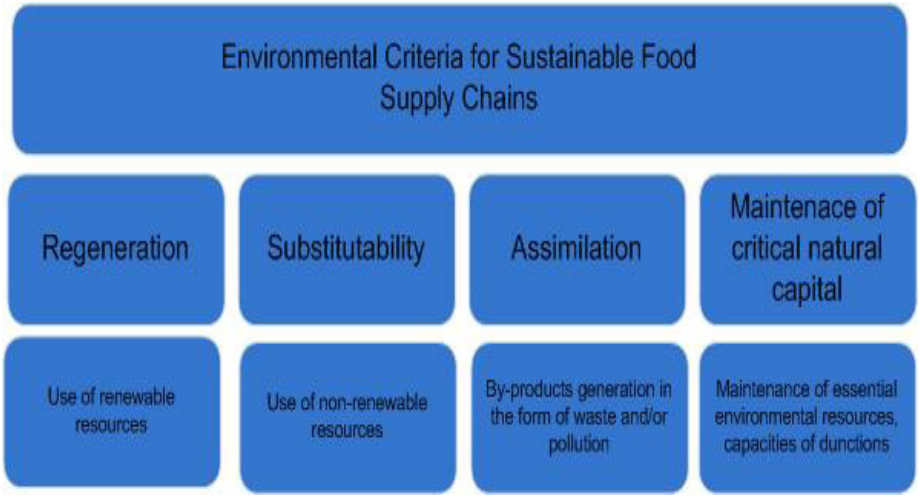
Regeneration as criteria indicates that renewable resources must be used efficient in order to achieve sustainability. Namely, food supply chain should should take into accountthe natural rate growth of renewable resource when determining the level of input that will be used. If the rate of input use exceed the natural growth rate, the resource will be extinctioned. When it comes to regeneration, it is very important to understand the maximum sustainable yield that indicates the maximum quantity of resource that can be taken on sustainable basis, and not to reduce its long term stock.

Substitutability means that it is necessary to find the optimal rate at which non-renewable resource should be used, so when non- renewable resource is used, an alternative exists in form of renewable resource or in other form of capital, because if non- renewable resource are substituted with other resources it is possible to meet present needs without compromising the ability of the future generations (Diaz, 2012).

The sustainable food supply chain must take into account ***assimilative*** capacity of the environment. In order to achieve that, basic structure of food supply chain must be re-defined by taking into consideration the minimization of resource and waste use.

In order to achieve sustainability to criterion of **maintance of critical natural capital**, environmental limitations must be well known. That means that the concept of critical natural capital requires that all activities in food supply chain fill environmental standards and do not exceed threshold under which the critical natural capital can be negatively affected (Diaz, 2012).

Figure 3. *Ecological criterion of sustainable food supply chain*



Source: *Diaz (2012)*

Conclusion

In the 1990's the food supply chain went through significant changes. Those changes (that refer to increasing concentration of processing and retail sector, changes in the consumers consumption patterns, neglecting the wholesale sector etc.) affected on the activities of all participants in the chain. As food supply chain includes a lot of actors and activities, and as it affect the environment in a many different ways, it is very important to apply the concept of sustainability on the food supply chain.

The term sustainability has many definitions, but in general it considers the balance between three main dimensions – economic, environmental and social, in the long run. In the food supply chain, the sustainability can be considered on the level of the whole chain, or it can be considered for some merely on the level of actors of the chain. Although the focus of the large number of research was on the sustainability of the agricultural sector, there is a need for a holistic approach in the evaluation of the sustainability of food supply chain because this approach can lead to identification of the problems and defining the improvement of the food supply chains operations.

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ISSUES OF STAFF POTENTIAL BUILDING AT AGRICULTURAL ENTERPRISES OF STAVROPOL REGION[1]

Marina Leshcheva[2], Anna Ivolga[3]

Abstract

The current demographic and labour situation in municipal entities of Stavropol region is characterized by decline of rural population due to migratory outflow that is not covered by the natural growth. Proportion of demographic load of dependent population on able-bodied citizens increases. Agricultural enterprises suffer from scarcity of labour. Share of young people under 30 within the staff structure at agricultural enterprises in some districts of Stavropol region does not exceed 5%. This value depends on the amount of investment on per hectare basis, wage level and migration gain. Considering these factors is crucial for complex solving of problems related to investment-based and demographic development of region's rural areas.

Key words: *rural population, natural population movement, age composition, labour need, professional qualification, economic factors, migration.*

Introduction

Currently the national goal of agricultural development is "creation of highly efficient export oriented sector developing by the means of new technologies and provided with skilled workforce" against the background of enforcement of the President of Russia V. V. Putin's May decrees (TASS, 2018).

An important condition of pursuing this objective is building proper workforce capacity that is able to provide accelerated development of the sector. Further increase of importance and competitiveness of the national agriculture significantly depends on availability, quality and full involvement of human resources from

1 Paper was presented within the Plenary section of the conference as a invited paper.

2 Prof. dr Leshcheva Marina, Doctor in Economics, Full Professor, Stavropol State Agrarian University, 12 Zootekhnichesky Side-Street, 355017 Stavropol, Russian Federation, Phone: +890 976 133 33, E-mail: marina_lesheva60@mail.ru

3 Prof. dr Ivolga Anna, Ph.D. in Economics, Associate Professor, Stavropol State Agrarian University, 12 Zootekhnichesky Side-Street, 355017 Stavropol, Russian Federation, Phone: +892 800 535 42, E-mail: annya_iv@mail.ru

the rural areas. This is being discussed by many Russian scientists. Thus, Mindrin considers rural population as the most important factor of sustainable development of the areas (Mindrin, 2005). Interrelation of innovation-driven economy and employment of rural population is being studied in the researches of Leglichin (2014), and Sapogova and Pronin (2016). Issues of staff training and acquisition for the purposes of development of import-substituting production in agrarian sphere of economy are covered in the papers by Kovalchuk (2017). Issues of food security and competitiveness of agriculture on the basis of advanced training of senior executives in the sphere of agribusiness are discussed in the papers of Kozlov (2008). Demographic aspects of human resourcing of agriculture are also covered in the papers by Russian scientists (Lipatova, Gradusova, 2015), however their regional peculiarities are understudied.

This led to the research goal to analyse demographic aspects of building labour potential of agriculture in Stavropol region.

Methods of the research

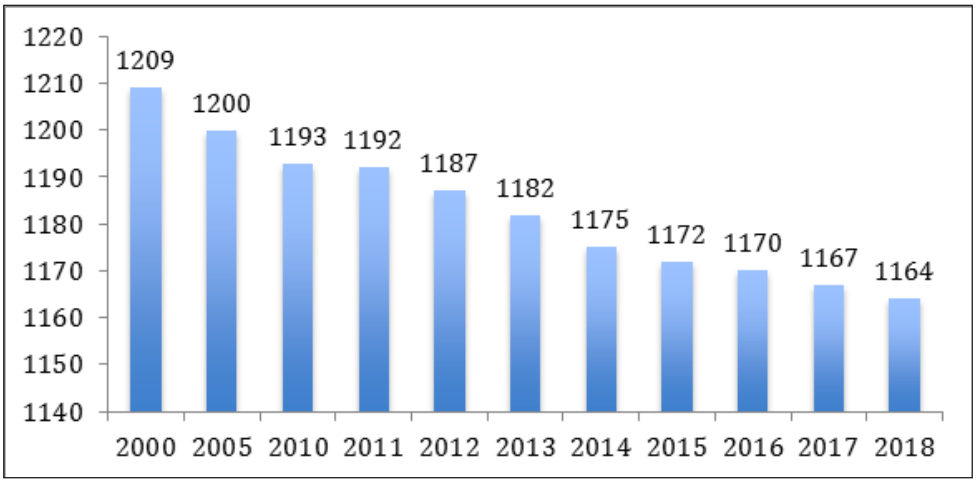
Theoretic and methodological background is modern economics, academic papers of national and foreign scientists in the matter of building labour potential. The research was based on dialectical, abstract-logical, computational and comparative methods with the use of analysis of official statistic information. Informational and empiric background is data from annual statistic reports of bodies of Federal state statistics service in Stavropol region, monitoring of social and labour sphere at regional level; data of departmental surveys of staff composition of agricultural enterprises in 2013-2017. Study object is staff composition of agricultural enterprises.

Results

Stavropol region is a big agro industrial Russian region. Almost 90% of the region's territory is occupied with agricultural land uses; as of 01.01.2018, 41% (1.163,8 thousand people) from 2.800,6 thousand people of region's population live in rural areas.

Rural population recovery is a base of building labour potential of agricultural enterprises that determines its main features: health and intellectual abilities. Study of this aspects has revealed that population of rural settlements in Stavropol region steadily decreases (Picture 1).

Picture 1. *Rural population of Stavropol region, thousand people*



Source:www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1137674209312

In 2000-2018 it decreased by 45 thousand people. The largest population drift was in 2000-2015. In subsequent year's rates of decrease in rural population declined, however the trend persisted. Number of rural inhabitants was decreasing by 2 thousand people annually on average in the period 2015-2018 (0,2% over the previous year).

Decrease of rural population is the case in 17 from 26 region's districts. Population increase occurs in cities, mainly, in the region's capital, area of Caucasian Mineral Waters and some territories on the border of the neighbouring North Caucasian republics. Changes in population occur both due to the natural and migratory population movement.

According to the data over a period of 2012-2017 about 40 thousand people annually leave region's rural settlements, and only 35 thousand people arrive to the rural areas. Thus, the annual average rural population drift is 5 thousand people over the last 6 years. The rate of total migration loss of rural population eased in 2017 and was equal to 13,2‰, the value of this factor was equal to 21,3‰ in 2015.

Over 40% of all migration movement in the region accounts for the intra-regional migration that leads to the biggest drift of rural population. Priority direction of the intra-regional migration flow is "from rural areas to a city".

Within the trans-regional migration every third migrant comes to the rural areas from the North Caucasian republics. The peril of this fact is ethnic misbalance of direct and reverse migration flow, especially in the eastern region's areas. Influx of migrant from the other Russia's regions does not cover migration loss of the native population. Over half of migrants leaving rural areas go to the Central and Southern Federal Districts. This reveals certain problems with attractiveness of rural areas of Stavropol region as they lose native population.

Natural migration flow of rural population in Stavropol region reveals steady decrease in number of births and deaths, and since 2015 the rate of decrease in births has been outrunning the rate of decreasing in deaths. This leads to natural population decline that amounted to 972 people in 2017 (Table 1).

Table 1. *Natural movement of rural population in Stavropol region, people*

Indicator	2012	2013	2014	2015	2016	2017	Absolute deri-vation 2017 to 2012	2017 % to 2012
Births	16.241	16.078	16.087	14.477	14.090	12.898	-3.343	79,4
Deaths	15.268	14.911	14.963	14.482	14.479	13.870	-1.398	90,8
Natural increase (-decline)	973	1.167	1.124	-5	-389	-972	-1.945	x

Source: *www.gks.ru/bgd/regl/b17_106/Main.htm*

Table 2. *Indices of natural population movement in Stavropol region (to 1000 people of the respective category)*

Indices	2012	2013	2014	2015	2016	2017
Birth rate						
Total in the region	12,6	12,6	13	13	13	11,5
including: -in urban areas	11,7	11,9	12,5	13,4	13,6	11,8
-in rural areas	13,7	13,6	13,7	12,4	12,1	11,1
Death rate						
Total in the region	12	11,7	11,7	11,6	11,7	11,2
including: -in urban areas	11,4	11	11	11,1	11,2	10,8
-in rural areas	12,9	12,6	12,7	12,4	12,4	11,9

Indices	2012	2013	2014	2015	2016	2017
Natural increase (- decline) rate						
Total in the region	0,6	0,9	1,3	1,4	1,3	0,3
including: -in urban areas	0,3	0,9	1,5	2,3	2,4	1
-in rural areas	0,8	1,0	1,0	0,0	-0,3	-0,8

Source: *www.gks.ru/bgd/regl/b17_106/Main.htm*

Birth rate in rural area is lower and death rate is higher than those in urban areas in 2015-2017. On average in the space of 3 years for every 1000 people 11,9 children are born in rural areas and 12,9 children – in urban area, and 12,2 and 11,0 people die respectively. Natural population growth (0,8) in 2012-2014 has altered to natural population decline (-0,8), (Table 2).

There is natural population growth in 12 region's districts (Shpakovsky, Neftekumsky, Kursky, Predgorny, Budyonnovsky, Levokumsky, Kirovsky, Stepnovsky, Arzgirsky, Blagodarnenskyc, Sovetsky, Turkmensky) and it's mainly provided by decline in death rate, not by growth of birth rate (Table 3). Number of births exceeds the level of the previous year only in two districts out of twenty six (Neftekumsky and Arzgirsky). The current situation highlights the complexity of solving problems of social and economic development of region's rural areas. Decline in birth rate deteriorates the whole demographic situation and complicates recovery of labour potential in region's rural areas.

Most of women both in rural and urban areas bear children at the age of 25-29 – 32,5% and 37,0% of all births in 2017 respectively. However, bearing at a younger age is more typical for rural dwellers. In 2017 the proportion of women, who bore at the age of 20-24, was 29,9% for rural areas and 20,8% for urban areas. Every forth city woman bear at the age of 30-34, for rural areas this is only every fifth woman.

In 2017 within the birth structure by the birth order was 39,9% of firsts, 34% of second children for rural area and 47,2% and 37,5% for urban area respectively). Rural women have bigger proportion of children of higher birth order that city women: the third children - 16,5% and 11,6% respectively, the fourth children – 6,0% and 2,6%, the fifth and higher – 3,6% and 1,1%.

Among the main causes of death of rural population are diseases of the circulatory system that caused 57 % of all deaths and neoplasms – 13% of all lethal outcomes. 6,8% of deaths were caused by events not related to health. Number of deaths by external causes in rural area is by 26% higher than in urban one. The majority of rural dwellers die of traffic accidents and suicide - 21,6% and 16,1% of death by external causes.

In 2017 death rate decreased in all region's municipal districts except: Stepnovsky, Turkmensky, Novoselitsky districts. The largest death rate decline was in Budyonnovsky, Shpakovsky, Izobilnensky districts, where rural dwellers can get well-timed medical support of higher quality in neighbouring towns.

Table 3. *Natural movement of rural population by municipal districts of Stavropol region, people*

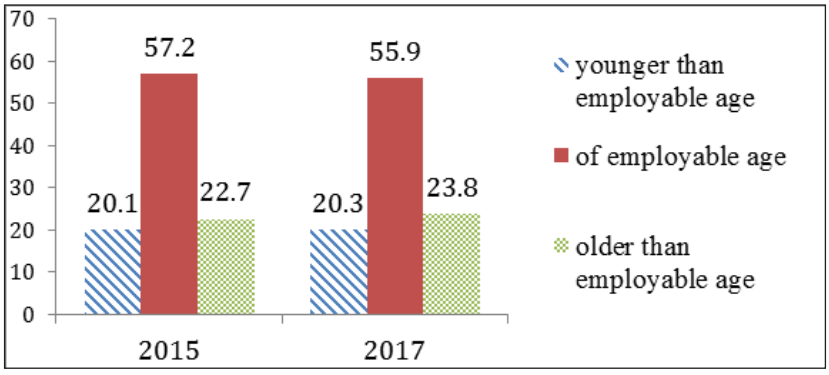
Name of municipal districts	Births		Deaths		Natural increase (- decline)
	2016	2017	2016	2017	
Kochubeyevsky	911	762	1.197	1.127	-365
Izobilnensky	1.068	944	1.384	1.296	-352
Petrovsky	787	719	1.077	1.037	-318
Ipatovsky	648	576	920	870	-294
Krasnogvardeysky	417	360	603	578	-218
Novoalexandrovsky	735	622	863	819	-197
Georgiyevsky	1.001	957	1.087	1.109	-152
Alexandrovsky	572	537	686	677	-140
Apanasenkovsky	340	315	459	451	-136
Trunovsky	408	383	470	471	-88
Grachyovsky	508	402	449	483	-81
Andropovsky	371	323	427	389	-66
Novoselitsky	308	287	291	300	-13
Turkmensky	324	319	304	317	2
Sovetsky	908	843	853	826	17
Blagodarnensky	799	793	826	766	27
Arzgirsky	302	313	300	283	30
Stepnovsky	311	287	190	236	51
Kirovsky	940	836	804	781	55
Levokumsky	537	514	479	445	69

Name of municipal districts	Births		Deaths		Natural increase (- decline)
	2016	2017	2016	2017	
Budyonnovsky	1.549	1.320	1.391	1.240	80
Predgorny	1.454	1.350	1.260	1.249	101
Kursky	765	721	530	472	249
Neftekumsky	929	989	608	567	422
Shpakovsky	1.904	1.779	1.410	1.309	470
Total in the region	36.336	32.460	32.813	31.546	914

Source:*http://stavstat.gks.ru/wps/wcm/connect/rosstat_ts/stavstat/ru/statistics/stavStat/population*

Another significant factor enabling natural growth of rural population is its age structure. In 2017 237,1 thousand people from 1.167,6 thousand people (20,3%) living in rural settlements were children and teenagers at the age of 0-15; 653,1 thousand people (55,9%) are people of working age, including 180,5 thousand people (15,5%) of young people aged 18 to 29 years; 277,4 thousand people (23,8%) over working age.

Picture 2. *Dynamics of age structure of rural population in the Stavropol region, in %*



Source:*http://stavstat.gks.ru/wps/wcm/connect/rosstat_ts/stavstat/ru/statistics/stavStat/population/*

Dynamics of age structure of rural population reveals growth of number of people over working age (Picture 2). Index of demographic load of dependent population on working population increases. In 2017 for each 1.000 people of working age there were 770 unemployed people. That is 11,0% higher than the same indicator in urban area. According to predictive appraisal, demographic burden on rural

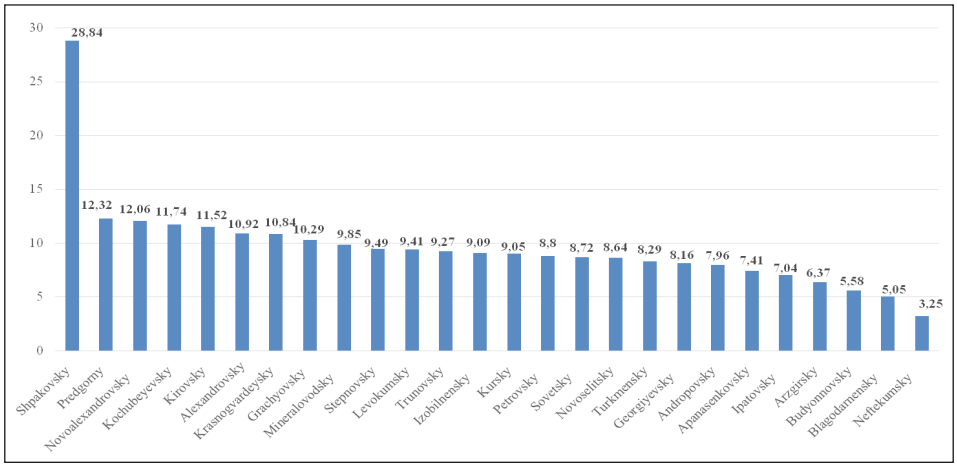
population of working age will grow and will have reached 948 people by 2031 (Territorial Dept Federal State Statistical Service in Stavropol Region, 2017).

In this context, keeping young people from leaving rural areas is of crucial importance. The share of people aged 18 to 30 years in municipal districts of Stavropol region decreases annually and in 2017 it was 15,1% (16,3% in 2015). In Sovetsky, Ipatovsky, Kochubeyevsky, Trunovsky districts this indicator does not exceed 13,5%. Share of youth within the structure of staff at agricultural enterprises is even lower and is on average 11,9%. In some districts it has reached critical value. Thus, proportion of workers under 30 at agricultural enterprises of Neftekumsky district is 3,25%, Blagodarnensky district 5,05%, Budyonnovsky district 5,58%, Arzgirsky district 6,37%, Ipatovsky district 7,04%, Apanasenkovsky district 7,41% (Picture 3).

Further deterioration of the current situation can have the most negative effects on agriculture, when these demographic problems impede economic growth.

Agricultural enterprises incur shortage of full-time staff members. According to the data from annual reports of agricultural enterprises within jurisdiction of Ministry of Agriculture of Stavropol region in 2017 labour supply at the above-mentioned enterprises was equal to 96,1%. This value does not meet manufacturing requirements.

Picture 3. *Proportion of staff members under 30 years old at agricultural enterprises of Stavropol region in 2017 by municipal districts, in %*



Source: *Authors' development based on http://stavstat.gks.ru/wps/wcm/connect/rosstat_ts/stavstat/ru/statistics/stavStat/population/*

Need for agricultural workers is 2.136 people. Labour shortage is the highest in Predgorny district - 284 people, Novoalexandrovsky district - 200 people, Trunovsky district - 163 people, Petrovsky – 163 people, Kirovsky district – 155 people (Table 4).

Therein, the level of supply with executives is about 97 %, i.e. 404 people. Agricultural enterprises are almost manned with chief agronomists, engineers, water-supply engineers, meliorators, chief economists. A little bit lower is the level of supply with chief livestock specialists (91,7%), chief power engineers (95,8%), chief veterinarians (96,4%).

Table 4. *Need for agricultural workers by municipal districts of Stavropol region, 2017*

Name of municipal districts	Demand, people	Actual personnel, people	Scarcity, people	Level of supply, in %
1	2	3	4	5
Predgorny	2.095	1.811	-284	86,4
Novoalexandrovsky	4.115	3.915	-200	95,1
Trunovsky	2.018	1.855	-163	91,9
Petrovsky	2.141	1.978	-163	92,4
Kirovsky	1.832	1.677	-155	91,5
Georgiyevsky	2.386	2.250	-136	94,3
Budyonnovsky	2.950	2.830	-120	95,9
Kochubeyevsky	3.234	3.117	-117	96,4
Sovetsky	2.852	2.740	-112	96,1
Ipatovsky	2.751	2.642	-109	96
Andropovsky	668	565	-103	84,6
Arzgirsky	966	863	-103	89,3
Grachyovsky	1.729	1.642	-87	95
Levokumsky	2.392	2.307	-85	96,4
Stepnovsky	776	706	-70	91
Mineralovodsky	803	862	-59	107,3
Krasnogvardeysky	2.664	2.610	-54	98
Blagodarnenskyc	1.367	1.328	-39	97,1
Novoselitsky	1.675	1.640	-35	97,9
Alexandrovsky	669,5	641	-28,5	95,7
Shpakovsky	7.466	7.451	-15	99,8
Kursky	1.008	995	-13	98,7

Name of municipal districts	Demand, people	Actual personnel, people	Scarcity, people	Level of supply, in %
Turkmensky	752	748	-4	99,5
Apanasenkovsky	2.856	2.856	0	100
Izobilnensky	2.047	2.047	0	100
Neftekumsky	1.137	1.137	0	100
Total	55.349,5	53.213	2.136,5	96,1

Source: *Authors' development*

Demand for mid-level executives is higher. Especially, when it comes to economists (70% of the estimated requirement), power engineers and electricians (90,5%), veterinarians and herd managers (95,5%). Demand for the rest executive groups does not exceed 4% (Table 5).

Table 5. *Level of supply of agricultural enterprises of Stavropol region with executives, 2017*

Region's districts	Demand, people	Actual personnel, people	Scarcity, people	Level of supply, %
1	2	3	4	5
Predgorny	557	484	-73	86,9
Novoalexandrovsky	990	978	-12	98,8
Trunovsky	461	445	-16	96,5
Petrovsky	504	487	-17	96,6
Kirovsky	505	486	-19	96,2
Georgiyevsky	578	556	-22	96,2
Budyonnovsky	776	742	-34	95,6
Kochubeyevsky	611	599	-12	98
Sovetsky	603	587	-16	97,3
Ipatovsky	588	568	-20	96,6
Andropovsky	181	139	-42	76,8
Arzgirsky	232	210	-22	90,5
Grachyovsky	171	160	-11	93,6
Levokumsky	450	429	-21	95,3
Stepnovsky	168	164	-4	97,6
Mineralovodsky	236	220	-16	93,2
Krasnogvardeysky	725	714	-11	98,5
Blagodarnenskyc	335	328	-7	97,9
Novoselitsky	204	204	0	100

Region's districts	Demand, people	Actual personnel, people	Scarcity, people	Level of supply, %
Alexandrovsky	239,5	233	-6,5	97,3
Shpakovsky	756	741	-15	98
Kursky	233	232	-1	99,6
Turkmensky	189	182	-7	96,3
Apanasenkovsky	530	530	0	100
Izobilnensky	420	420	0	100
Neftekumsky	219	219	0	100
Total	11.461,5	11.057	404,5	96,5

Source: *Authors' development*

It should be noted that the level of labour supply of agricultural enterprises should be increased by hiring staff professionally trained within the system of agrarian education.

Despite the fact that the share of executives with higher education grew within the last three years from 90,1% to 91,5% (Table 6), only 48% of them has higher education, 42,3% has secondary education. About 10% of executives have neither higher, nor secondary education, less than 1% is getting extramural or part-time education.
Insufficient level of qualification of executives in agriculture does not meet the goal of building competitive agricultural production, where human knowledge becomes the key competence of an enterprise and "scope of experience" is considered to be a unique competitive advantage.

Quality of labour supply of agricultural enterprises is significantly influenced by changes in age structure of staff. There is decline of share of executives under 30 in Stavropol region (it has decreased from 12,1% to 10,8% in the last three years). Meanwhile number of executives at retirement age increased from 11,7% to 12,8% .

The widening generation gap in top management of enterprises is also worth mentioning. In 2014 the difference in shares of young executives and those at retirement age was 16,6%, in 2017 it reached 20,6%. Thus, there is a trend of "ageing" within the managerial staff of regions agricultural enterprises.

Most of chief executives have solid professional experience, 32% of them have been holding their positions for 10 years and more, 24% - for 5 to 10 years.

Along with positive effect of longstanding experience, it leads to knowledge deterioration. This can be overcome and prevented by staff professional development (retraining). However, only a minor part of chief executives of agricultural enterprises uses this opportunity. Only 7% of chief executives completed advanced training courses in 2014 – 2017. With this rate of retraining the process of skill enhancement for all senior executives will take 40 years. This situation does not meet the aim of accelerated branch development, increase of competitiveness of agricultural products. According to expert analysis, many executives are not ready for working under modern conditions they do not have enough knowledge, skills, financial awareness that would enable them to solve economic tasks under conditions of innovation-based development of the sector. At the same time, despite the variety of opportunities and forms of skills enhancement, the executives are not interested in upgrading their skills.

The level of education of senior executives at farms of Stavropol region is significantly lower than of senior executives. Only 39% of section supervisors, their assistants, warehouse managers, brigade leaders has higher education. Within the last three years, the level of education has grown. The share of senior executives with secondary education grew from 31,7% to 48,7%, the share of those without professional education declined from 31,5% to 12,2%. Herewith, only 0,5% of mid-level executives is getting extramural or part-time education.

Table 6. *Level of professional training of staff at agricultural enterprises of Stavropol region, in %*

Name of districts	Has professional education			Has higher and secondary education		
	2015	2016	2017	2015	2016	2017
Andropovsky	96	95,8	96,8	63,5	54,2	66,9
Mineralovodsky	76,1	77,8	77,1	59,2	64,1	61,9
Grachyovsky	-	88,4	90,7	50,1	50,5	55,7
Alexandrovsky	83,6	79,2	79,1	52,3	53,2	54,0
Neftekumsky	95,3	82	82	78,3	53,8	53,8
Shpakovsky	87,4	72,7	77,8	42,8	58,6	50,0
Kirovsky	73,8	56,5	73,8	46,1	36,8	49,7
Georgiyevsky	72,3	78,1	81,3	52,5	58,9	49,2
Krasnogvardeysky	77	77,8	77,8	44,6	47,8	47,8
Predgorny	86,5	83,1	84,9	47,2	41,4	45,5
Arzgirsky	71	70,1	71,1	42,1	46,6	45,4

Name of districts	Has professional education			Has higher and secondary education		
	2015	2016	2017	2015	2016	2017
Petrovsky	86,0	86,4	91,4	46,0	46,9	44,8
Izobilnensky	84,7	84,7	84,7	44,8	44,8	44,8
Turkmensky	83,9	82,5	77,3	43,4	44,2	43,9
Budyonnovsky	87,9	88,9	89,3	40	41,6	41,3
Blagodarnenskyc	71	78,2	80,3	32,4	38,9	40,1
Trunovsky	72,2	67	74,2	34,6	34,3	38,8
Novoalexandrovsky	86,2	85,8	85,8	42,4	37,5	37,5
Kochubeyevsky	78,2	74,9	74,9	42,2	36,3	36,3
Kursky	69,9	67,3	64,8	32,8	30,8	34,3
Levokumsky	84,6	84,6	84,7	31,7	31,7	32,2
Ipatovsky	58,6	58,6	59,8	23,7	23,7	31,8
Stepnovsky	77,7	86,1	78	27,8	30,6	31,7
Novoselitsky	83,3	83,3	83,3	30,1	30,1	30,1
Apanasenkovsky	67,1	71,9	67,9	29,2	38,8	30,1
Sovetsky	69,5	66,6	71,3	27,6	28,9	29,7
Total in Stavropol region	85,3	59,2	78,9	42,3	41,0	42,1

Source: *Authors' development*

The majority of workers from this category have intramural professional education obtained at vocational schools. They also rarely upgrade their qualification as, from their prospective they have enough knowledge and skills for technical and technological management of production process.

Among other factors preventing employees of agricultural enterprises from upgrading their qualification is big workload, preoccupation with private household, family affairs, lack of evident operational requirement and financial assets at enterprise. Moreover, professional development usually does not lead to promotion at work or any changes in working conditions and wage.

The share of young people within the age structure of mid-level executives is 9,1%. Over the past three years the proportion of young executives decreased by 0,8%. The share of professional staff under 30 decreased by 1,2% that reveals a trend for decline of number of young employees at agricultural enterprises.

Analysis of main categories of workers of general professions revealed almost

the same trends. Supply with workers of general professions is equal to 96%, this means there is demand for 1.732 people (Table 7). Within the structure of demand for workers of general professions over 45% is skilled personnel, including 23,2% of tractor operators, 13,7% of drivers, 8,5% mechanical milking operators and staff at stock breeding complexes for cattle breeding and feeding.

Over half of vacancies for workers of general professions can be filled by unskilled labourers. Unmet demand for them reveals imbalance in workplaces and requirements imposed by potential workers. Wage level in agriculture is 19% lower than the regional level, however there are vacancies for unskilled labourers where average salary barely exceeds minimum living wage.

Employees in sheep and swine breeding, temporary and seasonal workers have the lowest wages as well as workers of housing and utilities sector and food services.

The level of professional training of workers of general professions is insufficient. In 2017 share of regular employees without professional education was 21,1%.

Proportion of skilled employees is especially high in animal husbandry (34,1%). In crop husbandry this proportion has grown from 13,1 to 21,3% over three years, including proportion of tractor operators that grew from 8,7 to 10,2%. In our opinion, this negative trend reveals shortcomings of the existing net of technical vocational schools that does not meet the current demographic potential of rural areas and needs of agricultural production.

The biggest share of employees of general professional is people of working age over 30 – 75%. About 12% of employees is young people under 30, 13,2% - employees of retirement age. Most of them have not reached the limit of their efficient, useful professional activity and can contribute to work process by sharing their knowledge and experience with younger employees.

Table 7. *Level of supply with workers of general professions at agricultural enterprises of Stavropol region, 2017*

Region's districts	Workers of general professions			
	Demand, people	Actual personnel, people	Scarcity, people	Level of supply, in %
Predgorny	1.538	1.327	-211	86,3
Novoalexandrovsky	3.125	2.937	-188	94
Trunovsky	1.557	1.410	-147	90,6

Region's districts	Workers of general professions			
	Demand, people	Actual personnel, people	Scarcity, people	Level of supply, in %
Petrovsky	1.637	1.491	-146	91,1
Kirovsky	1.327	1.191	-136	89,8
Georgiyevsky	1.808	1.694	-114	93,7
Budyonnovsky	2.174	2.088	-86	96
Kochubeyevsky	2.623	2.518	-105	96
Sovetsky	2.249	2.153	-96	95,7
Ipatovsky	2.163	2.074	-89	95,9
Andropovsky	487	426	-61	87,5
Arzgirsky	734	653	-81	89
Grachyovsky	1.558	1.482	-76	95,1
Levokumsky	1.942	1.878	-64	96,7
Stepnovsky	608	542	-66	89,1
Mineralovodsky	567	642	75	113,2
Krasnogvardeysky	1.939	1.896	-43	97,8
Blagodarnenskyc	1.032	1.000	-32	96,9
Novoselitsky	1.471	1.436	-35	97,6
Alexandrovsky	430	408	-22	94,9
Shpakovsky	6.710	6.710	0	100
Kursky	775	763	-12	98,5
Turkmensky	563	566	3	100,5
Apanasenkovsky	2.326	2.326	0	100
Izobilnensky	1.627	1.627	0	100
Neftekumsky	918	918	0	100
Total	43.888	42.156	1.732	96,1

Source: *Authors' development.*

However, number and share of workers at retirement age increases quickly and reflects the process of staff ageing. Thus, in 2014 proportion of women over 55 and men over 65 was 7,9%, but in 2017 it increased to 14,2 %. Staff ageing is the most obvious in animal husbandry. Share of employees of retirement age has almost triples over the last 3 years: from 5,2 to 18,8%. In this regard, there is a problem of personnel replacement that requires certain activities on recruitment and retention of young employees. It is deepened by competition from non-agricultural organisations located in urban area and offering more flexible and attractive conditions of work and level of wages.

Table 8. *Proportion of employees under 30 at agricultural enterprises by the level of average monthly wage*

Groups of districts by the level of wage, in rub.	Number of districts	Average wage, rub./ month	Proportion of employees under 30, in %	Name of districts
up to 20.000	8	16.551	7,8	Neftekumsky, Kursky Stepnovsky, Budyonnovsky Andropovsky, Grachyovsky , Kirovsky Levokumsky
20.000 to 25.000	8	2.255	9,4	Turkmensky, Izobilnensky Apanasenkovsky, Novoalexandrovsky, Petrovsky, Ipatovsky Predgorny, Arzgirsky
25.000 and more	10	28.592	15,3	Novoselitsky, Trunovsky, Kochubeyevsky, Shpakovsky, Mineralovodsky, Georgievsky, Sovetsky, Alexandrovsky, Blagodarnenskyc, Krasnogvardeysky
Regional average	26	21.384	11,9	x

Source: *Authors' development*

Turnover of workers of general professions is very intense. Each year 1/5 of all regular employees quits, including 19,6% of employees engaged in crop husbandry, 16% tractor operators, 20% of employees in animal husbandry. An important factor preventing outflow of young population from rural area is decent wage level. Distribution of region's districts by the wage level revealed that proportion of agricultural workers under 30 rises directly with increase of wage level (Table 8).

Thus, proportion of young people under 30 is equal to 7,8% in districts with average monthly wage up to 20 thousand ruble, 9,4% - in districts with average wage amounts to 20-25 thousand ruble and 15,3% in districts, where average monthly wage exceeds 25 thousand ruble. Investing activity of agricultural enterprises has direct relation to proportion of young employees within the staff structure. Proportion of young people in the staff structure is equal to 7,7% in districts with investment level up to 10 thousand rubles per hectare of farmland, 8,8% with investment level from 10 to 40 thousand rubles, 13,8% with level of investments over 40 thousand rubles (Table 9).

Table 9. *Proportion of employees under 30 at agricultural enterprises by the level of investments per hectare of farmland*

Groups of districts by the level of investments thousand rub./ha	Number of districts	Amount of investments, thousand rub./ha	Proportion of employees under 30, %	Names of districts
up to 10	13	5,23	7,7	Turkmensky, Kursky Arzgirsky Stepnovsky, Georgievsky Petrovsky, Sovetsky, Levokumsky, Budyonnovsky, Apanasenkovsky Neftekumsky Alexandrovsky Blagodarnenskyc
10 to 40	6	16,83	8,8	Novoselitsky, Trunovsky, Grachyovsky, Ipatovsky Mineralovodsky, Andropovsky
40 and more	7	90,0	13,8	Shpakovsky, Kochubeyevsky Novoalexandrovsky Izobilnensky Kirovsky Krasnogvardeysky
Regional average	26	31	11,9	x

Source: *Authors' development*

Implementation of investment projects assumes creation of new work places and use of advanced technologies helps young people equipped with modern knowledge on filling open positions.

Conclusion

The analysis revealed demographic features of staff potential building at agricultural enterprises of the Stavropol region. Social and economic situation in region's districts promotes migratory influx, but can neither make all of them leave, nor keep the locals. It also does not promote rise in births, leads to increase of demographic burden of dependent population on able-bodied citizens. The current condition and dynamics of labour supply of agriculture in the Stavropol region is closely related to demographic and labour situation in rural areas. Agricultural enterprises need labour resources however there is shortage of young employees. In this context, investing activity of agricultural producers and level of financial incentive of employees are the main reasons for young people to stay in rural areas. Considering these factors is crucial for making grounded strategic decisions on

development of agricultural production in Stavropol region, choosing measures of targeting for the purpose of improving current and prospect demographic situation and preventing its restricting effect of development of rural economy.

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PORTRAIT OF THE RURAL POPULATION OF SERBIA AT THE BEGINNING OF THE NEW MILLENIUM[1]

Marina Novakov[2], Dejan Jankovic[3]

Abstract

The paper analyses the demographic and social characteristics of the rural population of Serbia since the beginning of the 21st century. Demographic potential is an important basis for social and rural development, and many villages in Serbia are empty or demographically old. Accordingly, the aim of the paper is to analyse the basic features of the age, educational and economic structure of the rural population, as well as their marital and family contingent according to census data from 2002 and 2011 and other. Based on those data, it is concluded that there is an increasing decline in natural growth at the level of Serbia in all types of settlements that the educational structure of the population in rural areas is still worse than in urban, and that rural depopulation is one of the most relevant rural issue that Serbia faces today.

Key words: *population aging, economic activity, education, reproduction, rural population*

Introduction

The population, its structures and changes are the topic of numerous scientific disciplines and, depending on the theoretical and methodological orientation of the discipline, the population is analysed as an object in different ways. The first association in this connection is probably demographics as a discipline that is a new-age, relatively young social science, derived from the applicative needs

1 Paper is part of the research on the project "Sustainable agriculture and rural development in terms of the Republic of Serbia strategic goals' implementation within Danube region" (III 46006, 2011-2018), and project "Rural labor markets and rural economy of Serbia - the diversification of income and poverty reduction (ON 179028; 2011-2018).

2 Marina Novakov, Ph.D., Research Associate, University of Novi Sad, Faculty of Agriculture, Department of Agricultural Economics and Rural Sociology, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 21 485 33 81, E-mail: marinan@polj.uns.ac.rs

3 Dejan Janković, Ph.D., Associate Professor, University of Novi Sad, Faculty of Agriculture, Department of Agricultural Economics and Rural Sociology, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 21 48 533 81, E-mail: jankovic@polj.uns.ac.rs

of the state to record descriptive (and official) data, certain characteristics and trends of the population, trends of change, and so on. It should be kept in mind that such a relatively "comfortable position of descriptive and official statistics, close to modern state and political power" (Bobić, 2007) resulted in the rapid development of demography as a science, since it had at its disposal the essential resources provided by the state, as a commissioner for demographic analysis. Some authors (Bobić, 2007), see this positivistic and pragmatic characteristic of demography as its disadvantage, which is at the expense of its scientific autonomy, and in particular at the expense of the construction of theoretical and epistemological foundations. The solution to this state is seen in the interdisciplinary nature of demography and its relationship with sociology, psychology, geography, medicine, economics, social history, and the like.

In accordance with the complexity of social phenomena and the population in themselves, advocacy for social demography is justified, which would in explanative sense provide much more than quantitative, empirical and perhaps quantophrene demographics, which is usually abundant with dry facts, positivistic approach and the lack of relevant theoretical explanations of social phenomena and trends. This could especially be the case in the context of the globalization of the process of industrialization, urbanization and modernization, which were to a large extent the cause of various trends in population movements (Jankovic et al., 2018).

In this paper, the emphasis is placed on the demographic and social characteristics of the rural population of the Republic of Serbia, a country whose inhabitants have for a long time the characteristics of the population at a deep age, and rural depopulation poses a significant obstacle to economic and rural development. The characteristics of the rural population have been analysed since the beginning of this millennium, on secondary data sources based on the Population Census data (2002 and 2011) and other relevant publications, primarily the Republic Institute for Statistics of Serbia. The basic hypotheses of increasingly present rural households without children, which consist only of married couples (in the literature recognized as the empty nest families), then the lower participation of rural women in the category of active population and high participation in the category of dependent population, as well as lower level of education and literacy are proven.

Aging of the population and devitalization of rural areas

As a result of reducing fertility, leaving young people out of the countryside, falling mortality and prolonging life expectancy, Serbian village has been continuously aging the population for decades, which has resulted in a steady increase in the proportion of elderly persons, and within these processes, a special category of aging households is created. Due to the departure of young people from villages, rural households face difficulties to support their members who are incapable of work (Manojlović, 1966:673). By destroying the old order, transforming the old hierarchy, the penetration of the monetary economy, the great political and administrative changes (Erlih, 1972:31), security as a universal human need, on which the old people once counted in rural community, was brought in question. Most of the elderly depend on relatives' solidarity and possibly good neighbourly relations, and Svetozar Livada, more than three decades ago, noted that many villages are real "nursing homes for elderly" where there are no weddings, nor are there babies' crying. Of the then 2.5 million inhabitants of the SFR Yugoslavia, over 60, over ¾ lived in the villages. Agricultural production is abandoned and social fallow is growing, and there is almost no more love for the country that characterized the peasantry (Livada, 1972:7.13). The main flows of population movement lead from the village to the city, and as the "spatial diffusion of the family" arises (Livada, 1966), its elderly members among other problems, also face a loneliness that is often worse and hunger itself (Livada, 1972:11). The population of Serbia is one of the oldest inhabitants in the world, and the characteristic character of aging of the population in our country is deprived socio - economic position of the elderly (Milić, 2004). Age brings diseases, various types of physical and mental defects that disable the person for independent life, and at the same time "require the adjustments of the closest environment (relatives and friends) to this reduced age potential" (Milic, 2004:447). According to the number of settlements identified in the last census in 2011 (according to Mitrović, 2015:47- 48), there are 6,158 settlements in Serbia, of which 193 are urban (3,1%) and 5,965 are settlements, which are considered as rural. The results of the Population Census show that demographic trends in the Republic of Serbia, especially in its rural areas, are becoming increasingly unfavourable and that a trend of depopulation and ageing continues. These data show that total population in the period between 2002 and 2011 decreased by 311,139 inhabitants, or 4.15%, which was primarily due to negative natural increase and net migration rate. The largest decrease is of the rural population (for 357.115 inhabitants, or 10.9%). The indicator of rural depopulation is the number of rural settlements with fewer than 100 inhabitants, because they are settlements that will soon be empty. According to the 2011 Census (according to Mitrović, 2015:47- 48), there are 1034 such settlements in Serbia (717 in 1991, 483 in 1981, 281 in the 2002 census). Due to under-

development and rural poverty for decades they are mostly situated in the Region of South and East Serbia (693 villages or 35%, or every third settlement belongs to this category), while in Vojvodina (as the most developed Serbian region) there are 12 settlements with less than 100 inhabitants. Depopulation of rural areas in Vojvodina is most evident in border areas (over 70%), whereby the reduced number of inhabitants is not only caused by reduced natural growth, but also by the mechanical outflow of the population (Mitrović, 2015:47-48).

It is a very disturbing fact that in the rural settlements of South and East Serbia, the population has been reduced by as much as 19% in nine years, which speaks of the fearful devitalisation of the region, which, as a region, is in a bad socio-economic position, taking almost all parameters of underdevelopment. On the other hand, one of the most developed regions, the region of Vojvodina, has an absolute decrease in the number of inhabitants of about 115 thousand, between the two censuses, although it is a traditionally immigration area, which, after colonization after World War I and World War II, as the migrations of the nineties 20th century - immigrated a very large number of inhabitants. The ageing index in 2010 in rural settlements was 130% compared to the index of 94 urban settlements, and even 82.5% of the settlements had a negative natural growth. Less than 100 inhabitants had 986 of rural settlements, while in 1,458 settlements (31%) none of the children were born, and 31.8% of the total live births and even 47.38% of the dead in 2012 are from rural areas (Government of the Republic of Serbia 2014:119).

Table 1. *Changes in population size, total and according to types of settlements 2002-2011*

Period	**Region**	**Serbia**
2002	Total	7.498.001
	Urban	4.225.896
	Other (rural)	3.272.105
2011	Total	7.186.862
	Urban	4.271.872
	Other (rural)	2.914.990
Index 2011/2002	Total	95,9
	Urban	101,1
	Other (rural)	89,1
% rural population 2002.		43,6
% rural population 2011.		40,6

Source*: Statistical Office of R. of Serbia, Census 2011.*

One of the basic demographic characteristics of the rural population is aging, and the unfavourable age structure obviously characterizes Serbia. Changes in the age structure in the period 2002-2011 indicate a continuation of the process of decrease of young, along with an increase in the share of older persons. Parameters of the age structure of the rural population are even more unfavourable. Every fifth inhabitant of the village in the Republic of Serbia is older than 65 years, while in the region of South and East Serbia it is every fourth. In the medium-age labour force category (30-49), the decline in the number of inhabitants is relatively moderate in the urban population, and is very pronounced in rural (Government of the Republic of Serbia 2014:39; Bogdanov, Babović, 2014b).

Table 2. *Age structure of the population of the Republic of Serbia in 2011*

Age	Population number	Percent (%)
0-14	1 025 278	14,27
15-64	4 911 268	68,34
65 and more	1 250 316	17,40
Average (years)	42,2	------

Source*: Statistical Office of R. of Serbia, Census 2011.*

A devastating fact is that the largest number of residents is concentrated in three towns in Serbia. Namely, according to the size, settlements with less than 500 inhabitants dominate (62.75% of all settlements), that is, even 80.76% of the settlements have fewer than a thousand inhabitants, but only 1.160.145 (16.2%) of the inhabitants live in them. Only in Belgrade live a little more than that, that is, 1,166,763 inhabitants (Mitrović, 2015:56). The process of "belgradization" occurs as indicated by the following information: in the period between the last two censuses, the number of young people in towns increased by 61.2%. However, the absolute number of young people in all regions and urban and rural areas has been reduced, but in Belgrade region live as much as 80.8% of young people live. This region has the smallest area and the highest density of the young population, with slightly more than one fifth of the young population concentrated (Jankovic et al., 2018).

Educational characteristics of the rural population

The process of industrialization and urban growth significantly influenced the development of the education system. Until the beginning of the 19th century, most of the population did not have any education, however, as the industrial economy

expanded rapidly, there was a great need for specialized education and educated workforce. Since occupations have become increasingly heterogeneous, it has become impossible, as it used to sometimes, to directly transfer work skills from parents to children (Gidens, 2003:496). Education, therefore, is one of the traditional functions of a family that has mostly handed over to institutions, and the attitude towards the education of rural children has varied through history. Similarly, just as the views on the role and function of education in contemporary society also vary.

In the past, literacy was more often a feature of men. At the end of the 19th century, according to the population census of 1866, there were less than 5% of the literate population in Serbia, and especially few in the villages - only 1.36%. The next census from 1874 recorded a certain increase due to the fact that 139 primary schools were opened in the inter period, increasing the number from 373 to 517 (Isić, 2001:12). Although slowly, literacy in Serbia was constantly increasing in the late 19th century, especially of the male population. The influence of the First World War on the development of literacy in Serbia was long-lasting. Because of the numerous human casualties, a child of primary school age has become an important economic factor in this period, and in many rural households it was the only workforce. Additionally, impoverished farms could not provide children with the most basic needs for schooling and often left their children at home. Outside of the education system, female children were particularly left out because in rural areas it was considered that for their social role (mothers, wives, and housewives) it was not needed. The Law on National Schools of 1929, and the 1930 amendments, stipulates the mandatory eight-year education in the entire Kingdom of Yugoslavia. What was legally prescribed was difficult to realize because the great agricultural crisis had a detrimental effect on the economic power of peasants (Isić, 2001:68). Greater literacy followed thirty years after the war, and in the later periods men retained a better educational structure than rural women (Novakov, Jankovic, 2016).

Observed from the middle of the 20th century, the share of illiterate persons in the total population of 10 years and older in the territory of Serbia is in constant decline and today it is 1.96% (compared to 27.91% in 1953, 10.86% in 1981 and 3,45% in 2002). In addition, as many as 82% of illiterate are women, and ¾ illiterate are over 60 years of age (Census Atlas 2011, 2014: 38). This decline in the number of illiterates is largely the result of the natural dying of the old population. In the rural settlements, the situation is more unfavourable: 3.31% are illiterate, of which the total males are over 10 years old is 1.13, while women who cannot read and write are even five times more (5.48%).

When considering the educational structure of the rural population in 2011 (Table 3), it is noticeable that today the secondary school is the most frequent degree of education of the rural population (42.37%). Second place is represented by primary education (27.68%), while only each sixteenth has high or higher education (6.1%). If we observe the share of the population with a lower level of education than high school, it follows that in these settlements it amounts to 51.1%, which is a decrease of 12.7% in relation to the period from the beginning of this century (2002 Census). However, this is at the same time twice more than the number of persons with lower education than in urban settlements (22.98%).

The tendency for rural parents to send their daughters to school more and more is backed up by the latest Census data. Namely, there was a somewhat higher participation of women in rural settlements in higher education (3.22%) than men (3.1%), which is a novelty and in relation to the 2002 Census, where highly educated men were 1.8% and women 1.23% in the villages. Men dominate in the category of secondary education (48.93%), while the participation of women is significantly lower (35.84%). In the category of incomplete primary and completed elementary schools approximately the same gender is represented, while gender disproportion is present in the category of persons without schooling. Thus there are four times more women among them, obviously due to historical reasons that literacy was more often a feature of men.

Table 3. *Educational structure of rural population 2002 and 2011 (%)*

	No school	Incomplete elementary school	Elementary education	Secondary school	Higher	High	Unknown
2002							
total	8,86	26,81	28,17	30,55	2,11	1,51	1,99
male	3,54	24,10	29,27	36,46	2,32	1,80	2,50
female	14,04	29,44	27,11	24,80	1,91	1,23	1,48
2011							
total	4,41	19,01	27,68	42,37	2,94	3,16	0,43
male	1,56	15,00	27,88	48,93	3,12	3,10	0,40
female	7,25	22,99	27,47	35,84	2,76	3,22	0,47

Source*: Census 2002 (Book 4) and 2011 (Book 3) authors' calculation.*

Work activity of the rural population

The division of labour by gender and age has been settled in Serbian rural areas for a long time, with the rural family functioning as "working community", in which all the jobs are complementary, but also with gender division of jobs. The

traditional gender division of labour has changed in many ways modernization of agricultural production. Today, all or most of the male jobs can be female, so there are only few jobs that a woman cannot do. The greater participation of women's workforce in agriculture was also due to the migration movements of the male labour force towards the city. Employment of men outside the farm demanded increased involvement of the woman on the farm (Stojanov, 1989:40, 42), which additionally burdened the rural woman and increased her importance in the agricultural holding, since she took on many traditional men's jobs. In addition, it should be kept in mind that this additional work in agriculture was more a consequence of necessity than its choice, and also, on the other hand, the employment of women themselves, which is in a negative correlation with fertility level, is considered one of the main factors of change that have taken place in family and family relationships that was emphasised by many authors (Burić-Ćuković, 1968; Vukosavljević, 1983; Stojanov, 2004; Babović, Vuković, 2008; Blagojević, 1997).

At the beginning of the new millennium, according to the 2002 Census, of the total active population living in rural communities in Serbia, 39.2% is female population, while their share in the category of dependent population is significantly higher, amounting to 65.5%. This category of active population includes persons aged 15 and over who are engaged in occupations, but also unemployed persons looking for work, and taking into account only the share of rural women performing a particular occupation, then it amounts to 37.95% (Census 2002, book 5). In addition, of all individual agricultural producers, women make up 43.6% (Census 2002, book 7), so that a large part of production is in their hands. However, among the active population, women are more represented in urban settlements than in rural areas mostly due to female rural-urban migrations and their traditional role of housewife in rural areas, whereas at the same time, agriculture is dominated by men.

When considering the total population according to the economic activity according to the latest Census (2012), it can be concluded that economically active persons holding a profession are 32.07% at the level of Serbia (Table 4). Observed by regions, the largest share of this category of occupied population is in the Belgrade region (35.47%) and the least in the region of South and East Serbia (29.26), which is also the region with the largest share of pensioners.

Table 4. *Population of R. of Serbia according to economic activity in 2011 (%)*

Activity Serbia		Region					
		Belgrade	**Vojvodina**	**Šumadija West Serbia**	**South and East Serbia**	**KiM**	
Economic active	with occupation	32,07	35,74	31,44	31,83	29,26	-
	unemployed	9,28	7,78	9,25	9,20	10,99	-
Economic inactive	children under15 years	14,27	14,02	14,36	14,69	13,85	-
	pensioners	22,66	23,68	22,06	21,52	23,79	-
	persons with property income	0,45	0,22	0,60	0,49	0,44	-
	pupils and students over 15 years	7,89	8,55	7,64	7,88	7,51	-
	persons who perform only housework in their household	8,34	5,22	9,33	9,40	9,05	-
	other	5,06	4,79	5,32	4,98	5,12	-
Total		100	100	100	100	100	-

Source: *Census 2011, Book 7: Economic activity, Belgrade: RZS, p. 26.*

The employment rate in 2014 (Labor Force Survey, 2014:15) is 37.6% in urban and 42.8% in other types of settlements. The activity rate is also higher in rural settlements (50.9%) than in urban areas (47.6%). When employment is observed by gender, it follows that in urban settlements there are far more employed women (60.5%) than in rural areas (39.5%). Thereby, there is a somewhat smaller difference in type of settlement: 54.3% are employed in cities and 45.7% in villages.

The structure of household income sources in Serbia shows that salaries or other earnings based on work in agriculture are represented in 2.7% of households. The most common source of income is derived outside of agriculture (30%) and mixed income (29.5%). A significantly higher share of agriculture in income sources is for rural households (6.6%), about three times higher, and somewhat higher mixed income (Table 5). In addition, three-member and four-member rural households have the highest share of salaries outside agriculture. On the other hand, single-parent households are most often at the same time old-age households, relying on a pension of 62.9%.

Table 5. *Households by number of members and sources of income*

Region	Total	Sources of household income						
		Earnings and other incomes based on work		Other incomes			Mixed incomes	No income
		Agricultural	Non agricultural	Pensions	Social earnings	Other		
Serbia	2487886	2,7	30,0	28,8	1,9	4,3	29,5	2,7
Rural settlements	954020	6,6	18,8	29,4	2,4	5,0	35,1	2,6
Members number								
1	205415	6,9	9,6	62,9	3,7	8,1	1,7	7,2
2	241641	7,1	11,6	48,9	1,8	4,9	23,7	2,1
3	158491	7,0	27,3	13,1	2,0	4,9	44,1	1,7
4	158337	6,4	39,3	4,3	2,5	4,4	42,1	1,1
5	91780	5,5	18,6	3,6	2,5	2,8	66,5	0,6
6 and more	98356	5,3	9,8	2,5	2,1	1,8	78,2	0,3

Source: *Census 2011, Book 13, pp. 70 and authors' calculation.*

Marriage, family types and natural increase in rural settlements

In the tradition of the Serbian people, the birth was related to marriage, sexuality subordinated to reproduction, and of all the roles that women took over on their lifetime, the role of the mother was most valued (Đorđević, 1930). The family had a productive and consumer function in Serbian patriarchal society, it represented the basic economic unit and "in the creation of basic means of living, such a household is, as a rule, directed at its own workforce. In every sense, each of the new-borns represents future work reinforcement, and therefore a guarantee for a further survival of the community "(Bandić, 1980:31). When, however, in the thirties of the last century, S. Vukosavljević wrote about the overcrowding in Serbia (evident when considering the agrarian population in relation to the countries of western and central Europe that were more densely populated than Serbia, but had less agricultural population), he notes that people with anxiety remember those times in which there was enough land and when it was a joy to have as many children as possible. Security was seen only in a sufficient inheritance, and in a situation of scarcity of the land people ceased to want to have many sons in order not to divide land by sharing, and daughters would not be given a dowry (Vukosavljevic, 1962).

In a modern living conditions, norms on a small number of children in the family have been adopted - two children, preferably of different sexes, have become an ideal reproductive norm in many countries. The former need for a large number of children as an important work resource, especially in rural areas, and as insurance for old age, has been replaced by the high economic and psychological cost of parenting. In addition to creating life for people, parenting also requires considerable resources: economic, psychological, and emotional. A large number of children in the family, five and more, has long ceased to be a feature of our country. Thus, the share of mothers who gave birth to five children fell from 21.65% in 1948 to just 1.04% in 2011 in our country. The most common number of children in the family since the beginning of this century in territory of Serbia is two, and then one child (Table 6).

Table 6. *Female population of Serbia aged 15 and over by number of live-born children, according to the census 1948-2011 (%)*

R. of Serbia	1948	1953	1961	1971	1981	1991	2002	2011
	100	100	100	100	100	100	100	100
Without children	34,69	32,03	25,69	26,61	25,23	22,31	24,87	25,70
1 child	11,95	19,55	16,70	18,45	18,95	20,48	19,85	19,73
2 children	13,11	20,57	20,26	24,0	30,38	39,65	42,01	42,69
3 children	10,47	12,29	12,30	11,29	10,45	9,61	9,04	8,88
4 children	8,13	7,24	7,96	6,53	5,25	3,45	2,43	1,96
5 and more children	21,65	8,10	16,93	12,93	9,74	3,78	1,75	1,04
Unknown	0,01	0,21	0,15	0,19	-	0,73	0,05	-

Source*: Census 2011, Book 6, pp. 11.*

Modern society is marked by the phenomenon of insufficient birth that Serbia faced more than half a century ago. The process of depopulation is constant, since the population of Serbia was among the oldest in the world, and the natural increase, which has declined for a very long period, in 2004 was -3,5 ‰ (Municipalities in Serbia, 2006:96). The rural population is continuously decreasing both through negative natural increase and through the emigration of a particularly younger population. If rural community village is underdeveloped, insofar as young people in it rarely remain there, and therefore the size of the fertile contingent is reduced.

For several decades Serbia has been experiencing low birth rates that are insufficient for basic reproduction of the population, and differences in the natural growth

are present between urban and rural areas. When considering the number of live-born children by type of settlement on the territory of AP Vojvodina in the period from 1963 to 2003, there is a noticeable difference between the urban and rural population. In the given period, only in 1963, the rural population had a larger number of live-born children, after which relations changed - urban settlements recorded an increase until the beginning of the 1980s and then the number of live births began to decline. In rural settlements, the number of live births fell all the time (Stevanović, 2006). When we consider natural growth according to the type of settlement for the period 1995 and 2005 (Stat. Annual report of Serbia, 2007: 73), it follows that the share of rural settlements with a negative natural increase at the level of Serbia, increased from 66.5% in 1995 to 78.9% in 2005. Approximately the same ratio is also in Central Serbia (65.8%:77.7%), but the situation is even worse in AP Vojvodina: while in other parts of the country, the share of rural settlements with negative natural increase increased by about 12%, Vojvodina it recorded an increase of 18.4%, from 73.2% in '95, to as much as 91.6% in 2005. In 2016, natural increase in Serbia amounted to -5.95 promille, with -2.37 in urban and -9.25 in rural settlements.

Regarding the birth of children, it should be emphasized that in the past marriage was considered the only legitimate framework for reproduction. In addition, the divorce was rare, despite the infertility; the people still approved him in the case when a woman gave birth to only female children. However, after the Second World War, the increase in divorce was at first a feature of the urban environment, but the changes soon became visible in the countryside (Pavićević, 2007).

According to data for 2002, there are about 7% more married women in rural areas in Serbia than in urban areas, although this difference between urban and rural settlements is significantly lower in the area of AP Vojvodina than in Central Serbia, amounting to 4,2%. Also, there are more widows in the villages, but are therefore divorced about 2.5 times less than in urban settlements (Census 2002, Book 12, 2003:19 and author's calculation). The latest census data (2011) show that the majority of the population in Serbia are married: 57% are married men and 53.4% are married women. This share is approximately the same in rural settlements: 57.6% of men are married and 57.1% of women. However, when data on divorced population are observed, there is still a difference, as in the previous census, between the share of divorced women in urban and rural settlements: over two times less divorced women are in the villages (3.3%) than in cities (7, 3%). The average age of divorced rural women is 51.23 and married 50.84 (Table 7).

Table 7. *Population aged 15 and over according to legal marital status, age and gender by type of settlement in 2011 (%)*

	Total	Age							
		15-19	20-24	25-29	30-39	40-49	50-59	60 and more	Aver-age age
Serbia	**6.161.584**	**6,5**	**7,1**	**7,8**	**16,1**	**15,5**	**18,1**	**28,9**	**xxx**
Male total	100,0	7,0	7,6	8,2	16,9	15,9	18,3	26,1	xxx
Single	33,3	20,7	21,4	18,5	19,9	10,0	6,3	3,0	30,31
Married	57,0	0,0	0,6	3,4	16,7	19,8	25,1	34,3	53,62
Wid-owed	5,2	0,0	0,0	0,0	0,4	2,1	9,9	87,4	73,25
Di-vorced	4,1	0,0	0,4	1,9	14,6	26,6	31,9	24,7	52,09
Un-known	0,4	10,1	16,7	12,7	21,0	15,0	13,1	11,6	38,44
Female total	100,0	6,1	6,7	7,4	15,3	15,1	17,9	31,4	xxx
Single	22,9	26,0	23,9	16,9	16,3	7,6	4,8	4,6	29,28
Married	53,4	0,2	2,1	6,1	19,6	21,3	24,4	26,2	50,14
Wid-owed	17,6	0,0	0,0	0,1	0,8	3,3	12,7	83,2	71,13
Di-vorced	5,7	0,1	0,9	3,3	16,1	23,8	27,2	28,6	52,43
Un-known	0,4	9,7	14,3	11,9	19,5	13,2	10,4	20,9	42,14
Urban	**3.652.252**	**6,5**	**7,3**	**8,4**	**17,4**	**15,7**	**18,0**	**26,7**	**xxx**
Male total	100,0	7,0	7,8	8,9	18,2	16,0	17,8	24,2	xxx
Single	34,1	20,5	21,7	20,1	20,9	8,9	5,3	2,6	29,73
Married	56,6	0,0	0,5	3,4	18,2	20,5	24,8	32,6	53
Wid-owed	4,3	0,0	0,0	0,0	0,5	2,4	11,4	85,6	72,41
Di-vorced	4,6	0,0	0,3	1,6	14,4	26,5	31,8	25,3	52,34
Un-known	0,5	9,4	16,1	12,6	21,9	15,6	13,3	11,0	38,5
Female total	100,0	5,9	6,8	8,0	16,7	15,5	18,2	28,9	xxx
Single	25,4	23,0	23,1	18,4	17,9	8,1	5,0	4,5	29,89
Married	51,0	0,1	1,6	6,1	21,1	21,7	24,8	24,5	49,63

	Total	Age							
		15-19	20-24	25-29	30-39	40-49	50-59	60 and more	Average age
Widowed	15,9	0,0	0,0	0,1	0,8	3,5	13,5	82,0	70,54
Divorced	7,3	0,1	0,7	2,8	15,6	24,1	27,8	29,0	52,78
Unknown	0,4	8,7	13,6	11,6	20,9	14,4	10,8	20,0	42,28
Rural	**2.509.332**	**6,6**	**6,9**	**6,9**	**14,2**	**15,1**	**18,3**	**32,0**	**xxx**
Male total	100,0	6,9	7,3	7,4	15,0	15,8	18,9	28,7	xxx
Single	32,2	21,1	21,0	16,2	18,5	11,7	7,9	3,5	31,14
Married	57,6	0,0	0,8	3,5	14,6	18,9	25,5	36,6	54,46
Widowed	6,4	0,0	0,0	0,0	0,4	1,9	8,5	89,1	74,04
Divorced	3,5	0,0	0,4	2,3	14,9	26,7	32,1	23,6	51,64
Unknown	0,4	11,3	17,6	12,7	19,3	13,8	12,8	12,5	38,34
Female total	100,0	6,4	6,6	6,4	13,3	14,5	17,6	35,2	xxx
Single	19,1	32,1	25,6	14,0	12,9	6,5	4,3	4,6	28,03
Married	57,1	0,3	2,8	6,1	17,6	20,8	23,9	28,5	50,84
Widowed	20,2	0,0	0,0	0,1	0,7	3,1	11,6	84,5	71,85
Divorced	3,3	0,2	1,8	4,9	17,8	22,9	24,9	27,5	51,23
Unknown	0,3	11,5	15,7	12,5	17,1	11,1	9,8	22,4	41,89

Source*: Census 2011, Book 5, pp. 30 and authors' calculation.*

The traditional sequence of events in family life, which implies courting, marriage, and even then the birth of children - is no longer worthwhile in many families. More and more unmarried women give birth to children. Children have more and more chances to live in the household with their mother alone. Prove for that conclusion is an increasing number of single parent families, where parent is most often the mother, in the world and in Serbia, as well (Schaie, Willis, 2001:172; Novakov, 2012; Tomanović et al., 2014).

Table 8. *Types of families according to types of settlement – data by regions 2011 (%)*

Region and type of the settlement	Total family number	Family type					
		Married without children	Not married without children	Married with children	Not married with children	Single mother	Single father with children
R. of Serbia	2125772	28,3	2,3	48,9	3,2	13,7	3,6
Urban	1258461	24,8	2,6	50,0	3,2	15,9	3,5
Rural	867311	33,3	1,9	47,4	3,1	10,5	3,7
Belgrade	483018	23,5	3,0	49,2	3,2	17,3	3,9
Urban	389661	22,4	3,2	48,7	3,2	18,6	3,9
Rural	93357	27,9	2,1	51,1	3,3	11,7	3,8
Vojvodina	568117	26,7	2,9	48,4	3,9	14,6	3,5
Urban	337546	25,4	3,2	48,4	3,8	15,9	3,3
Rural	230571	28,7	2,4	48,4	4,1	12,6	3,7
Šumadija and West Serbia	602229	30,0	1,4	51,2	2,1	12,0	3,4
Urban	285547	25,5	1,5	53,2	2,2	14,4	3,2
Rural	316682	34,1	1,3	49,3	2,0	9,8	3,5
South and East Serbia	472408	32,8	2,0	46,5	3,7	11,3	3,7
Urban	245707	26,7	2,1	50,3	3,8	13,5	3,6
Rural	226701	39,3	2,0	42,4	3,6	8,9	3,9

Source*: Census 2011 in the Republic of Serbia. Book 12: Families. Belgrade: RZS, p.p. 49, 63,102,246 and the author's calculation.*

When family types are observed by type of settlement (Table 8), it is evident that the dominant family type is a married couple with children. Bigger difference between rural and urban settlements at the level of Serbia is present in the category of married couples without children who are more in the rural areas (33.3%) than in the urban (24.8%). This difference is due to the fact that (because of youth outmigration) in rural areas there are more and more "empty nest" families. The representation of single mothers with children in other settlements, according to the regions, ranges from 8.9% in South and East Serbia, to 12.6% in Vojvodina where it is the largest one.

Conclusion

Demographic potential is an important basis for rural and any other development, and many villages in Serbia are empty or demographically old. With less than 100

inhabitants in Serbia in 2011 there were 1034 settlements. Statistical data show a continuous decline in birth rate, an increase in mortality and an increasing decline in natural growth at the level of Serbia in all types of settlements. Large families and the birth of a large number of children in rural settlements are now something from the past. In many mountain and many border rural areas villages, schools without pupils are closing down, because village has no children. Rural population is declining both through negative natural growth and through the emigration of a particularly younger population. In underdeveloped village young people rarely stay in it.

Depopulation of the rural areas is one of the biggest social problems in Serbia that exceeds the pace of decreasing the agricultural population (deagrarisation) and the overall population. In addition, according to Mitrović (2015), it cannot be expected that only the measures of the population policy significantly turn the flow of demographic processes in Serbia. Today's demographic and social structure in Serbia is due to the complex historical and developmental socio-cultural processes and related economic and political relations. Accordingly, the population policy in underdeveloped rural areas should be based on an appropriate regional, development, economic and cultural policy that is significantly different from what has been so far, which has pushed young people out of the countryside and agriculture (Mitrović, 2015:53-54).

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THE STRATEGIC FRAMEWORK OF SUSTAINABLE DEVELOPMENT IN SERBIA – PRIORITIES IN THE DOMAIN OF ECOLOGICAL SUSTAINABILITY

Milan Počuča[1], Jelena Matijašević Obradović[2]

Abstract

Sustainable development as a modern developmental concept is focused on improving the quality of life, and it includes three components: economic, social, and environmental. The foundation of economic and overall social development is the conservation and management of natural resources, which indicates the importance of the environmental dimension of sustainable development. Following a short observation of the most important aspects of sustainable development, we have presented in detail the strategic concept of sustainable development in Serbia, with particular emphasis on the normative-analytic approach to priorities in the domain of environmental safety. The paper is particularly focused on issues with regard to defining the sustainable development concept, as well as the principles of sustainable development management, then regarding the strategic treatment of sustainable development, in particular strategic treatment priorities in the domain of environment conservation and improvement.

Key words: *Sustainable Development, Ecological Sustainability, National Sustainable Development Strategy 2008-2017, the Action Plan 2011-2017.*

Introduction

One of the qualities and virtues of modern society is the attention it focuses on sustainable development (Šimkova, 2007) as a modern developmental concept (Matijašević-Obradović, Škorić, 2017). According to Pokrajac, the sustainable development concept provides a symbiosis of the key categories and criteria of economics and ecology, however, both ecology and economics are oriented towards the developmental goals of civilization (Pokrajac, 2009).

1 Milan Počuča, Ph.D., Full Professor, Faculty of Law for Commerce and Judiciary in Novi Sad, Geri Karolja no. 1, 21000 Novi Sad, Republic of Serbia, E-mail: pocucabmilan@gmail.com

2 Jelena Matijašević Obradović, Ph.D., Associate Professor, Faculty of Law for Commerce and Judiciary in Novi Sad, Geri Karolja no. 1, 21000 Novi Sad, Republic of Serbia, E-mail: jela_sup@yahoo.com

The sustainable development concept was created in 1980, when the International Union for Conservation of Nature and Natural Resources devised a development strategy, which was aimed at implementing sustainable development through conservation of living resources (Beriša et al., 2017) In 2000 the United Nations' Assembly adopted the United Nations Millennium Declaration, which defines the goals of development (in the regions of interest to the whole international community), and activities which should contribute to their fulfilment. The Declaration supports the principle of sustainable development which becomes a key element in upholding environmental sustainability – one of the eight Millennium Development Goals that the United Nations' member states undertook to realize until 2015 (Srpak, 2017).

The principle of sustainable development, as Srpak points out further on, "gains powerful support at the World Summit on Sustainable Development – WSSD, which was held in Johannesburg in 2002. In that meeting the states were called upon to pass regional and national sustainable development strategies, and start with their implementation. In addition, the inclusion of the sustainable development principle into national policies and plans is one of the goals of the Millennium Declaration, with a view to realizing the millennial ecological sustainability objective" (Srpak, 2017).

The National Sustainable Development Strategy, which was applied in the Republic of Serbia until 2017, defines sustainable development as "a goal-oriented, long-term, continuous, all-embracing and synergetic process which affects all the aspects of life (economic, social, ecological and institutional) on all levels. In addition, sustainable development implies the creation of models which in a proper way satisfy the socioeconomic needs and interests of citizens, simultaneously eliminating or significantly reducing any effects which are hazardous or detrimental to the environment and natural resources."[3] A long-term concept of sustainable development, according to the aforesaid Strategy, implies "continuous economic growth which, besides economic efficiency, technological development, more and cleaner technologies, innovativeness of society in general, and socially responsible conduct of business ensures reduction in poverty, a better long-term use of resources, the improvement of health conditions and the quality of life, and reduction in pollution to a level bearable to the environmental factors, prevention of new contamination and biodiversity conservation. One of the most important sustainable

3 National Sustainable Development Strategy for the period 2008-2017, Official Gazette of the Republic of Serbia, no. 57/08.

development goals is the opening of new job opportunities, and reduction in the unemployment rate, as well as a drop in the gender-related and social inequality of marginalized groups, encouraging the employment of young people and disabled persons, as well as other risk groups."[4]

In view of the aforesaid, as Miljanović points out, it is very important "to accept the fact that sustainability is "a multilayered phenomenon", and that the paradigm of sustainability has the highest potential as a new form of critical awareness of the limitations of the existing development models, and as a standard (an "asymptotic ideal"), with its specific goals and criteria" (Miljanović, 2006). In that context, Matijašević-Obradović and Kovačević quote that sustainable development as an integral approach is now the foundation of all the development policies of states within the EU, whose membership Serbia aspires too (Matijašević-Obradović, Kovačević, 2016).

Finally, within the introductory presentation of the issue in question, we can say that sustainable development is a kind of development which satisfies the needs of the present, without putting at risk the needs of future generations.

In view of the aforesaid, following a short observation of the most important aspects of sustainable development as a concept, the work will focus in detail on the stragetic concept of sustainable development of the Republic of Serbia which was formulated within the National Sustainable Development Strategy and applied in the period from 2008 to 2017, and the Action Plan for implementing the National Sustainable Development Strategy for the period 2011-2017. Special attention in the normative-analytic approach referred to above will be devoted to the priorities in the field of ecological safety, as an important element of the sustainable development concept.

The concept and conceptual definitions of sustainable development, the principles of sustainable development management

As indicated by Beriša et al., "sustainable development is a concept which generally tends to improve the quality of life, and it includes: economic development (through continuous economic growth, without inflation and rise in external debt), the social component (through elimination of poverty and any forms of social pathology), and ecology (through a rational use of the national resources

4 Ibid.

and conservation of the environment)" (Beriša et al., 2017). This concept of sustainable development is known as a "three-pillar model", or a "three-circle model" (Giddings et al., 2002). In addition, all the three factors are interlinked, and in turn none of them is sufficient in itself. In other words, the economic, social and ecological components need to co-exist to enable unity, as well as a stable support to the sustainable development of contemporary society.

As pointed out by Frajman-Jakšić et al., "sustainable development represents a new techno-economic paradigm which has to be based on the new values of society and consumers, with focus on "sustainability". Therefore, a fundamental precondition for implementing the sustainable development model (not only in its ecological, but also the economic and social components) is the existence of a proper value system in society" (Frajman Jakšić et al., 2010).

In this context, Miljanović points out that in theory "deficit" is implicitly referred to as the situation in Serbia with regard to assumptions for applying the sustainable development concept, and in elaborating this idea further on he says that four of a large number of developmental problems in Serbia have the most complex implications for formulating and realizing a new generation of sustainable development documents, i.e. for an economic-ecological restructuring of economy, and they are the following: poverty, unemployment, spatial-ecological imbalance and neglect and obsolescence of the largest part of economy. The authors add two more problems to the aforesaid: huge regional disproportions, which are growing in scale, and unfavourable key social, cultural, educational and health indicators" (Miljanović, 2006).

Defining the sustainable development concept, individual authors point out that sustainable development constitutes growth which does not impair the bearing capacity of the ecosystem, and thus enables continuous material advances (Pravdić, 2001), while certain authors say that sustainable development implies the society's aspiration towards achieving sustainable economic growth, to an extent which would enable meeting the needs of present and future generations (Đula, 2006). We can also say that sustainable development is "continuous economic development, with significantly reduced effect on the living environment, with full consideration of the living environment in a systemic way, as well as social policy, in the opinion forming and decision-making process. It includes a harmonization of the needs of the current generation with the future needs of our children, our grandchildren, great-grandchildren and their children, as well as a

harmonization of the needs at the local and regional levels, with the needs of the continents and the whole planet".[5]

On the other hand, the International Institute for Sustainable Development states that "the essence of the sustainable development concept is the idea of the way intragenerational and intergenerational equality affect the shaping of, or changes to national economy and global development" (Đekić, Hafner, 2013).

In line with the aforesaid, Beriša et al. quote the generally accepted definition of sustainable development. It follows that "sustainable development represents an integral economic, technological, social and cultural development, adjusted to the requirements of conservation and improvement of the environment, which enables present and future generations the satisfaction of their needs and improvement of their quality of life" (Beriša et al., 2017).

Speaking of sustainable development management principles, Đekić and Hafner point out that "sustainable development requires an integration of ecological, social and economic objectives within the decision-making and implementation process. This implies both horizontal and vertical integration of different levels of management, and their aspiration towards achieving the common goal. The balancing, or equal regard for all the three dimensions of sustainable development in the decision-making process is very difficult to achieve. As a result, efficient sustainable development management requires mutli-line management of the distribution of responsibility and authorities involved in the decision-making process at different levels" (Đekić, Hafner, 2013). In the following table, we have presented the principles of sustainable development management.

Speaking of sustainable development indicators, Veljković states that „the achievements of the sustainable development concept are accompanied by the corresponding indicators, based on contemporary ecological laws, which identify causal relations between economic policy and the policy of conservation and improvement of the living environment" (Veljković, 2011). According to Veljković, a reliable indicator warns us of a problem before it becomes too serious, and it helps us to understand what is to be done to solve the problem in question. Besides, sustainable development indicators reveal where the causal relations between economy, the living environment and society are weak, and show us the way to solving those problems (Veljković, 2011).

5 Srbija na svom putu ka održivom društvu [Serbia on Its Way to Sustainable Society] (2010): www.djelic.net/pdf/Srbija-na-svom-putu-ka-odrzivom-drustvu.pdf (01.09.2018.), p. 3.

Table 1. *Sustainable development management principles*

Principles of management	Integration elements	Challenges
Horizontal integration	Economic, ecological and social policy	The state should make its policies (economic, ecological and social) more coherent
Vertical integration	The local, national and supranational level of policy creation	Different government levels should work together on realizing the common goals
Stakeholder participation (integration)	Before: decision-makers and stakeholders - Now: the state, the business world, civil society	The state should involve stakeholders from the business world and civil society in the decision-making process
Integration of knowledge	Knowledge in different areas and the policy creation process	The states should base their decisions on the knowledge provided by science and society
Intergenerational equality (goal integration relating to time)	Short and long timeframes	The governments should consider a long-term development policy within their election cycles

Source: *Steurer Reinhard (2009): Sustainable development as governance reform agenda: An aggregation of distinguished challenges for policy-making, Institut für Wald, Umwelt und Ressourcenpolitik Universität für Bodenkultur, Wien, p. 5; cit. according to:* Đekić *Snežana, Hafner Nenad (2013): Savremeni koncept upravljanja institucionalnom dimenzijom održivog razvoja [The Modern Concept of Managing the Institutional Dimension of Sustainable Development], Topics, University of Niš, 37 (3), 1243-1261, p.1248.*

One possible approach to defining sustainability is compliance with the politically established criteria of environmental conservation. In other words, sustainability defined in this way constitutes observance of the politically established criteria of quality of the environment. This approach includes consulting the most important strategic documents related to the sustainable development concept. One of the most important national documents, which were applied in the Republic of Serbia from 2008, is the National Sustainable Development Strategy for the period 2008-2017, the key provisions of which will be expanded on below.

Strategic treatment of sustainable development

In recent years, the strategic treatment of sustainable development was governed by the National Sustainable Development Strategy for the period 2008-2017 (hereinafter: the Strategy).

According to the Strategy, the aim was to bring into line the three crucial factors, i.e. the three sustainable development pillars: the sustainable development of economy, business and technology, the sustainable development of society based on social balance, and environment conservartion with rational disposal of natural resources. At the same time, the aim of the strategy was to blend the three pillars into a whole which would be supported by the relevant institutions. The Strategy significantly contributed to harmonizing potentially conflicting goals defined from different perspectives of socio-economic development, to bridging the gap between sector policies, as well as to establishing a system of mutual advantages.[6]

In terms of content, the Strategy consists of eight parts[7]. The first part sets out the methodology involved in drawing up the Strategy, and the basic data on the adopted strategic Republic of Serbia documents the Strategy is founded on.

The second part of the Strategy defines strategic orientation towards sustainable development and includes the vision of development, the national priorities and the Strategy principles.

The third part deals with economy, as one of the three "pillars" of sustainable development. It sets out the foundations of Republic of Serbia economy based on knowledge, and specific goals and priorities in macroeconomic management, and a selection of an appropriate economic policy, transitional trends, sustainable production and consumption, sustainable development education, information-communication technologies and knowledge-based economy, sustainability of scientific-technological policy and protection of intellectual property.

The fourth part of the Strategy is concerned with the socio-economic conditions and perspectives sustainable development offers in the Republic of Serbia. In this part we have specified the goals, measures, and priorities relating to different areas of social development and their connections and effects on economic development and environmental protection in the Republic of Serbia – social values, the quality of life and social wellbeing, population policy, social security, poverty and social inclusion, the policy of equal opportunities, gender equality, public health, housing and housing policy, the regional and local aspects of sustainable development, as well as informing the public and its participation in decision-making.

6 National Sustainable Development Strategy for the period 2008-2017, p. 3.
7 Ibid., p. 3-4.

The fifth part is devoted to the issues of environmental protection and conservation of natural resources in the Republic of Serbia, as well as the effects of economic development on the environment. In this part we have specified the goals, measures, and priorities relating to conservation of natural resources (the air, water, soil, biodiversity, forests, mineral resources and renewable energy sources), protection from the effect of different environmental risk factors (climate changes and ozone layer depletion, waste, chemicals, traffic accidents, ionizing and non-ionizing radiation, noise and natural disasters), protection from risk factors affecting the environment in different economic sectors (industry, mining, power engineering, agriculture, forestry, hunting and fishing, transportation and tourism), as well as the introduction of cleaner production.

The sixth part of the Strategy provides the institutional framework and mechanisms for its implementation, focusing in particular on the setting up of new institutions and the strengthening of the existing ones for implementing the Strategy.

In the seventh part the financing sources of the Strategy are presented, while the eighth part sets out the implementation monitoring methodology.

The Action Plan for implementation of the National Sustainable Development Strategy for the period 2011-2017, according to the goals the Strategy defines, identifies the following: 1) the priorities in Action Plan realization; 2) the specific measures/activities aimed at Strategy implementation; 3) the competent institutions and partners for implementing the measures/activities referred to above; 4) the timeframes for measure/activity implementation; 5) the measure/activity implementation expenses and the sources of financing; 6) the indicators for monitoring measure/activity implementation.[8]

The priorities in Sustainable Development Action Plan implementation result from the elaboration of the Republic of Serbia strategic goals defined by the Strategy. The Action Plan implementation priorities are: increasing energy efficiency at all levels and reducing energy intensity in all the sectors, including industry, power engineering, transportation, agriculture, utilities, housing, etc.; reduction of the dependence of economy and society in general on fossil fuels, and active involvement in the global efforts of protecting the climate from human-induced

8 Akcioni plan za sprovođenje Nacionalne strategije održivog razvoja za period 2011-2017. Godine [The Action Plan for Implementing the National Sustainable Development Strategy for the period 2011-2017], Official Gazette of the Republic of Serbia, No. 62/2011.

changes; progress in the use of solid waste and waste water; stopping the rising trend in overall poverty, with simultaneous reduction of regional inequalities and better social inclusion; systematic introduction of the process of education for sustainable development, in support of knowledge-based economy.[9]

In view of the Action Plan priorities mentioned above, and the fact that the Strategy defines the following national priorities: European Union membership; development of competitive market economy and balanced economic growth; the development and education of people, a rise in employment and social inclusion; the development of infrastructure and balanced regional development; as well as environment protection and improvement, and a rational use of natural resources, special attention under the next subtitle will be devoted to priorities in the domain of protection and improvement of the environment.

Strategic treatment priorities in the domain of environment protection and improvement

According to the Strategy text, the possibility to achieve sustainable development of the Republic of Serbia lies in the introduction, adjustment and application of the principles predominant in the EU, i.e. in increasing competitiveness which is based on knowledge, innovations and entrepreneurship, as defined in the Lisbon Strategy.[10]

One of the key national priorities is the protection and improvement of the environment and a rational use of natural resources, maintenance and improvement of the environmental protection system, reduction in pollution and environmental pressures, using the natural resources in such a way that they remain available to future generations. For this priority to be realized, the Strategy defines the following goals: to establish the system of protection and sustainable use of natural resources (the air, water, soil, mineral raw materials, forests, fish, wild plant and animal species); encouragement of mutual activities and the realization of significant mutual effects of environmental protection and economic growth, inclusion of environmental policy into the development policies of other sectors; investing into reducing environmental pollution and the development of cleaner technologies; reducing the high energy intensity of Republic of Serbia economy

9 Ibid., p. 1.

10 Nacionalna strategija održivog razvoja za period 2008-2017 [The National Sustainable Development Strategy for the Period 2008-2017], p. 12.

and a more efficient use of fossil fuels; encouraging the use of renewable energy sources; planning sustainable production and consumption and reduction of waste by product unit; protection and conservation of biodiversity.[11]

According to the view stated in the Strategy, one of the national priorities for accomplishing sustainable development in the Republic of Serbia regards the conservation and improvement of the environment, and a rational use of natural resources. This includes the integration and harmonization of the goals and measures of all sector policies, the harmonization of national regulations with EU legislation and their full implementation.[12] The authors are of the opinion that the system can be defined as ecologically sustainable if it has the property of harmonization. It follows that every kind of behaviour that reduces the system's stability can be deemed unsustainable (Štrbac et al., 2012). Drawing on the view that "problems resulting from interaction of man and nature have been manifested through exhaustion of supplies of non-renewable natural resources, climate change and global warming, pollution of the air, water and soil, ecosystem hazards and reduction in biodiversity" (Milenović, 2000), the ecological dimension of sustainable development, according to Hafner, "demands that natural resources – of the soil, water, air, the flora and fauna, be used in a way which would also prevent a long-term negative effect on them. This attitude is aimed at protecting the natural resources and preserving the genetic potential of plant and animal species" (Hefner, 2015).

Table 2. *The strategic treatment of the defined sector-specific goals for natural resources, in the context of environmental protection and improvement*

Natural resource	The principal sector-based goals of sustainable development defined by the Strategy
Air	1) harmonizing national regulations with EU legislation; 2) reducing air pollution resulting from power engineering and industry; 3) improving the quality of fuel; 4) improvements in the air quality monitoring system in cities; 5) improving public access to information on the quality of air and raising public awareness;
Water	1) harmonizing national regulations with EU legislation; 2) increasing the availability of good-quality water; 3) reducing losses in water supply systems; 4) protection and improvement of the quality of water in accumulations intended for water supply; 5) improving the quality of water in waterways, and controlled use of fertilizers and plant protection products; 6) the restoration and remediation of polluted waterways; 7) establishing the economic valuation of water and services, by applying the "polluter pays" and "user pays" principles; 8) the proper institutional and territorial organization of the water sector; 9) determining the legal status and the ownership transformation of water management companies; 10) resolving utility water problems; 11) introducing the regulatory function; 12) ensuring public participation and involving the users in all water management phases;

11 Ibid., p. 13-14.
12 Ibid., p. 73.

Natural resource	The principal sector-based goals of sustainable development defined by the Strategy
Soil	1) harmonizing national regulations with EU legislation; 2) preventing further losses of the soil and maintaining and improving its quality; 3) protection from degradation and change in the soil purpose.
Biodiversity and conservation of nature	1) passing the laws on the conservation of nature and the ratification of international agreements; 2) drawing up the national strategy of sustainable development of natural resources; 3) drawing up the national strategy and action plan for biodiversity conservation; 4) increasing the protected natural resource areas by 10% of the Republic of Serbia territory; 5) establishing an efficient biomonitoring system; 6) establishing an information system on the biosystem and other natural values of the Republic of Serbia; 7) making an inventory of biological diversity in the Republic of Serbia; 8) instituting the monitoring of biodiversity components; 9) the implementation of effective measures of control of genetically modified organisms in line with EU practice; 10) improving the methods of sustainable use of the gene pool and forming a bank for genetic material preservation.
For-ests	1) harmonizing national regulations with EU legislation; 2) improving the state of forests; 3) improving sustainable husbandry of forests and protected natural resources; 4) increasing wooded areas to 29% of the Republic of Serbia.
Mineral resources	Metallic raw materials and industrial minerals: 1) harmonization with EU legislation; 2) passing strategic documents of sustainable use of resources and goods; 3) finding new deposits and a rational use of the existent natural resources; 4) testing the validity of remaining mineral raw materials in tailings and landfills of active and closed down mines with regard to economy and environmental protection. Fossil fuels: 1) the exploitation of non-renewable natural resources in a way that ensures the highest long-term energy security; 2) finding new deposits and sustainable use of non-renewable natural resources; 3) the application of modern methods of oil and gas exploration in the local exploration area; 4) replacement of fossil fuels by renewable energy sources;
Renewable energy sources	1) intensifying research into the potential of renewable energy sources with the aim of their verification and better balancing; 2) determining the technologies which justify the introduction of incentives; 3) passing regulations aimed at promoting the use of renewable energy sources; 4) increasing the scope of use of renewable energy sources; 5) education and the raising of public awareness with a view to promoting a wider use of renewable energy sources.

Source: *The National Sustainable Development Strategy for the Period 2008-2017, Official Gazette of the Republic of Serbia, No. 57/2008, p. 74-91.*

The sector-specific goals of the Strategy, specified for each particular kind of natural resources, are presented in the following table, in the context of environmental protection and improvement.

In summarizing the relationship between sustainable development and environmental protection, Štrbac et al. (2012) quote the relative similarities and differences of the two dimensions. Namely, the most important similarities between sustainable development and environment protection are: the implementation of measures and activities of protecting the environment is aimed towards sustainable development, as it enables clean air, water and soil, which

are important both for the present, and future generations; a number of environment protection approaches (such as repeated use and recycling) preserve the resources for future generations; education for environment protection supports the sustainable development concept; sustainable development is a concept much broader than environment protection.

The most important differences between the sustainable development and environment protection concepts include the following: sustainable development represents a general behavioural pattern of society; sustainable development is the aim of society as a whole, while environmental protection only applies to some of its segments; sustainable development is an approach based on the involvement of all society segments and is the joint obligation of everyone (individuals and institutions); environment protection is only one of the components of sustainable development. The social and economic components are equally important in achieving sustainable development; environment protection is frequently restricted to nature, while sustainable development explores the links and interrelations of responsible action in economy, society and the environment; environment protection implies reduction in pollution, which does not mean that future generations will necessarily inherit the same amount of the natural, social and economic resources as the earlier ones; environment protection is formally governed by regulations, while sustainable development goes further than mere compliance with laws and regulations, so that environment protection can be taken as mandatory, and sustainable development as a voluntary choice and inclination (Štrbac et al., 2012).

Conclusion

Drawing primarily on the fact that the initial and principal goal of sustainable development is sustainable use of natural resources at all levels: the local, regional, national and international, and that sustainable development includes the fulfilment of the needs for social contacts and communications, then the accessibility of goods and services, along with observance of the fundamental sustainable development principles, we can say that sustainable development constitutes the realization of three general goals of ecological sustainability – a stable economic development, a fair distribution of social opportunities, and protection and improvement of the environment (Srpak, 2017). As Hafner points out in this context, "the basis of economic and overall social development is the conservation and management of natural resources, which indicates the importance of the ecological dimension of sustainable development. The ecological approach is

based on meeting the requirement of stability or harmonization of the ecosystem. Stability refers to individual variables within the system, while ecosystem harmonization refers to the ability to maintain the organization of the whole system during and after a disturbance. In this way the natural resources are protected and the genetic potential of plant and animal species preserved" (Hafner, 2015).

In view of the aforesaid, following a short observation of the most important aspects of sustainable development as a concept, we have discussed in detail the strategic concept of sustainable development in the Republic of Serbia, with special emphasis on the normative-analytic approach to priorities in the ecological safety domain. Considering the essential goal and national priorities of the Strategy, which are basically followed by the Action Plan for its implementation, in this article we have been mainly concerned with issues relating to defining the sustainable development concept, and the principles of sustainable development management, then relating to the strategic treatment of sustainable development, in particular to the strategic treatment priorities in the field of environment protection and improvement.

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FORECASTING WHEAT AND CORN PRODUCTION IN REPUBLIC OF SRPSKA AND BOSNIA AND HERZEGOVINA

Miroslav Nedeljković[1], Boro Krstić[2]

Abstract

The aim of the authors was to create an adequate model for forecasting the production of wheat and corn in Republic of Srpska and throughout B&H based on the twenty-two-year time series (1996-2017) by applying the trend analysis and other quantitative methods of research. After selecting a square model, as the most appropriate model, an analysis of movement tendency of basic production indicators of the observed crop cultures was carried out. The forecast was carried out for a five-year period (2018-2022). The results showed that wheat in the next five-year period (2018-2022) will show a decrease in production in Republic of Srpska, and an increase in the whole of B&H. Wheat yield will grow in both Republic Srpska and B&H. In the prediction period, there will be a decline in production and yield of corn. The contribution of this research is reflected in making timely and rational decisions concerning the further development of crop production and agriculture.

Key words: *forecast, wheat, corn, crop production, manufacturing*

Introduction

The cultivation of wheat and corn has an important economic, organizational and agro-technical character. Due to its importance, it is important to know the trends in their production parameters in the future period, thus avoiding the adoption of inadequate decisions related to the further development of crop production and agriculture as a whole. For this reason, the subject of this paper is the analysis of movement tendencies in wheat and corn production (production and yield), with the aim of creating the most suitable production forecasting model in this case in the Republic of Srpska and Bosnia and Herzegovina.

1 Miroslav Nedeljković, M.Sc., Ph.D. student, Faculty of Agriculture, University of Novi Sad, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +387 66 893 935, E-mail: miroslavnedeljkovic2015@gmail.com

2 Boro Krstić, Ph.D., Assistent Professor, Faculty of Agriculture, „Bijeljina“ University, Pavlovića put bb, 763000 Bijeljina, Republic of Srpska, Bosnia and Herzegovina, Phone: +387 65 237 072, E-mail: direktor@ubn.rs.ba

Many domestic and foreign authors (Ivanišević et al., 2015; Novković et al., 2013; Lazić, D., 2014; Najeeb et al., 2005; Nasiri et al., 2012), in their works they dealt with by analyzing and forecasting crop production.

In earlier studies, Azhar et al., 1973, and Falak and Ahmad, 2008, carried out projections of wheat area and production. Finger, 2007, as well as Tahir and Habib 2013, predicted, by means of a square model, the trend of the future production of certain crop products. Irfan and Tahir, 2011, were involved in the design of rice production indicators, while Mutavdžić, 2009, carried out the prediction of the production parameters of certain vegetable crops in Vojvodina, precisely using quantitative models based on time series. Also, Ivanišević, 2015, in his doctoral dissertation, predicts production and economic parameters in the vegetable industry of Serbia. Ilić et al., 2016, using quantitative models, predict the movement of corn production in Serbia. Mutavdžić et al., 2014, foresee the development of horticulture in the Republic of Srpska, and Nedeljković, 2018, performs the prediction of the basic production indicators of wheat production in B&H in the twenty-two year analyzed period. In addition to the mentioned authors and their research, there are many other authors who have dealt with the above mentioned issues.

Method of work and data sources

The paper analyzes the trend that consisted of a linear trend, a square trend, and an exponential trend model whose equations are expressed below:

- The linear trend model was calculated according to the following equation:

$$Yt = ß_0 + ß_1 t + e_t$$

- A square trend model was calculated according to the following equation:

$$Yt = ß_0 + ß_1 \times t + ß_2 t^2 + e_t$$

- The exponential trend model was calculated according to the following equation:

$$Yt = ß_0 \times ß^{t}_1 \times e_t$$

The choice of the most appropriate assessment model was based on three accuracy measures: Mean Absolute Percent Error (MAPE), then mean absolute deviation (MAD) and mean squared deviation (MSD).

MAPE (*Mean Absolute Percentage Error*) is a prediction method that is particularly useful in time series where periodicity is observed. Its equation is:

$$MAPE=\frac{1}{n}\sum I(yt-\hat{y}t)/ytI100$$

MAD (*Mean Absolute Deviation*) is a dispersion method that is created as a deviation of the modality from a representative parameter. Its equation is:

$$MAD=\frac{1}{n}\sum Iyt-\hat{y}tI$$

MSD (*Mean Squared Deviation)* is a mean square deviation that represents a mathematical expectation of how well the arithmetic meanings present the results from which it was obtained. Its equation is:

$$MSD=\frac{1}{n}\sum(yt-\hat{y}t)^2$$

The lowest value of all these measures shows the good equipment of the model with minimum error projections (Karim et al., 2010).

The standard statistical instrument was used in this paper as the mean value of the occurrence, variation interval (minimum and maximum), variance variable (coefficient of variation) as well as the annual rate of change.

The data used for the research were taken from the available statistical publications of the Statistical Office of the Republic of Srpska and the Agency for Statistics of B&H. Namely, this is a time series of data on total production and yield of observed crops in the period from 1996 to 2017. In addition, scientific and professional literary sources, as well as previous research on the topic of work, served as an important source of information.

Results of the research with discussion

According to the report of the US Department of Agriculture (USDA), areas under wheat and corn in 2017 amounted to about 220 million hectares or about 184 million hectares. The same source states that the total wheat production in the world in 2017 was at the level of 688 million tons and the average yield was 3.12 t / ha, while the production of corn reached over 937 million tons, while the average yield was 5.10 tons/ha.

The largest producers of wheat were EU-28 (137.60 million tons) and China (117.73 million tons), while among the largest producers of corn in the world were USA with production of 336.53 million tons, and China whose crop production was at the level of 195.85 million tons (www.fas.usda.gov).

As far as the Republic of Srpska is concerned, the total area of these two cultures was about 183,300 ha in 2017, making them the most widespread grain crop, given that the total surface area of crops was 209,931 hectares (RZS RS, 2017).

The following Table 1 shows the yield and trends of wheat and corn production in a twenty-two-year period measured by standard statistical indicators.

Table 1. *Dynamics of the production of wheat and corn in RS (1996-2017)*

Indicators	Average value	Interval of variation		Variation coefficient (%)	Rate of change (%)
		Min.	Max.		
Wheat					
Production	166563,82	76130,00	266438,00	28,7	4,59
Yield	3,31	2,21	4,30	17,3	2,46
Corn					
Production	591832,23	359453,00	880997,00	24,3	0,75
Yield	4,18	2,31	6,40	24,7	0,79

Source: *Calculation of the author based on the data of the RS Statistical Office and the Agency for Statistics of B&H.*

In the observed twenty-two year period average wheat production was 166,564 tons, while in the same period the average production of corn was at the level of 591,832 tons. The average yield ranged from 3.3 t / ha for wheat to 4.2 for corn. The stability of the production indicators measured by the coefficient of variation was relatively high in both the analyzed cultures and especially in the production of wheat (28.7%). This is certainly due to unstable weather conditions in the analyzed period and extreme weather events, especially those that occurred in 2010 and 2014. A slightly higher tendency of growth compared to other production parameters for both crops was noticed in wheat production at the annual rate of change of 4.6%.

According to the Statistics Agency of Bosnia and Herzegovina, the areas under wheat and corn throughout B&H occupy a total of 263.566 ha, and the dynamics of production and yield in B&H in the period 1996-2017 are shown in Table 2.

Table 2. *Dynamics of the production of wheat and corn in B&H (1996-2017)*

Indicators	Average value	Interval of variation		Variation coefficient (%)	Rate of change (%)
		Min.	Max.		
Wheat					
Production	247600,77	145412,00	340931,00	21,94%	2,89
Yield	3,28	2,30	4,30	16,53%	2,38
Corn					
Production	810389,55	471963,00	1178423,00	22,0%	0,80
Yield	4,15	2,30	6,10	22,2%	0,40

Source: *Author's calculation based on the data of the RS Statistical Office and the Agency for Statistics of B&H*

The table above shows that wheat in the analyzed period reached an average wheat production of 247,600 tons, and 810.389 tons of corn, which suggests that more than two thirds (67%) of wheat production is realized in the Republic of Srpska. Also, comparing the data from the previous two tables, we can notice that most of the corn production is realized in Republic of Srpska (73%). The obtained average yield values for both crops are at almost the same level in the Republic of Srpska and throughout B&H. A similar situation is with the stability of the movement of production indicators, that is production and yield, as well as with growth rates, except that the measured growth rate of wheat production in the Republic of Srpska is somewhat higher than in the whole of B&H.

In order to select an adequate model for forecasting the production indicators of the analyzed crop cultures, the three aforementioned measures of accuracy (MAPE, MAD, MSD) were used.

The following table 3 gives us the calculated values for the projection of wheat production in the Republic of Srpska according to the mentioned measurements of accuracy. From it we note that the values of the square trend model are the lowest, and it is the most adequate model for predicting future wheat production in the Republic of Srpska.

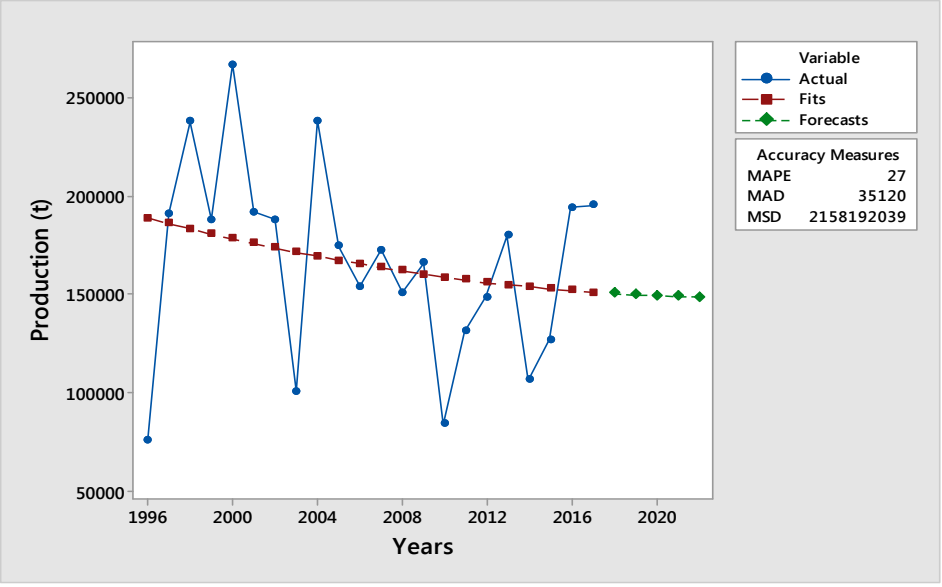
Table 3. *Measures of accuracy in the selection of the prediction model for wheat production in RS*

Model	MAPE	MAD	MSD
Linear	27	35324	2161263671
Exponential	27	37518	2229263526
Square	27	35120	2158192039

Source: *Author's calculation*

Graph 1 in the form of numerical values shows the projection of wheat production by the year 2022. Movement of actual value is marked by a blue curve in the graph, while red curve represents the set value, and green shows predicted wheat production in tons. It is important to note that the values obtained in foreseeable period are attained with 95% predictions interval.

Graph 1. *Prediction of wheat production in RS till 2022*



Source: *Made by the author based on the data of the RS Statistical Office*

From the following Table 4 we see that wheat production in the five-year forecasting period (2018-2022) is decreasing, and that its value in the last year of the prediction period is 17,920 t lower than the average production of the analyzed time series.

Table 4. *Five-year forecasting of wheat production in RS*

Forecast for the period	Production (t)
2018	150.515
2019	149.900
2020	149.384
2021	148.965
2022	148.644

Source: *Author's calculation*

Also, when selecting the prediction model for wheat yield, the most adequate is the square model with values: MAPE (13.2399), MAD (0.4055) and MSD (0.2286), (Table 5).

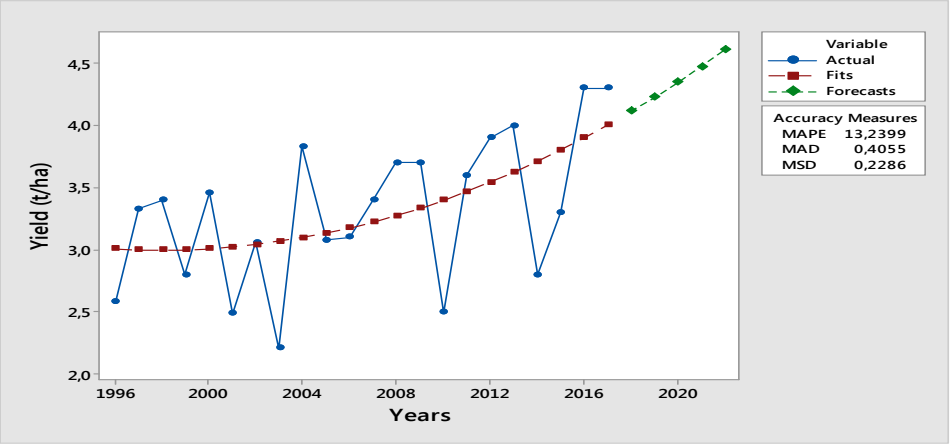
Table 5. *Measures of accuracy in the selection of the prediction model for wheat yield in RS*

Model	MAPE	MAD	MSD
Linear	13,3978	0,4115	0,2387
Exponential	13,3696	0,4164	0,2382
Square	13,2399	0,4055	0,2286

Source: *Author's calculation*

Graphic and numerical movements of wheat yield in RS are shown in Graph 2.

Graph 2. *Prediction of wheat yield in RS by 2022*



Source: *Made by the author based on the data of the RS Statistical Office*

Throughout the forecast period, yield of wheat is growing, so that its value at the end of the prediction period is 4.6 t / ha, which is 1.3 t / ha more than the average yield of wheat in the period 1996-2017 (Table 6).

Table 6. *Five-year forecast of wheat yield in RS*

Forecast for the period	Yield (t/ha)
2018	4,11266
2019	4,22720
2020	4,34734
2021	4,47309
2022	4,60444

Source: *Author's calculation*

The values for determining the accuracy measures for predicting corn production in the Republic of Srpska are given in the following Table 7. The lowest values have been achieved with the square model, and as such we take it as the prediction model.

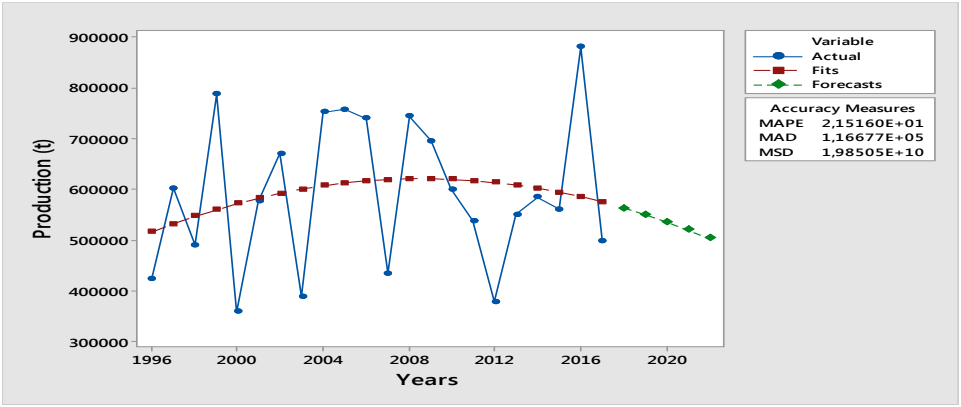
Table 7. *Measures of accuracy in the choice of the prediction model for corn production in RS*

Model	MAPE	MAD	MSD
Linear	2,23858E+01	1,21921E+05	2,04039E+10
Exponential	2,17816E+01	1,22255E+05	2,07314E+10
Square	2,15160E+01	1,16677E+05	1,98505E+10

Source: *Author's calculation*

The graphical and numerical relationship of the actual, set and predicted values of corn production in the analyzed period can be seen in the following Graph 3.

Graph 3. *Predicting the production of corn until 2022*



Source: *Made by the author based on the data of the RS Statistical Office*

In the five-year prediction period, corn production in the Republic of Srpska is decreasing. The planned production in the end-year is 503865 tons, which is about 59,662 tons less than the production in the first year of the prediction period (Tabele 8).

Table 8. *Five-year forecast of corn production in RS*

Forecasting for the period	Production (t)
2018	563.527
2019	550.578
2020	536.318
2021	520.747
2022	503.865

Source: *Author's calculation*

The values of the square model as the most adequate model for the prediction of corn yield in the Republic of Srpska are given in the following Table 9.

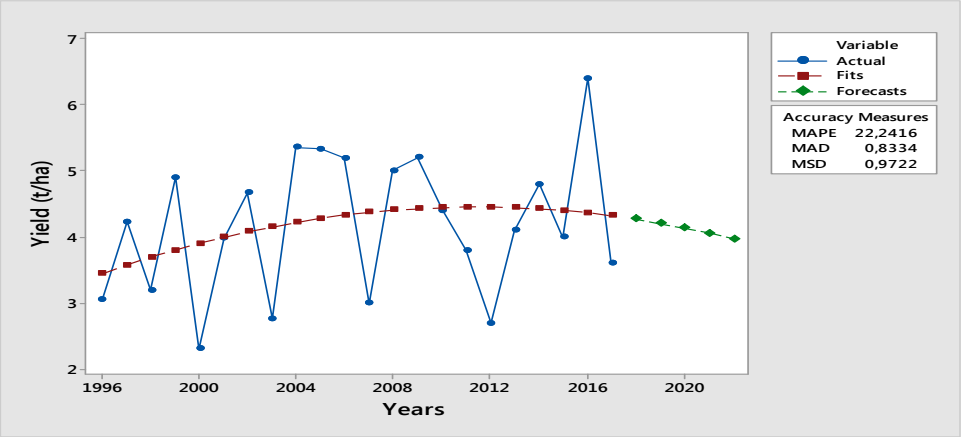
Table 9. *Measures of accuracy in the selection of the corn yield prediction model in RS*

Model	MAPE	MAD	MSD
Linear	23,1103	0,8704	0,9956
Exponential	22,7622	0,8845	1,0137
Square	22,2416	0,8334	0,9722

Source: *Author's calculation*

Graph 4 gives us a graphical insight into the movement of yields in the analyzed and prediction period using the square model as the most advantageous prediction model.

Graph 4. *Prediction of corn yields in RS by 2022*



Source: *Made by author based on the data of the RS Statistical Office*

Corn yield recorded a slight increase in the first year of the forecasting period relative to the average yield in the observed twenty-two year period. In the next four years, the yield in the prediction period is decreasing, so that its value in 2022 will be around 4 t/ha (Table 10).

Table 10. *Five-year prediction of corn yield in RS*

Forecast for the period	Yield (t/ha)
2018	4,26779
2019	4,20714
2020	4,13797
2021	4,06028
2022	3,97407

Source: *Author's calculation*

When it comes to wheat production throughout B&H, the data from Table 11 confirm that the square model is most suitable for predicting the dynamics of future movements (Table 11).

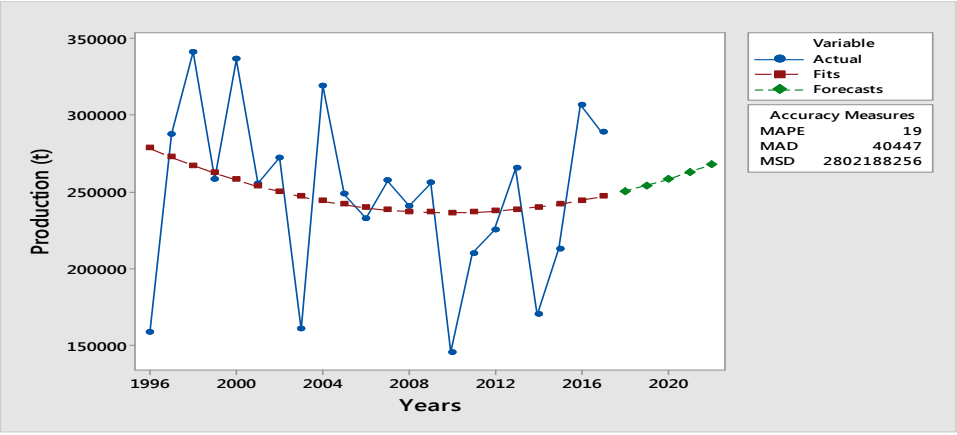
Table 11. *Measures of accuracy in the selection of the wheat production prediction model in B&H*

Model	MAPE	MAD	MSD
Linear	19	40920	2861543173
Exponential	19	42325	2902530205
Square	19	40447	2802188256

Source: *Author's calculation*

The visual and numerical movement of wheat production is given in the following Graph 5.

Graph 5. *Prediction of wheat production in B&H until 2022*



Source: *Made the author based on data of the Agency for Statistics of B&H*

Throughout the five-year forecast period, wheat production in B&H is increasing, so that its value will reach 267,426 tons in 2022 (Table 12).

Table 12. *Five-year forecast for wheat production in B&H*

Forecast for the period	Production (t)
2018	250.205
2019	253.866
2020	257.957
2021	262.477
2022	267.426

Source: *Author's calculation*

When it comes to wheat yield, accuracy measures indicate that the square model is the most appropriate and the values of its measures are: MAPE (10,8785), MAD (0,3323) and MSD (0,1655), (Tabele 13).

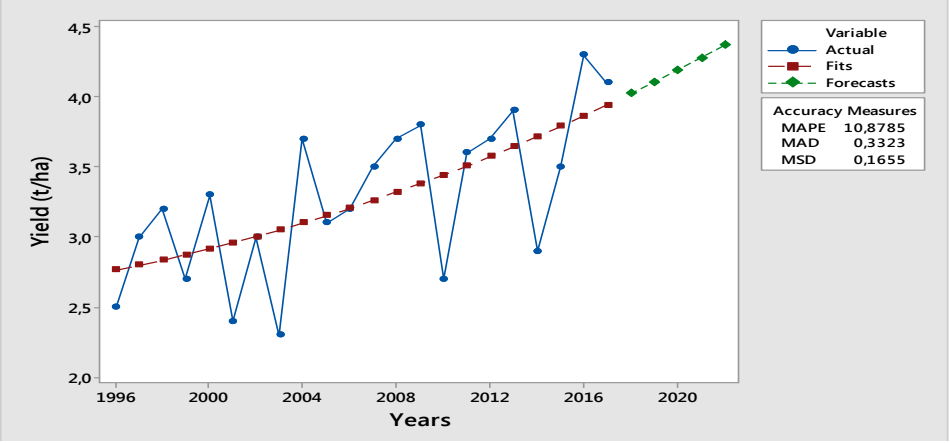
Table 13. *Measures of accuracy in the selection of the wheat yield prediction model in B&H*

Model	MAPE	MAD	MSD
Linear	10,9677	0,3352	0,1670
Exponential	10,9470	0,3380	0,1667
Square	10,8785	0,3323	0,1655

Source: *Author's calculation*

Graph 6 shows the upward trend of the yield of wheat yield in the forecast period, and its exact numerical value is given in the Table 14.

Graph 6. *Prediction of wheat yield in B&H by 2022*



Source: *Made the author based on data of the Agency for Statistics of B&H*

Table14. *Five-year prediction of wheat yield in B&H*

Forecast for the period	Yield (t/ha)
2018	4,02273
2019	4,10505
2020	4,18957
2021	4,27627
2022	4,36516

Source: *Author's calculation*

Again using the square model, as the most suitable forecasting model, we obtain corn production values in the next five-year period (Table 15).

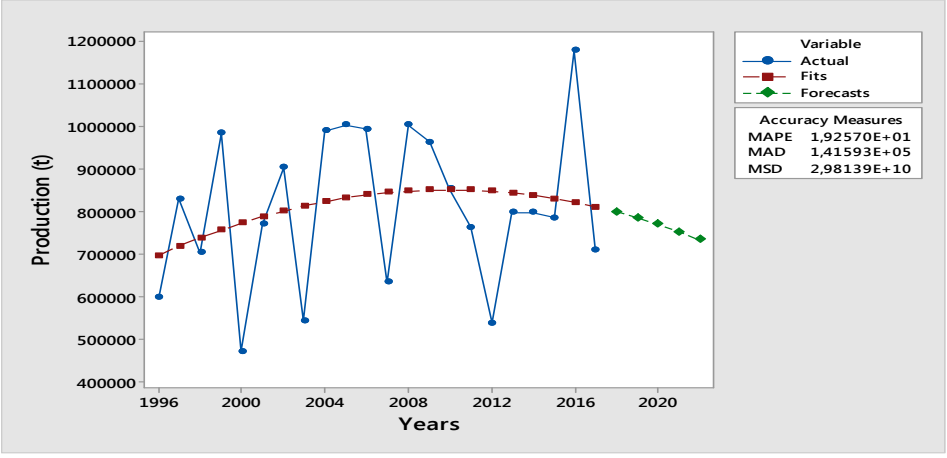
Table 15. *Measures of accuracy in the selection of prediction model for corn production in B&H*

Model	MAPE	MAD	MSD
Linear	2,02650E+01	1,50012E+05	3,06348E+10
Exponential	1,97382E+01	1,49731E+05	3,10784E+10
Square	1,92570E+01	1,41593E+05	2,98139E+10

Source: *Author's calculation*

There is a downward trend in the movement of corn production, as can be seen from the following graph 7.

Graph 7. *Predicting the production of corn in B&H until 2022*



Source: *Made the author based on data of the Agency for Statistics of B&H*

The corn production in B&H in the last year of forecast declined by 64.515 tons compared to initial year of the prediction period, i.e. 75.558 t compared to the average production value for the period 1996-2017 (Table 16).

Table 16. *Five-year prediction of corn production in B&H*

Forecast for the period	Production (t)
2018	799.346
2019	785.612
2020	770.282
2021	753.355
2022	734.831

Source: *Author's calculation*

As in previous cases, in case of prediction of corn yield in B&H, the square model proved to be the most suitable (Table 17).

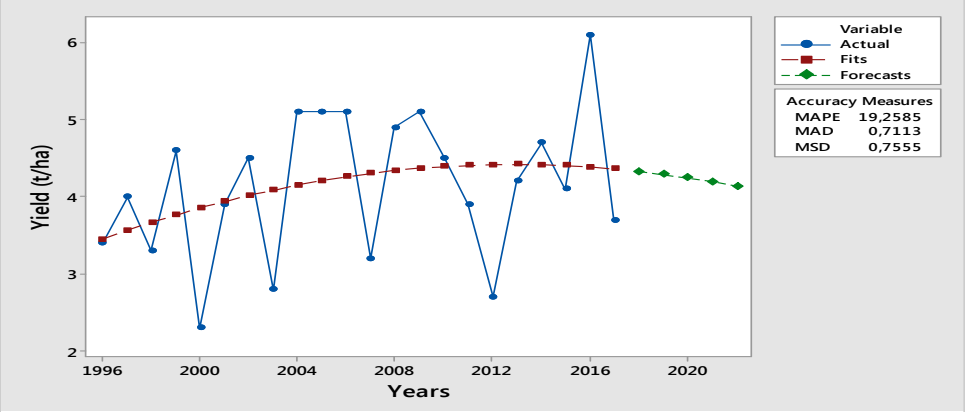
Table 17. *Measures of accuracy in the selection of the prediction model for corn yield in B&H*

Model	MAPE	MAD	MSD
Linear	19,9392	0,7423	0,7704
Exponential	19,7266	0,7531	0,7825
Square	19,2585	0,7113	0,7555

Source: *Author's calculation*

The visualization of the yield of corn in B&H is concretized in the following graph 8. The forecasted yield values show a downward trend, and the exact numerical values are presented in the following Table 18.

Graph 8. *Prediction of corn yield in B&H till 2022*



Source: *Made the author based on data of the Agency for Statistics of B&H*

Table 18. *Five-year prediction of corn yield in B&H*

Prediction for the period	Yield (t/ha)
2018	4,33052
2019	4,29207
2020	4,24680
2021	4,19471
2022	4,13580

Source: *Author's calculation*

Although there is a downward trend in corn yields over the next five years, the value increased in the first year of 2018, which is a little compared to the average yield value for the period 1996-2017.

Conclusion

From the aforesaid, we can conclude the following:

- ❖ Considering the areas occupied by wheat and corn in the Republic of Srpska and throughout Bosnia and Herzegovina, they represent the most abundant grain.
- ❖ According to the implemented calculations, the production of wheat will fall in the predetermined period of the forecast in the Republic of Srpska, while in the same prediction period wheat production will increase in the entire B&H.
- ❖ As for the yield of wheat, it will grow during the forecast period, both in Republic of Srpska and throughout B&H.
- ❖ The production of corn, according to the obtained results, will decrease in both the Republic of Srpska and throughout B&H in the period 2018-2022.
- ❖ Also, just like production, corn yield will fall in both of the observed territory of the prediction period.

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PERSPECTIVES OF DEVELOPMENT OF FORESTRY IN CONTEXT OF SUSTAINABLE AGRICULTURE OF THE CITY OF NOVI SAD[1]

Nada Mijajlović[2]

Abstract

Forest ecosystems are crucial in environmental protection and improvement of living conditions in urban and rural communities. Novi Sad, as the capital of AP Vojvodina, has a forest fund and natural forest communities. The aim of this paper is to analyze the state of the forest fund under the administration of the city of Novi Sad. The data considered are related to the forest communities of Fruška Gora and rhytic water ecosystems within the Upper Danube region. Forest plantations under the management of state forest farms were considered. Perspectives of the development of forestry in the territory of Novi Sad were considered in the context of sustainable development of agriculture.

Key words: *forest farms, forest fund, ecosystem, sustainable development.*

Introduction

Forest ecosystems are dominant in terms of representation on the Earth's surface, occupying about 4 billion hectares, which is about 30% of the world's land (Food and Agriculture Organization 2006). The forest life community is diverse of the plant and animal species, as well as fungi and microorganisms. Forests are terrestrial ecosystems that account for 75% of the gross primary production of the Earth's biosphere and produce 80% of our planet's biomass. (Pan Yude et al., 2013) Forests are the most complex land-based ecosystems that have a very intense influence on the geological base on which they are rooted. Forests, as plant communities, in the highly active process of photosynthesis, the metabolic exchange of carbon dioxide and oxygen affect the composition of the air in the

1 The work is a part of integrated and interdisciplinary research project no. 46006: Sustainable agriculture and rural development in the function of accomplishing strategic objectives of the Republic of Serbia in the Danube region, funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia, in the period 2011-2018.

2 Nada Mijajlović, M.Sc., Expert Associate, Institute of Agricultural Economics, Volgina no. 15, 11060 Belgrade, Serbia, Phone: +381 11 69 72 854, E-mail: nada_m@iep.bg.ac.rs

wider area. At the surface of the forest of 1 ha per day, about 4 t of carbon dioxide is consumed and about 3 t of oxygen is released into the atmosphere. Forests absorb harmful gases, sediment the dust, filter solid radioactive particles (the wild chestnut tree can absorb about 120 kg of dust and about 80 kg of aerosol per year), therefore in urban areas where air pollution is very pronounced, the planting of tree plantations should be undertaken to the greatest extent possible surfaces. Forests contribute significantly to environmental protection and are a significant noise reduction factor (depending on the type of forest, density, tree height, peakness and seasons). Air in coniferous forests is rich in essential substances that have a bactericidal effect. It is believed that from a hectare of dairy forests about 30 kg of etheric materials are discharged into the atmosphere, which can disinfect the air of the smaller city (http://ekovrba.com/sume-i-znacaj-suma.html).

The importance of the forest is to prevent the formation of torrents in the course of the river. The catchment areas of the forests have 30-50% lower water levels than non-forested plains. Forests prevent land cover and soil erosion. Forests also represent the best filter for drinking water.

In the context of climate change, which is a global problem with serious consequences at the local level, forests are ecosystems that somewhat compensate for these changes, but also under the influence of these changes. Forests are in many ways endangered by climate change: fires are more frequent and more dangerous, more frequent diseases, epidemics and pests (Mijajlović, 2012).

The exploitation of forests in order to meet the needs of the human population on a world scale has reached a very high new level, due to which the forests, especially in the tropics, are endangered. Annually, about 16 million hectares of forest are cut worldwide. Many world organizations (such as the World Wildlife Fund, WWF) work on afforestation and implementation of forest protection and conservation programs.

Forests are a significant component of global carbon cycle. The forests are in an interdependent relationship with the climate and are an important factor in the global warming of the planet. Forests are the most important type of vegetation in terms of net source, binding and retention of carbon. Forest ecosystems and land for which they are bound have a great capacity to accumulate and liberate carbon (Mijajlović, 2015).

Sustainable development by definition means the use of existing natural resources in order to meet the needs of the present generations, without compromising the ability of future generations to use resources for their own needs. Forests as a very important resource in the context of sustainable development are included in terms of conservation, protection and improvement both in the legislation of the world level and at the local level.

Forests of Serbia

Regarding the areas under the forest Serbia belongs to the middle forests. Of the total territory of Serbia, 29.1% is under forest (in Central Serbia it is 37.6% under forest, while in Vojvodina it is 7.1% under forest). (According to the National Forest Inventory of the Republic of Serbia, 2009). Worldwide the forest is 30% of the territory, the European average is higher and amounts to 46% of the forest. In relation to the number of inhabitants in Serbia, the forest is 0,3 ha per capita (in Russia, 11,11 ha per capita, Norway 6,93 ha, Finland 5,91 ha, Bosnia and Herzegovina 1,38 ha and Croatia 1,38 ha). Of the total forest area of 2.252.387 ha, state ownership is 1.194.000 ha (53%), the rest that makes 1.058.387 (47%) is privately owned, or managed by other social enterprises or national parks (http://www.srbijasume.rs/sumskifond.html).

In geographical sense, Serbia has three parts: the Pannonian plain (the lowland with hilly mountains and the lower mountains), the northern part of Vojvodina, which consists of fertile plains and mountainous parts (the central part and the southern part of Serbia with preserved forests).

In the biogeographical sense, two zonal vegetation (biomes) are present in Serbia. Most of the surface belongs to the biomass of broad-leaved and mixed forests in the moderate climatic region, while the areas above the upper forest border represent biom tundra.

Forest biom is composed of four eco-regions: Balkan mixed forests, Pannonian mixed forests, Dinaric mixed forests and Rodopic mixed forests. Balkan mixed forests occupy the area south of the Sava and the Danube. This eco-region is within the paleo-arctic biomass of temperate broad-leaved and mixed forests. These forests extend from Podrinje to the west to the Black Sea coast in the east, from the periphery of the Pannonian Plain and the Carpathian slope in the north to the Aegean and the Marmara Sea in the south.

Pannonian mixed forests are distributed along the periphery of the Pannonian Plain. These forests are geographically limited to the Pannonian Plain and the eco-region that consists of broad-leaved and mixed forests of temperate landscapes.

Dinaric mixed forests are an eco-region on the mountains of the Balkan Peninsula and extend from the southeastern Alps to Prokletije at an area of 58.200 km^2, mostly in the Dinaric Mountains.

Rodopic mixed forests are small areas in the southeast of Serbia. Rhodope Mountain mixed forests are mostly in the Balkan and Rhodopes mountains in Bulgaria, while they are in smaller territories in Serbia, Macedonia and Greece.

The legal regulations in the area of environmental protection in Serbia are adapted to the international, especially taking into account protected areas. Legislation in Serbia is a forestry area that is adapted to European and world standards. In line with this, many international documents that are important for environmental protection and which are directly or indirectly important for the development of forestry have also been signed and accept. Among these documents, the following should be highlighted: Agenda 21 (1992), UN Framework Convention on Climate Change (1992), Convention on Biodiversity (1992), Convention on Long-range Transboundary Air Pollution (1979), Convention on Wetlands (Ramsar) 1977), Convention on International Trade in Endangered Species - CITES Convention (1973), Convention on the Protection of the World Cultural and Natural Heritage (1972), (https://upravazasume.gov.rs/wp-content/uploads/2015/12/Strategija-razvoja-sumarstva.pdf).

In accordance with the adopted international documents at the level of the Republic of Serbia, many legal acts were adopted which are influenced by the forestry sector: Some of them are the Constitution of the Republic of Serbia (1990); Law on Forests (1991); Law on Environmental Protection (2004); Law on Strategic Assessment of the Environmental Impact (2004); Law on Environmental Impact Assessment (2004); Hunting Act (1993); Law on Spatial Plan of the Republic of Serbia (1996); Inheritance Act (1995); Water Law (1991); Law on Agricultural Land (1992); Law on National Parks (1993); Law on assets owned by the Republic of Serbia (1995); Law on Business Enterprises (2004); Law on reproductive material of forest trees (2004).

Regarding the composition of forests in Serbia, 90,7% of the deciduous forests are represented in the largest percentage, and coniferous forests with 6,0%, while remaining 3,3% of mixed forests of deciduous forests and coniferous forests remain. Beech forests are dominant with 27,6%, then oak forests 24,6%, other hardwoods 6,0%, poplar 1,9%, other softwoods 0,6% and mixed hardwood forests 30%. General condition of state-owned forests in Serbia is unfavorable: age structure, unsatisfactory densities and health conditions, there is great deal of participation of interrupted forest assembly and weed area due to unplanned, uncontrolled and often illegal logging and exploitation (www.fornetserbia.com/doc/shared/Strategija_razvoja_sumarstva.pdf).

Climate change in Serbia has mostly affected the forest communities in the Danube-Carpathian basin. In this respect, climate change reflected the movement of the boundaries of certain types of forests in relation to the latitude and altitude, the change in the composition of individual plant communities, the disappearance and withdrawal of individual forest communities, the change in the relation of individual trees to light. All these changes due to the cumulative effect could endanger biodiversity and management of these natural resources in accordance with the principles of sustainable development (Medarević et al., 2007).

Regarding forest communities that have been placed under different types of protection in Serbia, about 543.000 ha (6,1%) of territory are five national parks: Fruška gora, Kopaonik, Tara, Šar planina and Đerdap. In addition, 15 nature parks, 50 strict and 21 special nature reserves, 284 nature monuments, 16 landscapes of exceptional features, 37 sites of cultural and historical importance and 624 natural rarities are being protected as protected natural assets (https://upravazasume.gov.rs/wp-content/uploads/2015/12/Strategija-razvoja-sumarstva.pdf).

Based on the annual plans in the Republic of Serbia, artificial afforestation is carried out within the existing forests and outside the forest (karst, bare, live sand, eroded and agricultural land). Public enterprises “Srbijašume” and “Vojvodinašume” and public companies of national parks, on the basis of these annual plans, carry out activities of raising and cultivating forests and planning woodcutting.

Table 1. *Surface areas in the Republic of Serbia with indexes*

Republic of Serbia	Afforestation (ha)		(ha)
	In the Forest	Outside of Forest	
2015	1338	398	1736
2016	890	390	1280
Index 2015=100	66	98	74

Source: *Statistical Office of the Republic of Serbia - release Statistic of forestry, number 128, LXVII, May 19, 2017.*

Table 1 shows the achieved afforestation activities in the Republic of Serbia in 2015 and 2016 and indexed data. The total forest area in 2016 is lower compared to 2015. Within the forest there were less afforestation than on the areas outside the forest where this activity was maintained at the same level. Within the activities of the state-owned company "Srbijašume", forestation and exploitation activities are coordinated in order to increase the areas under the forests that were exposed to uncontrolled exploitation in the previous period in order to improve the state of the environment at the state level.

The state of forest in Vojvodina

Forest areas in Vojvodina (which occupies the territory of 21.506 km2) make 175.136,05 ha, of which 130.589.26 ha are under the management of the Public Enterprise Vojvodinašume. Vojvodina forests, which are managed by state forests, are organized as four Forest Company: "Sremska Mitrovica", "Novi Sad", "Sombor" and "Banat" Pancevo. Large state-owned forested complexes as a special larger continent are within protected areas such as Fruska Gora National Park, Deliblatska peščara, Vršački breg, Subotička peščara, Posavina, Podunavlje, Potamišje and Potisje.

The arrangement of the remaining forests in Vojvodina is bad, so that in some areas of 500.000 ha there is not even 1% of the forest, and in some areas of 100.000 ha the humidity is less than 1%. Therefore, Vojvodina, which has become a desert in an ecological sense, if it reaches the planned 14% of the area under the forest, would not become a real desert. The economic importance of the forests in Vojvodina is reflected in the increase in the production of wood, especially of willow and poplar trees (in the last 40 years, the increase has increased for these species 6 times). In these Vojvodina urban areas, in addition to

the economic importance of forests, the following forest functions are important: in protection of soil from aquatic and eolic soil erosion, protection of the plow from excessive drainage, mitigation of the effects of climate change, greenhouse effect reduction, carbon dioxide bonding and oxygen production, conservation of biodiversity and geno-fonda of forest woody plant species.

In the forests fed by Public Enterprise "Vojvodinašume" the types of trees that are mostly represented are: European oak, poplar, willow, narrow-leafed ash and American ash and acacia. In the area of the Forestry company Sremska Mitrovica there are mostly forests of oak forests, while these forests are less represented on the forest companies Novi Sad and Sombor. The types of black poplar and willow are selected and planted with the application of agro-technical measures. There are also natural communities of these species in the riverside areas of the Danube, Tisa, Sava and Tamiš. The narrow-leafed ash is in the community with European oak in the lower and wet areas. The American ash can be found in unprotected areas in the river bank, due to its high spontaneous propagation capacity, this species represents a serious competition to indigenous species of forest trees, and is less economically significant compared to narrow-leafed ash.

Table 2. *Average timber volume in the Republic of Serbia (balance at the end of 2014)*

Region District City Municipality	Cut timber volume			
	Total m^3		Technical wood %	
	Deciduous forests	Coniferous forests	Deciduous forests	Coniferous forests
Republic of Serbia	2.551.738	402.087	34	58
Vojvodina Region	696.042	4.379	53	50
South Bačka District	171.005	209	51	94
City Novi Sad	39.220	196	45	93
Municipality of Novi Sad	20.236	-	65	-
Municipality of Petrovaradin	18.984	196	24	93

Source: *Statistical Office of the Republic of Serbia, Municipalities and Regions in the Republic of Serbia, 2016.*

Table 2 shows the comparative data on felled timber at the level of the Republic of Serbia, Vojvodina, South Backa District, the City of Novi Sad and its municipalities. Of the total volume of felled wood at the level of the republic of Serbia, the share of felled deciduous forests for Vojvodina is 27.27%, while for the city of Novi Sad 1.53%. Of the total cut wood volume in Vojvodina, 53% of the deciduous forests are large, of which there is a large share of quality wood of acacia trees.

Acacia is a species that is cultivated on sandstone in the function of forest protection belts. Acacia has a very wide use value, its wood is used for technical purposes, in construction and as firewood. In addition to the mentioned woody species in Vojvodina there are some other types of forest trees: Quercus cerris, black and white pine, linden, white poplar, European hornbeam and others (www.vojvodinasume.rs/sume/).

Table 3. *The survey of forested areas (ha) in certain regions, areas, cities and municipalities in Serbia (data refer to the situation at the end of 2014)*

Region District City Municipality	Afforestation (ha)				Forest surface total (ha)
	In the Forest		Outside of Forest		
	deciduous forestS	coniferous forests	deciduous forests	coniferous forests	
Republic of Serbia	884,00	454,00	184,00	214,00	2.168.746,00
Vojvodina Region	656,18	6,02	-	-	123.811,38
South Bačka District	250,70	-	36,78	-	22173,55
City Novi Sad	14,00	-	-	-	5.503,98
Municipality of Novi Sad	11,00	-	-	-	2.927,98
Municipality of Petrovaradin	3,00	-	-	-	2.576,00

Source: *Statistical Office of the Republic of Serbia, Municipalities and Regions in the Republic of Serbia, 2016.*

Table 3 shows the data related to afforestation in the Republic of Serbia within the planned activities of state forest enterprises. The data relate to afforestation of seedlings of deciduous trees and coniferous species. It also shows the total areas under the forests on the basis of which it can be noticed that the Vojvodina region should continue to be intensively afforested in order to prevent ecologi-

cal degradation of this area. To this end, the forest company "Banat" should be mentioned, under whose management there are forests and three protected areas. This forest company occupies an area of 52.190 ha, of which 96% is under state administration, and the remaining 4% is privately owned. Of the total forest area in state ownership, the area by 66% (32.820 ha) is covered by the forest, 40% of which is under of natural forest (20,001 ha, which is a percentage that is much higher than the average at the level of the provincial Vojvodina and exceeds the republic average) and under forest culture is 26% (12.447 ha). Forestry company "Banat", within its plans and activities, deals with the following: cultivation and protection of forests, restoration, maintenance and use of forests, production of planting material, raising new forests and, breeding and hunting of game, fishing, forest products trade, management protected areas, tourism, hospitality and research and development.

The wood fund of this company is 4 million cubic meters. Within this fund, 81% are deciduous forests, while 19% are conifers. Poplar cultures are 36% of the total wood fund, then are acacia, black and white pine, linden, oak, white willow, ash and others.

According the annual plan cut about 140.000 m3 of hardwood deciduous (oak, ash, acacia, beech) and softwood deciduous (lime, poplar aspen). In the total timber assortment structure, 60% are quality poplar logs, which serve further for the production of veneer or peeling.

There are three protected areas on the surface of 33.666 ha within the "Banat" forestry farm. These protected areas are Delibatic sandstone, Vršac mountains and Imperial Bar. The special nature reserve of the Delibatic sandstone represents the largest European area built of Eolian sand with expressive forms of the dino relief. In this nature reserve there are sandstone, steppe, forest and wetland ecosystems. There are about 1000 species of plant species, including rarities, relics, endemic species and subendems. Deliblato Sand is considered to be the last and largest oasis of autochthonous vegetation of the Pannonian lowland, and the biodiversity center in Europe. By the Decree of the Government of Serbia since 2002, this reserve was declared a protected area managed by a public company "Vojvodinašume".

State of the forest fund in Novi Sad

Novi Sad is the capital of the province of Vojvodina. This city with its surroundings is a unique and indivisible urban-rural environment. The city is located on the banks of the river Danube between 1252 and 1262 km of river flow. On the left bank of the Danube, there is a plain part of the city belonging to Backa, while the hilly part of the city belonging to Srem is located on the right bank of the hills of Fruška Gora. The elevation from the side of the side is from 72 to 80 m, while from the Srem side it is from 250 to 350 m. In Novi Sad, Mali Bački Channel flows into the Danube, which is part of the Danube-Tisa-Danube Channel.

The city of Novi Sad occupies an area of 702,7 km^2, with the narrower area of Novi Sad with Petrovaradin and Sremski Kamenic on a surface of 129.4 km^2. The city's construction area occupies 106.2 km^2. The city of Novi Sad as an administrative center belongs to 15 suburban settlements.

Novi Sad is located on important road corridors with road, rail and river connections. Corridor 10 crosses the city, connecting eight countries in the direction of Salzburg-Thessaloniki, while Corridor 7 or the Danube Corridor represents a significant waterway connecting the countries of Western Europe with the Black Sea through the Danube (https://sr.wikipedia.org/srec/%D0%9D%D0%BE%D0%B2%D0%B8_%D0%A1%D0%B0%D0%B4).

Regarding the forest fund in the territory of the City of Novi Sad, out of the total 70.270 ha on which this city lies, 5.234,45 ha is under the forest. Out of which state-owned land is 3.468,11 ha, and in private ownership 1.776,34 ha is under forest. (Development Plan of the South Bačka Forest Area for the period 2016-2025, 2017). With regard to the percentage representation, this represents 7,45% of the total area (which is slightly higher than the provincial average of 7.1%), which is much less compared to the republic average, which is around 29.1% (at the level of central Serbia it is 37.6%). (National Forest Inventory of the Republic of Serbia, 2009)

In the area of the city of Novi Sad there are different ecosystems that are characterized by significant biodiversity. The Danube's floodplains are distinguished by various aquatic, wetland, marshland ecosystems, which alternate with low occasional flooding meadows and forests. These ecosystems have a diverse flora and fauna with many endangered rare, relict and endemic species. Regarding the fish fund in the Danube and the flooding area, 46 species of fish are registered,

of which 38 are domestic. Koviljsko -petrovaradinski rit is distinguished by a significant number of bird species of 172 species of which 118 species are nests.

Considering that the Fruska gora in the terciary was an island, first in the Mediterranean, then in the Pannonian Sea there is a flora gets of over 1500 species. The forest is covered with 90% of Fruška Gora, of which 30% is lime (tilia) forest. There are 30 types of orchids in the plant communities of Fruska. On the slopes and the foothills of Fruška Gora mountains there are pastures, vineyards and orchards. The vineyards of Fruska Gora are grown over 2500 years from the time of the Roman Empire. There are 200 species of birds found on Fruška Gora, of which there are 11 species of birds of prey that are here and nest. In terms of hunting game, deer, fallow deer, and moufflon are limited to hunting grounds and hunting reserves, while rabbits and roe deers can be found in the wider area. The Danube, Futoški and Kamnik parks are protected monuments of culture due to the rich flora and fauna.

In the town of Novi Sad there are urban greenery, parks, lawns, avenues and flower alleys that contribute to the aesthetic experience of the city, but are also significant in the healthcare aspect. From the parks in Novi Sad it stands out as the most interesting Danube Park. Some examples of unusual and unique trees in Novi Sad were placed under the protection of the state (Koprivić in the center of Novi Sad (1st category), American platan on Sajlov (3rd category), American platan in Futog (3rd category), Platan in the courtyard of the Basic school "Miloš Crnjanski" (3rd category), mulberry on Čenejski salaš (category 3), *Platanus* × *acerifolia* in Novi Sad (3rd category)). Status protected trees or "monuments of nature" are obtained on the basis of exceptional dendrological and aesthetic qualities, as representatives of rare species in this area or as rare representatives of species typical in this area.

On the wider area of Novi Sad, represented typical agro-eco systems on the Backa side are represented, forest complexes are located on Fruška gora, and the Fruska Gora gorge is distinguished by the cultural landscape and the Danube regions by marshland forests and floodmeadow. In this very diverse area we encounter forest vegetation of Fruška gora, plant communities of loess plane, vegetation of the alluvial plane Danube, wetland and meadow plant communities and anthropogenic forests.

Forest communities are reduced and degraded to a great extent, which greatly disturb the stability of biological, climatic, hydrological and pedological (forests prevent soil erosion) opportunities.

In the area of Novi Sad, forest complexes are located on the coastal belt and Danube river islands, on the left bank of the Danube there are forests in cadastral municipalities Begeč, Futog, Novi Sad, Kać and Kovilj, while on the right there is a forest between Petrovaradin and Srem Karlovci and Sremska Kamenica and Beočin. The forests of this area are exposed to deforestation and are suppressed in low-lying areas or in the areas in front of the embankments. Thus, the indudacion flat and the remaining low-flowing forests became significant in an ecological, recreational, touristic way. Forests in the coastal belt of the Danube are of importance for the development of excursion tourism. The Danube banks are under special protection in the width of 100 m, in order to preserve the nature and used for tourist, recreational, fishing activities, on the principles of sustainable development. (Environmental Protection Study in the area of Novi Sad, 2009)

Public Enterprise Vojvodinašume with a branch of forestry company Novi Sad (Novi Sad) performs planned exploitation and afforestation in its area of the city. On the basis of the plans of this forestry company there is logging: willow, poplar, acacia, American ash, hornbeam, lime (tilia). In addition, afforestation of the following woody species is planned: acacia, white poplar, field ash, spruce, willow, tilia and oak (Plan of development of South Bačka forest area for the period from 2016 to 2025, 2017).

Table 4. *Presentation of forested areas in the territory of the City of Novi Sad for certain wood species planned in 2017.*

Municipality	Afforestation (ha)							Total (ha)
	Acacia	White poplar	Poplar clones	Field ash	Spruce	Willow	Tilia	
Novi Sad	3,09	31,19	970,39	12,85	-	262,35	-	1279,87
Petrovaradin	-	-	62,33	0,47	-	15,34	-	78,14
Total state forests	3,09	31,19	1032,72	13,32	-	277,69	-	1358,01
Novi Sad	26,87	12,07	214,43	37,97	-	148,39	7,63	447,36
Petrovaradin	12,07	0,93	0,87	-	0,08	0,56	-	14,51
Total private forests	38,94	13,00	215,30	37,97	0,08	148,95	7,63	461,87
Novi Sad	29,96	43,26	1184,82	50,82	-	410,74	7,63	1727,64
Petrovaradin	12,07	0,93	63,20	0,47	0,08	15,90	-	92,65
Total City Novi Sad	42,03	44,19	1248,02	51,29	0,08	426,64	7,63	1820,29

Source: *Data taken from the Forestry Novi Sad*

On the basis of Table 2, it is noticeable that at the level of the city of Novi Sad the largest percentage of felled wood is used as a technical tree. Based on this, it is

concluded that the leafy wood species that are processed here are of high quality. Table 3 shows the data on afforestation at the level of the city of Novi Sad by species of deciduous forests. Table 4 shows which wood species are represented in the afforestation plan. The largest share in the afforestation of Novi Sad Forestry is occupied by seedlings of poplar clones after willow. In addition to the listed species, according to the data obtained from this farm, on the territory of the municipality of Novi Sad, on the surface of 0.42 ha, sowing seed of oak ore was carried out.

Part of the Novi Sad Forest Fund belongs to the Koviljsko-Petrovaradinski rit as a special nature reserve (this nature reserve extends in the territories of the municipalities: Novi Sad, Petrovaradin, Sremski Karlovci, Indjija and Titel). Kovinjsko -petrovaradinski rit is a complex of marshland ecosystems along the Danube at 4,840 ha, as a nature reserve of exceptional importance, it is classified in the first category of protection. Among the woody plant species represented in this area are the willow (white and almond), poplar and ash. Poplar plantations are in more than half of the area (55.6%) of this protected area. (Annual program for theediting of agricultural land 2017).

In Novi Sad, in the settlement Begeč, there is a nature park Begeč jama. Begeč jama is located on an area of 489 ha and represents the natural good of the II category under the protection of the state. Begeč jama is the Danube branch, which represents a specific preserved ecosystem of exceptional biodiversity. The floodplain lake, Šašićeva ada, river beams and still whater are included in this nature park. Around the lake on a surface of 40 hectares there are reeds, white poplar forest (*Populus alba*) and black poplar (*Populus nigra*), black mulberry, white willow. There are 125 taxa of higher plants, and among them rare species such as, white water lily, frogbit, water caltrop, water ferns, etc.

Conclusion

Novi Sad, as the administrative and cultural center of Vojvodina, represents the urban industrialized zone and the backbone of the economic progress of the region. The intensive agricultural activity has led to the suppression of forest ecosystems throughout the territory of Vojvodina and Novi Sad. Preservation and improvement of the remaining natural forests, planned forest management and afforestation are the goals that are being pursued in accordance with sustainable agricultural development. In accordance with the accepted international standards and the National Strategy for Sustainable Development, it is possible to promote sustainable forest

management in protected natural resources, based on harmonized development of ecological, economic, social and cultural functions of forests. Based on the data presented, it can be concluded that in Novi Sad, as a metropolitan area within the Danube region, activities of improvement and rehabilitation of the state of the forest fund are planned in accordance with the principles of sustainable development.

Forestry company Novi Sad, as part of the public company "Vojvodinašume", undertakes activities aimed at improving the existing state of forests and preserving natural forests within protected areas. According to the data of this activity, afforestation must be enhanced, in order to make Novi Sad an ecological better environment. Natural protected reserves and natural parks and natural resources within the city of Novi Sad do not represent large areas but preserved natural ecosystems that are improving and represent a growing tourist value in recent times.

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FACTORS THAT AFFECT THE TOURISTS PERCEPTION ABOUT THE DESTINATION ECOLOGICAL SUSTAINABILITY

Nataša Đorđević[1], Marija Kostić[2]

Abstract

Sustainable development of tourism is increasingly seen as the only possible form of tourism development in the destination. Also, awareness of the need for environmental protection is on the rise, which affects the increase in popularity of ecotourism and ecotourism destinations. Through the ecological sustainability of the tourism destination, the natural resources are protected and thus the natural attractions of importance for the development of tourism are preserved. Bearing this in mind, such sustainable development can be a long-term source of the destination's competitive advantage in the tourism market. The aim of the paper is to determine which are the key factors that influence whether a tourist will perceive a tourism destination as ecologically sustainable. The methods used in this paper include fieldwork and cabinet research. The survey was carried out on random sample by sending a questionnaire via e-mail.

Key words: *ecological sustainability, sustainable development, tourism destination, touristic motives.*

Introduction

The alarming changes in the environment such as (Union of Concerned Scientists, 2018): rising seas and increased costal flooding, longer and more damaginig wildfire seasons, more desturcitve huricanes, more frequent and intense heat waves, an increase in extreme weather events, increased pressure on groundwater supplies, melting glaciers, destruction of coast reefs etc, have contributed to the increase of importance of sustainable development in the 21st century and of the awareness of the necessity for environmental protection. The researches show

1 Nataša Đorđević, M.Sc., teaching assistant, University of Kragujevac, Faculty of Hotel Management and Tourism in Vrnjačka Banja, Vojvođanska no. 5A, 36210 Vrnjačka Banja, Serbia, Phone: +381 365 150 021, E-mail: natasa.djordjevic@kg.ac.rs

2 Marija Kostić, Ph.D., Assistant Professor, University of Kragujevac, Faculty of Hotel Management and Tourism in Vrnjačka Banja, Vojvođanska no. 5A, 36210 Vrnjačka Banja, Serbia, Phone: +381 36 515 00 21, E-mail: marija.kostic@kg.ac.rs

the increasing number of consumers who are ready to pay more for ecologically responsible brands, which contribute to environment preservation and social development. From 2014 to 2015 the percentage of these consumers has increased from 55% to even 66% (CREST, 2016). A survey conducted in the Western Costa del Sol (Andalucia, Spain), showed that most tourists (97.8%) with high levels of "sustainable intelligence" (commitment, attitude, knowledge and/or behavior with regard to sustainability) are willing to pay more to visit a sustainable tourism destination. However, overall, only 26.6% of all types of tourists surveyed are willing to pay more to visit a sustainable destination, and a large majority of those who are willing to pay more for sustainable tourism products would not pay more than 10% above the cost of travel (CREST, 2018). Such a trend in demand can be regarded as a chance for the subjects of tourism offer to be used by applying the principles of sustainability development. On the other hand, bearing in mind the responsibility towards the enviroment, this type of development is suggested as necessity and priority in one's endeavours in economy.

As the sustainable development has become both necessity and a trend in tourism market, it appears a question of how the application of sustainability principles on the supply side affects the tourists and in what way they perceive sustainability of tourism destination. The goal of this paper is to determine the way in which tourists perceive the ecological sustainability of a tourism destination.

The main question of the research is related to whether tourists firstly perceive the ecological sustainability of tourism destination based on the factors related to the activity performed due to application of sustainability principles or due to the condition of nature (natural resources and attractions). The thesis statement is that the activities for application of ecological sustainability principles are first to be perceived as the key factors needed by tourism destinations in order to be ecologically sustainable, while nature and its values are regarded as primary attractions of this type of destinations.

Literature review

Tourism can put enormous pressure on an area and lead to impacts such as soil erosion, increased pollution, discharges into the sea, natural habitat loss, increased pressure on endangered species and heightened vulnerability to forest fires. It often puts a strain on water resources, and it can force local populations to compete for the use of critical resources (Sunlu, 2003). Tourism has

been one of the key drivers to the anthropogenic component of global warming, which is predicted to contribute about 7.5% of global CO2 emissions in 2035 (Chen et al., 2018).

To balance economic, environmental and socio-cultural objectives, and to support economic activities there is an increase need for sustainable development in toursim. According to United Nations Environment Programme and World Tourism Organization (UNEP, UNWTO, 2005) "sustainable tourism is tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities. Sustainable tourism should thus make optimal use of environmental resources, respect host communities and ensure viable, long-term economic operations, providing benefits that are distributed fairly among all stakeholders". Therefore sustainable tourism should be based on sustainable preservation of ecological, socio-cultural and economic components (UNWTO, 1992).

Ecological sustainability of tourism destinatintion is a type of development with a specific focus on the preservation of the indispensable ecology and biodiversity (Sangchumnong, 2018), i.e. it focus on environmental protection, resources, energy, air and waste (Nilnoppakun, Ampavat, 2016).

In order to achive ecological sustainbility the destination managment can use soft strategies for sustainable development, in terms of planning and management, these are applied in modified environments such as urban centres where the absence of intact natural environment makes the environmental protection an irrelevant factor regarding that highly developed tourism activities do not necessarily cause stress in the social and natural environment. This approach is in strong contrast to the strategies of sustainable tourism that are applicable for relatively intact natural and cultural environment where even a small increase in tourist activity can result in unacceptable social and cultural damage to the natural environment (Angelevska-Najdeska, Rakicevik, 2012).

An important part in managing sustainable development of tourism represents the management of visitors which consists of controlling the visitors' number, determining their way of behaviour, adapting the destination's resources in such a way that they can withstand the visitors' pressure, while not leading to degradation (Mason, 2015). In order to achieve ecological sustainability, destination management needs to determine ecologically carrying capacity which presumes maximal level

of tourist usage of the location while not leading to ecological degradation. Its estimation includes complex observation of a string of factors such as ecological, geomorphic, and climatic characteristics of destination, the number of visitors, types of tourism activities, the level of built tourism capacities, infrastructural content, economic factors. From the aspect of sustainable usage of natural resources this is the most demanding form of carrying capacity (next to psychological, socio-cultural, and economic base capacity) because by rule, tourism tends to exploit natural resources as much as possible while often disregarding their sustainability. This capacity in a destination can be expressed through: acceptable level of tourist overcrowding and density in the crucial spaces (such as beaches, parks, and the like), maximally acceptable loss of natural resources (water or soil), acceptable level of air or water polution, acceptable level of noise, intensity of usage of traffic infrastructure and traffic objects and services, usage and congestion of community objects and services (water supply, electricity, waste management) and adequate availability of other social objects and services in a tourism destination that are in regards to public health, security and safety, etc. (Jovičić, 2011).

The key participants (*stakeholders*, groups of interest) in sustainable tourism development are (Popesku, 2007): public sector (governments, local law agencies, etc.), tourism industry, various forms of associations (professional associations, non-governmental organizations, etc.), local community (local residents of a destination), media and tourists.

United Nations discussed the sustainability indicators and accepted an action plan which is named as Agenda 21, where priority areas of Agenda 21 action plan for 'Travel and Tourism' are (UNWTO, 1992; Yüzbaşıoğlu et al., 2014): reducing waste and recycling, energy efficiency and effective management, freshwater management, waste water management, hazardous materials, transportation, land management, cooperation of employees, local people and tourists for activities of sustainability, arranging sustainability, cooperation for sustainable tourism.

According to Gössling, Hall and Weavar (2009) there are numerous challenges in the realization of sustainable development of a tourism destination, one of them being that the tourism economy is not directed by neither the state nor the market to achieve higher sustainability. Beside that, tourism economy often refuses to accept the responsibility for negative impacts to environment and the necessity to change its approach in management. In order to achieve successful realization it is needed to include all the key stakeholders, however, in practice this is somewhat

different so certain parties who take interest are often not included in the planning and realization of sustainable development although they have a significant role in tourism development (e.g. National Tourism Organization - NTO, local community and other).

Some authors like Liu (2003), emphasized some weaknesses in the concept of sustainability of tourism destinations such as: attention is not paid to the tourism demand at the destination level; discussion of resource sustainability usually fails to appreciate that resources evolve with the changing needs, preferences, and technological capabilities of society; and many writers and practitioners enthusiastically promote new types of tourism that are more linked to sustainability (e.g., ecotourism, alternative tourism, responsible tourism, soft tourism, low-impact tourism, community tourism), but experience shows that none of these forms can properly combine sustainable development with the growing tourism industry worldwide. In this context, sustainable tourism requires both the sustainable growth of tourism's contribution to the economy and society and the sustainable use of resources and the environment based on the analysis of the tourism demand (Liu, 2003; Rodríguez Díaz, Espino Rodríguez, 2016).

Sustainable tourism demand

Although sustainable tourism is not a new form of tourism, but evolutional step for all tourism forms (Bošković, 2015), it can be spoken of sustainable tourism demand, in other words, tourists who rather choose tourism destinations based on how much they contribute to sustainable development and how much and in what way they are a part of this development. Also, modern tourist seeks for experiences that give him a feeling of closeness with natural values and local community. In literature, this type of tourist can be found by names such as environmental or ecological tourist, ethical tourist, or sustainable tourist (Pulido-Fernández, López-Sánchez, 2016), but it has become difficult to define this type of tourist segment, because their activities coincide with the activities of tourists of rural tourism, adventure tourism, and nature tourism (Blangy, Vautier, 2001). These kinds of tourists are mainly motivated by the willing of discovering new and uncontaminated natural contexts, and to experience cultural enrichment (Conti, Micera, 2018).

Acording to the TUI global research about sustainable tourism, one in ten European tourists book eco-friendly holidays (TUI, 2017). These sustainable travellers are generally higher-educated, well-travelled people of all ages from higher socioeconomic groups (CBI, 2017).

There are five different types of tourists regarding their understanding of sustainable tourism that can be identified (Wehrli et al., 2011):

- The *balanced type* seriously observes all three dimensions of sustainable tourism.
- The *sceptic* has a critical attitude towards sustainable tourism.
- The *socio-economic type* who values more the social and economic dimension of sustainable tourism.
- The *localised type* who values especially the attributes related to local aspects of sustainability and to culture as relevant for sustainable tourism.
- The *ecological type* considers in particular ecological aspects to be relevant for sustainable tourism.

An important role in the decision to choose a tourism destination can have tourists` attitudes and perceptions and destination image. The image is the sum of perceptions and beliefs that people have in relation to that destination. The image of a destination is not necessarily based on prior experience, i.e. a visit to that destination (Mazilu, 2012). A significant number of studies have been published that attempt to measure the potential of demand segments with motivations and perception linked to sustainability (Deloitte 2008; Wehrli et al., 2011; Pulido-Fernández, López-Sánchez, 2014; Bernini et al. 2015).

According to Pulido-Fernández, López-Sánchez (2014) if a destination wants to differentiate itself in the market as a destination that carries out practices and offer tourism products of a sustainable nature - in short, as a sustainable destination - the image that it conveys will be crucial to encourage more visitors to appreciate and value these issues. Also, if destination wants to advance in sustainability, it is not only enough to implement supply policies, but it is also necessary that "their" tourists are also involved in this process; that is, they must value (both ethically and economically) these issues. In that sense it is not sufficient to guide tourism supply towards more sustainable practices; it is also necessary that tourists appreciate these efforts and are willing to make their own efforts by improving their behavior, of course, and by paying a higher price to enjoy a destination that is making an effort to be more sustainable. In this way, the demand would support the actions undertaken on the supply side (Pulido-Fernández, López-Sánchez, 2016).

The reasearch method

The research on the factors that affect the respondents' perception of ecological sustainability of tourism destination has been carried out on random sample by sending the questionnaire via email in November 2018. The questionnaire was distributed to 250 email addresses after which there were 110 responses, giving a response rate of 44%. Prior to the research, there was a preparation of the questionnaire which consisted of 10 questions of open-ended and closed-ended type. The questionnaire was divided in two parts. The first part consisted of 5 questions that were related to socio-demographic characteristics of respondent. In the other part of the questionnaire, respondents had the possibility to give answer to 5 more questions designed in accordance to the main research question related to whether tourists rather perceive ecological sustainability of tourism destination based on the factors which were in relation to activities that were performed because of application of sustainability principles or rather based on the condition of nature (natural resources and attractions).

According to Liu (2017), in defining a framework identifying factors influencing travel motivations for sustainable tourism destinations, ecological dimension of destination sustainbility can be observed as pull factor. Starting from this finding, the questions in the research about the factors that influence the perception of ecological sustainability of tourism destination were defined. As pull factors of ecological sustainability of a destination, the actions that are performed in order to accomplish ecological sustainability and preservation of natural destination's value as the key attraction and the result of sustainable development were observed. In this sense for the needs of research, the factors that could affect the perception of ecological sustainability of tourism destination were divided into factors that were related to activities performed for the sake of preservation of nature and its values. Based on this, questions that were derived were related to who had the main role in realization of these activities, which type of tourism and which destination type were rather related to ecologically sustainable tourism destinations.

The goal of the research is to identify the key factors that may have influence on the perception of ecological sustainability of tourism destination. The data gained through questionnaire research has been processed by descriptive statistical analysis.

Results and discussion

There were 110 respondents who took part in this research, out of which 88 were female (80%) and 22 were male respondents (20%). For the question of age, 5 age groups were defined. The respondents belonging to the age group from 18 to 25 years, that is 74 respondents (67,3%), make the largest part of participants, as well as the respondents aged 26-35, which is 31 respondent (28,2%).

According to the education level, the highest number of respondents are those who finished high school, 46 respondents (41,8%). Moreover, a significant participation was taken by the respondents who have a bachelor degree, which is 39 respondents (35,5%).

Most respondents live on the territory of Serbia which is 108 respondents (98,2%), while one respondent is the USA resident, and one is Greek. Residents of Vrnjačka Banja make the highest number of respondents – 29 (26,4%), followed by Trstenik – 14 respondents (12,7%), Kraljevo - 11 respondents (10%). Other cities that are respondents' place of residence are: Belgrade, Kragujevac, Niš, Novi Sad, Požarevac, Leskovac, Lapovo, Kruševac, Ivanjica, Vranje, Čačak, Aranđelovac, Valjevo, Prokuplje, Paraćin, Knjaževac.

Forty respondents stated that they travel once per year (36,4%), then those who travel twice per year 32 (29,1%) and more than two times per year - 38 respondents (34,5%), concluding that there are 70 (63,6%) respondents who travel twice per year or more than two times per year (table 1).

Table 1. *Socio-demographic characteristics of respondents*

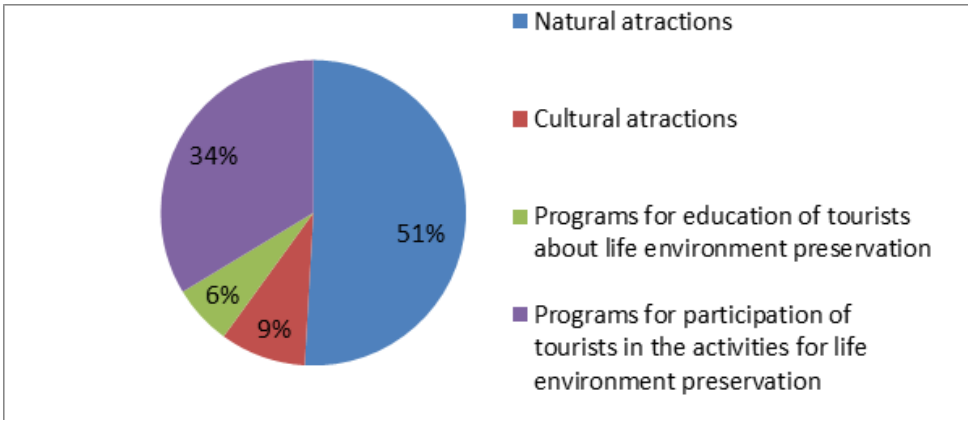
		Frequency	Percentage (%)
Gender	Male	22	20
	Female	88	80
Age	18 -25	74	67,3
	26-35	31	28,2
	36-45	3	2,7
	46-55	1	0,9
	More than 55 years	1	0,9
Place of permanent residence	Vrnjačka Banja	29	26,4
	Trstenik	14	12,7
	Kraljevo	11	10
	Kragujevac	4	3,6
	Beograd	4	3,6
	Other places in the territory of Serbia	46	41,8
	Places out of the territory of Serbia	2	1,8

		Frequency	Percentage (%)
Level of education	Primary school	0	0
	High school	46	41,8
	College	8	7,3
	University degree	39	35,5
	Master/Magistar/PhD	17	15,5
How often do you travel?	Once per year	40	36,4
	Two times per year	32	29,1
	More than two times per year	38	34,5

Source: *Authors, based on research*

Within the first question related to evaluation of factors that could influence the perception of ecological sustainability of tourism destination, the respondents chose the groups of attractions that were, in their opinion, of the most importance for the ecologically sustainable tourism destinations. In the given answers, beside basic natural and cultural attractions, there were the activities that could be characteristic for ecologically sustainable destinations, designated for tourists, and which could in this sense be regarded as an appealing factor in a destination. A high number of respondents 56 (50,9%) believes that *natural attractions* are the most significant for ecologically sustainable destinations as well as *programs for participation of tourists in the activities for life environment preservation,* which was the view of 37 respondents (33,6%). There are a small number of respondents who believe that those are *cultural attractions* and *programs for education of tourists about life environment preservation* (graph 1).

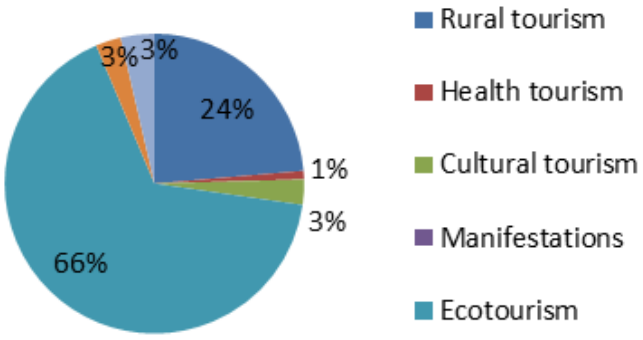
Graph 1. *Respondents' answers to the question which attraction are the most important for the destination ecological sustainability*



Source: *Authors, based on research*

The highest number of respondents – 73 (66,4%) chose that the answer to the question *Which form of tourism would you associate with ecologically sustainable tourism destinations* would be *ecotourism*, while 26 respondents (23,6%) chose *rural tourism*. There are a number of terms in wider circulation which are often confused with or conflated with sustainable tourism and one of them is ecotourism (Bulatović, Rajović, 2016). Although it is about different terms, ecotourism is most often connected to sustainable tourism destination management, because it is about of tourism form that is based on the application of sustainable development principles (Milićević et al., 2016). The other answers are shown in the graph 2.

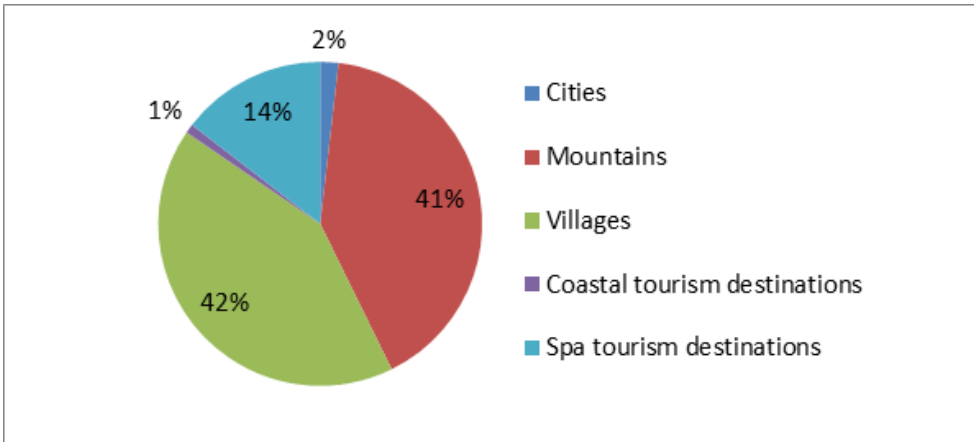
Graph 2. *Respondents' answers to the question Which form of tourism would you associate with ecologically sustainable tourism destinations*



Source: *Authors, based on research*

The question *Which type of destination would you rather think to be ecologically sustainable tourism destination* resulted in the answer, by the largest part of the respondents, that those are destinations where primary attractions are those of natural value and which have a low level of urbanization. According to the opinion of respondents, in the first place those are village destination, which 46 respondents (41,8%) opted for, followed by mountain destinations which were the choice of 45 respondents (40,9%). Only 16 respondents (14,5%) view spa destinations as ecologically sustainable, while the lowest number of respondents views city and seaside destinations as ecologically sustainable (graph 3).

Graph 3. *Respondents' answers to the question Which type of destination would you rather think to be ecologically sustainable tourism destination*



Source: *Authors, based on research*

In the following question *What is the most important factor that a destination must have in order to be ecologically sustainable tourism destination,* the respondents had the possibility to opt for 3 answers out of eleven. The given answers were factors grouped in the activities that a tourism destination performs for the sake of ecological sustainability (the first 6 given factors) and natural values (the last 5 given factors), which could be regarded also as a result of ecological sustainability of tourism destination (Table 2).

Table 2. *Respondents' answers to the question What is the most important factor that a destination must have in order to be ecologically sustainable tourism destination*

Responses	Frequency	Percentage (%)
Architectonic control, the usage of corresponding materials for infrastructure that are compatible with the local surrounding and minimal endangering of the scenery by building new objects.	**29**	**26,4**
Wastewater treatment, appropriate waste disposal, and the usage of alternative energy sources such as solar energy, bio gas, composting, etc.	**68**	**61,8**
The existence of "green hotels", eco inns and other accommodation capacities that work on the principles of sustainable development	**46**	**41,8**

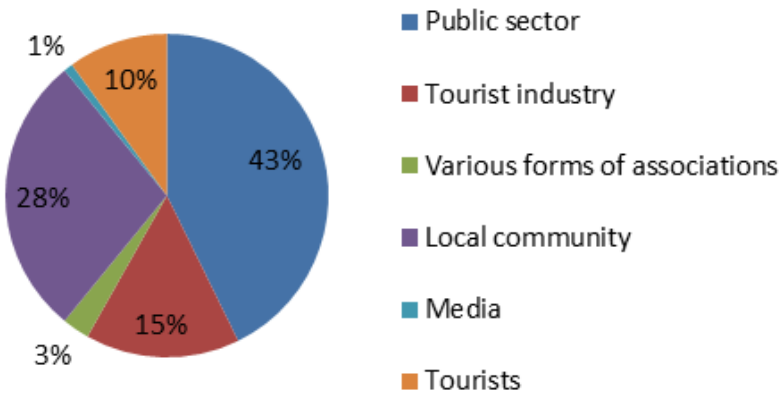
Responses	Frequency	Percentage (%)
Determing the carrying capacity (maximal number of tourists that can visit a destination).	**39**	**35,5**
Marketing directed to promoting a decrease in over-usage, re-usage, and recycling (3R - Reduce, Reused and Recycle).	**18**	**16,4**
Education of tourists and local residents about life environment preservation.	**46**	**41,8**
There are various natural habitats (forests, meadows, lakes, rivers and others).	**16**	**14,5**
Preserved nature and ecological processes.	**31**	**28,2**
The existence of rare and unique species of plants and animals.	**3**	**2,7**
Richness in biodiversity.	**7**	**6,4**
Protected natural areas and protected plant and animal species.	**27**	**24,5**

Source: *Authors, based on research*

The largest part of the study subjects, 68 (61,8%) believes that the factor of *Wastewater treatment, appropriate waste disposal, and usage of alternative energy sources such as solar energy, bio gas, and composting, etc.* is the most significant for the ecological sustainability of tourism destination. This factor is of importance to management of natural resources and it lies within a group of factors related to the activities for ecological sustainability of a destination. Based on the level of importance there are factors of *The existence of "green hotels", eco inns and other accommodation capacities that work on the principles of sustainable development* and *Education of tourists and local residents about life environment preservation* which was opted for by equal number of respondents, 46 (41,8%), and which also belong to the group of factors related to the activities for ecological sustainability of a destination. When it comes to the group of factors that are in connection to nature and its values, the highest number of respondents, precisely 31 respondent (28,2%) stated that the most important factor that an ecologically sustainable destination must possess is *Preserved nature and ecological processes*, while a lower number, 27 study subjects (24,5%) is of opinion that the most important factor is *Protected natural areas and protected plant and animal species*. The other answers are shown in the Table 2. According to the represented answers, it can be concluded that there are more respondents who opted for the factors related to the activities that need to be carried out so that the destination would be ecologically sustainable, rathen than for the result of its ecological sustainability – preserved life environment and natural values.

Within the last question *Who has the most important role in achieving the ecological sustainability of tourism destination*, all the key stakeholders which according to Popesku (2007) participate in the sustainable development of a tourism destination were numbered as the given answers.

Graph 4. *Respondents' answers to the question Who has the most important role in achieving the ecological sustainability of tourism destination*



Source: *Authors, based on research.*

The highest number of study subjects, which is 47 (42,7%) stated that the most important key role is played by the *public sector*, followed by *local community* which was opted for by 31 respondent (28,2%). Only 17 respondents (15,5%) believes that *tourism industry* has the crucial role, while 11 subjects of study (10%) give the priority to *tourists*. The lowest number of the respondents make those who agree that various forms of associations play the most significant role – 3 respondents (2,7%), and media which in opinion of only one respondent may have a primary role in achieving ecological sustainability of tourism destination (graph 4).

Conclusion

A destination needs to include tourists in order to develop tourism with sustainability, but also to look into their perception of sustainability, motivation, and how much they are ready to support sustainable development of tourism destination. This leads to the necessity to define a certain frame and research method which will define the connections in relation to tourists and sustainable tourism development.

The research that was carried out in the paper leads to a conclusion that the respondents associate factors related to the activities performed for the sake of application of ecological sustainability principles rather than the factors in connection to preserved nature and its values as the factors that must be in possession of destinations in order to be ecologically sustainable. The highest number of study sample stated that the natural attractions are crucial for ecologically sustainable destinations. Also with these destinations they associate tourism types (ecological and rural) and destinations (villages and mountains) that are believed to be natural values as primary attractions, in other words, a motivation for tourists' visit. Based on this it can be concluded that the thesis statement, which is *the activities for application of ecological sustainability principles are first to be perceived as the key factors needed by tourism destinations in order to be ecologically sustainable, while nature and its values are regarded as primary attractions of this type of destinations* has been proven. Public sector, that was selected by the study sample as the key stakeholder in the development of ecological sustainability, has a role in making a basis and a frame for development of sustainable tourism. This shows that the respondents clearly recognized the role of public sector. However, a question that is raised is what their awareness of the role of other stakeholders is.

It is not easy to measure tourists' perception of a destination. In order to achieve preciseness in measurement, it is necessary to define higher factor groups that can affect this perception. By researching the perception of tourism destination sustainability of potential tourists, it is possible to create marketing strategies more attentively, moreover, as Buhalis (2000) indicates, destination marketing is one of the key success drivers of sustainability.

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ECONOMIC EFFICIENCY OF TRADE ON WHOLESALE MARKETS

Nedeljko Prdić[1], *Miljana Barjaktarević*[2]

Abstract

The basic aim of this workpaper is cognition of evaluation elements of agriculture products on wholesale market economic sustainability, using the concept of economic efficiency and multifunctionality. Realization of basic aim of the workpaper will remove all dilemmas and accept principles and recommendations that will enable recognition of the most important market, competitiveness, price and other factors for sustainable trade model. Based on achieved business results, wholesale markets realize positive rate of return on investments, observing their role and significance in market developed industries, points of sale, significance of buyers and potential buyers, awareness, interest and sale level in relation to costs. They are very useful for cost efficiency evaluation, especially in comparison to other trade points and costs of direct trade. The conclusion is that direct sale of merchandise on wholesale markets may be calculated as total value and percent of realizedsale andfulfil economic and communication aims.

Key words: *economic efficiency, sustainable commerce, wholesale market, agriculture products, multifunctionality.*

Introduction

Wholesale markets are specialised market institutions where trade of agricultural products is performed, mostly fruit and vegetable, but also other products in agroindustry complex. These market institutions have basic function to supply big cities and regions with agricultural and other agroindustry products, depending on their purpose and multifunctionality. Observing these specialised market institutions from the aspect of organisation, they are mostly placing for trade with unstandardized and partially standardised trade process.

1 Nedeljko Prdić, Ph.D., JKP Tržnica, Novi Sad, Đorđa Servickog no. 2a/6, 21000 Novi Sad, Serbia, Phone: +381 63 500 818, E-mail: ekonomistdoo@sbb.rs

2 Miljana Barjaktarević, Ph.D., Full Professor, Alfa University, Palmira Toljatija no. 3, 11070 Belgrade, Phone: +381 69 44 10 620, E-mail: miljana.barjaktarovic@alfa.edu.rs

Basic market function of wholesale markets is possibility for sales of great quantities of agriculture products and food, with maximum concentration of demand and supply. Organisational and technical approach means that wholesale markets must be built near traffic knots, highroads, railways, docks, with spacious parking areas and modern roads that enable efficient internal and external transport on wholesale markets.

Multifunctionality of modern wholesale markets is represented by possibility to, beside trading, they enable taking, sorting, classifying, storage and cooling of great quantities of domestic products (fruit and vegetable) and imported products (tropical fruit, etc.) Economic efficiency and multifunctionality of wholesale markets derives from these market possibilities. It creates prerequisites of efficient trade with low prices and good supply. Market efficiency of wholesale markets derives from their importance in trade of agriculture and agroindustry products in sense of time and space, and economic efficiency in whole agroindustry complex.

In developed economies, beside basic functions in wholesale markets, they become places with laboratories for physical and chemical quality checking. With this function, wholesale market performs its role of controlling origin of products, their quality, quantity, packing, transport and other functions that are advantages of these trading places over competition. There trading places may also have important role in controlling the evidence of tax payment and export of agriculture products.

The aim of this workpaper is to depict economic efficiency and multifunctionality on modern wholesale market that will make possible for market in Serbia to develop, having in mind market opportunities. Also, we would like to point out the significance of this specialised institution in developed economies trade. In modern conditions, wholesale market trade is trustworthy informatic basis for sellers and buyers, but also for economy chambers and other institutions that observe market changes in agriculture and agroindustry, using statistic and other data.

The state and perspectives for wholesale market development in Serbia

"Wholesales" of fruit and vegetable are placed on bazaars, opened or semi-opened area where manufacturers and salesmen offer their merchandise on improvised places for trade. These bazaars are not wholesale markets according to conditions

and definition of place for fruit, vegetable, and other agriculture products and food. In the beginning of 2012 in Belgrade, enterprise „Wholesale market – Belgrade "ltd was founded, and in March of 2013 six manufacture municipality, one enterprise, one agriculture economy, Town of Belgrade and Wholesale market Belgrade, signed declaration about cooperation in building the system of National wholesale market in Belgrade.

„Wholesale market Belgrade" is the key link in the chain of food providing of Belgrade end Serbia.Wholesale market in Belgrade is place for joining, achieving market standards of import substitution and place for export agreements (www.veletrznica.co.rs, 2018).

Wholesale market is special market institution which organizes wholesale trade, by arranging, servicing and renting specialized area for exhibiting and selling fruit, vegetable and other agriculture products and food, other commodities, and providing services such as storage of merchandise, finishing, processing, packing and other services connected to logistics and transport (Low on Trade, Republic of Serbia, 2010, 2013).

Wholesale market is special market institution on wide spectre of trade, before all, perishable agriculture products, food and other similar products. Foreign experiences in functioning have shown that the most important groups merchandise on wholesale markets are: fruit and vegetable, meat (fresh), milk (fresh), fish and flowers. However, the most often there are fruit and vegetables (Lovreta, 2008).

Concept of wholesale trade development, primarily trade of fruit and vegetable, has not succeeded until now, mostly because the lack of national trade strategy in agroindustry complex. It is known adoption of development strategy of national and regional wholesale markets da means adoption of concept of founding these specialised market institutions, modified by modern standards that are used in developed economies in the world. It is not necessary to stress that Serbia is also agriculture country and domestic needs for agriculture products and food are huge, and that in social status means satisfaction existence and economic needs.

To meet the requests more sophisticated buyers on both domestic and foreign markets, strengthening competition of domestic economy imposes, among other things, the need for programs for advancing the agriculture and rural development (Subić, 2017).

Agriculture competitivity maintenance requires from macroeconomic management basic element changes in agriculture strategies, in the direction of modern agriculture system that rise with knowledge and innovations and market and agriculture products chain development (Mihailović et al., 2016).

It is necessary to stress the significance of fruit and vegetable for sustainable domestic agriculture and rural development, as part of development strategy of domestic agriculture and trade increase on regional and world market (Prdić, 2017).

The conclusion that interest of lenders, buyers and consumers has increased, gives solid bases for fulfilment of assumption of increasing their needs that are feasible by building of modern wholesale market object (Kuzman et al., 2017).

The aim of this work paper is not to analyse transformation of ownership, small, middle and big agriculture properties, but domestic manufacture adjustment and trade of world economy flows. These are the reasons why present state in wholesale trade in agriculture and whole agroindustry complex may be defined as trade without clear national strategy. There are some examples of free market abuse, such as free market of Russia. The role of economy chambers and the government must be decisive in the sense of creating free trade and safe, healthy and high-quality products with low prices. The most important turnover in building of infrastructurally and informatically equipped business objects for fruit, vegetable and other agriculture products. For successful adjustment, development and competition, it is necessary to:

- systematic adjusting of all market potential in manufacture of fruit and products and encourage of development and manufacture
- build modern market objects on national and regional level, type „wholesale market “
- perceiving the market potential of wholesale enterprises with relevant distributive, storage and other potential, for the insight in total trade of fruit, vegetables and other agriculture products
- to direct marketing strategy with clearly interest principle of trade in agroindustry complex, to efficient marketing channels on domestic and foreign market.

Based on the knowledge of trade situation in agriculture complex, it is necessary to make national strategy for development of wholesale trade of fruit and vegetables on wholesale markets. For implementation of such developing strategy, we need

financial assets and ownership structures that would maximally contribute to trade and export increase. National strategy for this trade object would certainly arouse interest of investors that have models for management of action society. Public interest must be derived from integrated marketing and selling strategy based on continuous market research, using existing and new techniques for price level, communication, education and techniques for sales in wholesale trade of fruit, vegetables and other products.

Importance of wholesale markets in developed economies

Agriculture products wholesale trade development in world's trade is continual and dynamic process. Competition is on the level where marketing message is one of the most determining factors for place to buy. Modern importance of wholesale markets in the world is that wholesale market are channels for selling fresh and quality products on low prices on permanent selling point. Significance of buyers in modern trade on wholesale market is tremendous, so the "message" is fresh, high quality and low prices on traditional buying places (bazaars), that preceded modern wholesale markets for fruit and vegetable.

As distribution channel, wholesale markets are more important as market develops, and their competitiveness in comparison to different forms of market centres. Strategy of competitive advantage must be clearly profiled (Prdić, 2016).

Special significance and role for wholesale market development has The World Union of Wholesale Markets, (WUWM), founded in 1958 for:

- Providing international promotion of wholesale markets
- Increase of efficiency and effectiveness of wholesale market functioning
- Increasing role of wholesale markets within all food industry sector (www.wuwm.org, 2017).

There are some examples of successful national and regional wholesale markets, as efficient points of trade:

1. Spain – the country which introduced great improvements in wholesale marketing in 1960. In 1996 Empresa Nacional Mercados Centrales de Abastecimientos S.A. (MERCASA) was founded, with Department of Commerce as founder. The intention was to create modern network of wholesale facilities to replace old markets in centres of big cities. Agreement between MERCASA and each local community, provided two possibilities:
    - Forming company that unites Mercasa and relevant local authority and

professional organisations in sectors that would like to be involved, with adequate compensation in money or merchandise. The share is 51% of ownership is local community, 49% maximum or 26% minimum of ownership of Mercasa, and the resto of the ownership belongs to professional organisations.The company is combined enterprise, mostly registered as limited company.

- Forming unions, also as limited company, which owners, beside Mercasa, are manufacturers, trade and consumers associations and organisations, with an aim to promote and build new markets. Such possibility was used in situation where, for some reason, local municipalities have chosen to participate in such venture from the first phase of project, sometimes from financial reasons. Before the beginning, company status is adjusted to local legislature. Local municipality buys certain number of actions. In some specific situations, Mercasa share may be higher in order to cover total financial costs (www.fao.org, 2018).

By involvement in such companies, cities secure by legal and, depending on market position, economic and financial assets for foundation of integrated trade centre for agriculture and food products within Mercasa trade network.

Within Mercasa system there are 23 wholesale markets, 17 wholesale fish markets, 7 wholesale meat markets, 3 wholesale flower markets, 16 wholesale manufacturer marketsand 4 slaughters as wholesales. There are 3160 privatecompanies in the system and they have 27000employees. Annual sales are 50% of total trade of fresh food in Spain, 6.822.831 tons of merchandise is sold, or 11,8 billion of Euros. Total space of sales area is 7.700.866 m^2, 77000 buyers per day and 71000 vehicles per days passes to Mercasa system. (www.spainbusiness.com, 2018).

Mercasa, as trade network system does not buy or sell fresh products.Mercasa manages and sustains infrastructure and offers services to companies within its system, in order to develop the trade in best conditions.

2. Italy – country with many laws that regulate this area, and the most important of them is 125/1959 low of wholesale markets and 41/1986 of state financing and building. Italian legislature is based on mentioned law that represents state striving to decentralise and delegate ownership and management rights to local authorities (direct management without separate accounting procedures). This law liberates wholesale trade, for the first time in Italy. However, Italian wholesale markets are structurally older, they were inefficient and made loss-

es. With the intention to promote investments and renovation, and building of new wholesale markets, 41/1986 law was created, and it gives state assets under certain circumstances (economic and geographic importance of the market, majority of ownership of public sector in company, multifunctionality of market structure), (www.fao.org, 2018).

There are about 400 wholesale markets in Italy. Speaking about ownership structure, there is example of wholesale market in Bologna, which owner is the city of Bologna in 80% and region Emilia Romagna, wholesalers, economy chambers and others. Annual sales are worthy about billion euros. Income is invested mostly in development of new capacities for storage of fruit, vegetable, fish and flowers, but also chambers for preservation, sorting and packing (www.caabmercati.it, 2014).

For managing Italian wholesale markets, wholesalers and private companies get concessions that last to seven years. For the economic efficiency of investment, government gives assets to support companies that promote wholesale markets and union companies with prevailing public sector ownership (regions, localmunicipalities, economy chambers) in foundation of wholesale markets in national, regional or province level. The aim of these measures was independent and functional system for balanced national distribution of goods, without doubling through centres settled on wholesale markets. Decree from February the 2nd in- wholesale markets are defined as places for meeting markets and consumer trends which enable market development and retail trade network.

In many developed countries with developed national strategy in fruit, vegetable and other food products, there are modern technologies in manufacture, sales and market communications. Such approach to the market led to greater number of wholesale markets, greater and integrated agriculture production with lower transportation and marketing costs per unit. Many wholesales are located on the wholesale market as brokers for negotiation and selling products. Wholesale markets are still the most important place for product price determination, but long run business contract are serious competitors for this function.

Results and discussion

The most important role of wholesale markets on world market is efficient meeting of buyers and sellers of agriculture products in constant time interval, during the whole year, in big cities and regions. Beside market function, wholesale market al-

sohas control function of fruit, vegetable and other product sales. Control function means that sale is performed with monitoring of quantity and quality of agriculture products. The most up to date world's wholesale markets in developed industries have their own laboratories for checking the physical and chemical quality of products. Full documentation of production, quality, quantity, packing, transportation and all other characteristics of product that influence economic power and satisfaction of buyers, is inevitably necessary.

Total volume on products market is 26 million tons per year, and it is approximately 40% of fruit and vegetable supply in Europe (24 million tonsper year), 10% of fish and fish products supply in (1 million tonsper year), and 2% of meat and meat products supplyin Europe (1 milliontons per year). (WUWM, 2016).

Union of Russian Wholesale Markets (RWFM) controls sales and distribution of merchandise within country and merchandise from export to final point, including security and quality of the merchandise that arrives in main distributive centres (wholesale markets), harbours and other trade centres (www.export.gov, 2017).

Congress (wuwm) is held biennially, and conference annually or bi-annually, with special theme or regional problems. Congress of union is being organised also for members and non-members, and for all important segments of wholesale market, transportation and safety of food experts, food industry representatives, manufacturers, distributors, academics and decision makers on national and regional level (www.wuwm.org, 2018).

In developed countries, wholesale markets survive and develop within changeable market circumstances, as essential bond of manufacture and consumption in agriculture products trade. New economic conditions give to wholesale market primary role in providing big cities and regions, mostlywith fruit and vegetable, but also other products (Kuzman et al., 2017).

With the purpose to help newly formed wholesale markets in Central and Eastern Europe, CEI (The Central European Initiative Wholesale Markets Foundation) foundation is founded, in Poland in 1999, and whit the help of great European and world's organisations (EBRD, CEI, FAO and UNICEF). The foundation is directed to improvement and development of its member, for better client services and increased ability to generate profit. The support and services to present and potential members, foundation gives through (Lovreta, 2008):

- promoting members and stressing their significance to local institutions for in order to improve their influence and financial position,
- providing help in securing better logistics and satisfaction of needs of big retailers,
- improvement of experience and information exchange and information, not only between members but also with external parties in specific technical fields.

The most important conclusion for developed countries in market conditions of this century is national strategy of connections of wholesale and retail markets, and that enables enlarging and uniting supply and optimization of domestic production, with the aim of development of whole agroindustry complex.

Optimization of competition is one of basic elements of modern fair marketing, and competitive is more and more important. The aim of this work paper is through analogies of marketing processes in economies and nano-procesess in nature, to find optimal model of competitiveness (Prdić, 2017).

Based on experience of developed countries, situation on market of agriculture and agroindustry in our country, in order to build modern wholesales markets and optimise competition, it is necessary to:

- adopt national strategy or agroindustry trade development, using wholesale markets,
- such infrastructural and organized places should become the most important places for supply and demand of fruit and vegetables,
- harmonize strategy of trade to make direct relation of wholesale market and retail trade, in order to strengthen these kinds of markets in relation to discount centres and specialised supermarkets,
- enable the approach to competitive market to all relevant subjects in order to obtain maximum of economic effects by low prices of products,
- arrange wholesale markets to respect market principle in doing business, but also protect small manufacturers and salesmen,
- create conditions for development of cities and industry potentials in agriculture and agroindustry, having in mind wide economic and social attitude,
- by the model of modern wholesales markets in the world, it is necessary to settle efficient management with the aim of achieving economic efficiency and market multifunctionality of wholesale markets.

Wholesale market is institution of commune character, with the function of concentrate supply and demand for agroindustry products. On one side there are great manufacturers (agroindustry manufacturers, agriculture cooperatives, food distributors) and on the demand side there are big consumers (trade enterprises for retail provision, other big consumers – restaurants and hotels, hospitals, etc. (Vlahović, 2013).

In building of wholesale markets, key questions are planning and projection, since they are designed of retailers and wholesalers. The location is very important and efficient sales on markets, having in mind specific attributes of products and necessity to provide them to final consumers in fresh condition (Lovreta, 2008).

Benchmarking, as opposition to the best practices, if it is adopted and modified in the right way, may generate significant performance profit in short run (Maire et al., 2005).

Distribution channels are means that may be used in delivery of supply and means that citizens use to have approach to that supply. In the marketing sense, it is the "P", place, connected to the one of the most critical decision for management (Cotler et al., 2008).

Economic sustainability and multifunctionality of wholesale markets in world proportions, enable their role as logistic intermediate on market, especially in fruit and vegetables market. Their economic efficiency is manifested on one familiar place where maximal service in the sense of economic rationality is provided. Since many wholesales, manufacturing or importing enterprises do not have neither economic nor space opportunity to enable trade, in the sense of multifunctionality and public importance, wholesale markets represents both market and social institutions.Multifunctionality of wholesale market is its role as market and social economic subjects. Social and public character of wholesale market gives it opportunity to define public interest object.

Economic sustainability and efficiency of wholesale market is enabled by:

1. Economic sustainability. Economic sustainability is efficiency of wholesale market management to preserve market position of the firm and its competitive position. Economic sustainability is obtained by resources, efforts and precautions for fulfilment of planned aims on market of fruit and vegetables and other food products. Variety of supply and services would enable eco-

nomic sustainability of enterprises and build competitive position in environment. Economic efficiency of wholesale markets may be measured by the number of realized contacts of purchase on wholesale market/number of purchases that equals = value of realized sales on wholesale market. Having in mind how specific is trade in agriculture, wholesale markets are efficient for improvement of sales and marketing communications. We expect positive effect on sales, both in short and long run. Namely, due to concentration of supply and demand of merchandise, wholesale markets are useful indicator of cost efficiency based on realized contact per query. Merchandisers may calculate cost efficiency very accurately, dividing total costs (direct and indirect) by number of realized contacts on wholesale markets. Besides, multifunctionality of wholesale market enables additional efficiency in form of cost reduction and lower prices influencing optimal business result.

2. Stock trade. When mutual relations and interests of stock and wholesale market trades as organized, infrastructurally equipped spaces are established, it is possible to concentrate the supply of fruit and vegetable and great distribution of products on the market.Based on the exposed, there is firm opinion formed on experience of trading of stock markets, that stock and wholesale markets enable wide spectre of trade in agroindustry complex. It may be concludedthat wholesale market trade reaches positive rate of return on investments, observing consciousness, interest, marketing possibilities for potential buzzers on resulting sale level in relation to costs. Auction commerce. Auctions are specialised market institutions for wholesale trade of merchandise by public sale with licitation. The owner of merchandise is the buyer who offers the maximum price for offered quantity. We may conclude that in modern circumstances of trade, wholesale markets are efficient places for auction trade due to maximum of supply and concentration of market environment. The efficiency of wholesale markets in our conditions is disputable, without improvement of economic sustainability and cost efficiency. However, this situation is the result of poor market organization, lack of organization of wholesale market and weak worry for domestic production and trade in agroindustry complex. Considering world's experiences, wholesale markets may be the most efficient mean of trade, since total costs per unit are low.

Vickrey auctions are closed auctions. They are auctions by highest price where participants of bidding who offers the higher price, gets the goods and pays offered amount of money. On auction on second highest price, bidding participants who offers highest price gets the goods and pays the price equal to second highest offer.

Vickrey auctions are well studied in economic literature, but they are not usual in practice. There are generalised variations of Vickrey auctions for multiply auctions, such as generalised auction of second price (Benjamin et al., 2007).

About auction trade it may be said that wholesale market is very efficient trading place. From the market aspect, auction is the most precise type of trading in the sense of price determination in a moment of trade. Through the bidding process prices are changed by either buyers or sellers of the products. Auction is an efficient wholesale trading instrument and wholesale markets as specialised market institutions are economically efficient place for trade.

According to performed researches, we may conclude:

- Wholesale markets are legislative defined places for commerce within national economy and they are the most important distributive channel for fruit and vegetable.
- In majority of countries owners of wholesale markets are state, regional and local municipalities or retail commerce firms (markets) and private wholesale tradesmen, brokers, transport and insurance companies and other entities interested in economic sustainability of wholesale market.
- In the most countries, wholesale markets are strategic institutions of great importance for commerce, health, safety and quality of products, domestic and imported that are distributed.
- Their role and importance are unmeasurable in the sense of meeting of supply and demand of fruit, vegetables and other agriculture products, and at the end they generate lower prices of products.
- In most great cities and regions in Europe and Russia, there are wholesale markets organizationally connected to commerce of fruit, vegetable, meat, fish, flowers, diary, etc.
- The size of supply and commerce enable them, beside wholesale trade and provision of retail traders, to provide institutional buyers within state system, and it is important consumer section.
- Modern wholesale markets are becoming important places for stock market institutions and the most important distributive channel for auction commerce.

Each segment of research of existence and building wholesale market within wholesale market trade of fruit, vegetable and other agriculture product is important. However, with the certainty we may argue that national wholesale market and at least three regional markets are necessary. That would be great infrastructure

and market objects that attract higher supply of goods and infrastructure position. Especially, we may say that based on research and analysis within world trade and European countries experience, all larger cities and regions have modern wholesale markets. Wider aspect of wholesale markets importance in the world gives the real base for interests of the town, region and whole country for such objects in domestic agriculture market. Public interest is very high.

Critical review and recommendations

Based on researches performed for this work, it may be argued that domestic trade does not have adequate strategy of wholesale market development, except from certain solutions provided by law. Belgrade wholesale market existence is just the first step in that direction, and it is base for wholesale market building in other greater cities and regional markets. It may be concluded that wholesale markets are accepted as significant trade instrument on world's market of fruit, vegetable and other agriculture products, and that their efficiency is not questionable. In developed economies, many experts are interested in area of wholesale market trading. Investments in this kind of trade are growing. When speaking about domestic authors in this problematic, there are work papers that theoretically elaborate such themes, but there is a lack in practical investigation of economic effects of wholesale market as market and public subject, and effects they may bring to salesmen.

A great contribution to importance of wholesale market trade give confirmations from scientific and professional researches and statistical data for trade and models of wholesale market management. The detailed analysis of wholesale market importance for market, infrastructure and public significance in our country is necessary, and it is only one research in such direction. Especially, it is necessary to stress economic efficiency and sustainability of wholesale market building in sense of investment project. The intention of this workpaper is to show the wholeness of wholesale market trade, having in mind interest of all interested subjects, and to determine the place of wholesale market within total trade of agriculture products. The aim was to show that wholesale markets have important place in developed countries and that usage of adequate model, domestic trade may increase sales through wholesale markets.

Having in mind that wholesale market as market and public object, contribution of this work paper is awareness that domestic wholesale markets must know their market position and based on that they should make decision that would define the

place of wholesale markets in fruit, vegetable and other agriculture products trade. For wholesale management, contribution is the adoption of certain theoretical assumptions that unite knowledge about wholesale market trade between enterprises and environment.

Conclusion

Based on the presented, it may be concluded that wholesale markets generate positive rate of return on investments in developed countries, observing market and public significance and interest of loyal and potential buyers and resulting level of sale in relation to costs. Such market position is the most probable in the countries with adopted national strategy of development and trade on wholesale markets. If we would buck up from this preposition, the process of economic measurement effects on the market would be more difficult. Watching the efficiency of one entrepreneur or enterprise on the wholesale market, efficiency may be observed in form of sustainability of fulfilmenteconomic or communication aim. It may be concluded that efficient enterprise in the one that obtains its goals, and inefficient is the one that fails. Observing economic sustainability by efficiency, wholesale market represents the place for reaching new revenues, new buyers and markets and market impulse on which you may improve the quality and economic advantages of your own products. On wholesale market we may obtain knowledge of above average value of fruit and vegetable, which markets may provide the greatest effects. Economically thinking, efficient model of sustainable trade on wholesale market is in expectation of positive effect on sale level, but also information and multifunctionality of services on wholesale market that create real prerequisites for greater efficiency of investments. Such role of wholesale market is particularly important when it is organized strategy for export of fruit and vegetable in the region, European market, market of Russia and others. So, organized distribution of fruit, vegetable and other agricultural products on both domestic and export markets would achieve greater effects in export and rise of prices per unit, but also rise of business in agroindustry complex.

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INTRODUCTION OF ALTERNATIVE OIL PLANTS IN PRODUCTION ON SMALL FARMS

Nenad Đurić[1], Marija Spasić[2]

Abstract

According to research results to date, under our agroecological conditions alternative oil plants can be successfully grown in flatlands and hilly regions up to 500 m altitudes. The six described plant species (safflower, false flax, castor bean, oil poppy, cucurbita and linseed), although they belong to different families, have the common characteristic that they contain over 40% of oils in their fruits or seeds. These plant species utilize water rationally, have xeromorphic characteristics and tolerate draught, i.e. elevated temperatures resulting from global warming. Production costs compared with realized yield and the price for the obtained grain, give a gross financial result higher than for most agricultural crops grown on larger surfaces, from 54,000 dinars per hectare for false flax production, to 209,250 dinars per hectare for oil poppy production. The financial result is in fact even better if the value of byproducts is also taken into account; therefore, it is fully justified to recommend to our farmers to designate certain areas for growing these alternative oil species.

Key words: *alternative oil plants, safflower, false flax, castor bean, oil poppy, linseed, production.*

Introduction

Alternative oil plants are a group of agricultural crops interesting for growing in a system of sustainable and organic production on small areas (Đurić et al., 2015). In the Republic of Serbia, farmers grow most of these plants on infields, most often using their products for own needs or for sale on the local market.

1 Nenad Djuric, Ph.D., Assistant Professor, Megatrend University, Faculty of Biofarming, Maršala Tita 39, 24300 Bačka Topola, Serbia, Phone: +381 62 803 53 60, E-mail: nenad.djuric@outlook. com

2 Marija Spasic, Ph.D., Research Associate, associate on the project III 46006, Serbia, Phone: +381 64 88 034 12, E-mail: mrmarija.spasic@gmail. com

An analysis of the volume of crop production and insight into the structure of planting of field crops in general shows the evident interest of individual farmers to grow plant species that are new in this region or plants the production of which has been almost extinguished during the past decades (Prijić et al., 2003).

Today, there are several small associations of producers of oil poppy, cucurbita and linseed, bringing together our selection companies, agricultural expert services and institutions working on the study and processing of productive organs of such plants, as well as offering services such as lectures, brochure preparation and organizing events dealing with agricultural production (Glamočlija et al., 2010; Filipović et al., 2014; Glamočlija et al., 2016; Popović et al., 2017; Đurić et al., 2018; Glamočlija et al., 2018).

Biology and economic importance

Following species belong to the group of alternative oil plants that can be grown under agroecological conditions in Serbia: safflower, false flax, castor bean, oil poppy, cucurbita and linseed. These species belong to different botanical families, but have the common characteristic that they synthesize and accumulate large quantities of oil containing vitamins D, E and K in their seeds and fruits. As for nutrients, the second place is held by proteins, therefore these species can conditionally also be called oil-protein plants.

Safflower (*Carthamus tinctorius* L.) is an annual species belonging to the *Asteraceae* family. During the vegetation period lasting 110-140 days plants develop a strong spindle shaped root system and an upright sturdy and branching stem up to 200 cm tall. Leaves are small, oval-elongated, leathery, pointed, with pronounced xeromorphic structure. Branch tips develop flower heads with yellow or red flowers along the edges. A flower head contains 20-100 bisexual tubular flowers. The plant is pollinated by bees, and the fruit is an achenium containing one seed, similar to the fruit of the sunflower. It is firmly enveloped in a pericarpium, representing 25-35% of the seed. The fruit contains 35-48% oil, 15-25% total proteins, 22-26% carbohydrates and 2-3% mineral salts. Creation of new species is in several directions. The first is to obtain varieties with an elevated content of certain fatty acids. Current linolene type varieties have a high content of this omega-6 fatty acid and produce very valued edible oil. In addition, oil is an important industrial raw material for manufacturing lubricants, bio fuels and agents for personal hygiene. Depending on the manner of extracting oils, oil cakes can be used as concentrated

feed (Kholer et al., 1996) or raw material for further industrial processing. Varieties with low oil content, but high protein content and a thin pericarpium are used as feed for poultry and caged birds, while very branching varieties with large leaves are used for feed via biomass grazing or mowing (Landau et al., 2004).

False flax (*Camelina sativa* Cr.) is an annual plant belonging to the *Brassicaceae* family. It was introduced in crop production in Germany and Russia after upgrading indigenous species spontaneously growing on large areas in fields of Europe and Central Asia, often as weeds (Sampath, 2009). According to the time of planting, it can be a spring and a winter crop, with a vegetation period of 70-100 days, i.e. 240-250 days. Winter forms pass the winter as leaf rosettes (Glamočlija, 2010). It develops a spindle shaped root system with huge suction power. The stem is upright, branching, 30-80 cm tall, covered in small simple leaves that dry during the maturing of the plant. Flowers are on flower branches of 10-30 cm. They are bisexual, with light yellow crowns. They are pollinated by insects. The fruit is a spear-like husk of up to 1 cm, divided into two chambers containing up to 10 small oval-elongated yellow-red seeds. As stated by Zubr (2003), seeds contain 30-45% oil with a dominance of unsaturated fatty acids (omega-3 and omega-6). In quantity, oils are followed by proteins (25-30%), carbohydrates (approx. 20%) and mineral salts (1.5-2. 5%). False flax is pre dominantly grown as an oil plant. Its oil belongs to the group of best quality edible oils and is used in preparing functional foods. Technical oil is used in the cosmetics industry (Crouzier, 2005) and to manufacture fine bio lubricants and biofuels (Jeromela et al., 2016). In arid regions, false flax is a valued crop adequate for grazing domestic animals. Remnants after seed processing and harvest remnants can be used as forage for domestic animals (Flachowsky et al., 1997).

Castor bean (*Ricinus comunnis* L.) is a species belonging to the *Euphorbiaceae* family. It originates from tropical regions of Africa, where it was cultivated some 6,000 years ago. Today there are annual forms grown in the temperate climate belt and perennial bushes in tropical and subtropical regions. During a vegetation period, lasting 120-140 days, the plant develops a strong, deep spindle shaped root system with great suction power. The stem grows during the entire vegetation season and can grow up to 13 m. In selected varieties, the stem has limited growth, reaching up to 2-3 m. It branches abundantly, and is covered in large ball-shaped leaves with long stems. Branch tips develop flower branches, approximately 50 cm long, with male flowers in the lower, and female flowers in the upper section of the flower head (Glamočlija, 2010). Pollen is transferred by wind. The entire

plant has a pronounced xenomorphic structure, covered on the surface with a wax layer. The fruit is a ball-shaped to elongated cocoon containing three seeds, with a pericarpal surface naked and smooth in selected varieties, and covered in solid spines in unselected populations. The seed is large, oval-elongated, mosaically mottled. It is enveloped in a firm smooth envelope, making up to 25% of the total seed mass (Oplinger et al., 2018). The seed contains 55-60% oil, approximately 24% total proteins, approximately 25% carbohydrates and approximately 4% mineral salts. In addition to decorative forms grown in parks, modern annual varieties of castor bean are produced for their oil rich seeds. Unrefined oil is very toxic because it contains ricin and RCA protein. Oil obtained by cold pressing is used in the pharmaceutical and cosmetics industries, and can also be used as edible oil if toxic substances are removed by a complex refining process. When oil is extracted by a warm procedure, it is used in the textile and leather industry, for manufacturing motor oil, or as liquid biofuel. Oil cakes are raw material for further industrial processing, and if toxic substances are removed, they can also be used as animal feed (Rao et al., 1984).

Oil poppy (*Papaver somniferum* L.) belongs to the *Papavreaceae* family. It originates from wild species introduced into production by peoples of Asia Minor, and approximately 3,000 years ago growing expanded to Europe and the entire Asian continent (Bernáth, 1998). This plant species is adapted to conditions of occasional and abundant precipitation by having roots spread out in the surface layer, even though the root system is spindle shaped. The stem is upright, brittle and easily broken, in the initial phases of growth herbaceous, later becoming woody. Lateral branches develop in the upper section of the stem. The poppy develops large elliptical leaves clasping the stem. The entire plant is coated in a wax layer giving it a blue-green color. Large bisexual flowers of prominent colors are on the tips of lateral branches, the plant is self-pollinating and cross-pollinating. The fruit is a conical, ball shaped or oval cocoon containing several seeds, which does not burst when ripe. Plants mature rather uniformly, which can be recognized by the drying of leaves and the separation of seeds from the placenta (Popović et al., 2017). Productive organ of the oil poppy, the seed, contains 55-60% oil, approximately 25% total proteins, 20-25% total sugars and 2-4% mineral salts. Cold pressing produces quality edible oil, light colored and with a pleasant aroma (Popović et al., 2018). The warm process produces technical oil used in cosmetics and the chemical industry to produce painting colors, varnishes and other agents for wood protection. Oil cakes are used as concentrated animal feeds (Statham, 1984; Küçükersan et al., 2009). Dry harvest remnants are appropriate as fuel for heating residential buildings and economic structures on farms.

Cucurbita (*Cucurbita pepo* L. *var. styriaca*) is an annual plant belonging to the *Cucurbitaceae* family. It is a natural mutant of summer squash *(Cucurbita pepo* L. *var. pepo)* which first appeared in Austria (Glamočlija, 2006). Depending on the original variety, there is a difference in seed structure, where it does not have a firm envelope, but a thin and delicate greenish envelope. The vegetation period of cucurbita lasts 90-130 days. Plants develop a spindle shaped root system with the majority of roots in the surface layer of the soil. The stem is creeping, with few branches, covered in short thorns, and is up to 10 m long (Berenji, 2010). Large heart-shaped leaves on long stalks develop on the stem. Leaves are serrated along the edges and covered in rough hairs. Unisexual flowers are formed on plants, and are pollinated by insects. The fruit is a large and fleshy berry with an average weight of 2-4 kg. The thick firm green-yellow outer wall covers an orange fleshy layer, with a placenta in its interior where egg-like flat seeds are formed. They have thin envelope covering the cotyledons and germ. Nutrients, oils (45-48%), total protein (30-40%), total sugar (15-20%) and mineral salts (approximately 2%), are located in the germ. The seed is the main product and is used to obtain edible oil extracted using cold pressing or solvents. Oil content is approximately 45% linolenic, 25% oleic, 30% palmitic and very little saturated stearic acid. Pressing produces higher quality oil, because it also retains other useful substances, vitamins B_1, B_2 and B_3, D, E and K, phytins, phytosterons, etc. in the oil. Oil cakes, the meat of the fruit and harvesting remnants suitable for producing silage, are used as animal feed (Nikolić et al., 2014). Seeds of other Cucurbita species can also be used to obtain oil, but the best quality oil is obtained by pressing the fruit of the oil-rich variety.

Linseed (*Linum usitatissimum* L.) is an annual plant belonging to the *Linaceae* family, and originates from the selection of the wild species *Linum angustifolium* Huds. over 9,000 years ago in the region of the Fertile Crescent (Kvavadze et al., 2009). Linseed production spread quickly in Africa, Asia and Europe. Fiber obtained from the stem was used to produce textiles, and the seed as food. The long history of cultivation led to the differentiation of several linseed varieties. The most important are linseed and flax used to produce fiber. Linseed is planted in the spring, while the fiber variety is planted in the spring in continental regions, and in regions where winter air temperatures are not below -10°C it can also be planted in the autumn. The vegetation period of spring varieties is 100-115 days, and of winter varieties 240-250 days. Plants develop a spindle shaped shallow root system, predominantly in the plowed soil layer. The stem of oil varieties is upright and branching, 50-70 cm tall, covered with a wax layer. Small elongated leaves with short stalks develop on it. As plants mature, leaves change color and fall off.

Bisexual flowers, most frequently with blue petals, develop on tips of branches in racemose flower heads. The plant is predominantly self-pollinating. The fruit is a ball shaped capsule that does not burst when ripe, containing several seeds. The seed is flat with a shiny brown or yellow envelope. Studies of the seed have shown that it has high nutritive and energy value. Oil has the highest content (38-47%) with a high share of omega-3 fatty acids, followed by sugar (22-35%), total protein (18-24%), mineral salts (2. 3-3. 5%) and other compounds (Filipović et al., 2014). The oil has multiple uses. If extracted by cold pressing, it is used in the food industry for food preparation. Due to its high content of alpha-linolenic acid the oil is very important for preparing functional foods. Technical oil is used to manufacture paints for painting and printing, varnishes and agents for impregnation of furniture and wooden joinery, for manufacturing cosmetics, in the pharmaceutical industry, to obtain biofuels (Gilbery et al., 2009) and for other purposes. Flax boon is used in construction to produce composite materials (Khazma et al., 2008). In nutrition, unbroken or the milled seed is used as a raw material in bakery and patisserie industries. Linseed is also added to mixtures for caged birds. Oil cakes are very nutritious and very easily digested, and are used as concentrated animal feed for swine and cattle (Gilbery et al., 2010).

Environmental conditions

A comparison between these oil plants and environmental and soil conditions and our agroecological conditions (Table 1) shows:

Water regime. Alternative oil plants have moderate water requirements. They economize available water, as shown by the transpiration coefficient, which is under 400 in most species (Đurić et al., 2015). These plants have xenomorphic structure and root systems with good suction power, and can therefore tolerate short droughts. Dynamics of water uptake and utilization show that plant requirements are highest in phases of flowering and fruit formation. In our agricultural regions, this is the beginning of the summer period (second half of May and June) when average volumes of precipitation are highest. In general, the average water regime in our agricultural areas is favorable for growing these oil plants even without irrigation (Maletić, Jevđović, 2006; Glamočlija et al., 2015).

Thermal regime. Mentioned species are plants of tropical and subtropical regions and for optimal growth and development, they incorporate much heat, mostly in generative phenophases. In addition to their pronounced thermophilic character,

species such as linseed, poppy, false flax and safflower tolerate frost in initial phases of growth. By comparing these plants and the annual heat distribution in our agricultural regions, it can be emphasized that the thermal regime in flatland and hilly areas is favorable for growing alternative oil plants (Glamočlija, 2004; Sampath, 2009; Đurić et al., 2015).

Soil conditions. The relationship with the soil depends on the development of the root system of each plant species. Even though best results (yields and quality of the main product) will be achieved on fertile and structured soils, by using more intensive agro-technical measures these plants can be grown on soils less suitable for the main crops (Filipović et al., 2010; Popović et al., 2017). Numerous types of soils in our agricultural areas offer the possibility for optimal creation of regions for growing these species.

Table 1. *Multiannual yearly average rainfall and heat distribution*

Region, month	Vojvodina, Pančevo		Central Serbia, Paraćin	
	Precipitation	Temperatures	Precipitation	Temperatures
1.	55	1.6	43	0.1
2.	51	2.1	37	4.6
3.	54	6.9	80	8.2
4.	52	13.0	61	13.8
5.	80	18.3	110	17.7
6.	82	22.4	50	23.9
7.	55	24.0	62	23.9
8.	56	23.5	71	23.6
9.	54	18.5	70	18.1
10.	54	11.2	67	12.2
11.	52	7.1	54	7.8
12.	45	2.4	52	1.9
Sum, average	682	12.6	757	11.9

Source: * *Data: Republic Hydrometeorological Service of Serbia*

Technology of production

Adequate selection of sites and crop rotation enable significant savings for agro-technics reflected in reduction of land cultivation, additional fertilization and plant protection.

The system of basic and pre-planting cultivation should be determined based on the preceding crop, the grown species and the general state of the soil. Reduced and conservational basic cultivation offers an advantage on less weed-infested soils and after a preceding crop for which intensive agro-technics were applied.

Alternative oil plants are crops with different planting times. They should be planted using precise seeding machines and using seeds with declarations, while the time and manner of planting are determined based on climate and soil conditions.

Measures for plants with broadly spaced rows should include mechanical weed suppression with one or two cultivations and hoeing between the rows. Irrigation is used in extremely dry periods. Water quantity should be determined according to soil moisture content and plant needs.

Plant protection against weeds is orientated toward indirect (preventive) measures, such as crop rotation, land cultivation, optimal crop density, and mechanical methods. For protection of plants against pests, crop rotation with broad plant replacement, monitoring the life cycle of insects, and local suppression when they appear in certain plant sections, are used. Against pathogens, efficient measures of protection are crop rotation after crops they have no common pathogens, selection of more tolerant varieties, planting healthy disinfected seeds, removing diseased plants, and only in case of a more severe attack, preventive chemical protection.

The harvest should be adapted to plant maturation. On small areas, harvesting is combined, manual and by machines, and on large areas it is in one phase using combine harvesters for wheat. Having in mind that seeds of most species are very small, machines must be adjusted before the harvest and work quality should be checked occasionally.

Storage of the main product, seeds, is an important agro-technical measure. These fruits have high oil content so inadequate storage conditions can cause a process of degradation of these compounds.

Economics of cultivation

Before opting to produce any of the mentioned alternative oil plants, the farmer should prepare a cost estimate of production and assess profit after the sale of produced goods.

By growing safflower on one hectare, using standard agro-technics following results can be achieved (Table 2).

Table 2. *Analytical calculation for safflower production*

Elements	Quantity	Price	Value, rsd
Yield	1.800 kg ha^{-1}		
A) **Value of production**		60 rsd	**108.000**
B) **Costs of production**			
Cost of materials			
- NPK mineral fertilizer	350 kg ha^{-1}	42 rsd	14,700
- seed	10 kg ha^{-1}	80 rsd	800
Machines			
- plowing	8,500 rsd		8,500
- preplanting preparation	2,000 rsd		2,000
- planting	2,200 rsd		2,200
- inter-row cultivation	2,500 rsd		2,500
- combine harvester	10,000 rsd		10,000
- seed transport	2,000 rsd		2,000
- preparation for storage	2,000 rsd		2,000
Total expenses			**44,700**
Gross financial result			**63,300**

*** Source:** *Đurić, Spasić*

Prices for seed and seed goods were obtained from the world stock market. For the production of safflower seed, gross profit would be 63,300 dinars, not taking into account the value of by-products.

In the production of false flax for seed under our very favorable agro-ecological conditions, a yield of 1,100 kg ha^{-1} can be realistically expected. With this yield, a gross profit of 54,000 dinars can be realized (Table 3).

Table 3. *Analytical calculation for false flax production*

Elements	**Quantity**	**Price**	**Value, rsd**
Yield	1,100 kg ha^{-1}		
A) **Value of production**		85 rsd	**93,500**
B) **Costs of production**			
Cost of materials			
- NPK mineral fertilizer	300 kg ha^{-1}	40 rsd	12,000
- seed	8 kg ha^{-1}	100 rsd	800

Elements	Quantity	Price	Value, rsd
Machines			
- plowing	8,500 rsd		8,500
- preplanting preparation	2,000 rsd		2,000
- planting	2,200 rsd		2,200
- inter-row cultivation			
- combine harvester	10,000 rsd		10,000
- seed transport	2,000 rsd		2,000 rsd
- preparation for storage	2,000 rsd		2,000 rsd
Total expenses			**39,500**
Gross financial result			**54,000**

*** Source:** *Đurić, Spasić*

Taking into account the fact that in the mid-20th century in Serbia castor bean was very successfully grown in Banat and Pomoravlje on 7,000 hectares, it would be easy to re-introduce this plant into production, because the seed has a high price on the market. With an average seed yield of 2,000 kg ha^{-1} the producer would achieve a gross profit of 78,500 dinars (Table 4).

Table 4. *Analytical calculation for castor bean production*

Elements	Quantity	Price	Value, rsd
Yield	2,000 kg ha^{-1}		
A) **Value of production**		64 rsd	**128,000**
B) **Costs of production**			
Cost of materials			
- NPK16:27:7	200 kg ha^{-1}	70 rsd	14,000
- KAN 27%	150 kg ha^{-1}	32 rsd	4,800
- seed	15 kg ha^{-1}	100 rsd	1,500
Machines			
- plowing	8,500 rsd		8,500
- preplanting preparation	2,000 rsd		2,000
- planting	2,200 rsd		2,200
- inter-row cultivation	2,500 rsd		2,500
- combine harvester	10,000 rsd		10,000
- seed transport	2,000 rsd		2,000
- preparation for storage	2,000 rsd		2,000
Total expenses			**49,500**
Gross financial result			**78,500**

*** Source**: *Đurić, Spasić*

Table 5. *Analytical calculation for oil poppy production*

Elements	Quantity	Price	Value, rsd
Yield	900 kg ha^{-1}		
A) **Value of production**		300 rsd	**270,000**
B) **Costs of production**			
Cost of materials			
- NPK15:15:15	400 kg ha^{-1}	42 rsd	16,800
- KAN 27%	100 kg ha^{-1}	32 rsd	3,200
- seed	10 kg ha^{-1}	455 rsd	4,550
- insecticide Nurelle	2 l ha^{-1}	1,500 rsd	3,000
Machines			
- plowing	8,500 rsd		8,500
- preplanting preparation	2,000 rsd		2,000
- planting	2,200 rsd		2,200
- inter-row cultivation	2,500 rsd		2,500
- protection against insects	4,000 rsd		4,000
- combine harvester	10,000 rsd		10,000
- seed transport	2,000 rsd		2,000
- preparation for storage	2,000 rsd		2,000
Total expenses			**60,750**
Gross financial result			**209,250**

*** Source**: *Đurić, Spasić*

Oil poppy is grown for its seed, and as indicated by our production calculation, with the new varieties producers achieve excellent yield and financial results (Németh et al., 2001; Popović et al., 2018a), (Table 5).

The best gross financial result achieved by growing oil poppy is 209.250 dinars, which is an important incentive to grow this oil plant.

Under our agroecological conditions, Cucurbita has high yields of total biomass, so in addition to the seed, high quality fodder, consisting of the fruit after seed extraction and leaf cuttings, is also obtained. According to data provided by Glamočlija (2004) and Berenji (2010), in the regions of Srem and Bačka, the average yield of dry seed is about 600 kg ha^{-1}, although in years with higher precipitation or if crops are irrigated, yields were significantly higher. With an average yield and sale of unprocessed seeds, a high gross financial result is achieved (Table 6).

Table 6. *Analytical calculation for cucurbita production*

Elements	Quantity	Price	Value, rsd
Yield	600 kg ha^{-1}		
A) **Value of production**		450 rsd	**270,000**
B) **Costs of production**			
Cost of materials			
- NPK16:16:16	400 kg ha^{-1}	42 rsd	16,800
- KAN 27%	150 kg ha^{-1}	32 rsd	4,800
- seed	10,000 seeds	1. 5 rsd	15,000
Machines			
- plowing	8,500 rsd		8,500
- preplanting preparation	2,000 rsd		2,000
- planting	2,200 rsd		2,200
- inter-row cultivation	2,500 rsd		2,500
- machine harvesting	10,000 rsd		10,000
- seed transport	2,000 rsd		2,000
- seed washing and drying	12,000 rsd		12,000
- seed storage	2,000 rsd		2,000
Total expenses			**77,800**
Gross financial result			**192,200**

* **Source:** *Đurić, Spasić*

For farmers, linseed is becoming an increasingly interesting oil plant due to the growing demand and use of its seeds directly in human nutrition, but also for processing to obtain oil. With an average yield of 1,300 kg per ha^{-1} and a wholesale price of 120 dinars per kilogram, one hectare can yield a gross profit of 106,600 dinars (Table 7).

Table 7. *Analytical calculation for linseed production*

Elements	Quantity	Price	Value, rsd
Yield	1,300 kg ha^{-1}		
A) **Value of production**		120 rsd	**156,000**
B) **Costs of production**			
Cost of materials			
- NPK mineral fertilizer	350 kg ha^{-1}	42 rsd	14,700
- seed	40 kg ha^{-1}	200 rsd	8,000
Machines			
- plowing	8,500 rsd		8,500
- preplanting preparation	2,000 rsd		2,000
- planting	2,200 rsd		2,200

Elements	Quantity	Price	Value, rsd
- combine harvester	10,000 rsd		10,000
- seed transport	2,000 rsd		2,000
- preparation for storage	2,000 rsd		2,000
Total expenses			**49,400**
Gross financial result			**106,600**

*** Source**: *Đurić, Spasić*

Conclusions

Numerous research results to date on the issue of optimal methods of growing alternative oil plants under our agro-ecological conditions permit following conclusions:

- the six described plant species (safflower, false flax, castor bean, oil poppy, cucurbita and linseed) belong to different botanical families, but have a common characteristic that they contain over 40% of oil in their fruits or seeds that can be extracted by standard extraction methods and used in various industries, and also in households for food preparation;

- based on biological properties of these plants, foundations for production technology in agricultural areas have been designed, and all operations related to the growing of these plants can be done using standard agricultural machinery, with certain adjustments to the work of the machines;

- by comparing the relationship between these plants and climate and soil conditions, it is evident that with the exception of false flax, the other five species originate from tropical and subtropical areas, and therefore have high heat requirements for growth and development during the vegetation period;

- also, researched plant species very rationally use the water they uptake, have xenomorphic structure and tolerate occasional droughts;
- analysis of climate conditions in our agricultural areas, in flatlands and hilly regions, up to 500 m altitude, shows that genotypes with shorter vegetation periods can be successfully grown in the most important agricultural areas of Serbia;

- prepared cost calculations, compared with the achieved yield and the price of obtained seed, establish a gross financial result with a value that is positive and higher than for most main crops grown on large agricultural areas;

- the lowest gross financial result is realized by growing false flax (54,000 dinars); followed by safflower (63,300 dinars), and castor bean (78,500 dinars);

- when growing the following three species this value is significantly higher exceeding the value of 100,000 dinars: linseed (106,600), cucurbita (192,200), with the highest gross profit realized by growing oil poppy (209,250 dinars);

- these significant differences for the second three species compared to first three result from the fact that they are widely used in the food industry and in the production of various household food supplements;

- financial effects would be even better if the calculation would also take into account the value of by-products, harvest residues and remnants after preparing and processing seeds in the industry;

- From the organizational, economic and agro-technical point of view, there is much justification for our small farmers to designate sections of their land for growing one or several of these plant species, to equip themselves with seed processing machines and to appear on the market as sellers of final products. A great chance also exists in organizing organic production of alternative oil plants.

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AGRICULTURAL AND ECONOMIC HIGHER EDUCATION - VECTOR OF LEADERSHIP WITHIN YOUTH[1]

Nicolae Istudor[2], Emilia Gogu[3], Irina Elena Petrescu[4]

Abstract

This paper investigates the correlation between the number of students from agricultural field and the number of farms in agriculture from Romania. According to the nomenclature of the university specializations, the educational system of the agricultural field is presented in the "Vegetable and animal resources engineering branch". According to the Government decisions number 140/2017 and 615/ 2017, in the university year 2017 – 2018, in Romania were 22 universities (state and private) that offered a 165 bachelors programs, with a total number 12.420 places.

The biggest number of places is offered by the University of Agronomic Sciences and Veterinary Medicine of Bucharest, with a total number of 2640 places, representing 21% from the total offer. It is noticed that most students who have opted for an agricultural study program have as residence the countryside and it is feasible to assume that they will reintegrate to another level in agricultural activity. This was the argument that justified us to determine the correlation between the number of student enrolled in the agricultural field and the number of farms in agriculture.

From a dynamic point of view, there is a decrease in the number of students as well as the oscillation of the number of agricultural farms but also decreasing. The process of decreasing the number of agricultural farms is mainly supported by the sale.

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2 Nicolae Istudor, Ph.D., Full Professor, Bucharest University of Economic Studies, Department of Agro-food and Environmental Economics, Piata Romana no. 6, Bucharest, Romania, E-mail: nicolae.istudor@ase.ro

3 Emilia Gogu, Ph.D., Associate Professor, Bucharest University of Economic Studies, Department of Statistic and Econometrics, Piata Romana no. 6, Bucharest, Romania, E-mail: emilia.gogu@csie.ase.ro

4 Irina Elena Petrescu, Ph.D., Associate Professor, Bucharest University of Economic Studies, Department of Agro-food and Environmental Economics, Piata Romana no. 6, Bucharest, Romania, E-mail: irina.petrescu@eam.ase.ro

The analysis of the data shows that on an increase with a student in the agricultural field it mitigates the decrease of the number of agricultural farms on average by 12. As well, in the paper it is presented a comparison between Romania and Poland regarding the number of agricultural farms and age of the farmers.

Key words: *agriculture, education, leadership*

Introduction

Nowadays, in Romania, the agricultural sector has a special role in the development of leadership, a "launching" in entrepreneurship of graduates of higher education. Business facilities in the agricultural sector, respectively comparative advantages of graduates who would like to start business in rural areas, especially from agriculture or agro-tourism, are the following:

- Formation of independent organizations/independent individuals.
- Development of small and medium enterprises.
- Absorption of European and national funds.
- Attracting students from rural areas - to which we find a series of competences in the field obtained by tradition in the family.
- Strategic - a graduate from agriculture is less inclined to leave the country.
- The sphere of economic sustainability.
- Support provided by EU bodies for rural development.
- Supported Future - Global demographic growth creates a pressure on the volume of agricultural production.

Analysis of agricultural higher education and agricultural sector

The offer of studies by universities and by license areas in Romania

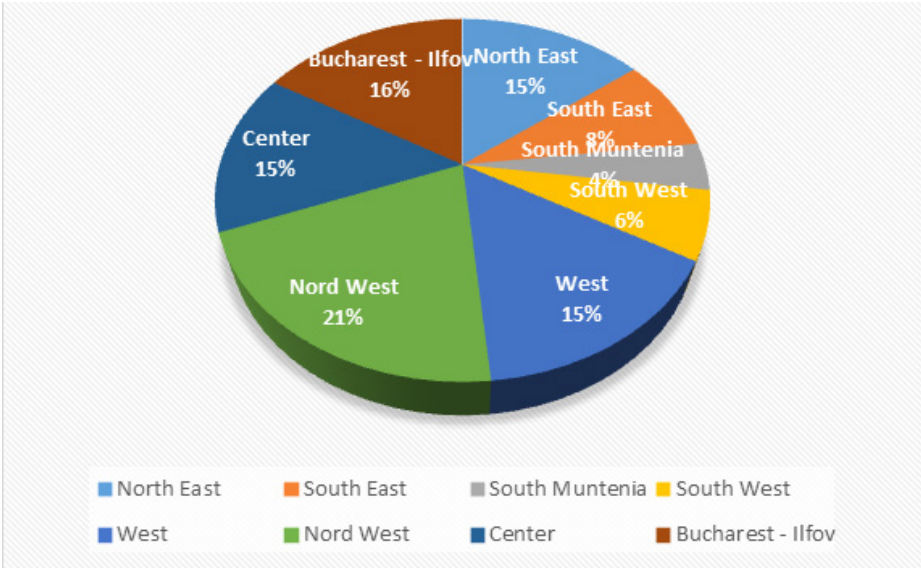
According to the nomenclature of the university specializations, the educational system of the agricultural field is presented in the "Vegetable and animal resources engineering branch". According to the Government decisions number 140/2017 and 615/ 2017, in the university year 2017 – 2018, in Romania are 22 universities (state and private) that offer a 165 bachelors programs, with a total number 12.420 places. The biggest number of places is offered by the University of Agronomic Sciences and Veterinary Medicine of Bucharest, with a total number of 2.640 places, representing 21% from the total offer.

Table 1. *Number of Bachelor's Degree Programs and Tuition Number in the Branch Plant and Animal Resources Engineering by Bachelor's Field in the academic year 2017-2018*

Element	No. of programs	Tuition number
State universities	**146**	**11.130**
Agronomy	27	1.910
Biotechnology	10	455
Horticulture	18	1,305
Food Engineering	41	2,905
Forest Engineering	5	295
Engineering and Management in Agriculture and Rural Development	19	2.280
Engineering and Management in Agriculture and Rural Development	1	50
Silviculture	13	1,065
Zootechnics	12	865
Private universities	**19**	**1.290**
Agronomy	1	30
Biotechnology	1	25
Horticulture	2	90
Food Engineering	8	630
Engineering and Management in Agriculture and Rural Development	6	455
Silviculture	1	60
Total	**165**	**12.420**

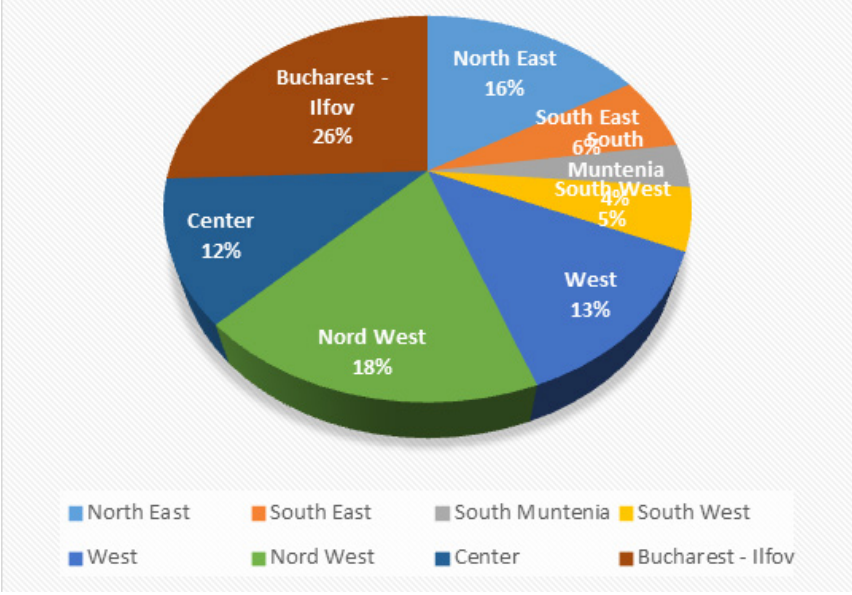
Source: *Processing by GD no.140 / 2017 and GD no. 615/2017*

Graph 1. *Number of Bachelor's Degree Programs in the Branch Plant and Animal Resources Engineering by regions in the academic year 2017-2018*



Source: *Processing by GD no.140 / 2017 and GD no. 615/2017*

Graph 2. *Number of Tuition Number in the Branch Plant and Animal Resources Engineering by regions in the academic year 2017-2018*



Source: *Processing by GD no.140 / 2017 and GD no. 615/2017*

Analysis of agricultural entrepreneurship - agricultural farms

The paper presents the results of a dynamic and correlation analysis on the number of students enrolled in the agricultural field and the number of agricultural farms. The increased number of agricultural farms is and has been generated by the return of land after 1990 in parallel with the urban-rural remigration caused by the closure of industrial enterprises and the return of former workers to the country. The positive side of this migration phenomenon was the "shock absorber" for the shock of unemployment.

Table 2. *Level, dynamics and structure of agricultural farms by development regions in 2005-2016*

Region	2005	2007	2010	2013	2016	Dynamics 2016/2005 %	Share in region 2016
Romania	4.256.150	3.931.350	3.859.040	3.629.660	3.422.030	80,40	100%
North West	591.510	533.770	528.460	499.860	478.490	80,89	14,0
Center	440.710	398.540	394.650	358.470	330.950	75,09	9,7
North East	854.870	807.460	790.790	754.530	720.240	84,25	21,0
South East	532.150	501.420	460.330	433.040	410.220	77,09	12,0
South Muntenia	847.560	762.890	800.830	753.590	694.660	81,96	20,3
Bucharest Ilfov	63.860	62.410	33.490	25.320	21.020	32,92	0,6
South West	608.160	580.610	576.600	557.850	539.550	88,72	15,8
West	317.330	284.260	273.890	247.000	226.900	71,50	6,6

Source: *Calculations by EUROSTAT, http://ec.europa.eu/eurostat/data/database Agriculture chapter accessed May 2018*

Not all agricultural farms produce for the market and are creating paid jobs, a large part of which are non-farm surviving farms, proof being the discrepancy between the number of agricultural farms and the volume of employed labour (3.422.030 farms compared to 1.587.650 people employed).

Table 3. *Labour force employed on agricultural farms by development regions in 2005-2016*

Region	2005	2007	2010	2013	2016	2016/ 2005 %	% 2016
Romania	2.595.590	2.205.280	1.610.260	1.552.630	1.587.650	61,17	100,0
Nord West	344.170	282.200	237.640	216.420	217.250	63,12	13,7
Center	265.880	216.080	173.470	156.160	156.270	58,77	9,8
North East	523.920	462.260	354.720	325.690	346.530	66,14	21,8
South East	336.880	307.740	201.100	194.360	203.760	60,48	12,8
South Muntenia	538.070	397.100	285.850	279.380	276.200	51,33	17,4
Bucharest Ilfov	45.670	46.040	14.720	12.150	12.750	27,92	0,8
South West	373.080	347.520	227.000	251.630	271.940	72,89	17,1
West	167.930	146.340	115.770	116.840	102.950	61,31	6,5

Source: *Calculations by EUROSTAT, http://ec.europa.eu/eurostat/data/database Agriculture chapter accessed May 2018*

A big share of Romanian labour force is enrolled in agricultural activities. As we can see, starting from 2005 the total number of people working in agriculture has decrease, as in 2016, more than 1,5 million people are having as main activity.

The biggest share from the total number is in the regions having big surfaces of agricultural land, such as: North-East, Sud-Muntenia and South-West. The region Bucharest-Ilfov has the smallest share because it is more focused on industry and services.

Table 4. *Labour productivity of agricultural farms at the price of inputs*[5] *(euro/pers.)*

GEO/TIME	2005	2007	2010	2013	2015	Dynamics 2015/2005%
Romania	4.952	6.485	9.502	11.436	9.741	196,7
Nord-West	5.468	8.114	8.349	9.825	8.876	162,3
Center	5.863	9.426	10.554	12.847	11.479	195,8
Nord-East	4.434	5.350	7.231	9.052	7.332	165,4
South-East	5.722	6.357	12.061	15.305	13.192	230,5

5 Labor productivity determined as a ratio between the financial result of the agricultural industry and the labor force employed on agricultural farms.

GEO/TIME	2005	2007	2010	2013	2015	Dynamics 2015/2005%
South - Muntenia	4.101	5.812	9.614	12.536	10.869	265,1
Bucharest - Ilfov	4.608	3.922	11.496	19.724	14.817	321,5
South-West Oltenia	3.783	4.053	7.522	7.850	6.418	169,7
West	7.940	11.266	16.163	16.977	15.330	193,1

Source: *calculation from EUROSTAT data, http://ec.europa.eu/eurostat/data/database Agriculture chapter, accessed may 2018*

Even if the total number of labour force has decrease in the period 2005 – 2016, the labour productivity in agricultural activities has increased in all the regions. At national level we can see an increase of more than 96%, but Bucharest-Ilfov is the leader, with an increase of more than 220%. This region has the smallest agricultural land, but is the most develop and a lot of investments were made, especially in machinery.

Table 5. *Number of agricultural farms managed by persons under 25 years, by region, in the period 2005-2016*

Region	2005	2007	2010	2013	2016	2016/ 2005 %	% 2016
Romania	11.130	10.480	33.290	21.860	14.020	126,0	100,0
North-West	2.300	1.910	4.700	3.140	1.740	75,7	12,4
Center	970	1.090	3.110	1.860	1.250	128,9	8,9
North-East	2.940	1.570	7.700	3.810	2.270	77,2	16,2
South-East	1.020	620	4.130	3.860	2.540	249,0	18,1
South-Muntenia	1.520	1.630	6.380	4.430	2.850	187,5	20,3
Bucharest-Ilfov	110	20	190	120	120	109,1	0,9
South-West Oltenia	1.290	2.020	4.700	2.800	2.030	157,4	14,5
West	970	1.630	2.390	1.850	1.230	126,8	8,8

Source: *Calculations by EUROSTAT, http://ec.europa.eu/eurostat/data/database Agriculture chapter accessed May 2018*

The European Fund for Agriculture and Rural Development is financing young farmers, representing persons under 40 years. In Romania, the rural

area is facing the problem of depopulation and aging. In order to maintain the young people in the rural area, the European Union has created special measures for encouraging of developing business.

In Romania, the total number of farms managed by persons under 25 years had an oscillating evolution. In 2016 it has increased with 26% in comparison with 2005, but still, in 2010 we had a total number of 33.290.

Table 6. *Number of agricultural farms administered by managers 25-34 years by development regions 2005-2016*

Region	2005	2007	2010	2013	2016	2016/ 2005 %	% 2016
Romania	215.100	160.950	247.150	150.100	97.650	45,40	100,0
North-West	30.160	24.400	35.700	22.860	16.580	54,97	17,0
Center	22.050	15.250	26.070	14.870	8.900	40,36	9,1
North-East	59.590	43.780	60.070	35.460	22.090	37,07	22,6
South-East	25.750	21.000	28.960	16.430	9.900	38,45	10,1
South Muntenia	36.780	24.000	47.060	29.220	17.930	48,75	18,4
Bucharest-Ilfov	1.930	1.370	1.890	680	490	25,39	0,5
South-West Oltenia	26.490	19.930	31.390	20.920	14.780	55,79	15,1
West	12.350	11.240	16.020	9.670	6.990	56,60	7,2

Source: *Calculations by EUROSTAT, http://ec.europa.eu/eurostat/data/database Agriculture chapter accessed May 2018*

The number of agricultural farms managed by young farmers with age between 24-24 years has decreased significantly, with 55% in 2016 in comparison with 2005, in all the regions, but especially in Bucharest-Ilfov because in this region, the young people are more interested in other activities, especially services.

Correlation of the number of registered agricultural students and the number of farms in agriculture

From the profile point of view, most students who have opted for an agricultural study program come from the countryside, and it is feasible to assume that they will reintegrate to another level in agricultural activity. This argument justifies us to determine the correlation between the number of students enrolled in the agricultural field and the number of farms in agriculture, made by a gap of 5 years (e.g.

no. of students in 2.000 correlated with Number of agricultural farms in 2005) to surprise an average of 3 years since graduation. In order to capture more accurately the impact of the students and the graduates in the field, the agricultural farms managed by young farmers were selected as follows:

a. Farms with managers under the age of 25
b. Farms with managers aged 25-34 years

Table 7. *Number of agricultural farms administered by managers aged 25-34 years by development regions in 2005-2016*

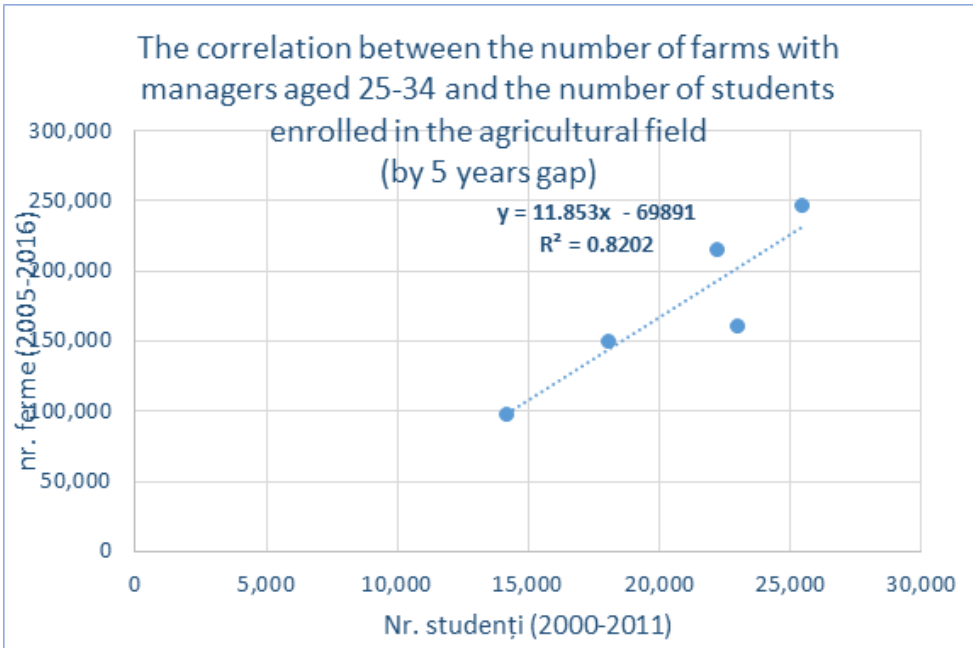
No. of students enrolled in agriculture		No. of farms with farmers under 25 years old		No. of farms with farmers 25-34 years old	No. of farms with farmers under 34 years old
2000	22.242	**2005**	11.130	215.100	226.230
2002	22.982	**2007**	10.480	160.950	171.430
2005	25.468	**2010**	33.290	247.150	280.440
2008	18.076	**2013**	21.860	150.100	171.960
2011	14.195	**2016**	14.020	97.650	111.670

Source: *Calculations by EUROSTAT, http://ec.europa.eu/eurostat/data/database Agriculture chapter accessed May 2018*

a) The first test of the correlation between the number of farmers under 25 years and number of students enrolled in the agricultural field does not confirm the hypothesis that students during the years of study would administer an agricultural farm. The regression function is not valid and the regression coefficient is not significant.

b) The second correlation between the number of farmers aged 25-34 and the number of students enrolled in the agricultural field confirms the hypothesis that a graduate of agricultural studies has a direct, strong impact on the administration of agricultural farms.

Graph 3. *Correlation between the number of farms, young managers and students enrolled in the field of agriculture*



Source: *According to authors calculation*

From a dynamic point of view, there is a decrease in the number of students as well as the oscillation of the number of agricultural farms but also decreasing. The process of decreasing the number of agricultural farms is mainly supported by the sale. From graphical representation and regression output, there is a direct and strong link between the two variables. The analysis of the data shows that on an increase with a student in the agricultural field it mitigates the decrease of the number of agricultural farms on average by 12. We can state, with a probability of 95%, that true value of the regression coefficient β_1 would be covered by the confidence interval $1{,}66<\beta_1<22{,}05$ (the minimum decrease of the decrease is 1.66 and the maximum is 22).

Table 8. *Correlation results*

Summary output						
Regression Statistics						
Multiple R	0,9056					
R Square	0,8202					
Adjusted R Square	0,7603					
Standard Error	28561,2					
Observations	5					
ANOVA						
	df	*SS*	*MS*		*F*	*Signif. F*
Regression	1	11163560537	11163560537		13,685	0,03429
Residual	3	2447226463	815742154,2			
Total	4	13610787000				

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-69890,59	67204,38	-1,04	0,37	-283764,93	143983,75
Number students	11,85	3,20	3,70	0,03	1,66	22,05

Source: *According to authors calculation*

The ANOVA output shows that the intensity of the link between the two variables is very high, so 82% of the variation in the number of farms can be explained by the variation in the number of graduates in the agricultural field, the remaining 18% is the influence of other unregistered factors. The overall regression model evaluation, based on the correlation ratio and the Fisher F test (where Signif. F is less than 0.05%), shows that the regression model is correctly specified with a probability of 95%.[6]

It is equally interesting to analyse the share of young farmers in the direct management of agricultural farms. Previously, the intensity of the link between graduates and the number of agricultural farms has been demonstrated, confirming their place and importance in the development of the sector, but they are not necessarily

6 It is worth noting that the value of the indicators is not sufficiently reliable due to the reduced length of the data series because of the lack of information, but this correlation is a valid regression model.

found in the category of direct managers. The share of young farmers under the age of 34 in 2016 was only 1.6%, compared to Poland this share is over 10%.

Often, in Romania, farm manager is considered head of the family (the older person on the farm or owns the land) and the young graduates usually fall into the category of unpaid family worker[7]. This fact results very easily from the very high share of agricultural farms administered by persons over 65 years old, which in the year 2016 was 46%, persons who do not necessarily have a solid / university training in the field either agricultural or economic. From this point of view, agricultural farms do not develop in the pace of innovative technologies. Families that develop farms are typically more traditional, even rudimentary, either financially or often lacking vision/strategy.

Table 9. *Number of agricultural farms administered by managers by age group in Romania and Poland during 2005-2016*

Year/element	**2005**	**2007**	**2010**	**2013**	**2016**	**Share 2016 %**
ROMANIA						
TOTAL from which:	4.256.150	3.931.350	3.859.040	3.629.660	3.422.030	100,00
under 25 years	11.130	10.480	33.290	21.860	14.020	*0,4*
25-34 years	113.290	77.750	86.800	53.510	40.720	*1,2*
35-44 years	-	467.060	609.610	504.810	398.200	*11,6*
45-54 years	756.300	666.810	636.370	614.550	630.550	*18,4*
55- 64 years	946.830	886.550	868.910	851.230	763.880	*22,3*
over 65 years		1.822.700	1.624.060	1.583.700	1.574.660	*46,0*
POLAND						**Share 2016 %**
TOTAL from which:	2.476.470	2.390.960	1.506.620	1.429.010	1.410.700	*100,0*
under 25 years	32.660	27.790	18.580	14.130	10.570	*0,7*

7 Def. macro statistics - Unpaid family worker - is the person who runs his or her activity in a family economic unit run by a family member or a relative for whom he / she does not receive remuneration in the form of salary or payment in kind. The peasant (agricultural) household is considered such a unit. If several people in a household work in their own household, one of them - generally the head of the household - is considered a self-employed worker and the other unpaid family workers.

25-34 years	276.910	263.850	203.000	159.430	133.890	*9,5*
35-44 years	-	516.690	369.560	339.130	324.870	*23,0*
45-54 years	769.550	743.860	486.300	431.810	399.150	*28,3*
55- 64 years	429.040	460.280	302.790	346.850	377.280	*26,7*
over 65 years		378490	126390	137660	164940	*11,7*

Source*: Calculations by EUROSTAT, http://ec.europa.eu/eurostat/data/database Agriculture chapter accessed May 2018*

We also wanted to compare a country that, like us, has gone through the collectivization policy, and then the de-collectivization of agriculture. In our country there are 2 million agricultural farms more than in Poland, but only 11.7% of them are managed by people under 65 years of age.

Alecu (2011) mentions that the agricultural public schools in Poland are managed by the local units and The Ministry of Agriculture and Rural Development. Also, he mentions that the ministry is managing a total number of 45 agricultural schools, with almost 14.000 students with 1400 teachers.

Table 10. *Number of students enrolled in agriculture, forestry and economics and their share in the total university system during the period 1990-2016*

Year	Total	Agriculture and silviculture[1]	Economic sciences[2]	Share of agriculture	Share of economic science %
1990	192.810	7.869	20.003	4,08	10,4
1991	215.226	9.110	24.801	4,23	11,5
1992	235.669	10.818	35.279	4,59	15,0
1993	250.087	10.861	39.867	4,34	15,9
1994	255.162	10.663	47.712	4,18	18,7
1995	336.141	10.749	83.996	3,20	25,0
1996	354.488	12.153	87.472	3,43	24,7
1997	360.590	13.457	86.861	3,73	24,1
1998	407.720	15.861	101.896	3,89	25,0
1999	452.621	19.399	105.727	4,29	23,4
2000	533.152	22.242	132.332	4,17	24,8
2001	582.221	26.898	146.110	4,62	25,1
2002	596.297	22.982	158.185	3,85	26,5
2003	620.785	24.280	172.409	3,91	27,8

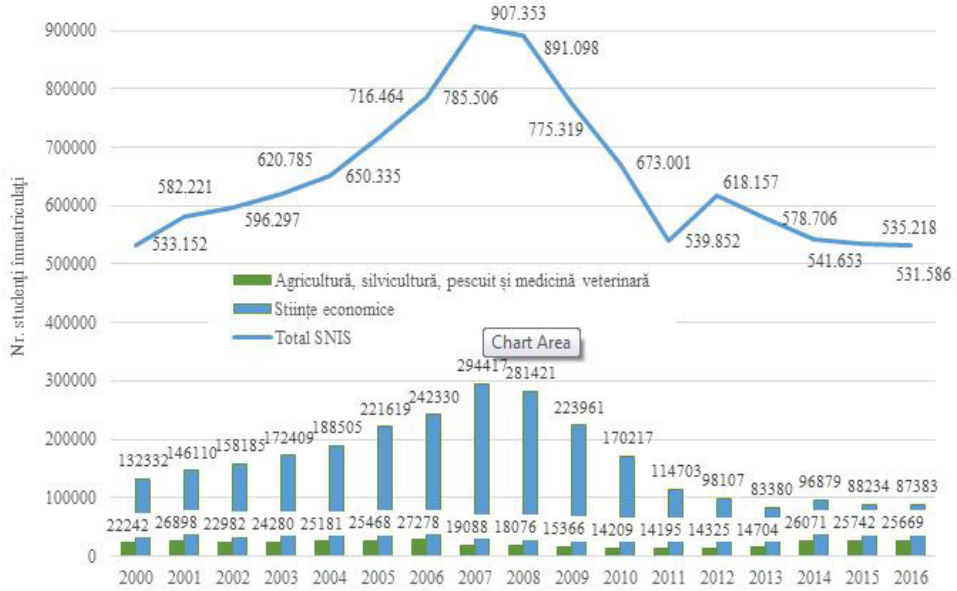
Year	Total	Agriculture and silviculture[1]	Economic sciences[2]	Share of agriculture	Share of economic science %
2004	650.335	25.181	188.505	3,87	29,0
2005	716.464	25.468	221.619	3,55	30,9
2006	785.506	27.278	242.330	3,47	30,9
2007	907.353	19.088	294.417	2,10	32,4
2008	891.098	18.076	281.421	2,03	31,6
2009	775.319	15.366	223.961	1,98	28,9
2010	673.001	14.209	170.217	2,11	25,3
2011	539.852	14.195	114.703	2,63	21,2
2012	618.157	14.325	98.107	2,32	15,9
2013	578.706	14.704	83.380	2,54	14,4
2014	541.653	26.071	96.879	4,81	17,9
2015	535.218	25.742	88.234	4,81	16,5
2016	531.586	25.669	87.383	4,83	16,4

Source: *Calculations by EUROSTAT, http://ec.europa.eu/eurostat/data/database, and tempo online INS, accessed May 2018*

The total number of students enrolled in higher education in Romania registered an oscillating evolution between 2000 and 2016. The highest number of students was recorded in 2007, with 907,353 students. Also in 2007, the highest number of students enrolled in the field of economics was registered, namely 294,417 students, representing 32.4% of the total.

According to Manole and Ion (2010), in the new approach to teaching and learning, the teachers' role has changed. They act like team member and facilitator, helping students to discover themselves their own methods of learning and encouraging them to work in groups.

Graph 4. *Dynamics of students enrolled in economic, agricultural and total SNIS in 2000-2016*



Conclusions

According to the Report on the state of higher education in Romania (Ministry of Education and Scientific Research, 2015), in 2015, out of the total number of persons enrolled in higher education, almost 86% attend study programs in state institutions and just over 14% in private education. By form of ownership, the percentages of undergraduate students differ, which is 74.4% in public education, and 85% in private education.

Regarding the evolution of the number of students enrolled in the field of agriculture and forestry, there is an oscillating evolution, reaching a minimum of 14,195 students in 2011 and the maximum of 27,278 in 2016. It is encouraging that starting with in 2014, there is a significant increase in the number of students enrolled in agriculture and forestry, reaching over 25,000 students, representing about 4.8% of all students.

The growing interest of young people in this field can be justified by massive investments made in the agricultural sector, funded through European non-reimbursable funds.

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SOME ITEMS ON MARKETING AGRICULTURAL PRODUCTS IN THE REPUBLIC OF SERBIA[1]

Nikola Ćurčić,[2] Zoran Simonović[3]

Abstract

In this paper, the necessity of identifying problems of the organization of marketing of agricultural products of the Republic of Serbia is treated. The exemption comes from the fact that marketing can be presented through a process of several steps (attention, interest, desire and action), and usually starts from a marketing process of a product, service, or organization. Most of the current marketing processes of organizations relates to the task of retaining permanent clients through activities of creating relationships between consumers, improving customer service, better representing the benefits of products and services, etc.

In the given sense, marketing of agricultural products is also considered. It is believed that modern agrarian production of Serbia is unimaginable without adequate marketing approaches that involve engaged agrarian entrepreneurs, sophisticated equipment and flexible transport networks. The agrarian entrepreneur should be incorporated into a chain that includes production, processing, turnover, banking transactions and science. Such agrarian entrepreneur must also be educated and prepared for modern agribusiness. Only in this way, and in accordance with natural conditions, already abandoned agricultural land can be used again and again, but only for the production that is in the mentioned agro-industrial chain. It is understood that the ultimate goal should be not only domestic, but above all the world market. The fact is that these processes are complex and require that marketing has a certain level of development. In addition, credit, tax, educational and other systems that influence the development of agricultural products are also important.

Key words: *marketing, agricultural product, Serbia.*

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2 Nikola Ćurčić. Ph.D., Assistant Professor, University Union – Nikola Tesla, Faculty of Management, Njegoševa Street no. 1a, 21205 Sremski Karlovci, Serbia, Phone: +381 21 21 551 85, E-mail: nikolacurcic@yahoo.com

3 Zoran Simonović, Ph.D., Scientific Associate, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 697 28 58, E-mail: zoki@medianis.net

Introduction

Marketing can be presented through a four-step process, which begins with the research, analysis and identification of the "universe" of potential users or customers. After the first phase of the marketing process, the process of drawing attention to users that are ready for purchase, from the "universe" of the target population, follows. In the third phase, systemic influences affect potential users to become interested in and accept existing concepts or offers, which are created based on the organization's marketing activities. Finally, the success of the previous three phases should lead to the transition to potential customers into "real" customers through activities that are implemented to enable potential customers to do the desired action - buying, calling, downloading documents, subscription, membership, sales, etc.

In this regard, we deal with the analysis aimed at helping to better organize marketing in the sale and marketing of agricultural products on the market in the Republic of Serbia. The basic goals of marketing in agriculture are to explore the needs and desires of consumers, linking it to the food produced in solving and meeting its needs, as well as to ensure consumers' right to health-safe food and protecting products harmful to the life and health of consumers. The role of marketing is to initiate and raise the ecological awareness of the end consumer with the help of communication marketing instruments (event-marketing and relationship marketing). The goal of such orientation in agricultural production, involves the involvement of in participants in the process of production and transport. Here, in the first place we mean suppliers, manufacturers, distributors and exporters. This implies an active role of the state in this domain. Marketing should permanently connect ecologically conscious buyers to a business entity (Vlahović, Štrbac, 2007).

Methodology and data sources

The subject matter has a research character, and the method is also subordinate to it. Several methodological approaches were used in the research on the application of marketing in agriculture. 1) The research relied on foreign and domestic literature. This literature was important to studying the application of smart technology in agriculture today in the world. 2) Author's research in the thematic field was used. 3) At the end of the research carried out by the Institute of Agricultural Economics and associates with the previous period.

In general, the research relied primarily on foreign literature. As far as domestic sources are concerned, they are few and insufficient for a more comprehensive examination of the problem of studying some of the marketing implications of agricultural products. We believe that not only in the world but also in our country there is an interest in researching the application of marketing in the placement of agricultural products, from various modern aspects: from the aspect of sustainable development, production of healthy - environmentally sounds food, from the point of view of proper use of agrarian resources, water, natural middle in general. Foreign literature on these problems was used. That is why one of the tasks of this research was to study and present the latest insights on this issue. Internet information that is numerous and significant should also be mentioned.

Special attention is paid to periodicals (scientific journals) and to scientific consultations (chamber of works), as it is better to notice the current problems that affect the application of marketing in agricultural production.

About marketing in the production process

The presented four-step process (attention, interest, desire, action), usually refers to the beginning of a marketing process of a product, service, or organization. Most of the current marketing processes of organizations relates to the task of retaining permanent clients through activities of creating relationships to consumers, improving customer service, better representing the benefits of products and services, etc. Marketing was created to solve the problems of production and producers when the supply was higher than demand, and the ultimate goal was the realization of the produced goods and the achievement of profit for the company. Today, the essence of marketing consists in solving consumers' problems - faster and better than competition. Accordingly, it is rightly pointed out that "having a competitive advantage is the same as having a pistol in the fight over knives" (Kotler, 2003). How much marketing has changed since its inception to date is the fact that in the literature there are now two terms with the concept of marketing:[4]

1. Business marketing relates to material goods, that is, products and services designed to solve some economic problem of a person or organization.
2. Social marketing is focused on solving some non-economic problems of society related to the quality and safety of life.
3. According to the same source, in addition to the above, today they are current:
   - Environmental marketing - which aims to preserve the environment, and

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then profit. It is developing in the recycling process.

- Intellectual marketing - includes the creation and sale of information. It does not apply to material goods, but to new values for people and society.
- Relational marketing - the central place occupies a focus on relationships of target groups, i.e. the buyer/user is indirectly introduced into the organization, through a certain value chain.

Marketing is a process whose primary importance is reflected on the establishment of a communication flow between the producer and the buyer or consumer. Marketing as an economic process takes place continuously and is an integral part of the reproduction in an enterprise. Marketing is not a promotion or an appearance of a fair or sale - it is already a process that lasts and encompasses marketing research, strategic marketing planning, and defining goals, formulating a marketing strategy, developing a marketing mix, marketing analysis, control and audit. So, it's a whole system, and every part of it is equally important and important.

Marketing Management

Marketing management is a process by which the marketing activity of a company is regulated. This is a dynamic process because the conditions both in the economy and in the company are constantly changing. Consequently, it is necessary to adapt the marketing activities as business functions of the changed conditions of the business environment and to the new business goals. In such conditions, marketing management is the process by which to initiate and direct marketing activities in order to meet the needs of citizens as consumers, businesses and companies in products and services with the achievement of profit (Milisavljević, 1999).

The previously defined marketing management activity can be analytically divided into: planning, organizing and controlling. At the planning stage, decisions are made about the goals, policies, strategies, programs and plans for marketing activities. During the organizational phase, the organizational structure is created and the immediate activity of the marketing sector is organized. Finally, at the control stage, the realization of planned decisions and the efficiency of the organization is measured and corrective actions are taken in the organization and functioning of the marketing sector of the company. The marketing management process is effective if all the management phases run continuously. Namely, certain phases of marketing management should be synchronized so as to give a

synergistic effect, to complement and stimulate each other. Thus marketing of agricultural products, as the complete logic of business-management thinking about the role of individual members of the system in the process of satisfying the needs of consumers, the growth and development of one's own resources as well as the national economy has an indispensable role in creating the increased value of products (Sudarević, 1999).

Marketing management essentially means managing the level, "timing" and the composition of demand, in a way that will help the organization achieve the goals (Kotler, Keler, 2006). The process of managing marketing activities involves analyzing market opportunities (existing or potential markets), formulating goals to be achieved on the market, defining the offer, and locating resources on selected action directions, creating an efficient organizational structure that should enable the realization of programs and plans on the market, permanent control of the achieved results of marketing activities and review of the rationality of the taken actions on the market (Milisavljević, 1999). Taking into account the aforementioned marketing management elements, it is noticeable that this process should, above all, to enable identification of market opportunities, their compliance with the company's operations and the creation of a program of actions to exploit distinctive competence in order to create a relatively lasting competitive advantage on the market (Simonović et al., 2012a).

Modern agrarian production

In the current conditions of production, agrarian production of Serbia is unthinkable without modern agrarian entrepreneurs, without modern equipment and well-organized transport networks. The agrarian entrepreneur must be in a chain that includes production, processing, traffic, banks and science. Such agrarian entrepreneur should be educated and prepared for modern agribusiness. Only in this way, and in accordance with natural conditions, already abandoned agricultural land can be used again and again, but only for the production that is in the mentioned agro-industrial chain. It is understood that the ultimate goal must be not only domestic, but above all the world market. These processes are complex and require appropriate credit, tax, educational and other support systems. The point of transition, i.e. structural changes and demographic trends, is to achieve more productive and more profitable agrarian production.

In close connection with the prominent problems of structural changes in the Serbian economy and demographic trends in agriculture, the problem of rural development in Serbia is the problem of transforming villages into modern settlements of a complete infrastructure of urban character (electricity, water, telecommunications, etc.). Spatial arrangement of rural areas and construction of road and other systems. The classical Serbian village relied exclusively on agrarian production of a natural type. Modern rural development implies the development of other non-agrarian activities if conditions for this or at least the development of processing capacities for agrarian production are at stake. It is a village as a settlement of a modern type that is not lost in space but is connected with space in all elements of today's available infrastructure.

Rural development is a part of the spatial development or spatial plan of Serbia, which implies, when it comes to agriculture, agrarian re-identification and specialization, or the use of comparative advantages for the corresponding type of production.

Factors that limit the development of agrarian regions

The limiting factors of agriculture and the agrarian sector are expressed in the form of declining demand and consumption of agrarian products on the domestic market, as well as the unfavorable relations between the realizations of the foreign trade of commodity goods trade (Simić, Stevanović, 2004). The largest decrease in production was in livestock production, while the intensity of production declines was somewhat slower in plant production.

The poor situation in the viticulture and wine sector is manifested through the reduction of grape and wine production and the loss of competitiveness of domestic wines with the increased import of wine. The movement towards fruit production had a stagnating character. Wine producers in Serbia are small do not have enough money to invest in marketing products that produce them. Investing in quality is what should be dominant, but without good marketing they cannot expect their products to be spotted on the market.

One of the main characteristics of the agro region in Serbia is their uneven development. There is a big difference in the development of the plain and mountain regions. Only 3% of the land in the mountainous region was socially owned. This means that in this region dominates the small estate divided into a dozen parcels

by farm. The natural process of concreting of the land surfaces was slow. It has started and has never been completed in an adequate way. The state should reopen and then complete this process. Production of the agrarian regions of the hilly and mountainous areas was mainly oriented towards satisfying its own needs, i.e. very little was focused on market conditions. Due to this type of circumstance, production was mostly scandalous and specialization was only in the indications. In this sense, in the hilly and mountainous areas, it was not possible to organize agricultural production on a larger scale, let alone talk about investing in some marketing. Of course, on this occasion, it should be noted that there are exceptions to which this paragraph does not apply. First of all, it is thought of as a small and medium enterprise in the agrarian sector.

There is no better situation in the equipping of hilly and mountain regions with agricultural labor. This equipment is significantly weaker than the flatland region.

About export chains of agricultural products

Considering the trends on the EU market, and bearing in mind the achieved level of production and competitiveness of domestic producers, it can be concluded that from the assumption of meeting the quality controls standards from the world market regarding the export of agrarian products, we are competitive only if we differentiate the offer, in terms of export of high quality products, with brand and / or indices of autochthonous origin.

Namely, Serbia can only build its export opportunity on the EU market using the modern concept of competitiveness, which implies creating a competitive advantage with quality and innovation, or differentiating the offer.

This strategy is partly used by Serbia in beef market, but its true dimension is this concept of strategy gained only in the products of higher level of final processing, thus exporting resources and raw materials, we are moving towards export of knowledge, technologies, innovations.

In the shortest, basic assumptions of this export strategy, or the modern concept of competitiveness, are:

- Increased investment in modernization of production,
- Harmonization of the overall legislation with WTO and EU regulations,
- Compliance with numerous standards of sanitary and veterinary control.

As the basic prerequisites for securing the modern concept of competitiveness of the domestic agrarian sector, the following can be stated:

- Increase investment in technology and innovation, or increase productivity;
- Achieving greater production, changing its structure and ensuring a stable export offer;
- Fulfilling strict quality control standards (adapting to EU standards in the field of veterinary, sanitary and photo sanitary needs, environmental protection) and harmonization of the overall legislation with the WTO and EU regulations;
- Development of marketing strategies, accentuating non-price elements of competitiveness and product branding;
- Organized performances by domestic producers and exporters; one of the ways of increasing the competitiveness of Serbia's economy and the agrarian sector is the development of business environment through clusters or "branch clusters." Clusters are groups of affiliated, export-oriented companies, with related institutions at the same location (customers, suppliers, competitors, universities, schools, marketing agencies, financial institutions, etc.).

Finally, no less important assumption of achieving competitive export of agricultural products of Serbia is also entering the WTO, which makes up about 95% of the world's total trade.

In order for WTO membership to be in the national interest, it is necessary, first of all, to increase the overall productivity of domestic agriculture and its efficiency, so that in terms of price and quality we can compete in export markets, but also in the domestic market, which to be opened by the act of lowering customs duties. This would have done most of the work in the process of EU accession, which bases most of its rules of those in the WTO. In this process, it is the most important to determine the national strategy and set priorities, in order to protect the domestic market and the most vulnerable segments of Serbia's agricultural production (Simonović et al., 2012b).

Issues related to the use of marketing in the placement of agricultural products in Serbia

In order to realize how well we know the possibilities of marketing in agricultural production of domestic producers of agricultural production, we did a survey. We asked some of our farmers for several questions. The first question concerns

the informing of agricultural producers about the possibilities of using marketing in the placement of agricultural products. As Table 1 shows, only 52,5% of the bearers claim that they know a lot about the possibilities of applying marketing in agricultural production.

Table 1. *Informing agricultural producers about the possibilities of using marketing in the placement of agricultural products*

answers of respondents	number of respondents	participation in %
quite familiar	21	52,5
medium	10	25,0
little	8	20,0
not known	1	2,5
in total n=40	40	100,0

Source: *Calculation of the author based on the survey.*

More than half of the respondents are familiar with the use of marketing in agricultural production. This is about the fact of how old this topic is and how many stakeholders in agricultural production know about it. The next question raised by the carriers was whether they would apply marketing in their agricultural production.

Table 2. *Would you apply marketing in your production?*

answers of respondents	number of respondents	participation in %
yes	33	82,5
no	2	5,0
no answer	5	12,50
in total n=40	40	100,0

Source: *Calculation of the author based on the survey.*

Interesting answers was obtained on this issue. Over 82.5% of surveyed stakeholders would use marketing to market their agricultural products, while only two respondents or 5% would not benefit. Based on this answer, it can be concluded that with domestic agricultural producers there is a great knowledge of the advantages that the application of marketing in the sale of agricultural products.

And from the respondents' answers to the next question, a high percentage structure of knowledge of this topic is observed. Only one (2.5%) of respondents did not even want to answer this question. While 82.5% see their interest in investing in marketing development.

Table 3. *Do you know that investments in marketing development create conditions for easier placement of agricultural products?*

answers of respondents	number of respondents	participation in %
yes	33	82,5
no	3	7,5
partially	3	7,5
no answer	1	2,5
in total n=40	40	100,0

Source: *Calculation of the author based on the survey.*

Better acquaintance of all those involved in agricultural production of this issue would certainly be useful and productive for our agricultural production. Serbia's agriculture has to respond too many of the challenges that wait on the road to the EU. It is precisely in this sense that the reformed Serbian agrarian policy should be organized, which would rely on the application of technical, technological and ecological standards in the agrarian sector. The same should enable the creation of modern models of agricultural producers and entrepreneurs, who would be equal to agrarian entrepreneurs in the EU.

Perhaps the solution to domestic agricultural producers represents their joint organization on the form of cooperatives or other associations with agricultural producers, all with the aim at making it easier to procure funds that are necessary for the application of smart agriculture. At present, cooperatives in Serbia are practical organizations. Most of the cooperatives in the modern way of doing business tend to think about fulfilling their current obligations. This way of thinking influences that the cooperative movement properly looks at the way to the future. The Cooperative Movement is today focused on pragmatic inclusion, responding to the given opportunities in order to adapt to the changes (Simonović et al., 2016).

Conclusion

Marketing as a concept emerged from the need to collect information about the market so that production aligned with the market requirements would get an economic sense, and the ultimate goal is always the placement of manufactured goods and making profits for the company. In this regard, product marketing is considered with the help of marketing instruments, whereby it is necessary to adequately manage to market as a process by which the marketing activity of company is regulated. This is a dynamic process, since conditions are constantly changing in the economy and in the company.

Accordingly, the research focus is given on contemporary agrarian production of Serbia. Without modern agrarian entrepreneurs and without modern equipment and well-organized transport networks, the same is unthinkable. The agrarian entrepreneur must be in a chain that includes production, processing, traffic, banks and science. Agrarian entrepreneurs are those who organize and implement agricultural production, and are the most responsible for the application of marketing in the placement of agricultural products.

Three agrarian regions of Serbia reveal diverse natural conditions for agrarian production. While in the plain region dominated by cereals, industrial plants and livestock breeding, fruit and vegetable and cattle production dominates in the hilly region, while mountain cattle breeding and fruit and vegetable production dominate. In the current conditions of the recession, the hilly and mountainous regions can appear in exports with berries (strawberries, raspberries, blackberries), where they have so far achieved significant results. Although the world has experienced a recession, it is known that the elasticity of food demands is small; demand is always present and must be covered by production. If we consider the affirmation of the agro-regional identity of Serbia in certain regions, we can conclude that, for example, the region of Sumadija can specialize in the production of plums and berries, the region of Sjenica for shady cheese, the region around Stara Planina for the production of the old mountain cheese, the region in the basin Jablanica rivers for the production of vegetables, etc.

There is a big disparity in economic development between the regions. The most developed are the plain region, and the least developed mountain, not only due to natural conditions, but above all because of socio - economic and historical circumstances. We believe that in the current moment, all regions have the chance to

use agrarian business or agrarian entrepreneurship in which marketing is used to start and organize production or redefine the already acquired comparative advantages in individual agricultural products.

Taking into account trends in the EU market, while respecting the achieved level of production and the competitiveness of domestic producers, it can be concluded that the domestic agrarian, assuming compliance with the quality controls standards of the world market in terms of export of agrarian products, can be competitive only if it differentiates the offer in terms of export of high quality products, with a brand or an indication of autochthonous origin.

The results of the research conducted with agricultural producers in the Republic of Serbia on the possibilities of using marketing in the placement of agricultural products, show that there is interest in agricultural producers in Serbia with the use of marketing opportunities. It can be concluded that agricultural producers should make more active and more use of marketing instruments when placing agricultural products. Engaging the agricultural producers in this direction would certainly contribute to the increase in potential buyers for the products they offer on the market.

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VOLATILITY OF AGRICULTURAL PRICES AS A FACTOR OF INFLATION IN THE REPUBLIC OF SERBIA

Nikola Njegovan[1], Tihomir Novaković[2]

Abstract

The stability of business in one economy has always been the primary goal that was difficult to achieve, and inflation is regularly used as the main indicator. It is a signal of a change in the general price level. The article analyzes inflation and prices of agricultural products and foodsuffs as a phenomenone, examines their causes and consequences. Also, particular importance is given to the change in prices of agricultural products and foodsuffs as well prices of inputs. Such tendencies are caused by changes that are happening on the global scale and which are gaining an increasing influence in the national bounderies. It shoves the change in the parity of prices and the impact of the global monopolistic structure on inflation. It also points out the importance of demand that causes inflation in less developed countries, and as a consequence, rising food prices, pushing further growth of wages that are not consequence of productivity growth.

Key words: *inflation, prices, agro-food products, glocal perspectives*

Introduction

Inflation[3] is a phenomenon that economists have been discussing for quite some time. However, it should be said that the first inflation was defined exclusively as monetary event that describes a situation in which "*too much quantity of money is chasing too small quantity of goods*." Today, there are mainly two approaches to inflation: a) one that is treated it as a monetary phenomenon, starting with demand, and b) one that, in defining inflation, starts from a global imbalance between supply

1 Nikola Njegovan, Ph.D., Associate Professor, University of Belgrade, Faculty of Economics, Belgrade, Kamenička Street no. 6, 11000 Belgrade, Serbia, Phone: +381 63 263 513, E-mail: nikolanj@yahoo.com

2 Tihomir Novaković, M.Sc., Assistant Professor, University of Novi Sad, Faculty of Agriculture, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 64 61 49 526, E-mail: tihomir.novakovic@polj.uns.ac.rs

3 The term "inflation" was taken from medical literature A. Delmer (1864) indicating a sudden jump in prices and excessive issuance of non-convertible banknotes for the purpose of financing wars. Later J. M. Keyns points out that *the continuous state inflation process can seize, hidden and uncovered a large part of the wealth of its citizens* (Keynes, 1956).

and demand, hence its outcome must not necessarily be expressed in all cases as price increases.

The issue of the causes of inflation in modern era is quite complex. Some researchers thought that the causes of inflation must be sought in excessive credit and stock exchange speculation, budget deficits, cheap money policies, unsecured bank credit policy and the war needs of the states. Therefore, the increase in monetary mass leads to the emergence of inflation, so the main focus should be on credit policy, open market policy and the balance of payments situation. However, observed exclusively from the monetary side, four main causes of inflation can be identified: 1) inflation of effective cash demand - inflation of purchasing power, 2) inflation caused by disproportionate distribution of real national income, 3) inflation caused by reduction of commodity funds, and 4) Adverse developments in the balance of payments.

When it comes to the consequences that inflation produces on the real economy and the general conditions of business, they are numerous. They are reflected in the general instability of the economic environment, which in particular means distortion of relative prices in the economy, pressure on the course, lower real wages, higher interest rates on borrowing money, higher state risk and many other implications.

In the case of the Republic of Serbia, it can be said that it is in a position to permanently implement monetary measures and that way regulate the market situation, since structural measures have been missing in the scope that would be more significant for decades. Thus, inflation in the previous three decades did not generally fall below 4%, and at the end of the 20th century, the record high inflation rate was observed in the global - World scale (Avramović, 2002).

Today, inflation in Serbia has a multi-dimensional character because of the inflation of demand, inflation of costs, structural and imported inflation that primarily indicates the disorder of the economic system. Therefore, macroeconomic stabilization should imply the establishment of an internal and external balance, and as a consequence, it should have a low and stable inflation rate[4]. Hence, it

4 In sutch conditions, monetary policy in addition to the inflation rate, must also account for other factors that can cause instability. Changes in employment, economic growth, in prices of real and financial assets, level of indebtedness of entreprises and banks (leverage) and the presence of non-transparent and complex financial derivatives are just some of the possible factors that are endangering the stability of transition countries.

can be said that inflation, in today's economic circumstances, is an economic category that has been placed under control. However, it should be emphasized that in a long run monetary measures can't be implemented in an adequate way because of price volatility, especially when the agricultural products are in play. Interventions should be extended to structural and institutional reforms, thus removing structural causes of inflation.

Finally, it should be added that in the process of globalization, internationalization of business activities and increasing integration on the international level, inflation is under the significant influence of movements that are manifested at the international market, primarily at the market of raw materials (energy) and agricultural and food products. Hence, agriculture can still be a significant factor in the growth of inflation caused by international trade as well as the underdevelopment of the two thirds of the world countries. Therefore, in such conditions, it shows a marked volatility in both quantitative and qualitative terms that is directly reflected in the movement of prices, which further affects inflation.

The role of prices

When it comes to inflation, prices are definitely an indispensable, even central topic. The most common are the so-called nominal prices as an element of equilibrium, whether individual or overall. Nominal prices are related to the so-called normal income. The analysis of the normal price and in this respect the market price is based on the following assumptions: the presence of complete competition, homogeneity of products within the industry, complete capital mobility and capitalist mode of production.

Hence the critique of both supply and demand as price determinants is based on a critique of the origin of the commodity value. Price theories in the so-called market economies are starting from the population that normal prices formed by the action of supply and demand forces. They consider that behind the supply are the average costs, and behind the demand, the subjective perception of the value of the goods i.e. their marginal benefit and income. The normal balance of the prices is derived from the balance on the side of the tenderer and the caterer.

In regular circumstances, individual bidders accept a normal price because they are not able to act on the side of supply and consequently demand. However, the theory of limited competition is using monopoly prices in which the monopolist, besides normal, also generates extra profit by manipulating with demand and

supply. The theory of market economy has made a significant contribution in explaining the equilibrium price phenomenon observed in different market structures. This phenomenon is reflected in researching the connection between price and demand (price elasticity), the interaction between prices (cross-elastic) and the dependence of the price equilibrium upon the social productivity of labor (normal price according to the rising, declining and constant costs), i.e. the impact of social productivity on the formation of prices in branches with increased, above-average and below-average social productivity of labor.

Agricultural prices could be characterized as the prices of the necessary product of the society that are influencing real income of agricultural producers as well the level of consumers and producers accumulation. They are not in direct proportion with the part of consumer's income dedicated to foodstufs purchase. For example, nowadays consumers in Serbia allocate's slightly less than 50% of their income for nutrition purposes[5]. On the other hand, prices arent a universal instrument for acting on agricultural producers (including international market prices). In addition to that, the orientation of agricultural production and its structure are influenced by other factors like loans, various subsidies, premiums, different reliefs, tax and contribution exemptions, etc.

Volatility of Agricultural Prices at the International Market

A number of factors have influenced the movement of agricultural prices in particular countries. Sometimes they are objectively conditioned, for example, the process of agricultural production globalization, financial and technology flows in different parts of the world during relatively short period of time, the monopolistic structure of the world market caused by the capital appreciation (the emergence of multi- and trans-national companies that conquer the world space, i.e. new markets, creating and expanding the network of business units in various countries), etc. The next factor which we emphasize is connected with strengthening of state's integration (economically powerful countries). Thus, there are situations in which the change in prices of agraricultural products on the international market is caused by various speculative actions. In addition to the above mentioned, important factors that are additionally influencing agricultural price changes, are as follows:

– an increase in demand for agricultural products in developing countries,

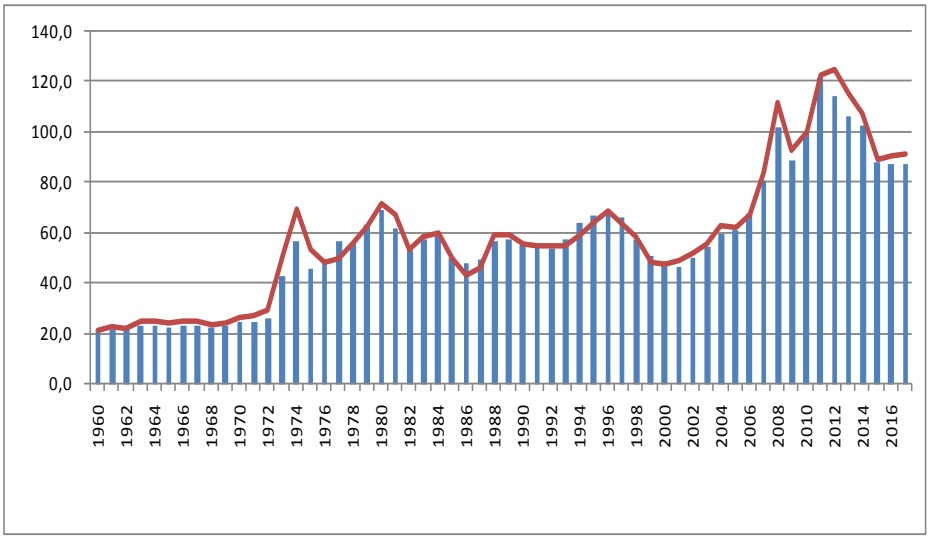
5 It is considered that if a third of the family budget is allocated for food purposes, then such a state is underdeveloped because only the basic needs of the family are met.

- a higher price of fuel and basic inputs of agricultural production,
- higher transport costs,
- the specificity of agricultural production caused by the influence of natural factors,
- redirection of field crops for alternative production (biofuels, etc.), and
- introduction of a food export restriction policy by some countries, etc.

The most important factor is on the side of field crops redirection for alternative production caused by the increased demand for those raw materials that are processed by renewable energy sources, especially in EU and USA (Mitchell, 2008:7). Some authors argue that an important factor of expansive monetary policy occurs in key industrialized countries, leading to low interest rates and a sharp decline in US dollar values (Frankel, 2006:22; Krichene, 2008:356). It should also be noted that the time of cheap foods has passed. This is indicated by changes in the movement of prices of agricultural products that are registered by the World Bank for a long period of time, Graph 1. The most significant is the increase in prices of agricultural crops that has increased in the last decades at the global level even four times (Pejanović, Njegovan, 2009:95).

As national market for agricultural products is under the influence of the international market, we emphasize that an effective national agricultural policy should have in mind two important determinants: *firstly*, that the raise of agricultural prices on the international market will affect national prices and therefore create inflation. In that sense, the difference in development between countries is the one that determines in which intensity these changes will be felt (due to the increased share of food in the consumer basket, the base inflation of the less developed countries is more endangered).

Graph 1. *Changes of gricultural and food prices at the International Market (1960-2017)*



Source: *World Bank Commodity data.*

Secondly, there is also an impact based on the expectation of future food price movements. As a result, pressure on the increase in wages is beginning. This leads to a rise in core inflation. Such events, in many countries and regions lead to a situation where the rise in food prices is higher than aggregate inflation, and thus to a greater extent contributes to inflationary pressure. For example, in Europe and Central Asia the total inflation was only 10% (before the crisis in the 2008), but the inflation in food prices was 15%, while the price of bread and grain was even 23% (Alam, Vybornaia, 2008:188).

Input prices, agricultural prices and global perspective

Volatility of agricultural product prices can also be explained by the change in the price of inputs, primarily energy products, Graph 2. This is the reason why the issue of food production and demand is directly dependent on energy supply opportunities in the long run. Therefore, it can be said that energy and food are factors that essentially define the inflation rate[6].

6 Energy and food prices achieve the highest degree of oscillation. The reason for this lies in the specificity of the products themselves (NBS, 2012).

Graph 2. *Trends in crude oil prices (1996-2010) US $ / barrel*

Source: *Statistical office of the European Union (www.ec.europa.eu)*

The global economic crisis of 2008 led to further redistribution of economic power on a global scale. Relative economic importance of the USA, Japan and the EU is decreasing and it strengthens the position of developing countries, especially the energy and BRICS countries (Brazil, Russia, India, China and the Republic of South Africa). Among the partially advanced economies, China is leading as it became the world's largest exporter, the world's second largest economy and the largest consumer of energy.

When it comes to prices of agricultural products, a number of other factors are influenced by them. First of all, the availability, or the limitation of the land resources used in agricultural production. It fixes its production capacity, which practically means that international supply is limited. In this way, under the pressure of population growth, the supply is limiting day by day. In addition, agricultural production is affected by natural conditions. They can to the some extent be controlled today. Also, there is a seasonal character of agrarian production. Also, we must not forget the importance of agricultural policy and its andvantages and limitations.

Our opinion is and the World Bank also forecasts that in the coming period, the tendency of price fluctuations will continue due to many global and internal factors in certain countries. This is confirmed by the fact that on tghe global level countries, for example spent on imports of food products US$ 1.290

billion (2011), that is 21% more than in 2010 (FAO, 2016). The estimations are that by 2050[7] food demand will grow between 70-100%, compared to 2010. On the other hand, the growth of agricultural production by 2020 is estimated at an average rate of 1.7% per year. This represents a decrease of 2.6% compared with previous decade. That could double cost of life (food) in two decades. Due to these tendencies food will be increasingly a strategic product in the coming period, which can significantly burden relations between individual countries of the world.

Due to all mentioned above, it can rightfully be said that the impact of agricultural and food prices on inflation is not only an economic but also a social issue, a topic that affects the very pores of society and its economic system. This topic is not up to date, but will be much more relevant in the future, especially when it is known how much will be the increase in demand for agro-food products[8] as a result of the world's population growth (doubled by 2050). Therefore, if there is no adequate response on the supply side, this will lead to an increase in the prices and thus create inflation.

The consequences of price growth and "pop up" of inflation

At the very beginning the next question might be posed: What is the maneuvering space of the Central Banks in meeting of the targeted inflation? When the conditions of the underdeveloped market mechanism are in play, the lack of fiscal and financial discipline and absence of a clearly differentiated structural policy in the real sector (these are the features of Serbian economy), wont bring price stability in the long run. In connection to that, it must be seen that agriculture represents an activity that provides food for the population - an aggregate supply of food, and in that sense affects relations that are established with aggregate demand for agro-food products. In this regard, the quantity of market surpluses that is used in other sectors is also relevant. The increase in these surpluses is necessary over time, *firstly* as an indicator of agricultural productivity increase, and *secondly*, for the nutrition of non agricultural sectors with cheap food, that

7 A meeting of the ministers of agriculture of the eight most important countries (Copenhagen 2008) sent a message of the necessity of increasing food production. Projections are given for the period until 2050, when production should be doubled (FAO, 2016).

8 In Europe, only Russia and Ukraine have higher natural resources for production in agriculture per inhabitant than Serbia and therefore an increase in food prices at the world market should act as a stabilizer of the national economy. However, in 2007 the highest growth of prices of basic food products in Europe was registered in Serbia.

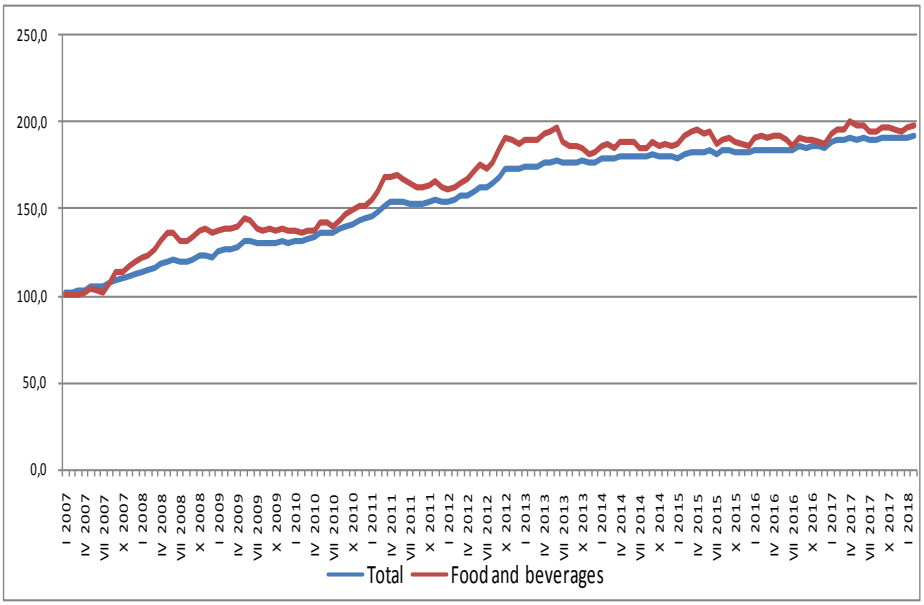
is the basis for maintaining relatively low wages (Njegovan et al., 2009:66-67). If agricultural prices are high, there is a pressure for raising the wages in the industrial sector (raising wages is unjustified because there has been no productivity increase). This necessarily causes inflation as a result of an increase in demand for agro-food products in conditions of relatively limited supply. Therefore, in the preservation of stability, the agricultural sector is inevitable, and for this sector the production strategy in the future is of fundamental importance.

It should also be noted that the inflation accounting system is today questioned, primarily due to the constant rise in food and energy prices. Their growth is no longer a passing phenomenon. We think that there is a complex change in the price relationship at the world market, because the rise in food and energy prices can no longer be seen as a reflection of short-term disorders. The high demand for raw materials, food and energy coming from developing countries, especially from China and India, as well the relative resource constraints and requirements for the sustainability of agricultural production, further affect the long-term observation of these processes. Based on this, it is estimated that there is a reciprocal influence (Fabris, 2006:389-405) i.e. that inflation has a decisive influence on the leveling of prices of agricultural and food products, as they in the further step rely on the household budget.

The impact of agricultural prices on the consumer price index in Serbia

At the very beginning it is necessary to point out several methodological notes. The price stability guard in Serbia is the National Bank of Serbia. Its government together with the National Bank defined the realization of core inflation, calculated on the basis of the retail price index (2006). Their proposal was that inflation has its planned value with the possibility of leveling, which also has its own interval. At the end of 2008, the inflation targeting regime was officially adopted, in agreement with the Serbian Government with the transition to targeting the overall consumer price index. The benchmark interest rate is used as the basic instrument of monetary policy. Since this instrument affects inflation with a time lag, the inflation targeting regime requires an ancillary asset to project (and forecast) inflation, but above all the path of the reference rate that should be followed in order for inflation to move within the target range. The model used in the National Bank belongs to a group of New Kensian models (Đukić et al., 2010:29). This model is based on the role of the monetary policy to maintain inflation in the prescribed framework. In purely theoretical terms, the consumer price index is one of the key areas of monetary finance and money theory, Graph 3.

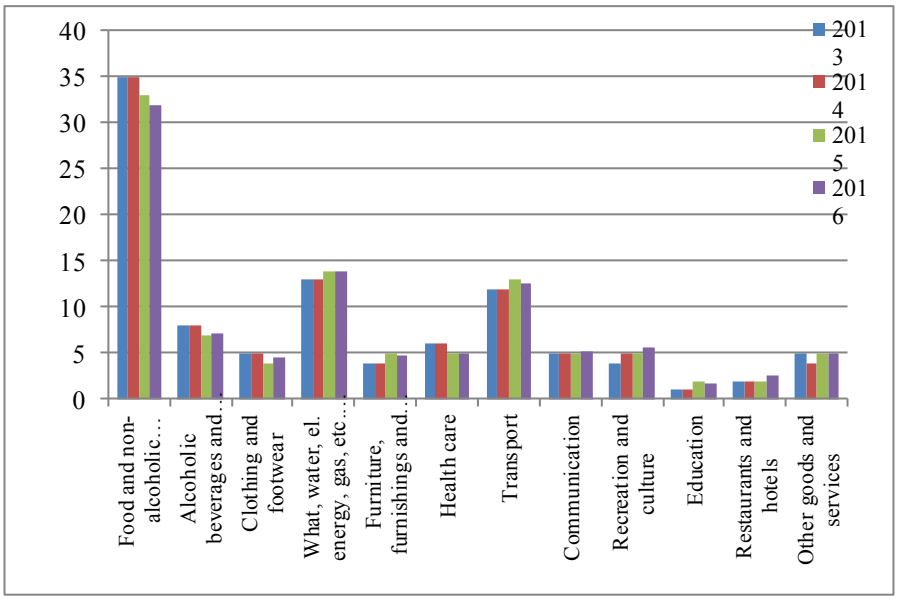
Graph 3. *Total consumer price index and food and beverage price index in Serbia (2006 = 100)*



Source: *National Statistical Beareu*

This index represents official measure of inflation, and for its definition the classification of goods and services of individual consumption is used, adjusted to the needs of the harmonized consumer price index. Products and services are divided into 12 divisions, while the total number of products and services is 606. When calculating, the key role belongs to the weights that reflect the structure of household consumption. The biggest share is weighted by the first division - *Food and non-alcoholic beverages*, with a share of 32 to 35% for the observed period. Graph 4 presents the weight structure for the period 2013-2016.

Graph 4. *The structure of consumer price indices (2013-2016 in %)*



Source: *Statistical Year Books for relevant Years*

In the basket of the consumer price index are present agricultural products that are in raw condition (a total of 38 individual products from the group of fresh and chilled fish, followed by a group of fruits, vegetables and eggs). Table 1, below are showing the structure of the individual agricultural products share for the period 2013-2016.

Table 1. *The share of agricultural products in the consumer price index*

Products-Years	2013	2014	2015	2016
Eggs	65	69	73	74
Purified walnuts, hazelnuts, almonds, chestnuts and the like.	29	22	20	25
Apples for food	50	45	39	35
Cherries and Sour Cherries	5	6	4	5
Garden strawberries	10	9	7	9
Raspberries	1	1	1	1
Apricots	2	4	2	3
Peaches	13	15	8	8
Plums for food	5	4	3	3
Grapes for food	15	13	11	11
Water Mellones	22	21	16	20

Products-Years	2013	2014	2015	2016
Lemon	11	12	10	12
Orange	24	21	19	18
Bananas	49	43	37	36
Mandarin	14	13	11	12
Grapefruit	2	2	2	2
Kiwi	4	4	3	3
Beans, beans, lentils	52	58	63	64
Onion	35	32	33	34
Carrot, pashkanat, celery, parsley root	22	20	21	20
Red rhubarb, rhubarb	6	8	6	5
Spinach, cabbage	12	10	10	8
Green salad of all kinds	13	13	13	9
Cabbage	31	30	25	27
Fresh cucumber	12	14	18	18
Garlic	11	10	8	6
Peas	3	2	3	2
Green beans	5	5	5	5
Fresh tomatoes	40	44	50	52
Paprika	51	49	48	48
Broccoli	8	9	9	7
Lean	5	4	5	4
Mushrooms	17	14	16	11
Zukinni, blue eggplant	9	10	11	8
White Potatoes	9	15	18	21
Red Potatoes	73	75	71	65
Carp	20	13	16	15
Fresh Trout	5	6	5	4

Source: *National Statistical Beareu*

In addition, it should be noted that a significant number of agricultural products do not enter directly into the calculation of consumer price indices, but serve as a basic input in the production of a final product such as wheat in the production of bread, sunflower in the production of edible oil, etc. That way the real significance of agricultural products remains hidden in a certain way is considerably higher. A wide picture of the importance of agricultural products in the formation of the consumer price index can be obtained by additional analysis of the share of industrial food products, Table 2.

Table 2. *Values of industrial food products ponders*

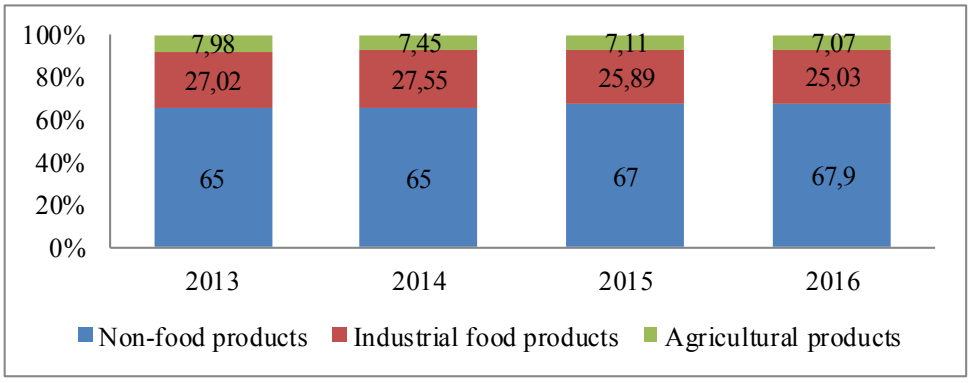
Products	2013	2014	2015	2016
Bread and cereals	510	525	482	491
- Rice	23	23	20	18
Meat	820	810	751	704
Fish and seafood	80	89	92	89
Milk, cheese and eggs	484	529	517	510
Oil and grease	103	100	79	78
Fruits	279	257	203	213
- Dried fruits, fruit in the shell and frozen fruit	44	36	27	35
Vegetables	402	508	415	383
Potatoes (red and white)	82	90	89	86
Other types of carob vegetable and their products	21	20	19	21
Sugar	70	65	46	45
Jam, marmalade and honey	23	23	21	21
Chocolate	44	45	66	66
Confectionery products	44	43	16	20
Ice cream	21	22	19	18
Artificial sweetener	0	0	0	1
Other food products	108	118	108	117
- Sauces, accessories	*38*	*41*	*38*	*40*
- Salt, spices and aromatic herbs	*40*	*45*	*33*	*39*
- Baby food	*5*	*4*	*8*	*5*
- Other food products	*30*	*28*	*29*	*33*
Coffee	128	132	136	123
Tea	7	7	6	7
Cocoa and chocolate powder	2	3	3	3
Mineral and spring water	58	59	52	58
Non-alcoholic beverages	79	80	70	77
Juices of fruits and vegetables	87	85	85	81

Source: *National Statistical Beareu*

The table contains the values of weighted food products (products used in raw condition and those that are based on agricultural products). The data indicate that the direct and indirect impact of agricultural product prices on the total consumer price index is unquestionable. That is of great importance for the creators of monetary policy that use the consumer price index as the basic measure of inflation. If for example the participation of agricultural products prices in the basket of the consumer price index is 8%, then the eventual increase in agricultural product prices of 10% directly increases the inflation rate by about 0.8%, assuming that the other conditions are unchanged.

In accordance with the above mentioned, it is worth to point out that for the observed period 2013-2016, agricultural products used in the raw state, are accounting for an average of 7.3% in the total ponder structure as a base on which the index of consumer prices is further formed. The data for the previously displayed data has been created, Graph 5. It presents the structure of the consumer price index.

Graph 5. *Structure of the consumer price index (2013-2016) - u %*



Source: *Calculation of Authors*

It can be noticed that the share of agricultural products in the total structure (the sum of all ponders of 10,000) decreases year after year, from 7.98% in 2013 to 7.07% in 2016. Also, there is a noticeable decrease in the share of industrial food products (by 2%), which ultimately results from a decrease in the share of the first division - *Food and non-alcoholic beverages* in the overall structure. In addition, the mentioned changes are minimal and clearly indicate that households in the Republic of Serbia are spending a third of their funds on a monthly basis on food. That is closer to the societies characterized by low quality of living standards.

Conclusion

In the Republic of Serbia, the total consumer price index which represents inflation, includes: core inflation with the largest share of over 60% then non-price inflation without oil derivatives and growth in oil derivatives prices. Hence, among other things, the volatility of prices of agricultural products has a significant impact on inflation. The change in food prices is consequently accompanied by the instability of production in the agricultural sector and affects the core inflation. Also one should not lose sight of the fact that agriculture affects inflation directly

and indirectly. Therefore, when it comes to setting goals for its development in a particular year, it is largely determined by the inflationary movement. This is due to the fact that food in the consumer price index is fairly represented. Agricultural sector significantly influences the formation of cost pressures on the prices of industrial food products because they are used as inputs (cereals, corn, soybean, sunflower, fruits and vegetables), and therefore, inflationary pressures should also be expected and vice versa.

It can be concluded that agricultural production in less developed countries such as Serbia has a higher impact on inflation. The importance of this topic is reflected in the fact that inflation in Serbia to a large extent burdens the movement of prices for agricultural products. The reason for this is the inadequate economic structure with agriculture as one of the dominating industries as well the unregulated economic system with the irrational spending of limited budget funds. They lead to imbalance and high inflation.

Finally, it should be said that price volatility and their impact on inflation can not be fully neutralized. In this sense, the starting point for solving the accumulated problems in the agricultural sector of Serbia is tied to its share in distribution of incentives for its growth and development. Possible solutions must take into account natural conditions, agricultural specificities, social and economic factors in order to minimize instability and inflation. The current state of affairs and problems that characterize Serbian agriculture and rural areas, make it difficult to deal with global challenges, among other things because the Serbian agricultural sector is under the strong influence of European highly competitive agriculture. It is therefore necessary to have a clear picture of the position and role of the agricultural sector.

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MODERN CHALLENGES OF ECOLOGICAL SUSTAINABILITY

Olgica Nestorović[1], Vesna Petrović[2]

Abstract

Sustainable development is a modern concept that implies economic growth and development in line with the social, economic and ecological component. In this paper, the author will analyze the effects of sustainable development on the ecological component, i.e. environment. The question arises whether the environment and economic growth are in positive correlation or not. In the past, we witnessed serious environmental threats at the expense of economic development. Today, economic development offers new opportunities for environmental protection by creating conditions for applying advanced environmental technology and management systems, but also by encouraging environmentally-friendly consumption models. Also, economic growth can contribute to sustainable development, but also cause enormous damage to the environment in the absence of the application of adequate measures.

Key words: *sustainable development, economic growth, environment, ecological component, ecological technologies.*

Introduction

Discussions on sustainability of development have been spurred by the increasing concern of the global community in terms of environmental degradation and the existing weaknesses of traditional models of development that have supported industrial modernization. The question of the way in which human, social and economic activities would coincide with the regenerative capacity of the global ecological system was at the center of attention, and for this reason, the interest in the concept of sustainable development, and therefore the environment, became more pronounced in the light of the process of globalization.

1 Olgica Nestorović, Ph.D., Assistant Professor, Faculty of Economics and Finance, Union Nikola Tesla University, Cara Dušana no. 62-64, 11000 Belgrade, Serbia, E-mail: olgica.n@yahoo.com

2 Vesna Petrović, Ph.D., Assistant Professor, Faculty of Economics and Finance, Union Nikola Tesla University, Cara Dušana no. 62-64, 11000 Belgrade, Serbia, E-mail: al.petrovicpn@gmail.com

Globalization creates new opportunities for developing cooperative relationships, but at the same time poses new issues and issues. For example, trade liberalization contributes to an increase in the rate of economic growth, which may result in an increase in pollution levels, including cross-border externalities and unsustainable consumption of natural resources. Economic integration strengthens competitive pressure across borders of the national economy, which contributes to the realization of consumers' interests by lowering prices, improving the quality of services and increasing consumer choice. However, such competitive pressure forces national governments to take regulatory action and condition the need for the implementation of inter-state coordination of national policies, as well as the need for cooperation in the area of global problems management. Without effective governance at the international level, globalization can intensify ecological damage and diminish the perspectives of sustainable development.

Alongside dynamizing the pace of economic growth and contributing to an increase in overall global output, globalization can impair prospects for economic prosperity in individual countries, sectors or industries. Such marginalization of people can result in excessive exhaustion of non-renewable resources and environmental degradation.

Globalization contributes to the spread of world production standards and can instigate a trend towards raising standards or a race to the top in environmental standards. On the other hand, in conditions of intense international competition, it is heightened and concerned about the loss of competitive ability due to the lack of fair competition or the application of poor standards, below the optimum level or race to the bottom in environmental standards. In addition, economic globalization changes the relationship between states and markets in achieving economic, social and environmental results. On the other hand, it asks for greater intergovernmental cooperation in governance as well as coordination of national environmental policies.

Interconnectedness of globalization and sustainable development

There is a high degree of interconnectedness and mutual dependence between globalization and sustainable development. Basically, the factors that trigger globalization are at the same time the driving force for sustainable development. For example, modern communication technologies contribute to accelerating change, while reducing the importance of traditional control mechanisms, while at the

same time increasing transparency and the ability to achieve global governance. They can improve access to relevant information, enable access to new knowledge, and facilitate the undertaking of necessary activities. Trade liberalization policies, which lie at the heart of globalization, help reduce the gap between rich and poor countries by accelerating the rate of economic growth.

The evolution of the global economy from international to global business is enabled, above all, by the growing flows of foreign direct investment and the expansion of the role of multinational corporations. The increasing role of multinational corporations and foreign direct investment, especially in global economic development, has led to the acceptance of the idea that these two entities are the main actors in the current globalization process, while their cross-border investment activities have significant positive or negative impacts on sustainable development (Nestorović, 2018).

Over the past several decades, the role of multinational companies as direct representatives of foreign direct investment in sustainable development has been one of the most controversial discussions among economists whose focus is on environmental issues and problems.

The views on the role of foreign direct investment in sustainable development vary and range from:

- those who proclaim them the main culprits for the growing ecological degradation and the unsustainability of current development models,
- to those who see them as the main driving force behind development and the leading factor in removing barriers that separate countries and hinder international economic relations, as well as factors that contribute to reducing differences in the level of development and achieving the vision of global sustainable development in the context of global change.

Environmentalists are critical of foreign direct investment and their relationship to sustainable development and environmental protection, and outline pessimistic views on their contribution to the protection and conservation of the environment in developing countries. In their opinion, driven by profit motivation, multinational corporations, as bearers of foreign direct investments, will reallocate eco-risk products from one country to another until they find the right market for these products.

Under the pressure of the burning development problems, the less developed countries are forced to prescribe weak environmental standards in order to attract foreign investors. Due to the high cost of alignment with tighter environmental standards in the developed world, developing countries will, therefore, become the ports for environmentally harmful industries of multinational corporations from the developed world.

These findings have been confirmed by a number of researches that supported the thesis on the reallocation of dirty industries to developing countries. For example, UNEP (1981) provided evidence of the relocation of some risky US industry to Mexico precisely thanks to environmental factors. For Corten (1995), therefore, "economic globalization provides greater opportunities for the richer to transmit their ecological intentions by poorer exports of waste and environmentally harmful factories." Mani and Wheeler (1998) indicate the migration of some Japanese dirty sectors, as well as American ones, to their trading partners. However, such a trend is not typical of developments within European industry. The disadvantage of environmental regulations can be a stronger side of foreign direct investment in these sectors compared with industries that are less intense in terms of pollution, such as electrical and non-electrical machinery, transport equipment and food production.Mabey and McNally (1998) point out that dirty industries, whether resource intensive or intense in terms of pollution, in which environmental costs are higher, can run to less robust environmental regimes. Similar evidence was also provided by Rasiah (1999), who analyzed the relationship between multinational corporations and the environment on the case of Malaysia, found that multinational corporations are transferring ecologically inferior machinery to Malaysia, due to lower ecological standards in Malaysia.

Unlike them, neo-liberal economists argue that multinational corporations are the most important drivers of sustainable development, since they appear as creators and owners of modern and environmentally cleaner technology, and because they follow a better managerial practice that can be directly transferred to their affiliations in developing countries. Consequently, instead of the pollution port, foreign direct investments through multinational companies create hazards of pollution in developing countries through the export of modern technology. "The available facts show that in some sectors hazards actually exist. This hypothesis is also confirmed in the energy sector, in which the use of newer and superior technology can bring significant environmental savings. "

By applying the energy efficiency indicators, as well as by applying the use of energy per unit of output, they have found that foreign ownership is associated with cleaner methods and lower levels of energy use. Also, there is evidence that foreign investment in the energy sector in China has increased energy efficiency and reduced emissions. This is because foreign direct investments are focused on the production and use of advanced technologies. Better management and strengthening competitive pressure on the host country market is also a consequence of the effects of pollution hazards.

Technological innovations as a driver of economic development

At a time of complex change, technological innovations are the leading driver of economic growth and the development of the economies of all countries. The diffusion of modern technologies is a key precondition for the rapid development of developing countries and countries in transition and their approach to developed countries.

However, modern technologies are not just an instrument for providing support in dynamizing the rate of economic growth and accelerating economic development. They also represent the basic instrument for improving the environment and ecological performance of developing countries and countries in transition. New production processes and products, depending on the degree of their ecological similarity, can contribute to minimizing "trade-off" between economic growth and environmental pressure by reducing the intensity of pollution of economic activities.

Changes in current models of production and consumption are crucial for the long-term sustainability of natural resources and the preservation of the quality of the environment. The development and application of ecologically similar technologies is considered to be the most significant element in achieving a transition to sustainable development. However, there is a big dilemma whether with the further diffusion of modern technology, ecological pollution will be reduced or will only come to the reoccurrence of ecological problems from one region to another or from one country to another.

Practice has shown that technological innovations with positive environmental impact can serve as a suitable instrument for minimizing and preventing negative impacts of anthropogenic activities on the environment. Examples of this kind in

the manufacturing sector and services related to:

- ecologically justified exploitation of raw materials,
- discovery and use of new sources of raw materials,
- replacement of raw materials with less scarce or renewable, less environmentally harmful resources,
- development and introduction of ecologically suitable consumer goods,
- development and introduction of new, economically justified technologies both in terms of resource consumption, as well as in terms of preventing harmful emissions,
- development and introduction of waste processing facilities and technologies for the rehabilitation of environmental damage.

In this respect, technological progress is a key factor in improving the state of the environment for at least four reasons:

1) Using modern technology in the production process increases the volume of production, reduces the cost of production factors and consequently realizes the effects of economies of scale,
2) Reducing the use of natural resources, using modern technology increases efficiency and rationalizes the use of each unit of spent resources in the production process,
3) A high level of production technology supports the production of those products that are less environmentally harmful when used or sold,
4) The application of modern ecologically similar technology is in function of reducing pollution emissions into the environment.

Mutual correlation between foreign direct investment and sustainable development

The link between foreign direct investment and technological changes is twofold: namely, foreign direct investment through multinational companies is the main actors in the development of technology, while at the same time, their activities are highly dependent on this development. In fact, technological development is a key factor that has contributed to the increase in the importance of foreign direct investment and global strategies of multinational companies, which are highly motivated by the need for control over the development and use of new technologies. These strategies show that increasing mobility of technological flows is induced by the activities of multinational corporations and that these enterprises are an important instrument for transferring technology to host countries.

Foreign direct investments, in addition to achieving potentially large effects on the rate of economic growth of the host country through different channels (through the impact on the quantity and quality of capital formation, technology transfer, raising the level of human capital development, expanding trade opportunities), also have an impact on the quality of the environment , with certain implications for the long-term sustainability of economic growth and the possibility of achieving sustainable development.

As the main promoters of research and development activities, as well as the holders of modern technology in the world, foreign direct investment today through multinational corporations has shown an increasing interest in researching and implementing environmentally friendly technologies. However, one should not ignore the fact that foreign direct investments today do not appear only in the unilateral role of technological innovators. They are also carriers of research and development activities, technological advances and also have knowledge, developed skills and techniques for safe manipulation, transportation, storage, use and disposal of toxic materials, as well as the development of technologies that reduce the level of waste and pollution.

Foreign direct investments in the form of multinational companies introduce modern ecologically sound technology into the host country directly, by investing in the establishment of affiliates or by selling technology to domestic producers and consumers. They can generate environmentally useful technology "spillover" effects, but also contribute to the increase of ecological efficiency, dynamism of competition in the market of the host countries. In addition, foreign direct investment imposes strict environmental requirements on its suppliers in the host country, which encourages them to adopt good environmental regulations, standards and management practices in the implementation of their activities. However, the environmental impact of incoming foreign direct investment is not the same in all sectors of an economy. Investments in environmentally sensitive sectors have far more impact on the level of eco-efficiency of the host country than those that are being realized in relatively inconsistent (cleaner) economic sectors.

Foreign direct investment does not only realize the transfer of environmentally-friendly technologies to their affiliations in the host country. Through foreign direct investments, they also transfer a more efficient environmental management system to suppliers, consumers and local enterprises in the host country, both on the basis of the demonstration effect and on the basis of the application of solid environmental standards.

The economic and environmental benefits of applying preventive pollution prevention measures are several times higher than some traditional solutions. Practical research shows that environmentally-friendly technology is not only economically and ecologically cost-effective but also contributes to the achievement of additional benefits. For example, its application can contribute to alleviating some of the social problems, such as unemployment and poverty, in the host country. The introduction of qualitative novelties into the corporate environmental management system is based on replacing the traditional approach, which is aimed at correction, a new approach aimed at ex ante environmental protection against pollution.

In addition, foreign direct investment can contribute to achieving the goals of sustainable development and transfer of environmental managerial knowledge and skills through the recruitment of foreign managers in affiliates in the host country. By making the available knowledge and lessons available less locally, foreign direct investments contribute positively to increasing the capacity of the eco-management of the host country. Therefore, it is not surprising that for developing countries, especially those that do not have resources for technological innovation, multinational corporations are not only important factors for sustainable development, but also the only realistic chance for its realization. However, a positive contribution of multinational corporations to sustainable development can be achieved only under the condition of the existence of such a regulatory system in the host country that actively promotes the sustainable behavior of foreign investors and contributes to the attainment of mutual interests: both the profitable motivation of foreign investors and the goals of sustainable development of the host country.

In order to ensure that foreign direct investment does not cause significant environmental damage, it is necessary to build the regulatory capacity of most countries so that it is able to implement and be consistent with higher national and international environmental standards. Improving standards can simply include better application of existing environmental impact assessment legislation or investor policy rules. Attention should be focused on the functioning of institutions at the meso level (regional, municipal and local authorities), because at these levels direct planning, resource use and private activity are directly controlled. However, given the cross-border nature of environmental problems, the creation of such a regulatory system that would allow greater flexibility and the ability to control environmentally-risk foreign direct investment projects of multinational corporations requires the development of an adequate institutional infrastructure not only at the national but also at the regional and international levels.

Foreign direct investments realize their impact on sustainable development and environmental protection directly through multinational corporations and their role is extremely important in this regard (Nestorović, 2017).

Increasing the impact of multinational corporations and their role in shaping development perfomances can be traced back to the 1970s when their cross-border activities begin to follow the trend of explosive growth. Judging by the available data, the period 1970-2010. The year is characterized by an upward dynamic of growth in the activities of multinational companies. This statement is confirmed by the increase in the number of multinational corporations: in 1970 only about 7,000 multinational corporations operated, their number increased to 63,000 parent companies in 2000, with some 690,000 affiliates abroad, while today 103,786 multinational corporations operate worldwide which control about 892,114 affiliations overseas.

Observed by size and economic strength, it can be concluded that multinational corporations have a large capacity to influence the development of development policies in host countries. Practice has confirmed that, owing to the many expected development benefits that accompany the activities of multinational corporations, economic and political decisions of host governments are often brought in favor of the invetions and market needs of multinational corporations. In such a situation, the question is whether the enormous corporate strength diminishes the perspectives of sustainable development by circumventing the host country's ecological standards. In addition, the fear of reallocation of investment activities and the abandonment of the host country, as well as the expected negative development effects of such developments per host country, can have a decisive impact on the level at which developing countries set environmental regulations regulating the activities of multinational corporations.

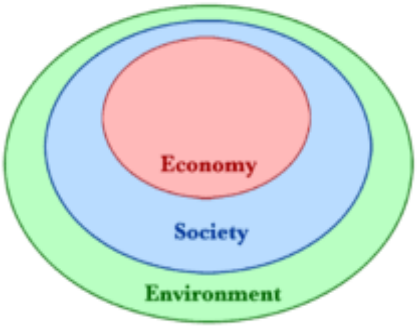
Foreign direct investments until the 1980's were considered as drivers of the development of the global economy. To such an opinion on their role in development, the attitude of free-market economists was largely influenced by the fact that multinational corporations are legally responsible only to their shareholders for the financial performance of the corporation. (Friedman,M., 1970.) Accordingly, the belief that multinational corporations represent exclusively profit-oriented entities, which do not have any legal obligation to incorporate social interests into their activities, has dominated. Milton Friedman explicitly supports this opinion in his work „The Social Responsibility of Business is to Increase its Profits", because

there is one and only social responsibility of the business - the use of resources and engagement in such activities that are designed to they increase their profits. However, after a series of ecological disasters directly induced by the activities of multinational corporations during the 1980s, and by matured awareness of the dependence of human survival on the quality of the natural environment, there was a radical change of opinion on the role of multinational corporations in development. Assuming multinational corporations to be the main drivers of environmentally-hazardous activities, many researchers call into question the traditional model of business practice, inviting multinational corporations to set the long-term sustainability of the environment to a high place in the ranking of priorities along with their profit interests. This idea of aligning corporate interests with environmental protection has given impetus to defining concept of sustainable development.

There is a belief that countries that are intensively engaged in the production process generate more pollution. Discussions on the impact of environmental regulations on the sustainable behavior of foreign investors have arisen with increasing differences in environmental regulations between developed and developing countries. This problem also got the significance that the activities of developing countries began to show signs of unfair competition by reducing regulations (Petrović-Ranđelović, 2007).

For a long time, researchers' attention has been occupied by the potential negative environmental effects of cross-border activities of multinational corporations on developing countries. The biggest debates were focused on the question of whether multinational corporations are carrying out the relocation of environmentally harmful production to developing countries in order to achieve cost savings, ie benefits from the application of weaker regulation on environmental protection. However, surveys conducted on the hypothesis of pollution ports have not provided enough convincing evidence to provide the basis for concluding that multinational corporations follow ecologically harmful practices in the implementation of cross-border investment activities in developing countries. This is especially due to the fact that "environmental costs are not key factors in deciding on the location of investments. In spite of the fact that cost effectiveness can be a significant driver of cross-border investment activities, multinational corporations show a greater inclination to carry out activities in a country with an adequate ecological framework than in a poor country. If companies undertake investments that improve the environment, many production costs will be reduced by improving the quality of the environment.

Figure 1. *Ecological sustainability*



Source:*www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&ved=0ahUKEwjQjPiVj93dAhXBwosKHWSfAO8QMwikAShgMGA&url=https%3A%2F%2Fsh.wikipedia.org%2Fwiki%2FOdr%25C5%25BEivost&psig=AOvVaw0JrJQTOE7A7dwdTKnbKSnO&ust=1538204160973534&ictx=3&uact=3*

Some researchers believe that multinational corporations do not apply even better or worse environmental practices than local businesses in the host country. In a comprehensive survey conducted by UNCTAD (1988), it has been established that the number of industrial accidents has increased over the last fifty years, with available data suggesting that in less than half of these unfortunate circumstances, multinational corporations were involved. A large number of accidents have just happened in national or state-owned enterprises. However, even if multinational corporations follow lower environmental standards in the rationalization of investment activities in developing countries, there is plenty of evidence that their ecological practices in developing countries are more reliable and responsible than the practice followed by local businesses.

In the field of environmental protection, two legal documents of the European Union are of particular importance. These are: the 2000 Lisbon Strategy (revised 2004) and the 2001 European Union Strategy for Sustainable Development (revised 2006).

These documents link the environment with economic and social development (Jelinčić, Đurović, 2009:20). In individual legal documents adopted at the level of the European Union, certain aspects of environmental protection are considered. This includes the protection of: water, air, soil, human and animal health,

plant protection, etc. It explicitly does not mention certain goods that come into the sphere of environmental protection, but specific plans and programs to protect it are identified. This is, for example, the case with the EU Directive 2001/42 / EC on the assessment of the impact of plans and programs on the environment. Its goal is to achieve a high level of environmental protection and contribute to the inclusion of factors important for the environment and the process of preparing and adopting plans and programs in order to promote sustainable development. It can be achieved by ensuring the adoption of appropriate plans and programs where there is a potential for significant environmental impact.

This is especially important when there is an objective possibility of creating significant environmental impacts (Prlja et al., 2012:161-162).

In its strategic documents, the European Union has particularly emphasized the need for environmental protection, regardless of the area of human activity. The current European Union's Development Strategy (Europe 2020) defines key objectives in the area of sustainable development. They are dedicated to the efficient use of available resources in a way that protects the environment (Ilić et al., 2017:45).

Although there are a wide variety of European legal instruments, it is not possible to establish a precise definition of the environment. It could be said that there is as much definition of the environment as the authors dealing with her study. A similar situation is in terms of European regulations regulating the environment. Therefore, the valid legal instruments used by the European Union to improve the position of the environment could be divided into two categories: a) as a set of objective, material standards, relating either to the establishment of a limit on the emission of harmful substances or to the prescribing of concrete standards of product or process quality Production; B) as a set of rules relating to different procedures within the framework of environmental management, such as monitoring procedures for air or water pollution, rules relating to the transparency and accessibility of environmental data (Jelinčić, Đurović, 2009:22).

Making decisions, while respecting potential environmental consequences, is important at different levels, ranging from strategic to operational work. In addition, the types of decisions in which to consider the environmental impact are in the areas of strategic planning and capital infrastructure investments: the construction of certain industries, green buildings, waste management; Eco-design and

product development; Operational management - the introduction of green public procurement (Stevanović Čarapina, 2014: 28). They set up areas in which it is necessary to establish legal mechanisms in countering various forms of environmental degradation. This implies the application of principles and principles that have universal validity. An important step in this direction is the definition and application of the precautionary principle on which all EU regulations must be based (Tubić, 2014:372).

In the European Union's legal instruments, the right to a healthy environment has never been treated as an essential right, but it is working on its development as procedural and participatory law - through the right to participate and the right to legal redress.

The Union views the environment beyond national boundaries, treating it as a regional problem (Kostic, 2009:220). It is necessary to bear in mind the fact that environmental pollution can not be resolved in the national context, since, in the end, the final outcome of the procedural part of the protection is made by the European Court of Human Rights.

Conclusion

It is widely accepted today that multinational corporations, when implementing their cross-border investment activities, use standardized technology and environmental management systems, regardless of the degree of development of the host country and the level of implementation of environmental regulations. Such behavior can be explained by the following reasons:

- purely profit motive lies in the basis of such behavior, since the application of the same technology leads to cost savings, due to the increase in international business efficiency and the achievement of higher productivity,
- the application of ecologically clean technologies and the respect of clearly defined environmental standards in the country of origin in affiliates abroad, contributes to strengthening the reputation of the corporation among consumers, but it is also an instrument for ensuring the risk of bringing legally accountable liability in case of industrial incidents.

Multinational corporations are increasingly engaged in equalizing business conditions not only by applying the same environmental standards in their affiliations and abroad, but also by imposing stronger environmental demands on local suppliers involved in the global production network. These commercial environmental

requirements are voluntary, but "de facto "binding on local suppliers in order to effectively integrate them into the corporate network of production, rational and profit-oriented foreign investors can anticipate raising environmental standards over time in a host country characterized by a less stringent regime of environmental regulation.

As a result, in the initial investment phase, they implement modern technology to avoid large cost adjustments in subsequent phases of the life-cycle of the investment,

If multinational corporations have similar capacities in countries with higher and lower ecological standards, they find it more useful to introduce the same pollution mitigation technology in countries with lower environmental standards. This is because the costs of dismantling the already introduced technology can outweigh the benefits of cost savings to mitigate pollution.

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ECONOMIC SUSTAINABILITY OF DAIRY PROCESSING SECTOR IN SERBIA

Rade Popović[1], Dalibor Panić[2]

Abstract

The main goal of this paper is to explore economic sustainability of dairy processing industry in Serbia during 2016. The focus is on several indicators of economic dimension of sustainability. From over 100 dairy companies 79 are examined, to reveal its competitiveness, according size and business strategies applied by companies in relation with other participants in milk supply chain. As a main performance indicators for competitiveness estimation are chosen productivity and efficiency. Results revealed that foreign owned big and several middle sized company with strategy focused on vertical coordination of activities with dairy farmers, reached highest level of labour productivity and technical efficiency. On other side results imply sources of lower competitiveness in other dairy companies.

Kay words: *sustainability, dairy processors, competitiveness, efficiency, productivity, Serbia*.

Introduction

Dairy sector across world facing several challenges. Restructuring and constant growth of dairy processing companies on international and in some cases intercontinental level are main characteristics. Ownership of dairy processing companies on world level is dominantly cooperative, but three the biggest are private companies. Regardless of ownership type they adjust their strategies to response on globalisation challenges.

Economics of scale become more important for dairy processing companies, but also for farmers. Last happenings caused with low milk price in USA market

1 Rade Popović, Ph.D., Associate Professor, University of Novi Sad, Faculty of Economics in Subotica, Department of Agricultural Economics and Agribusiness, Segedinski put no. 9-11, 24000 Subotica, Serbia, Phone: +381 63 8041 301, E-mail: popovicr@ef.uns.ac.rs

2 Dalibor Panić, Ph.D. student, University of Novi Sad, Faculty of Economics in Subotica, Department of Agricultural Economics and Agribusiness, Segedinski put no. 9-11, 24000 Subotica, Serbia, Phone: +381 64 84 22 121, E-mail: dalibor226@gmail.com

pushed dairy farmers with less than hundred cows out of business (USDA, 2018), especially in case if they were not secured under cooperative umbrella.

During period of transition in Serbian dairy sector processors lost market power and retailers gain it (Popovic, Radovanov, 2010, Popovic et al., 2017). In Serbia cooperative dairy processing capacities do not exists (Popovic et al., 2017). All dairy processing companies are private. During transition period foreign investors take control and ownership on 67% of dairy processing business, according share in business revenue. There are presented Mid Europa investment found, Lactalis, Meggle, Bongrain, and Bonafarm while some others showed interest to invest in Serbian dairy sector in future. Rest of 33% of dairy processing industry are domestic owned and significantly smaller in average size than those owned by foreign companies.

The purpose of this paper is to measure efficiency among Serbian dairy processing companies according business size, strategy and ownership in 2016. The objective is to identify the most efficient dairy companies in Serbia as precondition for later on measure of efficiency with companies in other neighbouring countries.

Economic sustainability is complex issue and in this paper it will be measured with efficiency as its component. Economic efficiency is product of technical efficiency (TE) and allocative efficiency as it is defined by Farrell (1957). Technical efficiency is principal element in economic profitability as it measures the ability of the firm to produce maximal output from a given set of inputs. This will be reflected in the average cost of operation and, hence, will directly affect the competitive position of the firm (Ben-Belhasenn, 2000). Allocative efficiency reflects the ability of the firm to use the inputs in optimal proportions, given their respective prices. The allocative efficiency is necessary if the firm maximizes its profits or minimizes its costs at a given level of production (Ouattara, 2012).

Studies of efficiency in dairy sector are numerous and mostly focused on dairy farms. Recently dairy processing industry came in focus. There is three main directions in research: efficiency of dairy companies in one country (Vlontzos, Theodoridis, 2013; Popovic, Panic, 2018; Popovic et al., 2018), efficiency differences between cooperatives and investor owned companies (Soboh et al., 2014), and efficiency differences between dairy sectors in various countries (Baran, 2013; Špička, 2015). In studies of dairy processing sector efficiency the most applied method is Data Envelopment Analysis, while some authors use Frontier Stochastic Analysis.

Material and methods

Data used for technical efficiency analysis of dairy processing companies in Serbia are acquired from financial reports of 2016, published by Serbian Business Registers Agency (SBRA). Financial and production data are collected for over one hundred dairy companies in Republic of Serbia. This research allied on research results focused on previous 2015 year (Popovic, Panic, 2018). Total number of dairy processing companies decreased from 2015, since one middle sized company was acquired by big one, and several micro dairies sized production. The sample in this research includes 79 dairy processing companies. Number of dairies in sample represent 99.7% of all dairy companies in Serbia that published financial reports in SBRA, measured in total business revenue. According to Law on accounting of the Republic of Serbia, 40 of them is classified as micro, 28 small 9 medium scale enterprises, and 2 of them classified as big enterprises. There are several reasons why not all dairy processors were included in sample. Some micro dairies do not have obligation to publish financial reports, some dairy processors are just small piece of total business presented in financial reports and in some cases dairy processors done business without labour and material costs.

Dairy processing companies in Serbia adjusting their strategies in milk supply chain as answer on external opportunities and threats. In 2016 each dairy processor applied one of several identified strategies. Basic strategies of dairy companies identified on Serbian market are:

1. Specialisation in milk processing. Row milk is provided on market through collecting stations without strong contract with farmers. Milk products are sold to wholesale or retail chains.
2. Vertical coordination with dairy farmers. Dairy processor is developing long term coordination of activities with dairy farmers to secure through strong contracts row milk market by quantity and quality. Dairy products are sold to on domestic or international market.
3. Partial vertical integration with dairy farm sector. Processor build or buy dairy farm or farms and provide significant amount or row milk for own processing capacities. Dairy products are sold to wholesale or retail chains.
4. Complete vertical integration. Fully integrated dairy chain with owned dairy farms, processing capacities and network of small dairy shops.
5. Partial vertical integration with small dairy retail shops. Focus on milk processing and sale of dairy products through own small dairy shops.
6. Dominant share in revenue from resale farmers dairy products.

Productivity and efficiency are often used interchangeably although they are not same things (Coelly et al., 2005). Productivity is ratio of output(s) that company produced and used input(s). It can be expressed as total factor productivity or partial productivity as it is labour, land, capital, productivity. Although partial productivity measures can provide misleading indication of overall productivity some authors agree that in labour intensive industry, as it is dairy, labour productivity is still adequate measure. In measure of microeconomic efficiency on firm level the most used method in literature is Data Envelopment Analysis (DEA). Method was developed almost two decades after Farrell defined basic economic efficiency concept. Charnes, Cooper and Rhodes (1978) developed first DEA model with Constant return scale (CRS).

For analysis of technical efficiency in Serbian dairy processing sector is chosen DEA input oriented, multi stage model with variable returns to scale (VRC), developed by Banker, Charnes, Cooper (1984). Comparing to the model with CRS it is more adequate to assume VRC approach since imperfect competition, government regulations, constraints on finance etc., may cause a firm to be not operating on optimal scale (Coelli et al., 2005). Each company in sample is treated as decision making unit (DMU), although some authors prefer term "firm". Model assumes data on N inputs and M outputs for each I DMU. For the I-th DMU these are represented by the column vectors x_i and q_i, respectively. The N x I input matrix and the M x I output matrix, Q, represent the data for all I DMU. For each DMU ratio of all outputs over all inputs could be obtained by $u'q_i/v'x_i$, where u is an M x1 vector of output weights and **v** is a N x1 vector of input weights. The optimal weights are obtained by solving mathematical programming problem:

$$\max_{u,v}(u'q_i/v'x_i),$$
$$\text{st}^3 \quad u'q_j/v'x_j \le 1, \quad j=1,2,...,I,$$
$$u, v \ge 0.$$

Values for **u** and **v**, such that the efficiency measure for the i-th DMU is maximised, subject to the constraints that all efficiency measures must be less than, or equal to one. To avoid infinite number of solutions in the ratio formulation it is necessary to impose constraint $\mathbf{v'x_i = 1}$, which provides:

3 "st" stends for Subject to

$$\max_{\mu,v}(\mu' q_i),$$
$$\text{st} \quad v' x_j = 1,$$
$$\mu' q_j / v' x_j \leq 1, \quad j=1,2,...,I,$$
$$\mu, v \geq 0.$$

Change of notation from **u** and **v** to **μ** and ***v*** is used to stress that this is a different linear programming problem. Using duality in linear programming and convexity constraint **I1'λ= 1** DEA model is derived in form:

$$\min_{\theta,\lambda} \Theta,$$
$$\text{st} \quad -q_i + Q\lambda \geq 0,$$
$$\Theta x_i - X\lambda \geq 0,$$
$$I1'\lambda = 1$$
$$\lambda \geq 0,$$

where I1 is an *I* x 1vector of ones (Coelli et al., 2005). Linear programming problem must be solved I times, once for each DMU in the sample. A value of Θ is than obtained for each DMU.

The proposed DEA model enable calculation of CRS and VRS models for each DMU, that presents technical efficiency (TE) and pure technical efficiency (PTE) respectively. Scale efficiency is the ratio of TE and PTE. If ratio is equal to 1 than DMU is scale efficient, otherwise results lower than 1 indicate scale inefficiency. Also TE and PTE are bounded by zero and one, where coefficient one stands for efficient DMU.

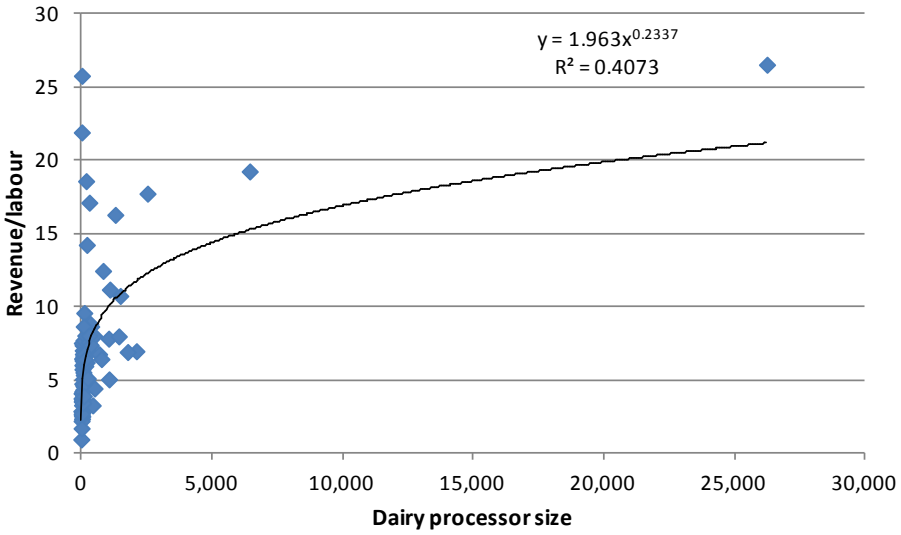
Results

Data presented in Graph 1. explain labour productivity trend in dairy processing sector in Serbia during 2016. Coefficient of determination for the power trend reveals moderate positive correlation between partial labour productivity and business size. It can be inferred that with increase size of business labour productivity also increase.

Variables chosen for DEA model covers all dairy business and counts five in total, one output and four inputs. As output variable is selected total business revenue, that include revenue from sales of products and services and revenue from sale of goods.

Input variables used in DEA model decreased on lowest number, cover all input side of dairy processing business. First one input variable is cost of material, which is dominant cost component in the most dairy companies. As input variable it includes cost of all purchased materials used in production process. In the structure of material cost, raw milk purchased from farmers have the biggest share. Cost of raw milk as main input could have share in total cost of dairy companies, ranging from 60% to 80%, depending on plant size and production structure (Popovic, Knezevic, 2010; Thiele, 2008).

Graph 1. *Productivity of 79 Serbian dairy companies in 2016.*



Source*: Data obtained from SBRA.*

Second input, labour cost includes all range of cost varieties connected with labour used in dairy plant. According share in total production cost in dairy business it is second large cost. Third input is energy cost. All energy cost in raw milk transport, milk processing and transport of dairy products to market are included in this category. Fourth input variable is category of other costs. It includes five costs categories: depreciation, cost of purchased commodities, contracted services, non-material cost, and interest paid.

Table 1 provide descriptive statistics for output and input variables of dairy industry in Serbia during 2016. There is huge variation of data from micro to big dairy companies, while cost shares in each DMU are relatively stable. In few cases mi-

cro dairy processors do not have material cost or energy cost, what is aligning with strategy 6 and outsourcing transport service.

Table 1. *Descriptive statistics for variables of 79 DMU in 2016, used in DEA method.*

Variable	Mean	Standard deviation	Minimum	Maximum
Return	717,035	3,030,773	1,873	26,237,653
Material	385,386	1,500,852	0	12,926,992
Labour	56	126	1	989
Energy	26,491	91,778	0	777,823
Other cost	195,900	910,215	374	7,901,067

Source: *Data from financial statements of dairy companies published on SEBRA*

Data in Table 2 reveal situation with strong correlation coefficients between inputs and output data. The strongest correlation exist in relation revenue and material cost, what is expectable, since row milk as main input have 54% share in total cost of dairy plants for all DMUs in sample. Sarkis (2007) as several other authors (Pastor et al., 2002; Ruggiero, 2005) propose that number of highly correlated inputs or outputs can be reduced in case of high correlation, in DEA model. But also warns that even in cases of perfect correlation of variables, results of efficiency estimate can slightly differ.

Table 2. *Correlation analysis of input and output variables for 79 DMU.*

	Revenue	Material cost	Labour cost	Energy cost	Other cost
Revenue	1				
Material cost	0.9985	1			
Labour cost	0.9918	0.9926	1		
Energy cost	0.9390	0.9504	0.9603	1	
Other cost	0.9952	0.9893	0.9807	0.9155	1

Source: *Author's calculation based on SEBRA data.*

DAEP 2.1 program (Coelli, 1996) was used to estimate DEA model with relative efficiency in sample of dairy processing companies in Serbia in 2016. Input - oriented multi stage model with variable return to scale was chosen for analysis. The results of CRS and VRS DEA models present TE and PTE respectively. Scale efficiency is calculated as the ratio of TE and PTE.

The results of estimated DEA models for 79 DMUs, with CRS and VRS are presented in Table 3. Average TE calculated with CRS assumption is 0.899, where 18 DMUs scored $TE_{CRS} = 1$, mostly in groups of micro, small and middle sized dairy companies, as well as big one. Decomposition of TE_{CRS} on PTE and scale efficiency revealed additional set of results.

Table 3. *Technical efficiency scores by DEA method of 79 Serbian dairy processors in 2016.*

Enterprise size	DMU	CRS TE	VRS TE	Scale	
Micro	40	0.888	0.911	0.976	irs
Small	28	0.907	0.920	0.985	drs
Middle	9	0.899	0.926	0.971	drs
Big	2	1.000	1.000	1.000	
Mean:		0.899	0.918	0.979	

Source: *DAEP 2.1 program results*

DEA model estimated with VCR assumption have slightly higher efficiency 0.918, while number of DMUs with $TE_{VRS} = 1$ increased to 30 DMUs, where additional increase comes from groups of big, middle sized and small dairy companies. Considering this model, treated as PTE, results imply that inefficient companies may reduce inputs without a reduction in output. It is particularly important in case of micro dairies which are most input inefficient, and where inputs can be reduced for 9.9%. In group of small sized dairies inputs can be reduced by 8%, while in group of middle dairies inputs can be reduced for 7.4%, keeping same level of output. The two biggest dairies are proved as most efficient in inputs use.

All dairy companies beside those 18, which are technically efficient, have another way to improve business results by changes in scale of business. Scale efficiency coefficients lower than one implying inefficiency. In the group of micro dairies (Table 3) the most of inefficient DMUs operate under increasing return to scale conditions. That is because those dairies are too small in its scale of operation, and way to increase its productivity is to increase size of business.

The most of scale inefficient dairies in groups of small, and all dairies in groups of middle and big dairy plants operate under decreasing return to scale conditions. 24 Companies from those three size groups are over dimensioned, i.e. above optimal productive scale. Approach to increase productivity to optimal level for this group

of dairy companies is to decrease in size. Two the biggest dairy companies have in average pure technical efficiency score.

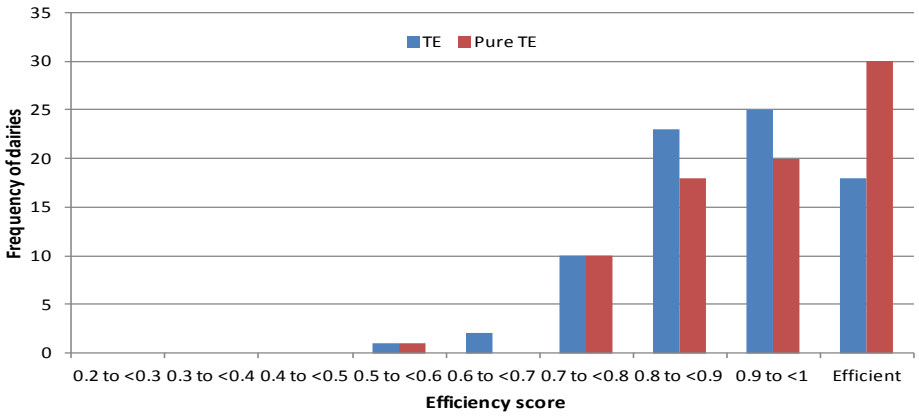
Table 4. *Technical efficiency scores by DEA method for domestic and foreign owned processors in Serbia for 2016.*

	DMU	CRS TE	VRS TE	Scale
Domestic	74	0.896	0.916	0.979
Foreign	5	0.943	0.956	0.986

Source: *DAEP 2.1 program results*

Comparing dairy companies by ownership it can be referred that foreign companies are more efficient than domestic (Table 4). Two big foreign owned companies are technically efficient, scored $TE_{CRS} = 1$. DEA model estimated with VCR assumption have slightly higher average efficiency 0.956 for foreign DMUs, where score $TE_{VRS} = 1$ performed by 4 DMUs. Only fifth dairy company with the smallest capacity scored with significantly lower level efficiency. Domestic companies have lower average efficiency in both cases, under CRS and VRS assumptions. Since domestic owned companies participate with only one third in total milk processing industry its lower efficiency do not have dominant influence on whole dairy processing industry efficiency.

Graph 2. *Efficiency score distribution of 79 Serbian dairy companies in 2016.*



Source: *Data obtained from DEA analysis.*

In Graph 2 are presented efficiency score distribution. From all dairies in sample 13 company have more significant problem with TE scored lower than 0.8, while 11 of them have lower PTE than 0.8. Those companies are mainly from group of micro and small dairies, while two are from middle sized dairies. It is important to emphasise that TE and PTE dairies exists in all range of company size.

Table 5. *Business strategies distribution for 79 Serbian dairy processors in 2016.*

Strategy	Micro	Small	Middle	Big	Total:
1	23	21	5	0	49
2	0	0	2	2	4
3	1	1	0	0	2
4	3	1	1	0	5
5	6	4	1	0	11
6	7	1	0	0	8
Total	40	28	9	2	79

Strategies practiced by dairy processing companies in Serbia are presented in Table 5. The first strategy, specialisation in milk processing, is most applied among all size groups except biggest dairies. Strategy number 2, dominantly oriented on vertical coordination of dairy processor with dairy farmers is in use among 2 big and 2 middle sized companies. The third strategy is practiced only by 2 companies, although several other companies tried this strategy in recent past. Strategy number 4 presents complete vertical integration is practiced from 5 dairy processors. Strategy 5 is second choice among dairy processing companies from different size groups. The last one strategy is practiced dominantly from side of micro dairies.

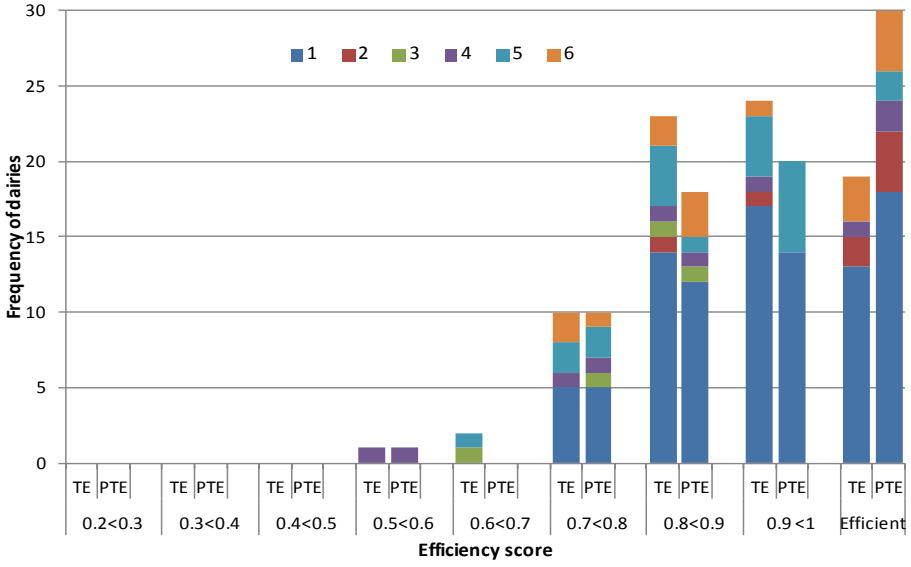
Table 6. *Technical efficiency scores by DEA method for applied business strategies of 79 Serbian dairy processors in 2016.*

Strategy	DMU	CRV	VRC	Scale	Rang
1	49	0.918	0.931	0.986	2
2	4	0.967	1.000	0.967	1
3	2	0.780	0.791	0.987	6
4	5	0.801	0.817	0.981	5
5	11	0.861	0.906	0.954	4
6	8	0.894	0.916	0.975	3

Source: *DAEP 2.1 program results*

Data for achieved average TE and PTE efficiency by applied business strategies presented in Table 6. During 2016 the most efficient strategy was vertical coordination strategy, numbered by 2. It is strategy that compensates lack of cooperatives in Serbian dairy sector. Similar conclusion prevails in numerous literatures from researches within agribusiness sector (Dries, Swinnen, 2004; Reardon et al., 2009; Dries et al., 2009). Vertical coordination between processor and dairy farmers is beneficial for both sides. Processor in long term stabilises row milk market by quantity and what is even more important by quality, while reach higher quality standards for dairy products and stabile production. Farmer on other side reach stable market and extension service leading his milk production to higher quality and bigger price. It should be noted that vertical coordination was existing in case of big and some middle sized dairy companies even before process of privatization and inflow of foreign direct investments.

Graph 3. *Efficiency score distribution of 79 Serbian dairy companies by applied business strategies in 2016.*



Source: *Data obtained from DEA analysis*.

Efficiency score distributions for 79 dairy companies according applied business strategies are presented in Graph 3. The most variable efficiency results achieved companies implementing strategy 4. Next one strategy by variability is number 5. The most applied strategy from dairy companies in Serbia,

strategy one, have also variable results in efficiency scores. Dairy companies practicing strategy 2 as most efficient in Serbian dairy business have the lowest variability of achieved results.

Conclusions

Dairy processing industry was facing significant globalisation challenges in recent decades. In Serbia dairy processing companies had even stronger pace of changes, since transition process brought additional challenges in company privatisation. After successful privatisation in dairy processing sector process of restructuring dairy companies was and still is characterised by decreasing number of dairy processing companies followed by increase in average size and internationalisation. Until 2016 two third of dairy processing industry in Serbia come in possession of foreign companies.

Examined inter efficiency of 79 Serbian dairy processing companies in 2016 prove that 18 companies were technically efficient and 30 companies scored pure technical efficiency. Although efficient companies exist in all size groups, average efficiency increasing with increase of groups size. Micro dairies operate on increasing return to scale, while small and middle sized dairies operate on decreasing return to scale conditions. Group of big dairy companies are most efficient.

Comparison of efficiency between dairy processors according ownership revealed that foreign owned dairy companies are more efficient than domestic ones. Among six identified basic strategies practiced by processors in milk supply chain, some strategies proved as better choice. Two big and two middle sized processor oriented on vertical cooperation with dairy farmers reached highest technical efficiency. Slightly lower efficiency is achieved by most numerous groups of dairy processors who specialised only in milk processing without developing strategic relationship with upstream or downstream participants. Group of companies integrated with dairy farm(s) accomplished lowest efficiency results. It was noticed that during period of last decade some dairy processing companies in Serbia were changing relation to upstream and downstream participants in dairy chain searching for more efficient strategies.

Question opened for future research are those oriented on efficiency comparison between Serbian dairy companies and dairy companies in region countries. Another open is question how to decompose output and input variables used to measure technical efficiency on amounts and prices to enable measure of economic efficiency.

Acknowledgements

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PESTICIDES USE IN AGRICULTURE AND HUMAN HEALTH IN A GLOBAL CONTEXT: EVIDENCE FROM ROMANIA

Raluca Andreea Ion[1]

Abstract

The paper investigates the relation between the pesticides use in agriculture and their effects on human health, in the global context of food security, overpopulation, and climate change. It is assumed that demographic growth led to the need of producing more food for over seven billion people. As the land is limited, the agricultural output must increase intensively, not extensively, meaning that yields are supposed to grow, not the area cultivated. In order to grow the yields, higher amounts of chemical substances, including pesticides, are needed. The objective of this paper is to assess the effects of the pesticides use on human health, using the simple regression model. The main findings show that digestive diseases are correlated to pesticides use. The relevance of the study lies in its capacity to inform people about the effects of the pesticides use on human health, so they could make informed choices on the food they consume.

Key words: *food security, overpopulation, climate change, intensive agriculture, human health, sustainability, resilience.*

Introduction

At the beginning of the twenty-one century, the relationships between food issues and other global emergencies become more complex. Food security is one of the world problems and has connections with other related problems: demographic growth, poverty, energy, natural resources, the environment, world trade and the monetary system, as considered by Bulgaru (2003, p. 21).

Nowadays, the global emergencies are even more complex, in the light of the results of a report in 2016 (Environmental problems): global warming and climate change, pollution, waste disposal, acidification of the oceans, acid rain, ozone depletion, loss of biodiversity and habitat, deforestation, urban expansion, public health, genetic engineering.

1 Raluca Andreea Ion, Ph.D., Associate Professor, Bucharest University of Economic Studies, Department of Agro-food and Environmental Economics, Piata Romana no. 6, Bucharest, Romania, E-mail: raluca.ion@eam.ase

These problems are interdependent. None of these can be addressed separately, as each depends on the others and has consequences for others (Ion, 2017). For example, habitat loss and climate change have a negative impact on biodiversity. In an attempt to solve the food problem in the world, natural resources have been intensively exploited and agricultural practices have had negative consequences on the environment. Demographic growth put pressure on natural resources.

Under this context, food security becomes a challenge in terms of population growth to 9 billion people expected to be the world inhabitants in 2050 (Ion, Popescu, 2013). More food is needed to feed the growing population. Bearing in mind the fact that the agricultural areas are already used and the attempt to include more areas in agricultural system become a problem for the environment, the solution for increasing the agricultural output is to produce food in intensive systems, using chemical substances for higher yields and lower losses. Studies (FAO, 2018, p. 22) estimated that the global yield loss due to biotic stresses (insects, diseases, viruses) averages over 23 percent of the estimated attainable yield across major cereals.

A FAO report (2018) shows that, in developing countries, 80 percent of the necessary production increases needed to feed over 9 billion people in 2050 would come from increases in yields and cropping intensity and only 20 percent from expansion of arable land.

The chemical substances used in agriculture are fertilizers, pesticides and veterinary medicine substances. But chemical substances used in agriculture remain in food as residues and affect human health. Thus, this paper investigates the effects of the chemical substances used in agriculture for obtaining agricultural products on human health.

The research questions are whether there is a relation between chemical substances used in agriculture and human health?, and if yes, what is its direction and intensity?

The objective of the research is to establish the direction and the intensity of the relation between chemical substances used in agriculture and human health. In pursuing this, statistical data for the two variables are analysed with simple regression model, using the SPSS program. The data are retrieved from the National Institute of Statistic in Romania and they refer to the last twenty-two years, from 1995 to 2016.

The paper is structured into six parts. After the introduction, the problem statement is described, based on literature review, with the goal of establishing the research hypothesis, in Section 3. Then, Section 4 presents the methodology, while Section 5 analyses the results of the regression models. Finally, in Section 6, the results are discussed, the hypothesis is validated, and the conclusions are drawn.

Problem statement

We argue that the amounts of chemicals administrated to agricultural crops will rise in the future. On the one hand, overpopulation put pressure on food security and more food is needed to feed 9 million people, expected to be in the perspective of 2050. FAO (2018) reports that food production must increase by 70 percent and the annual cereal production will need to rise to about 3 billion tonnes, from 2.1 billion and annual meat production will need to rise by over 200 million tonnes to reach 470 million tonnes. This increase implies changes in agricultural technology, including pesticides use and land use (Bran, 2012; George, 1997).

On the other hand, global warming leads to abundance of pest, diseases and weeds that will require higher amounts of chemical substances for their management.

There is abundant literature on the relations between global problems: climate change affecting food security and human health, overpopulation and over production putting pressure on natural resources and food security (Gerlach, 2015; Giampietro, Pimentel, 1994; Hoffmann, 2013). McMichael et al. (2003) and Crimmins et al. (2016) sound the negative effects of climate change on human health. Also, a report of The Interagency Working Group on Climate Change and Health (Portier et al., 2010) and other authors (Dich et al., 1997; Borlaug, 2000; Diamond, 2005) outline the effects of climate change on human health: Asthma, respiratory allergies, cancer, cardiovascular disease and stroke, foodborne diseases and nutrition problems caused by food contamination.

This study focuses on the last group of diseases, digestive diseases caused by food contamination. Food can be contaminated by microbial pathogens, parasites, chemical contaminants and bio toxins. Among them, the chemical contaminants coming from the residues of chemical substances administrated to agricultural crops are studied in the paper.

Worldwide, WHO (2017) estimated that 600 million – almost 1 in 10 people – fall ill after eating contaminated food and 420,000 die every year. In Romania, 1,694,876 cases of digestive diseases were reported in 2016 (National Institute of Statistics database, 2018).

Moreover, it is estimated that the quantities of chemical substances will raise, considering the global warming and the need to produce more food for a growing population. It has been demonstrated that climate change may affect agricultural technologies, because the abundance of pests, diseases and weeds will change the type, level and use of chemicals and fertilizers on crops (Miraglia et al., 2009).

These modifications in technologies lead to the need of using higher amounts of chemicals administrated to crops and found, finally, in food products. This is also argued by the WHO report in 2015 (WHO, 2015), showing that the climate of many developing countries favours the proliferation of pests, which need higher amounts of pesticide that is used for their combating.

Research hypothesis

The results of the research described in the previous section drive to the need of answering the questions whether there is a relation between chemical substances used in agriculture, as a result of both climate change and overpopulation needing more food, and human health?, and if yes, what is its direction and intensity?

This paper starts from the hypothesis that global warming, through increasing in number and types of pests, diseases and weeds, and needing, as such, higher amounts of pesticides, has negative impact on human health in Romania. The hypothesis tested in this paper is:

H1: Changes in pesticides use, as effects of climate changes in pests, diseases and weeds, and overpopulation needing more food, may be connected to digestive diseases.

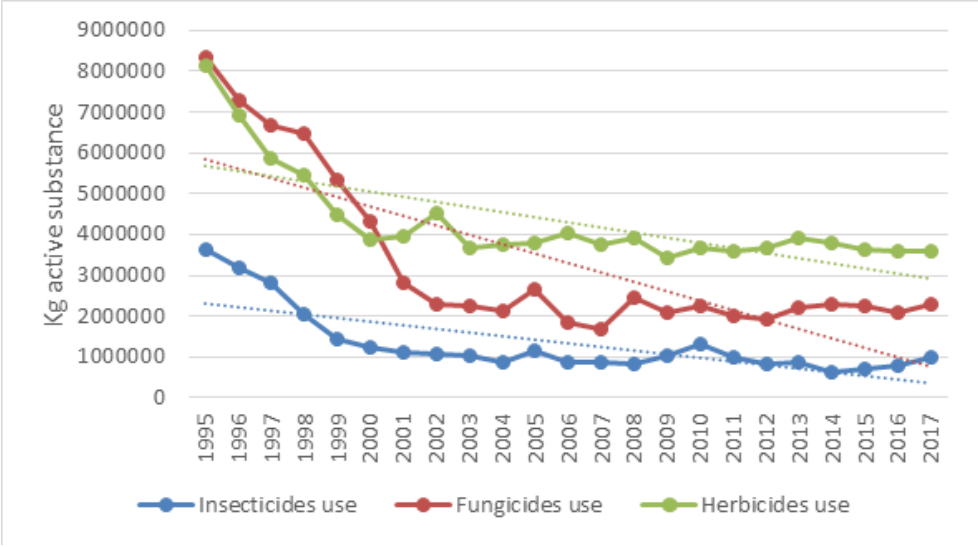
WHO (2015) sustains that contaminated food, containing harmful bacteria, viruses, parasites or chemical substances, causes more than 200 diseases – ranging from diarrhoea to cancers. In this piece of research, digestive diseases are considered for explaining the effects of chemical residues in food to human health.

Research methods

For validating the hypothesis arguing that changes in pesticides use, as effects of climate changes in pests, diseases and weeds, and overpopulation needing more food, may affect human health, the relationships between variables corresponding to the use of pesticides in agriculture and variables corresponding to human health are analysed.

The variables corresponding to the use of pesticides in agriculture are the amounts of insecticides, fungicides and herbicides administrated to crops in Romania, in the period 1995-2017. Figure 1 shows the dynamics of the pesticides use in agriculture. Negative trends can be observed from 1995 to 2003. After 2004, the quantities of insecticides stabilized between 700,000 and 1,000,000 tons of active substance, the quantities of fungicides to 2,000,000 tons of active substance and the quantities of herbicides to 3,500,000 tons of active substance.

Figure 1. *Dynamics of pesticides use in agriculture in Romania, 1995-2017.*

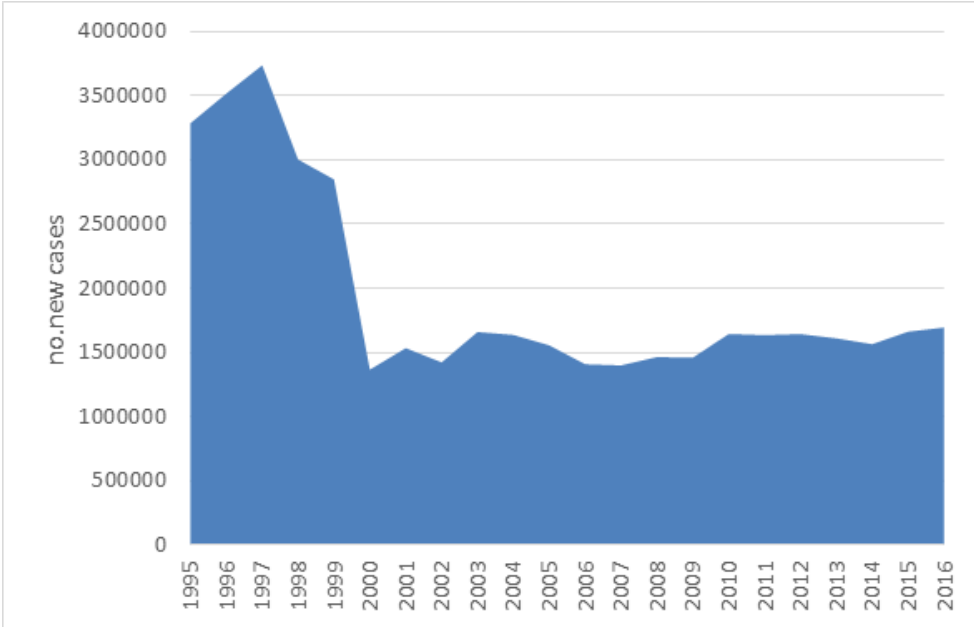


Source: *National Institute of Statistics, Romania.*

The agricultural area in Romania is 12,502,535 hectares (National Institute of Statistics of Romania, 2018). It means that the quantities of pesticides administrated per one hectare are 80 kg of insecticides, 182 kg of fungicides and 285 kg of herbicides.

The variable corresponding to human health is the number of new cases of digestive diseases. Digestive diseases have been chosen because it has been demonstrated that pesticide poisoning may cause nausea, stomach cramps, vomiting, diarrhoea, weakness, headache, confusion, excessive sweating etc. all of them being symptoms of digestive diseases (WHO, 2015). Data on digestive diseases have been retrieved from the National Institute of Statistic of Romania database. They are presented in Figure 2.

Figure 2. *Dynamics of new cases of digestive diseases in Romania, 1995-2016.*



Source: *National Institute of Statistics, Romania*

The number of new cases of digestive diseases dramatically decreased from 1995 to 2000, from 3,286,699 new cases to 1,366,312 new cases. In the period 2000-2016, the number of the new cases of digestive diseases stabilized around 1,500,000 cases per year.

The relationships of dependence between the variables are analysed with SPSS 22, using the simple regression model. The confidence interval is 95%. Twenty-two observations have been introduced, for the period 1995-2016. The source of the data is the National Institute of Statistics of Romania.

Findings

The relation between digestive diseases and insecticides use in agriculture are analysed using the simple regression model. The results are presented in Tables 1 and 2, and Figure 3. The coefficient of correlation between digestive diseases and insecticides use is 0.814, showing a strong and direct relation between the two variables (Table 1).

Table 1. *Correlation coefficients between digestive diseases and insecticides use*

Model	R	R Square	Adjusted R Square
1	.902[a]	.814	.805
a. Predictors: (Constant), Insecticides use b. Dependent Variable: Digestive diseases			

Source: *results of the regression model*

The model which shows the relation between digestive diseases and insecticides use is: y=0.902x, meaning that a change by one unit in the use of pesticides leads to a change with 0.902 in the new cases of digestive diseases.

The values of Sig.is 0.000, below 0.05, meaning that the model is valid. The interval for B value do not contain the value 0, meaning, again, that the model is valid. The results are provided with a standard error of 0.089 (Table 2).

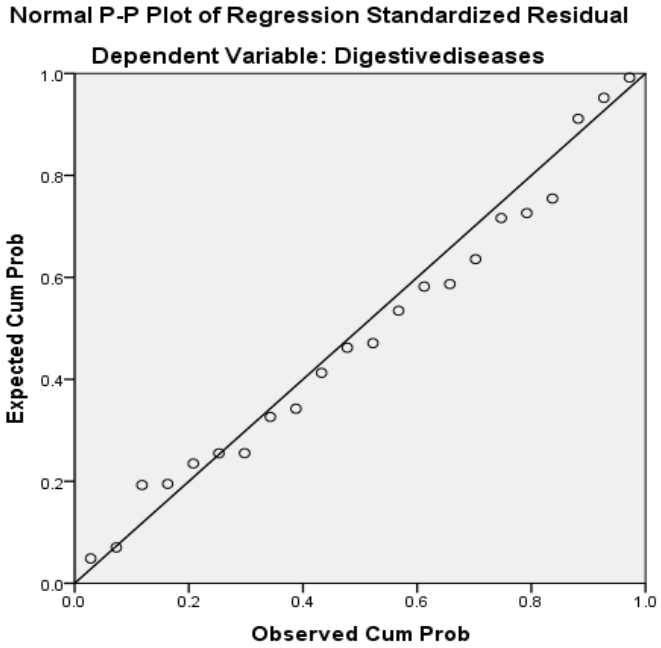
Table 2. *Coefficients of the regression model showing the relation between digestive diseases and insecticides use*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	833976.747	138785.185		6.009	.000	544475.923	1123477.571
	Insecticide use	.831	.089	.902	9.353	.000	.646	1.017
a. Dependent Variable: Digestive diseases								

Source: *results of the regression model*

The graph in Figure 3 expresses the linear correlation between the two variables: digestive diseases and insecticides use.

Figure 3. *The correlation between new cases of digestive diseases and insecticides use*



Source: *results of the regression model*

The relation between digestive diseases and fungicides use in agriculture are analysed using the simple regression model. The results are presented in Table 3 and 4, and Figure 4. The coefficient of correlation between digestive diseases and fungicides use is 0.857, showing a strong and direct relation between the two variables (Table 3).

Table 3. *Correlation coefficients between digestive diseases and fungicides use*

Model	R	R Square	Adjusted R Square
1	.926[a]	.857	.850
a. Predictors: (Constant), Fungicides use b. Dependent Variable: Digestive diseases			

Source: *results of the regression model*

The model which shows the relation between digestive diseases and fungicides use is: y=0.926x, meaning that a change by one unit in the use of fungicides leads to a change with 0.926 of the new cases of digestive diseases.

The values of Sig. is 0.000, below 0.05, meaning that the model is valid. The interval for B value do not contain the value 0, meaning, again, that the model is valid. The results are provided with a standard error of 0.031 (Table 4).

Table 4. *Coefficients of the regression model showing the relation between digestive diseases and fungicides use*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	794018.361	122342.198		6.490	.000	538817.009	1049219.714
	Fungicides use	.344	.031	.926	10.964	.000	.278	.409
a. Dependent Variable: Digestive diseases								

Source: *results of the regression model*

The graph in Figure 4 expresses the linear correlation between the two variables: digestive diseases and fungicides use.

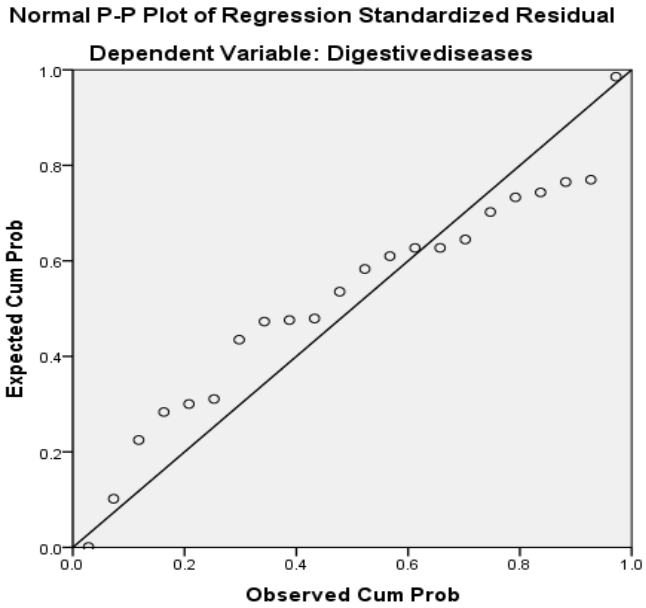
The relation between digestive diseases and herbicides use in agriculture are analysed using the simple regression model. The results are presented in Table 5 and 6, and Figure 6. The coefficient of correlation between digestive diseases and herbicides use is 0.734, showing a strong and direct relation between the two variables (Table 5).

The model which shows the relation between digestive diseases and herbicides use is: y=0.857x, meaning that a change by one unit in the use of herbicides leads to a change with 0.857 of the new cases of digestive diseases.

The values of Sig.is 0.000, below 0.05, meaning that the model is valid. The interval for B value do not contain the value 0, meaning, again, that the model is valid. The results are provided with a standard error of 0.073 (Table 6).

The graph in Figure 5 expresses the linear correlation between the two variables: digestive diseases and herbicides use.

Figure 4. *The correlation between new cases of digestive diseases and fungicides use.*



Source: *results of the regression model*

Table 5. *Correlation coefficients between digestive diseases and herbicides use*

Model	R	R Square	Adjusted R Square
1	.857[a]	.734	.721
a. Predictors: (Constant), Herbicides use b. Dependent Variable: Digestive diseases			

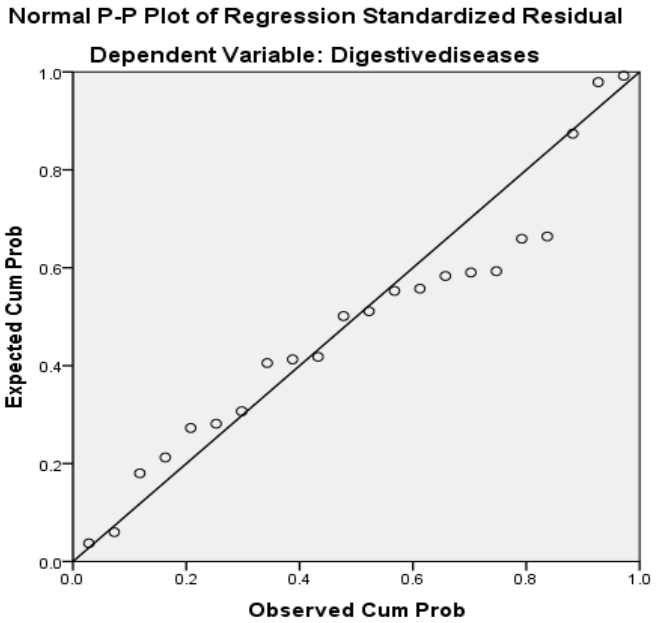
Source: *results of the regression model*

Table 6. *Coefficients of the regression model showing the relation between digestive diseases and herbicides use*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-408975.023	328223.229		-1.246	.227	-1093636.682	275686.636
	Herbicides use	.542	.073	.857	7.428	.000	.390	.694
a. Dependent Variable: Digestive diseases								

Source: *results of the regression model*

Figure 5. *The correlation between new cases of digestive diseases and herbicides use*



Source: *results of the regression model*

A summary of the models analysed above are presented in Table 7. It shows the direction and intensity of the relations between the variables and the coefficients of the regression functions, under specific standard errors.

Table 7. *The influence of insecticides, fungicides and herbicides use in agriculture on the number of new cases of digestive diseases*

Variable	Coefficients of correlation	Coefficients of regression function	Standard error	Sig.
Insecticides use	.814	.902	.089	.000
Fungicides use	.857	.926	.031	.000
Herbicides use	.734	.857	.073	.000

Source: *results of the regression model*

The research has its limitations. The first limit of the research is that not all digestive diseases are caused by contaminated food intake. There are other causes for digestive problems. We recommend that future research should consider only those cases of digestive diseases caused by food poisoning.

The second limit is the high levels of the values of standard error, especially for the regression model between insecticides use and new cases of digestive diseases (.089), and for the regression model between herbicides use and new cases of digestive diseases (.073). This limits the interpretations of the results.

The third limitation is that, when testing the variables, the value of Skewness test for normality is 1.09, higher than 0.5, but p-value is 0.14, higher than 0.05, meaning that the variables are normal.

The fourth limitation is that not only climate change with its abundance of pests, diseases and weeds, but also agricultural practices are responsible for chemical residues in agro-food products. In their concerns for higher yields and profits, farmers use excessively the fertilizers and pesticides.

In Romania this is even a bigger problem with the agricultural products sold on the producers' market, where the control of chemical substances administrated to crops is difficult to be achieved. Considering the fact that the share of this market in total agricultural output sold on all market is high, the issue of selling unsafe agricultural products is significant.

Conclusions

It was found that pesticides use in agriculture impacts human health. The hypothesis of the research, arguing that: (H1) Changes in pesticide use, as effects of climate changes in pests, diseases and weeds, and overpopulation needing more food, may be connected to digestive diseases, is validated.

The results are similar to those found by WHO (2015) showing that diarrheal diseases are the most common illnesses resulting from the consumption of contaminated food, including chemical contamination, causing 550 million people to fall ill and 230,000 deaths every year. Almost the same results were found by Ebi (et al., 2006), showing that people are vulnerable to climate change, and, as such, to vector-, food-, and water-borne disease.

The research demonstrated that climate change, through intensive use of insecticides, fungicides and herbicides, may have an impact on human health. The same results have been found by Portier (et al., 2006) who sounds, among the climate change effects on human health, foodborne diseases and nutrition problems caused by food contamination. Moreover, the Food Standards Authority

report in 2010 found that the presence of chemicals in food: insecticides, fungicides and herbicides, and veterinary medicine residues, natural, environmental and process chemical contaminants, is a factor affecting food safety.

Under this context, bearing in mind the need to increase the agricultural output by 70 % until 2050, when world population will reach 9 billion people, actions are needed to ensure food security so that every human being has access to adequate food.

First, FAO (2018) estimated that investments in developing country agriculture have to increase by at least 60 percent over current levels. Higher public investment and better incentives for farmers are encouraged.

Another way to increase the agricultural output is to encourage and finance the agricultural research that should focus on finding solutions to increase yields without harming the environment or human health. Pests, diseases and weeds management should be oriented to natural methods and materials, using lower amounts of chemical substances. As such, human being will have access to sufficient, safe and nutritious food, as required to ensure food security.

Acknowledgement

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DYNAMICS OF THE BOVINE PRODUCTS MARKETS IN ROMANIA - MILK AND BEEF

Rodica Chetroiu[1]

Abstract

The paper perform an analysis of the dynamics of Romanian cow's milk and beef market, integrating information on the structure of the bovine breeding sector, domestic cow's milk and beef production, import, export, consumption of milk and beef, production price of milk and beef etc. Regarding the production of cow's milk, we are witnessing a continuous decline after 2014. Also, the cows' number had fluctuations in the studied period, with a tendency to decrease. The milk supply on market increased in 2017 by about 9.9%, compared to 2012 due to the doubling of imports. The beef production was slightly downward during the period 2012-2014, after which it started to increase, reaching in 2016 127.1 thousand tons. In 2017, there was a fall in production of about 3.3% compared to 2016.

Key words: *milk, cows, beef, bovine, offer.*

Introduction

The present paper is intended to be a concrete analysis of the cow's milk and cattle market coordinates in Romania, seen in dynamics, in the context of a difficult period for the bovine livestock sector, both at national and European community level. The market for these two products has a complex economic structure, starting from the level of production farms, of the supply of milk and beef delivered by producers and continuing with the field of imports and exports, in which the defining aspects include the characteristics related to costs, pricing, and profitability issues. These aspects are quantified at all levels of the milk and beef channels, for each economic agent on the chain.

1 Chetroiu Rodica, Ph.D., Scientific researcher III, Research Institute for Agriculture Economy and Rural Development, 61 Mărăsti Blvd., sector 1, Bucharest, Romania, Phone: +40 213 181 686, E-mail: rodica.chetroiu@iceadr.ro

Material and methods

In this paper, fundamental research methods are used, using information from official statistical data sources - FAO, Eurostat, Ministry of Agriculture (MARD). Statistical analysis tools, comparative analysis, graphical tools are used, with Excel software applications. Data analysis is of longitudinal type, being carried out over a certain period of time, having both a quantitative and a qualitative character.

Results and discussions

The structure of the dairy cows sector

The analysis of the data provided by MARD (Table 1) shows that the number of dairy cows farms was on April 30, 2017 of 600,841, with a total of 1,402,862 heads, down from 2016, with 3632 farms.

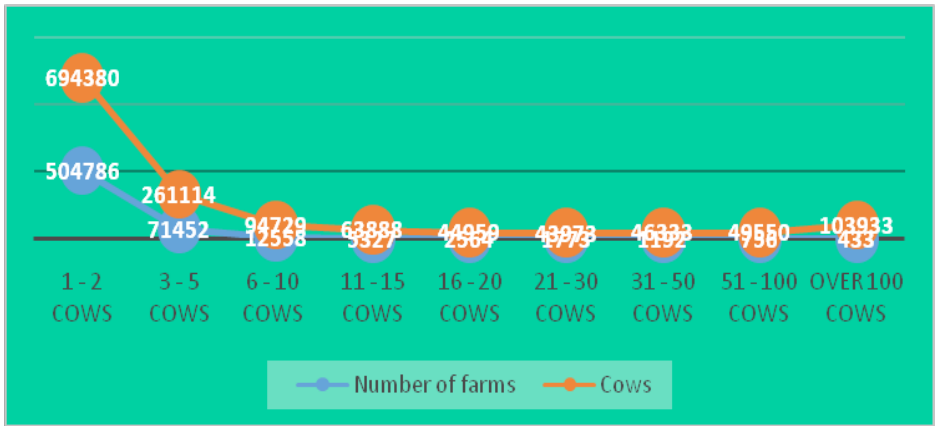
Table 1. *Dimensional structure of dairy and heifer farms - 30 April 2017*

Specification	Total sectors				
	Number of farms	%	Number of cows and heifers	%	Heads on farm
1 - 2 heads	504,786	84.00	694,380	49.50	1.38
3 - 5 heads	71,452	11.89	261,114	18.61	3.65
6 - 10 heads	12,558	2.09	94,729	6.75	7.54
11 - 15 heads	5,327	0.89	63,888	4.55	11.99
16 - 20 heads	2,564	0.43	44,959	3.20	17.53
21 - 30 heads	1,773	0.30	43,973	3.13	24.80
31 - 50 heads	1,192	0.20	46,333	3.30	38.87
51 - 100 heads	756	0.13	49,550	3.53	65.54
over 100 heads	433	0.07	103,933	7.43	240.03
TOTAL	**600,841**	**100.00**	**1,402,862**	**100.00**	**2.33**

Source: *Ministry of Agriculture and Rural Development.*

The largest share belongs to the size class 1-2 heads (84%), followed by the category 3-5 heads (11.9%), the rest of 4.1% representing farms with over 6 heads. The "over 100 heads" size class is a small part of our country's cow's farms, with only 0.072% of total.

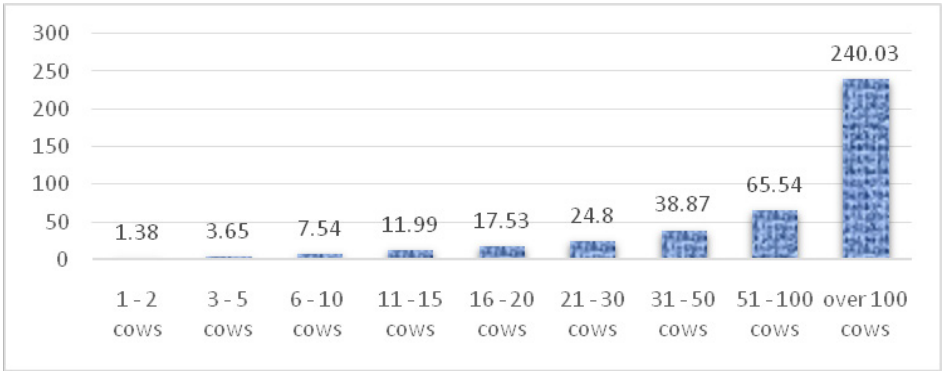
Figure 1. *Dimensional structure of dairy cows and heifers farms*



Source: *Ministry of Agriculture and Rural Development*

The average size of the holdings by size class, illustrated in Figure 2, shows that 84% of the holdings in Romania (size 1-2 heads) have 1.38 heads, being subsistence farms, which makes many of the measures support to not reach the vast majority of them. Also, nearly 92% of the cows' farms do not have legal personality.

Figure 2. *The average size of dairy cows' farms types*

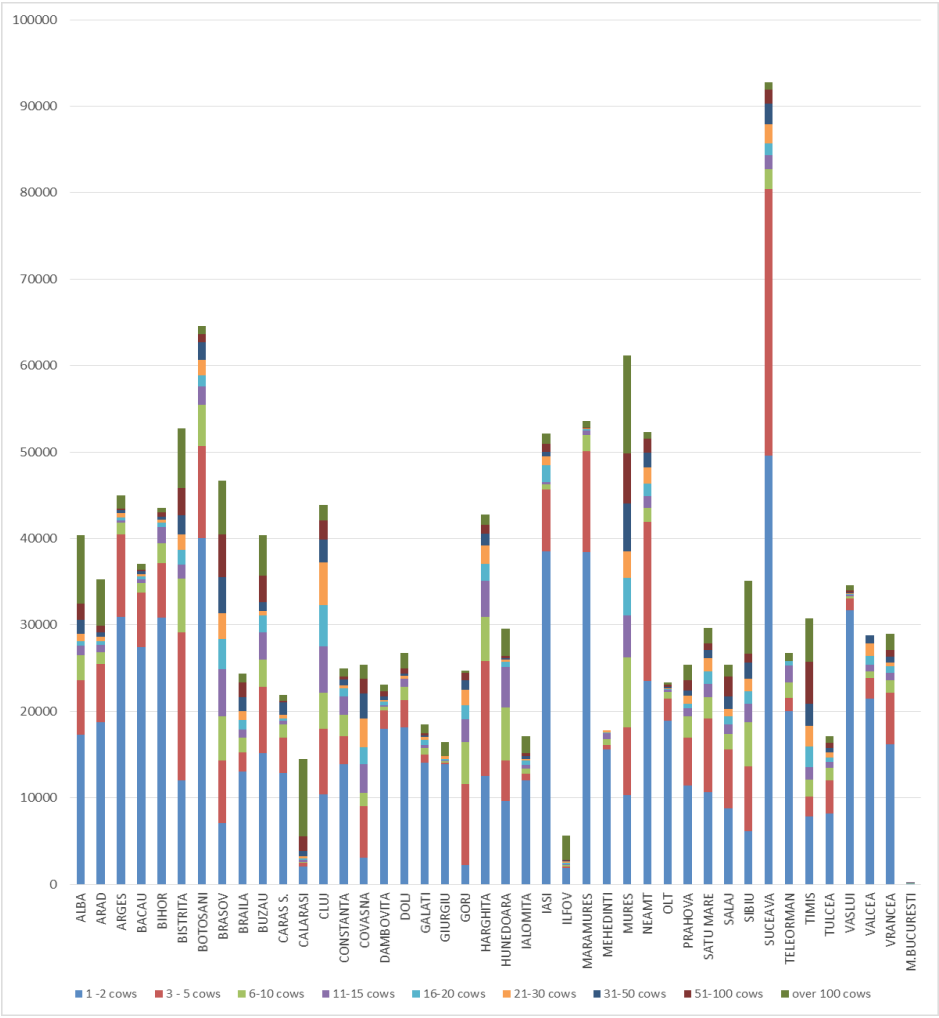


Source: *Ministry of Agriculture and Rural Development*

At territorial level, most farms with cows and heifers are located in the counties of Suceava, Maramures, Botosani, Arges, Iasi. These counties also occupy the first places in terms of flocks. The fewest cows and heifers are in the counties of Ilfov, Călărasi, Gorj, Tulcea, Sibiu, Timis. Distribution of

flocks by size class of farms shows that in almost all counties the size class 1-2 heads prevails (Figure 3).

Figure 3. *Distribution of cows and heifers by size class of farms*



Source: *Ministry of Agriculture and Rural Development*

The structure of the bovine breeding sector for beef

On April 30, 2017, the fattening young cattle population was 333,490 heads, respectively 153,261 holdings. The analysis of dimensional structure of the farms indicates that about 87% of the fattening young cattle holdings belong to

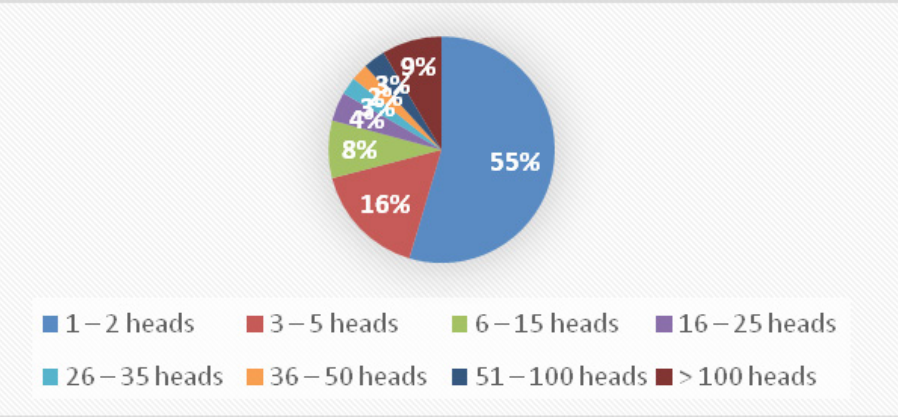
the 1 - 2 - class heads, meaning they belong to the households. Thus, the average size of a young cattle farm in 2017 was 2.18 heads. The farms of category 51-100 heads represented at the end of April 2017 only 0.10% of the total number of young cattle farms, and those with more than 100 heads held only 0.07% of the total number of fattening cattle farms (Table 2).

Table 2. *Dimensional structure of fattening young cattle farms - April 30, 2017*

Specification	Total sectors				
	Number of farms	%	Number of fattening young cattle	%	Heads on farm
1 – 2 heads	133,906	87.37	182,123	54.61	1.36
3 – 5 heads	14,435	9.42	54,501	16.34	3.78
6 – 15 heads	3,154	2.06	27,364	8.21	8.68
16 – 25 heads	967	0.63	13,847	4.15	14.32
26 – 35 heads	320	0.21	8,375	2.51	26.17
36 – 50 heads	221	0.14	8,120	2.43	36.74
51 – 100 heads	150	0.10	10,504	3.15	70.03
> 100 heads	108	0.07	28,656	8.60	265.33
TOTAL	**153,261**	**100**	**333,490**	**100**	**2.18**

Source: *Ministry of Agriculture and Rural Development*

Figure 4. *Structure of the fattening young cattle flocks*

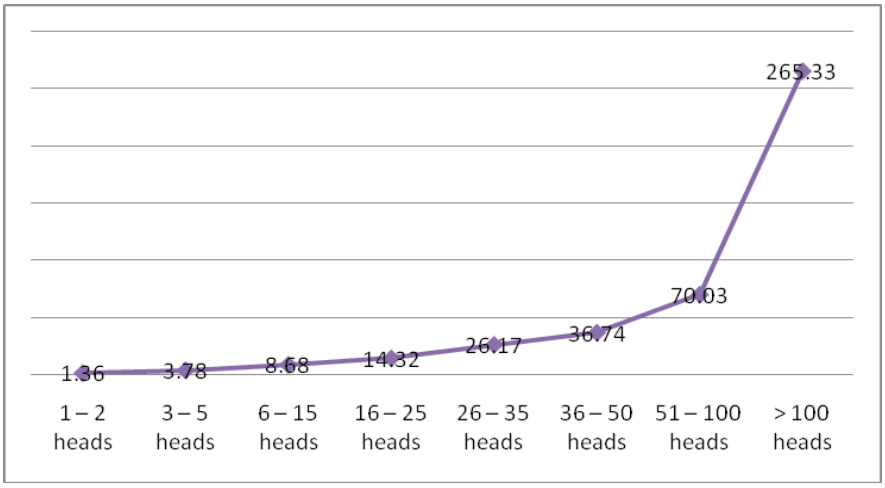


Source: *Ministry of Agriculture and Rural Development*

Regarding fattening young cattle herds, 55% of them are in the households (1-2 caps), 16% in the category 3-5 heads, and in the farms of category over 100 heads, only 9% (Figure 4).

The average size of types of fattening cattle holdings is shown in Figure 5.

Figure 5. *Average size of types of fattening cattle holdings*



Source: *Ministry of Agriculture and Rural Development*

Dynamics of cattle herds by types of property - 2012-2017

According to National Institute of Statistics data, the evolution of cattle herds shows a tendency to increase during the period 2012-2015, and then they decreased by 4% in 2017 as compared to 2015, which is one of consequences of the crisis from 2015-2016, in the milk sector (Table 3, Figure 6).

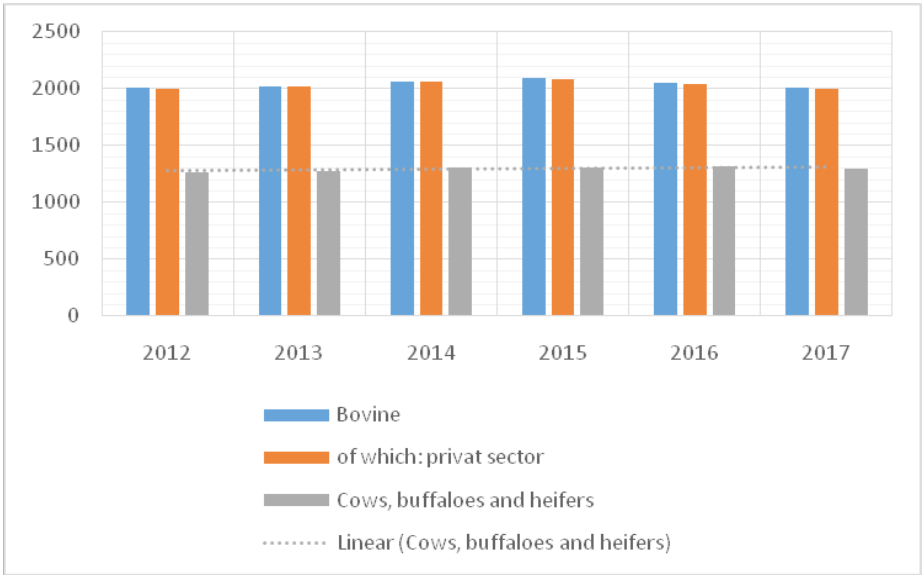
Of the total number of herds, 99.7% belong to the private sector, and 91.8% of them are in individual holdings. The cows and heifers number recorded a slight decrease in 2017 compared to 2016, about 1.5%.

Table 3. *Dynamics of the cattle population - 2012-2017 (thousands of heads)*

Categories	Forms of property	2012	2013	2014	2015	2016	2017
Bovine	Total	2,009	2,022	2,069	2,092	2,050	2,011
	Private sector	2,003	2,016	2,062	2,086	2,043	2,005
	Of which: individual holdings	1,866	1,878	1,915	1,935	1,887	1,840
Cows, buffaloes and heifers	Total	1,265	1,279	1,307	1,311	1,315	1,295
	Private sector	1,262	1,276	1,304	1,308	1,312	1,292
	Of which: individual holdings	1,196	1,211	1,234	1,235	1,236	1,213

Source: *National Institute of Statistics*

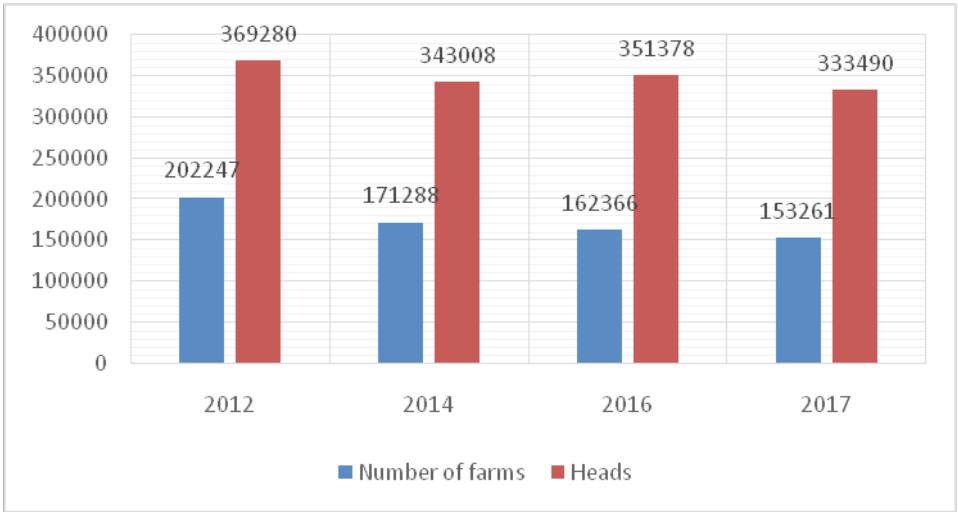
Figure 6. *Bovine herds during 2012-2017 (thousand heads)*



Source: *National Institute of Statistics*

Between 2012 and 2017, fattened young cattle herds have decreased by 10%, from 369,280 heads to 333,490 heads, while the number of holdings in which they are reared fell by 24.3%, from 202,247 in 2012 to 153,261 in 2017 (Figure 7).

Figure 7. *Evolution of herds and number of farms of fattening young cattle*



Source: *Ministry of Agriculture and Rural Development*

In the last years, the numbers of fattening young cattle have fallen on holdings with a size of 1-2 heads and are concentrated on medium-sized farms, as complementary national direct payments are granted from a minimum size of 3 heads / farm.

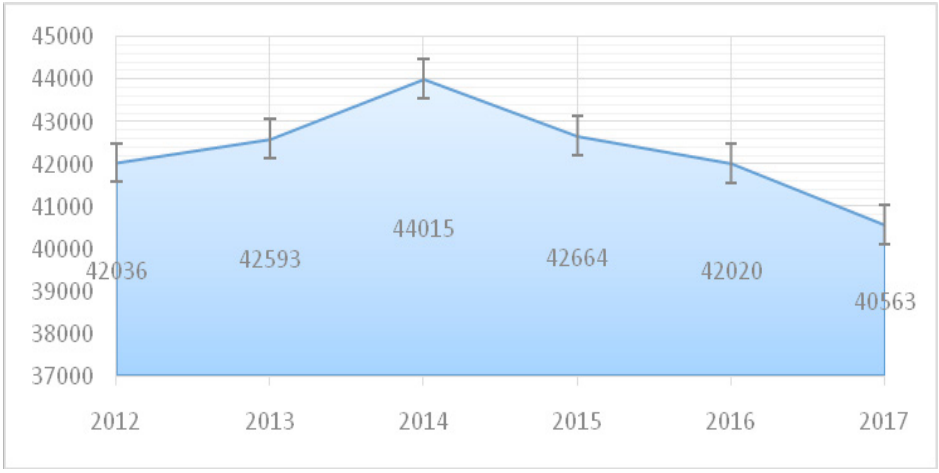
According to data from the Carcass Classification Commission, in the structure of the slaughtered cattle herds, the highest share is represented by cows (48.2 - 64.4%), followed by the fattening young cattle (11.2-27.9%), the rest being heifers, bulls, oxen, young bovine.

Production of cow's milk during 2012-2017

Total production of cow's milk

The domestic production of cow's milk and buffalo milk had an upward trend during the period 2012-2014 (in 2014 there were 44,015 thousand hl), after that it declined continuously, reaching in 2017 at the amount of 40,563 thousand hl, which means a decrease of 3.5% compared to 2012 and almost 8% as compared to 2014 (see Figure 8).

Figure 8. *Dynamics of milk production during 2012-2017 (thousands hl)*

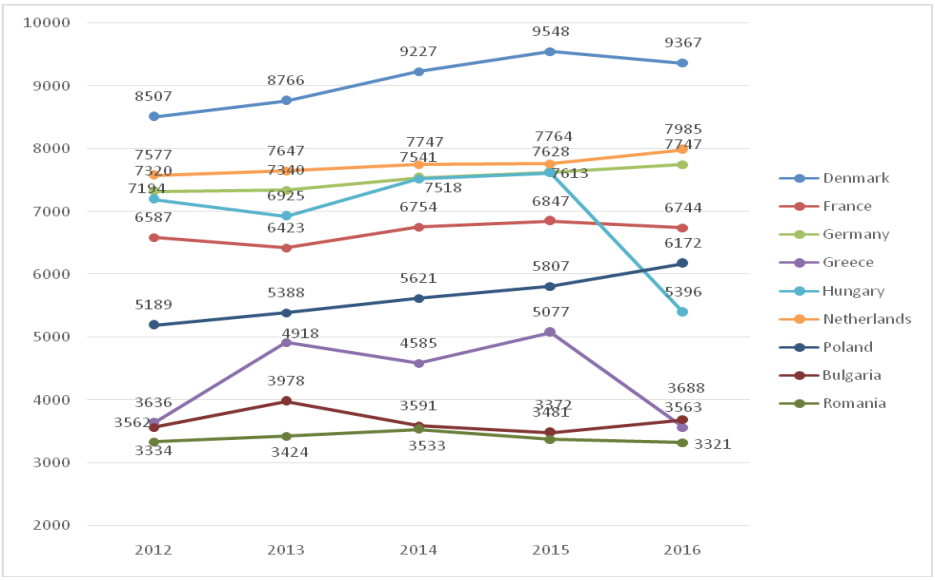


Source: *National Institute of Statistics*

Average milk production in Romania, compared with EU countries

Figure 9 illustrates average milk production in EU countries, indicating that the large milk producing countries are Denmark, which produced 9,367 kg of milk per cow in 2016, Netherlands - with 7,985 kg / cow, Germany - with 7,747 kg / cow.

Figure 9. *Evolution of average milk production during 2012-2016 in Romania and EU countries - kg / cow / year*



Source: *FAOSTAT*

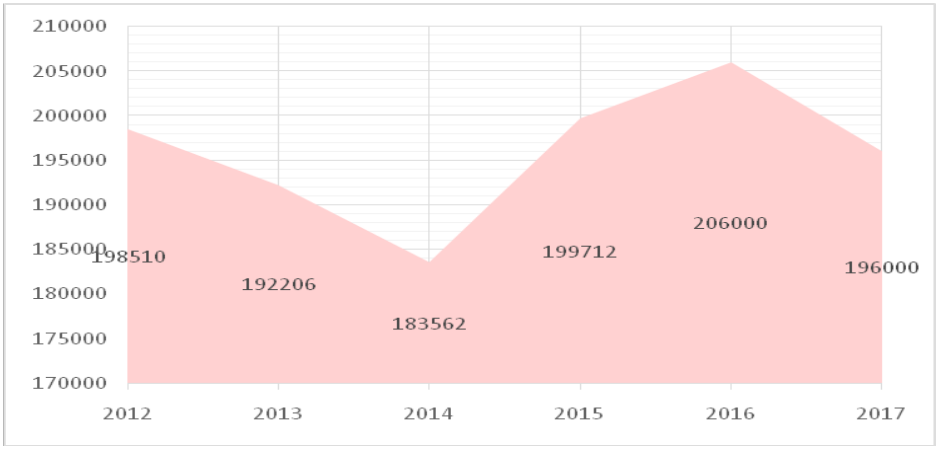
Also, the neighbouring country, Hungary, achieved 5,396 kg of milk per cow in 2016. Romania has among the lowest average milk yields per cow, with 3,321 kg / head in 2016 (FAO data).

But there are dairy farms in Romania that exceed the production of the largest cow milk producers in the EU, but these few examples do not have the power to raise the national indicators, that are influenced in an overwhelming proportion of over 83% of holdings, which have low yields and which determine policies and allocations of factors that disadvantage developed farms.

Domestic production of beef - 2012-2017

The evolution of beef production shows a continuous decrease during 2012-2014, followed by a significant recovery after this period, over 12% in 2016 compared to 2014, and in 2017 it decreased by 10% as compared to 2016 (sees Figure 10).

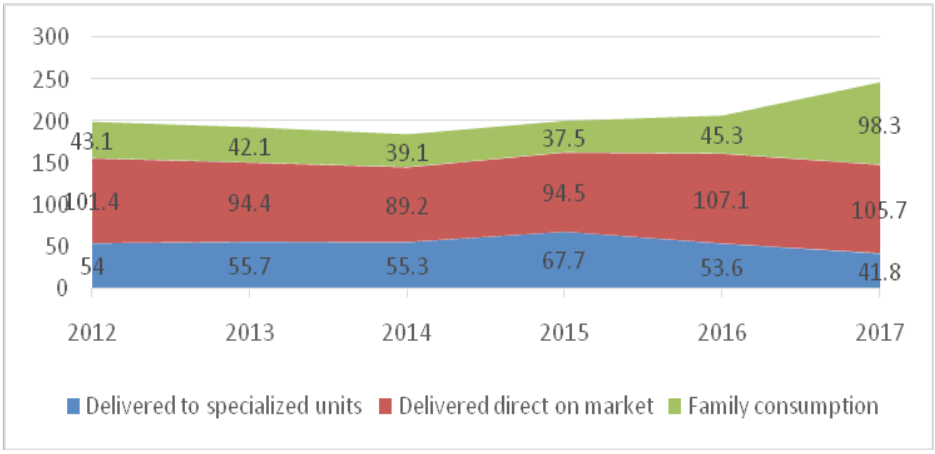
Figure 10. *Dynamics of internal production of beef (tons live weight)*



Source: *National Institute of Statistics*

Regarding the selling of the beef production, 43-52% of it is delivered directly to market, 17-34% is for deliveries to specialized slaughterhouse units, and the family consumption is 19-40% (see Figure 11).

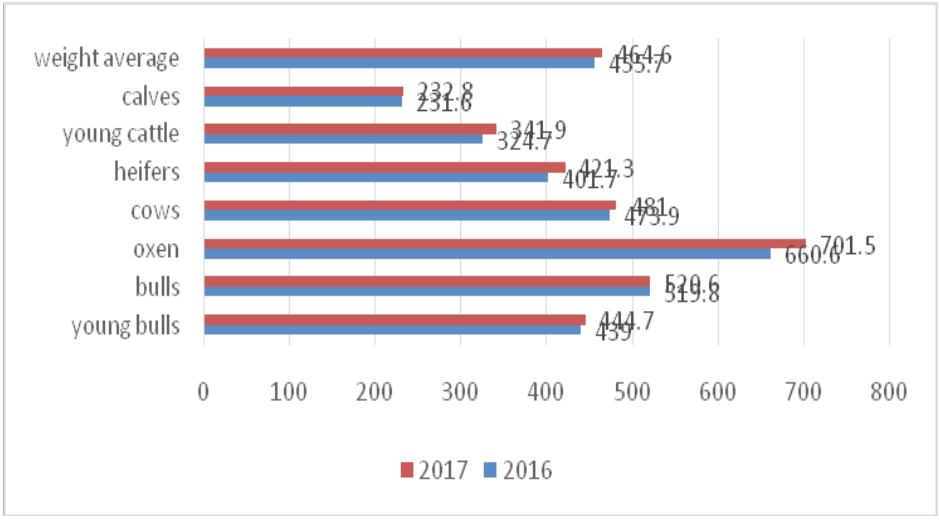
Figure 11. *Utilization of domestic beef production (thousand tons)*



Source: *calculations following NIS, MARD data*

The average live weight at slaughter in 2017 was 464.6 kg / head, the minimum being 232.8 kg / head for calves, and the maximum of 701.5 kg / head for oxen category. The fattened young bulls have a slaughter weight close to average (444.7 kg / head) and bulls of 520.6 kg / head. Reformed cows are sacrificed at a living weight of 481 kg / head (Figure 12).

Figure 12. *Average weight at slaughter by category in the years 2016 and 2017 (live weight / head)*



Source: *Carcass Classification Commission*

Milk demand and supply

During the analysed period, the milk supply on the market increased by about 9.9% in 2017 compared to 2012, due to the doubling of imports, and not on the domestic milk production, which decreased by 2.2%. However, per capita milk consumption increased from 241.1 litres in 2012 to 262.3 litres in 2017 (Table 4, Figure 13).

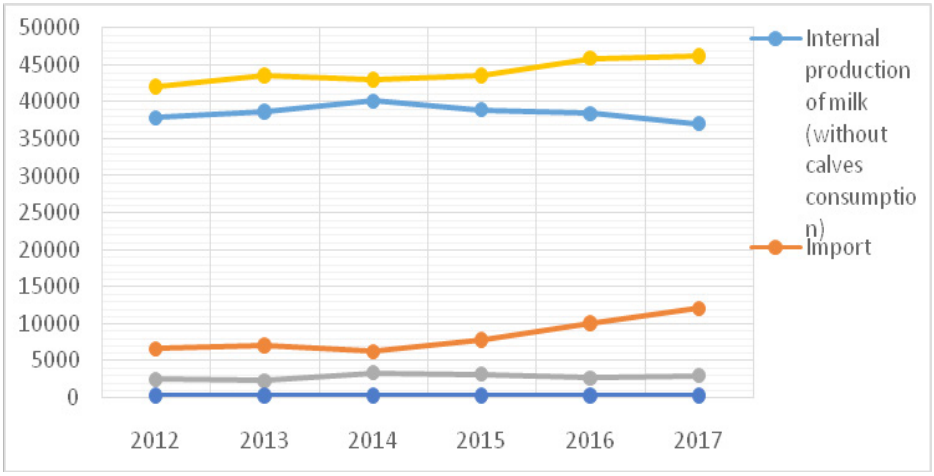
Table 4. *Demand and supply of cow's milk and buffalo milk - thou hl*

Specification	2012	2013	2014	2015	2016	2017
Internal production of milk (without calves consumption)	37,870	38,651	40,096	38,893	38,392	37,030
Import	6,627	7,111	6,278	7,853	10,108	12,073
Export	2,498	2,260	3,361	3,188	2,638	2,953
Milk offer	41,999	43,502	43,013	43,558	45,862	46,150

Specification	2012	2013	2014	2015	2016	2017
Milk consumption – l/capita/year	241.1	244.5	251.5	293.0	230.4	262.3
Share of internal production of milk in offer %	90.2	88.8	93.2	89.3	83.7	80.2

Source: *National Institute of Statistics; Ministry of Agriculture and Rural Development*

Figure 13. *Milk demand and offer – thousand hl*



Source: *National Institute of Statistics; Ministry of Agriculture and Rural Development*

Beef demand and supply

Domestic production of beef had a slight downward trend in 2012-2014, after which it started to increase, reaching 127.1 thousand tons in 2016. In 2017, there was a fall in production of about 3.3% compared to 2016. At the same time, the imports, after a significant increase in 2015-2016, reached 15.5 tons in 2017, 41% less than in 2016, while exports increased by about 25% in 2017 compared to 2016. Under these conditions, the supply of beef fell by about 24% over the period. Of the total supply, imports accounted between 16-24% of the quantity, the remainder being domestic production (Table 5, Graph 14).

Table 5. *Food balance of beef (2012 -2017 period), tons*

Year	Internal production of beef – live weight	Beef (Cut)	Import	Export	Offer	Kg/capita/year	% import of offer
2012	198,510	99,255	12,023	37,638	73,640	5	16
2013	192,000	96,000	13,213	29,972	79,241	5.1	17
2014	183,000	91,500	20,410	25,494	86,416	5.6	24
2015	245,200	122,600	26,793	32,872	116,521	6.3	23
2016	254,200	127,100	26,458	42,792	110,766	6.1	24
2017	245,800	122,900	15,512	53,585	84,827	4.3	18

Source: *NIS, MARD*

Concerning the consumption of beef, it was 6.1 kg / inhabitant in 2016, decreasing in 2017 to 4.3 kg, this being the lowest consumption of beef in the analysed period.

Figure 14. *Food balance – beef (tons)*

Source: *NIS, MARD*

Production cost of milk and producer prices

The economic indicators were estimated both for the level of 3,500 l / cow and for a larger production, of 6,000 l / cow. It is obvious that, in lower production, indicators have lower returns, but at 6,000 l / cow, a return of more than 25% can be achieved (Table 6).

Table 6. *The main economic indicators for milk, RON / litre*

Specification	3500 l/cow	6000 l/cow
A. Production value	1.37	1.38
A1. Of which, main production	1.20	1.20
B. Subsidies	0.11	0.06
D Total expenditures	1.27	1.11
I. Variable expenditures	1.10	0.97
1.Fodder	0.78	0.71
II. Fixed expenditures	0.16	0.15
-Labour costs	0.14	0.11
E. Taxable income	0.10	0.27
Taxes and fees	0.02	0.04
F. NET INCOME + subsidies	0.19	0.29
G.Rate of taxable income (%)	9.26	28.5
H. RATE OF NET INCOME + subsidies (%)	17.56	30.7
Production cost	1.10	0.93
Price	1.20	1.20

Source: *Own calculations*

The milk production cost is 1.10 RON / l at an average production of 3500 l / cap and is reduced to a production of 6000 l / cap, to the value of 0.93 RON / l. Of the cost of milk, feed is the largest expense - 71% for the production of 3500 l and 76% for 6000 l.

Production cost of beef and producers prices

Most of the expenditures included in the production cost of beef are variable costs (about 90%). Within the variable costs, feed costs represent 60.3%, and the biological material introduced to fattening occupy approximately 34.3% (Table 7).

According to data from the National Institute of Statistics, the farm gate price of 2016, which was 5.93 lei / kg live weight, was exceeded in 2017, reaching 6.34 lei / kg live weight.

Table 7. *The main indicators at beef, in 2017*

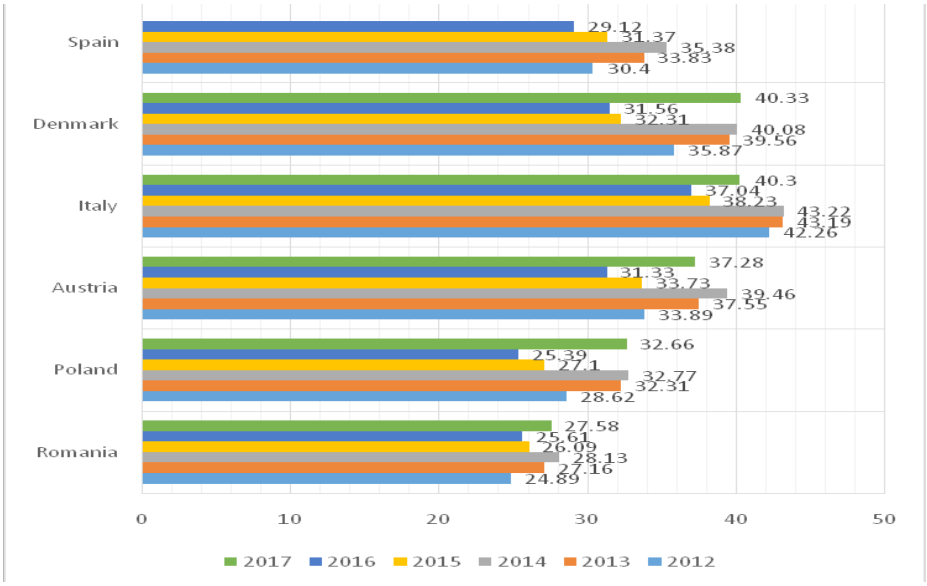
Specification*	RON/kg live weight
I. Variable expenditures	5.30
1.Fodder costs	3.20
2.Biologic material	1.82
II. Fixed costs	0.97
Production costs	5.87
Producer price**	6.34

**Initial live weight 100 kg; average daily gain 1000 g; live weight at delivering 450 kg/head*
***NIS data*
Source: *Own calculations*

Analysis of cow's milk prices on the Romanian market compared to those in the EU

Concerning the producers' milk prices in the EU countries, during the period 2012-2017, it can be seen that it has followed an upward trend until the crisis years 2015-2015, when it dropped, followed by a recovery period in all countries. In Figure 15, among countries surveyed, Romania has the lowest prices, similar to those of Poland, and the highest prices being in Italy and Denmark.

Figure 15. *Producer milk prices in a number of EU countries - Euro / 100 kg*

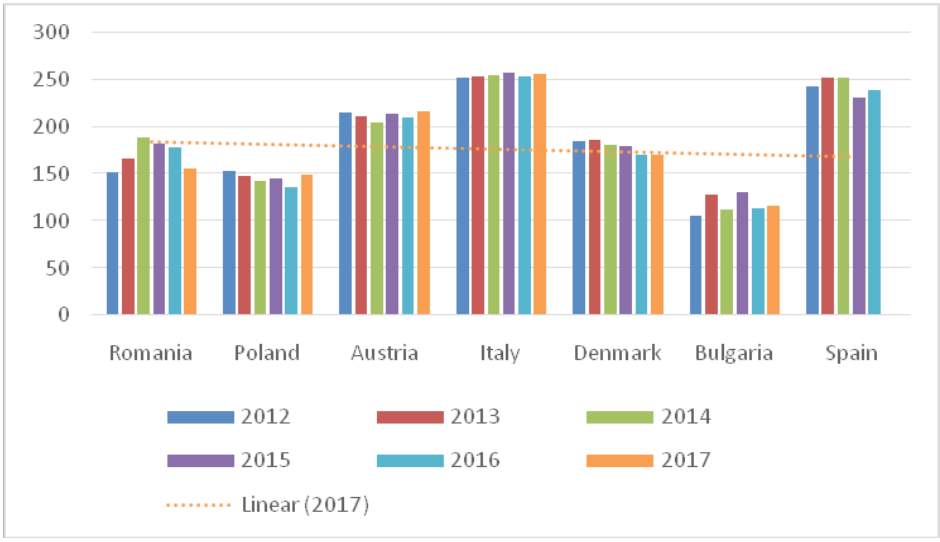


Source: *EUROSTAT*

Production prices for beef in Romania, compared to EU countries

The evolution of live cattle prices between 2012 and 2017 differed from one country to another, varying slightly from one year to the next, according to Figure 16. Thus, Italy and Spain are at the top of the list with the highest prices, Romania averaging 152.52 Euro / 100 kg live weight in 2012 and 155.29 Euro / 100 kg live weight in 2017.

Figure 16. *Evolution of producer prices at beef in European countries (Euro/100 kg live weight)*



Source: *EUROSTAT*

Conclusions

The number of dairy cows in 2017 was of 1,402,862 heads, with the largest share belonging to the size class 1-2 heads (84%). The fattening young cattle population was 333,490 heads and about 87% of the fattening young cattle holdings belong to the 1 - 2 - class heads. Domestic production of cow's milk had an upward trend during the period 2012-2014 after that it declined continuously, reaching in 2017 at the amount of 40,563 thousand hl. Romania has among the lowest average milk yields per cow, with 3,321 kg / head in 2016. The evolution of beef production shows a continuous decrease during 2012-2014, followed by a significant recovery after this period, over 12% in 2016 compared to 2014, and in 2017 it decreased by 10% as compared to 2016. The milk supply on the market increased by about

9.9% in 2017 compared to 2012, due to the doubling of imports, and not on the domestic milk production, which decreased by 2.2%. Domestic production of beef had a slight downward trend in 2012-2014, after which it started to increase, reaching 127.1 thousand tons in 2016. In 2017, there was a fall in production of about 3.3% compared to 2016. Romania has the lowest milk prices among the European countries and the producer price for beef is close to the average of European countries, with 155.29 Euro / 100 kg live weight in 2017.

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THE POSSIBILITY OF THE APPLICATION OF DANUBE AREA GROUNDWATER IN THE IRRIGATION PURPOSES

Sanja Mrazovac Kurilić[1], *Novica Staletović*[2]

Abstract

This paper presents the results of the groundwater quality assessment, on the Serbian Danube water area, for irrigation purposes. The analysis was done at 22 locations on the Danube water area (northern Serbia). The approach to assess the groundwater quality indicators is based on the sustainable water exploitation and the protection of health and environment. This paper presents an overview of the chemical parameters of water samples from the groundwater sources of the Danube water area, ie its shallow aquifer. Indicators on the basis of which the assessment of the possibility of water application for irrigation purposes was done are: electroconductivity, concentration of sodium ions, sodium absorption ratio, residual sodium carbonate, and magnesium hazard and permeability index. Based on the presented indicators, the quality of the shallow aquifer groundwater on the Danube water area for the irrigation purposes can be mostly assessed as satisfactory.

Key words: *groundwater, irrigation, shallow aquifer, Danube water area.*

Introduction

In northern part of Serbia, use of groundwater is the only way of water supply. Groundwater is used, except for drinking purposes, for irrigation purposes.

The quality of water that lies below surface of the Earth depends on the physical and chemical characteristics of the surrounding walls (rocks) in the observed aquifer (Matthess, 1982). The interaction between the water and surrounding rocks is a process that continuously lasts for a very long period of time. Chemical composi-

1 Sanja Mrazovac Kurilić, Ph.D., Associate Professor, Faculty for ecology and environmental protection, University Union-Nikola Tesla, Cara Dušana no. 62-64, 11000 Belgrade, Serbia, Phone: +381 11 21 80 013, E-mail: mrazovac@gmail.com

2 Novica Staletović, Ph.D., Associate Professor, Faculty for ecology and environmental protection, University Union-Nikola Tesla, Cara Dušana no. 62-64, 11000 Belgrade, Serbia, Phone: +381 11 21 80 013, E-mail: nomstale@mts.rs

tion of groundwater is a crucial factor that determines the continued use of water, whether for human consumption, industrial purposes or irrigation in agriculture.

Water used for agricultural irrigation is easily accessible and belongs to the shallow aquifer, which means that it is located at smaller depths, up to 20 m. Water quality for irrigation is determined by laboratory analysis of water samples. The most important factors on the basis of which the possibility of water use in agriculture for irrigation is determined are the following: sodium content; content of carbonates and bicarbonates; pH; salinity; trace elements; toxic anions; nutrients; free chlorine, etc. The intersection of all the above parameter gives a clear picture of the quality of water for irrigation of agricultural land.

The groundwater of the area being analyzed in this paper is widely used for the soil irrigation. The suitability of groundwater for irrigation purposes depends on their mineral (chemical) composition, ie minerals that are components of this water. Water for land irrigation should be of extremely good quality for achieving high productivity of crops in a certain area. Irrigation water contains soluble substances in certain amounts called salts. Salts can contain a certain amount of substances that come from the dissolution of the rock walls between which the groundwater is located.

The electrical conductivity and the content of sodium in water play an extremely important role in the possibility of using groundwater for irrigation. High salt content in irrigation water leads to an increase of osmotic pressure in the soil (Throne, Peterson, 1954), which complicates the root of the plant to extract water. The osmotic pressure is proportional to the salt content of the water or the danger of salinity. Different salts present in irrigation water do not directly affect the growth and development of plants, but also affect the soil structure, permeability and aeration, which also indirectly affect the growth and development of plants (Mohan et al., 2000).

The total content or concentration of dissolved salts in irrigation water can place this water in the zone of low, moderate and high salinity. The high value of water conductivity leads to the formation of salt soil.

Important chemical indicator for determining the benefits of irrigation water are the sodium content or danger of alkalis that is expressed through electrical conductivity, sodium absorption ratio (SAR), sodium % content, and residual

sodium carbonate (RSC), (Robbinson, 1984; Pfeifer et al., 1999; Van de Graaff, Patterson, 2001; Prasad et al., 2001; Bauder et al., 2007; Seilsepour et al., 2009).

Study area

The northern part of the Republic of Serbia, Vojvodina, by largest part of its territory belongs to southeastern part of the great Pannonian basin (Figure 1). The Pannonian Basin is an area extremely rich in groundwater. Total capacity of existing groundwater sources is 197 m^3 per year (Polomčić et al., 2011).

Figure 1. *Map of Europe with position of Serbia and its northern part with Danube course through Serbia*

Source: *own map*

In Figure 2, an overview of the analyzed area with 22 identified localities that belongs to shallow aquifer are shown.

Table 1 shows all localities where the chemical parameters of the shallow aquifer water were determined, together with the coordinates of the mentioned localities and the definition of its water bodies. All analyzed water belong to the shallow aquifer and Danube water area.

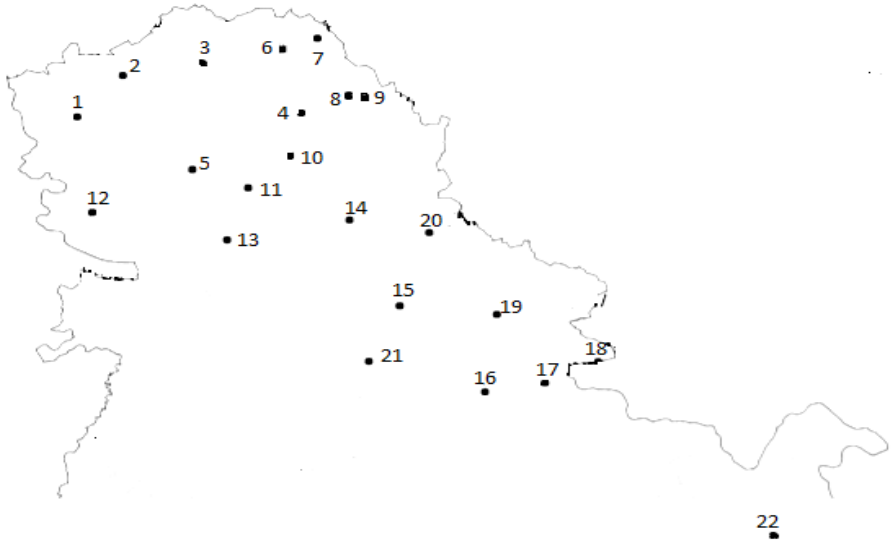
Water bodies are Northwest Bačka, Telečka, Upper Tisa, Northern Banat, Middle Bačka, Lower Tisa, Southwestern Banat, Vršac mountines, Southeastern Banat, Pančevo rit and Negotin-Kladovo aluvion.

Table 1. *Data of 22 localities where the water chemical parameters were determined, with coordinates of localities and their water bodies*

No.	locality	Coordinates		Water body (shallow aquifer)
		N	E	
1	**Sombor**	5070858	7356014	NW Bačka
2	**Aleksa Šantić**	5087933	7372002	Telečka
3	**Subotica**	5096101	7395257	Telečka
4	**Njegoševo**	5070163	7403338	Telečka
5	**Vrbas**	5049187	7396393	Upper Tisa
6	**Kanjiža**	5098500	7427850	Upper Tisa
7	**Banatsko Aranđelovo**	5103110	7440324	Upper Tisa
8	**Kikinda**	5078282	7456747	N Banat
9	**Padej**	5072449	7434668	N Banat
10	**Burza**	5054875	7430650	N Banat
11	**Nadalj**	5041695	7416062	Midd. Bačka
12	**Bač**	5031605	7361298	Midd. Bačka
13	**Novi Sad**	5020359	7408612	Midd. Bačka
14	**Zrenjanin**	5028441	7451606	Lower Tisa
15	**Debeljača**	4993137	7469151	SW Banat
16	**Kovin**	4957745	7499142	SW Banat
17	**Dubovac**	4961434	7520184	SW Banat
18	**Kusić**	4970250	7538800	Vršac mountines
19	**Banatski Karlovac**	4989545	7503331	SE Banat
20	**Sečanj**	5023225	7479525	SE Banat
21	**Borča**	4970273	7458430	Pančevo rit
22	**Negotin**	4900450	7623100	Negotin Kladovo-aluvion

Source: *www.sepa.gov.rs/download/KvalitetVoda2016.pdf*

Figure 2. *Map of study area with marked analyzed localities*



Source: *own map*

Methodology

Electrical conductivity and concentration of Na^+ ions are very important data to know for the classification of water for irrigation. High salt content in irrigation water causes osmotic pressure in soil. In addition, salts directly influence the growth of plants, the structure and permeability of the soil, aeration, texture and make the soil "heavy".

Electrical conductivity (EC) is a measure of the water mineralization degree that depends on the interaction between the water-rock wall, and also of the time that water stay in the rock (Eaton, 1950). The electrical conductivity of water for irrigation becomes one of the most important parameters for estimating the total chemical validity of groundwater and is used to compare water of different areas (Freeze, Cheery, 1979).

Table 2, presents the criteria for assessing the quality of water for irrigation based on the knowledge of the electrical conductivity parameter, or total dissolved solids (TDS).

Table 2. *Criteria for water quality assessment for irrigation on the basis of the electrical conductivity EC value, or ttal dissolved solids TDS value*

TDS (mg/l)	EC (µS/cm)	Quality
<150	<250	Excellent or low C1
150-500	250-750	Good or moderate C2
500-1500	750-2250	Suitable or high C3
1500-3000	2250-5000	Unsuitable or very high C4

Source: *Freeze and Cheery, 1979.*

USSL (United States Salnity Laboratory) from the US Department of Agriculture has adopted several techniques that are used to test the quality of water for agriculture, and some of these are used in this work.

Concentration of sodium ions Na%

This indicator of irrigation water is usually designated by percentual share of Na^+ ion and it can be determined using the formula (Wilcox, 1955):

$$Na\%=(Na^+ + K^+)*100/(Ca^{2+} + Mg^{2+} + Na^+ + K^+)$$

Where the content of individual ions is expressed in meq/l.
Sodium is very important in the classification of irrigation water due to its soil reaction, which causes a decrease in soil permeability.

Sodium in combination with carbonates can lead to the formation of alkaline soils, while in combination with chlorides builds salt soils. The resulting soil types do not contribute to the growth of plants.

Table 3 gives an overview of the criteria for assessing the quality of water for irrigation based on the concentration of sodium ions in water.

Table 3. *Criteria for water quality assessment for irrigation on the basis sodium ion concentration Na% value.*

Na%	Quality
< 20	Excellent 1
20-40	Good 2
40-60	Suitable 3
60-80	Doubtful 4
> 80	Unsuitable 5

Source: *Wilcox, 1955.*

Sodium absorption ratio SAR

SAR is used to make an estimate of the harmfulness that arises from the amount of sodium retained in the soil. Excessive sodium value in water for irrigation of soil leads to undesirable effects such as changes in soil properties, reduction in its permeability and changes in soil structure (Kelly, 1957). Therefore, knowing the concentration of sodium in water is necessary when considering its usefulness for irrigation purposes. USSL recommends estimating the risk of sodium or alkali in irrigation water, which takes into account the relative activity in the Ion exchange reaction with soil expressed in a ratio known as SAR (sodium absorption ratio).

Sodium absorption coefficient is an important parameter for determining possibility of using groundwater for irrigation and is based on determination ratio of the Na^+ ion concentration and the content of Ca^{2+} and Mg^{2+}:

$$SAR=Na^+ / sqrt ((Ca^{2+} Mg^{2+})/2)$$

Where the content of individual ions is expressed in (meq/l).

Table 4, shows the criteria for assessing the quality of irrigation water based on the SAR.

Table 4. *Criteria for water quality assessment for irrigation on the basis of sodium absorption ratio SAR value.*

SAR	Quality
<10	Excellent or low S1
10-18	Good or medium S2
18-26	Suitable or high S3
>26	Unsuitable or very high S4

Source: *Kelly, 1957.*

Residual sodium carbonate RSC

The amount of bicarbonate and carbonate in a higher quantity of soil alkalinity (Ca + Mg) also significantly affects the use of water for irrigation purposes. Residual sodium carbonate (RSC) is often used in assessing the quality of water for irrigation of soil. In order to determine the harmful effect of carbonates and hydrocarbons on the quality of groundwater, the RSC coefficient is calculated by equation (Eaton, 1950):

$$RSC= (CO_3+HCO_3)-(Ca^{2+}+Mg^{2+})$$

Where the content of individual ions is expressed in (meq/l).

Table 5 gives an overview of the criteria for assessing the quality of irrigation water based on carbonate and hydrocarbon content RSC.

Table 5. *Criteria for water quality assessment for irrigation on the basis of residual sodium carbonate RSC value*

RSC	Quality
<1.25	Safe 1
1.25-2.5	Moderate 2
>2.5	Unsuitable 3

Source: *Eaton, 1950.*

Magnesium hazard MH

Generally speaking, calcium and magnesium maintain a state of balance in groundwater. A higher amount of magnesium in water affects the quality of the soil by translating it into alkaline and reducing the yield of crops. Szabolcs and Darab (1964) on this occasion defined the concept of magnesium hazard (MH) for water used in irrigation purposes.

Magnesium hazard (MH) is considered as one of the most important parameters in determining the quality of water for irrigation. The excess of magnesium in water leads to a decrease in plant growth and yield, and an increase in soil salinity. The MH index is calculated according to the equation (Paliwal, 1972):

$$MH= Mg^{2+}x\ 100/(\ Ca^{2+}+Mg^{2+})$$

Where the content of individual ions is expressed in (meq/l).

Groundwater with MH> 50 is considered harmful and inadequate for irrigation.

Table 6 gives an overview of the criteria for assessing the quality of water for irrigation on the basis of magnesium content.

Table 6. *Criteria for water quality assessment for irrigation on the basis vrednosti magnesium hazard value*

MH	Quality
≤50	Good 1
>50	Unsuitable 2

Source: *Szabolcs, Darab, 1964.*

Permeability index PI

The soil permeability is affected by the long-term use of irrigation water and Na, Ca, Mg and HCO_3 content that are in the soil composition. Doneen (1964) has provided a criterion for assessing the possibility of using groundwater for irrigation based on the permeability index PI, which is calculated by the following formula:

$$PI=(Na^+ + sqrt\ (HCO_3^-))*100 / (Ca^{2+} + Mg^{2+} + Na^+)$$

Where the content of individual ions is expressed in (meq/l).

Table 7 provides an overview of the criteria for assessing the quality of water for irrigation on the basis of the soil permeability index. The soil is divided into three classes: excellent, good and unsuitable.

Table 7. *Criteria for water quality assessment for irrigation on the basis of permeability index PI value*

PI %	Quality
>75	Excellent – class I (1)
25-75	Good - class II (2)
<25	Unsuitable - class III (3)

Source: *Doneen, 1964.*

Results and discussion

The results of regular monitoring of the main ions content, electrical conductivity and total mineralization of shallow aquifer water on 22 locations of the Danube water area on the territory of the Republic of Serbia for 2016 are shown in Table 8.

Based on the presented data, basic water quality indicators for irrigation water were calculated: Na%, SAR, RSC, MH and PI.

Based on the calculated values of the indicators, Table 10 shows the value of the individual indicator estimates (including electrical conductivity EC) for a particular location that is monitored. In the last column of Table 10, the aggregate score of all indicators for each locality is given individually.

In order to perform the final assessment of the shallow aquifer water quality, for each of the 22 analyzed localities individually, Table 11 gives a proposal for a division on 3 classes of water according to quality, based on a summary assessment of all indicators: excellent, good and poor water quality for irrigation.

Table 8. *Review of the testing results of groundwater chemical composition on 22 localities of the shallow aquifer, on the Serbian Danube water area, for irrigation purposes. (Ion concentrations of Na^+, Mg^{2+}, Ca^{2+}, K^+, HCO^-, Cl^-, SO_4^{2-} are expressed in meq/l, electroconductivity EC in μS/cm, and total dissolved solids TDS in mg/l)*

No	Na^+	Mg^{2+}	Ca^{2+}	K^+	HCO_3^-	Cl^-	$SO4^{2-}$	EC	TDS
1	7.54	2.42	4.00	0.079	12.67	0.71	0.65	1143	724
2	2.59	2.25	4.55	0.036	8.33	0.62	0.60	790	496
3	2.77	5.08	6.00	0.036	8.75	2.81	2.06	1192	766
4	8.41	4.08	3.75	0.036	11.56	1.73	1.33	1407	895
5	1.59	3.50	4.15	0.033	8.85	0.26	0.42	775	484
6	0.92	1.67	2.55	0.015	6.28	<0.14	0.19	564	348
7	5.60	2.84	6.40	0.026	9.21	5.07	0.69	1349	817
8	5.54	2.58	3.20	0.018	12.21	0.25	0.44	1074	675
9	2.30	3.50	6.80	0.044	10.66	0.91	1.31	1092	696
10	7.42	7.08	6.45	0.051	15.34	3.36	2.29	1832	1125
11	5.12	4.67	4.75	0.046	10.08	0.89	1.67	1269	763
12	1.35	3.33	7.40	0.049	8.52	2.06	1.46	1095	648
13	0.94	10.75	2.85	0.028	9.75	2.00	2.10	1263	745
14	14.27	5.75	7.60	0.018	21.82	1.88	3.04	2330	1488
15	10.94	2.92	1.30	0.013	12.08	1.10	1.96	1310	829
16	0.96	1.75	4.10	0.026	6.46	<0.14	0.17	589	363
17	0.29	1.50	3.50	0.013	4.64	<0.14	0.52	463	288
18	0.30	0.50	4.15	0.113	4.18	0.17	0.48	461	271

No	Na^+	Mg^{2+}	Ca^{2+}	K^+	HCO_3^-	Cl^-	$SO4^{2-}$	EC	TDS
19	14.2	2.58	2.90	0.028	6.18	0.17	0.10	568	351
20	84.83	1.58	1.85	0.021	8.95	3.21	0.10	1140	663
21	21.61	4.17	6.55	0.074	8.85	1.96	0.75	1065	630
22	1.08	3.08	8.35	0.149	8.90	1.40	2.04	1028	616

Source: *www.sepa.gov.rs/download/KvalitetVoda2016.pdf and own calculation*

After the analysis, it can be noticed that a total of 12 localities, out of 22, possess excellent water quality for irrigation originating from the shallow aquifer, where the lowest achieved is the aggregate score of 8, at sites 16,

Table 9. *Review of the results of calculated irrigation water quality indicators for 22 localities on the Serbian Danube water area*

No	Na%	SAR	RSC	MH	PI
1	54.27	4.21	6.25	37.70	79.51
2	27.86	1.41	1.53	33.09	58.32
3	20.21	1.18	-2.33	45.85	41.36
4	51.89	4.25	3.73	52.11	72.72
5	17.50	0.81	1.2	45.75	49.40
6	18.14	0.63	2.06	39.57	66.65
7	37.84	2.61	-0.03	30.74	58.19
8	49.02	3.26	6.43	44.64	79.81
9	18.54	1.01	0.36	33.98	44.17
10	35.57	2.85	1.81	52.33	54.11
11	35.42	2.36	0.66	49.58	57.05
12	11.53	0.58	-2.21	31.03	35.34
13	6.64	0.78	-3.85	79.04	27.94
14	51.70	5.52	8.47	43.07	68.58
15	72.19	0.06	7.86	69.19	95.09
16	14.42	0.56	0.61	29.92	51.42
17	5.71	0.18	-0.36	30.00	46.20
18	8.16	0.20	-0.47	10.75	47.36
19	72.19	8.58	0.7	47.08	84.79
20	96.12	64.78	5.52	46.06	99.50
21	66.92	9.33	-1.87	38.90	76.04
22	9.71	0.45	-2.53	26.95	32.48

Source: *own calculation*

The 17 and 18-area of Banat iandVršac mountine. 9 of 22 localities show the average water quality for irrigation, while only one site is estimated as unsuitable, the site number 20- Sečanj in Banat. In percentage terms, 96% of the shallow aquifer water at 22 localities of the Danube water area in the Republic of Serbia can be safely used for irrigation purposes.

Water quality indicators for irrigation water are shown in Table 9 and are calculated by the content of the ions expressed in meq/l.

The estimates of individual indicators are expressed as dimensionless, and in this way it is possible to express the final summary of each individual locality.

Table 10. *Review of the shallow aquifer water quality indicators assessment for irrigation purposes, on 22 localities of Serbian Danube water area*

No	Na%	EC	SAR	RSC	MH	PI	SUM
1	3	3	1	3	1	1	12
2	2	3	1	2	1	2	11
3	2	3	1	1	1	2	10
4	3	3	1	3	2	2	14
5	1	3	1	1	1	2	9
6	1	2	1	2	1	2	9
7	2	3	1	1	1	2	10
8	3	3	1	3	1	1	12
9	1	3	1	1	1	2	9
10	2	3	1	2	2	2	12
11	2	3	1	1	1	2	10
12	1	3	1	1	1	2	9
13	1	3	1	1	2	2	10
14	3	3	1	3	1	2	13
15	4	3	1	3	2	1	14
16	1	2	1	1	1	2	**8**
17	1	2	1	1	1	2	**8**
18	1	2	1	1	1	2	**8**
19	4	2	2	1	1	1	11
20	5	3	4	3	1	1	**17**
21	4	3	2	1	1	1	12
22	1	3	1	1	1	2	9

Source: *own calculation*

Based on data presented in Table 10, it can be concluded that shallow aquifer of Danube water area on territory of Serbia possesses excellent and good quality water suitable for irrigation, and this is compatible with fact that northern part of Serbia is largest area of fertile land on the territory of Serbia.

Table 11. *Review of the criteria for the final assessment of the shallow aquifer water quality for the irrigation purposes, on 22 sites of the Serbian Danube water area*

SUM	Quality
6-10	Excellent
11-16	Good
17-21	Poor

Source: *own calculation*

Conclusion

In this paper the systematization of the shallow aquifer water quality in Danube water area on the territory of the Republic of Serbia for the purpose of soil irrigation was performed The analysis was done on the basis of regular monitoring data on 22 monitoring stations in the Danube water area. The measured parameters that were taken into consideration are electrical conductivity (EC), total dissolved solids (TDS), as well as ions content of sodium, magnesium, potassium, calcium, hydrocarbonate, chlorine and sulphate.

Based on the measured values, water quality indicators for irrigation water were also assessed: Na%, SAR, RSC, MH and PI, and based on the value of these parameters, an assessment of each individual site was given. It can be concluded that 41% of the analyzed localities show good shallow aquifer water quality for irrigation, 55% excellent quality, while only 1 locality (Sečanj) or 4% of the total number of localities has insuitable water quality for irrigation.

Based on analyzed data, the overall water quality of the shallow aquifer in Danube water area on the territory of the Republic of Serbia is exceptionally satisfactory.

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THE IMPACT OF HUMAN RESOURCES IN HOTELS ON THE COMPETITIVENESS AND SUSTAINABILITY OF DONJE PODUNAVLJE AS TOURISM DESTINATION

Snežana Milićević[1], Jelena Petrović[2]

Abstract

Hotels as the important part of tourism industry represents labour-intensive sector. The purpose of this paper is to indicate the most important human resources to achieve competition and sustainability of Donje Podunavlje as tourism destination. The study relies on comparative analysis, correlation analysis, and regression analysis. Based on model of Ritchie and Crouch and model of Dwyer and Kim, the survey was made with aim to analyse the competitiveness of Donje Podunavlje as tourism destination. The paper comprises the following segments: a) analysing the competitiveness of Donje Podunavlje as tourism destination; b) analysing the economic aspects of sustainability of Donje Podunavlje as tourism destination; c) testing correlation between the competitiveness and sustainability of observed destination; b) analysing the impact of human resources in hotels on tourism competition of Donje Podunavlje.

Key words: *human resources, hotels, competiveness, sustainability, tourism destination, Donje Podunavlje.*

Introduction

Donje Podunavlje is tourism destination with the high concentration natural and antropogenical tourism resources with different degree of protection, sustainability and valorisation. This destination has the rich cultural and historical heritage that can be base for the tourism development. But, it is necessary to indicate the existence of barriers to the tourism development. First of all, it refers to the poor connection of the destination with the other parts of country as well as to the

1 Snežana Milićević, Ph.D., Associate Professor, University of Kragujevac, Faculty of Hotel Management and Tourism in Vrnjačka Banja, Vojvođanska street no. 5A, 36210 Vrnjačka Banja, Serbia, Phone: +381 36 515 00 24, E-mail: snezana.milicevic@kg.ac.rs

2 Jelena Petrović, Ph.D., Associate Professor, University of Niš, Faculty of Science and Mathematics, Department of Geography, Višegradska street no. 33, 18000 Niš, Serbia, Phone: +381 18 533 015, E-mail: jelena25@pmf.ni.ac.rs

transit traffic, which is done through the National Park. From the economic point of view, disadvantages are: low level of economic development, high unemployment, depopulation and unfavourable structure of the population.

The tourism destination Donje Podunavlje includes the following five municipalities of Eastern Serbia: Veliko Gradište, Golubac, Majdanpek, Kladovo and Negotin. In the paper, special attention will be dedicated to the analysis of the tourist offer and tourism demand of each municipality, ie analysis of natural and anthropogenic tourist potentials and analysis of accommodation capacities as well as tourist traffic.

Starting from the tourist traffic, the analysis of the economic aspects of tourism sustainability will be carried out, with special attention being paid to the analysis of Average length of stay of tourists in observed destinations, ie in Veliko Gradište, Golubac, Majdanpek, Kladovo and Negotin. The Average lenght of stay of tourists represents one of indicator of Economic Value Core Indicators. The system of indicators of tourism destionation sustainable development proposed by the European Commision (European Commision, 2013) includes the following sets of indicators: Destinations Management, Economic Value, Social and Cultural Impact and Environmental Impact. All these sets of indicators can be divided into the Core and Optional Indicators. The Economic Value Core Indicators include the following indicators: Number of tourist nights per month, Average length of stay of tourists (nights), Occupancy rate in accommodation (average for the year), and Direct tourism employment as percentage of total employment, Percentage of tourism enterprises inspected for fire safety in the last year and Percentage of tourism enterprises actively taking steps to source local, sustainable and fair trade goods and services. Based on the results of the questionnaire, the analysis of the competitiveness of the observed destinations and the impact of human resources in hotels on destination competitiveness will be carried out. At the same time, special attention will be dedicated to the analysis of the interdependence between the sustainability and competitiveness of the observed destinations.

Literature review

The main objective of each tourism destination is to achieve long-term competitive advantage on the tourism market (Ritchie, Crouch, 2000). The competitiveness of tourism destinations is linked to their capability to deliver tourist experiences that bring greater satisfaction to tourists compared to competitive

destinations (Vengesayi, 2003). New experiences become a main motive for a decision on tourism travel (Milićević, Petrović, 2017). In other words, to be competitive, tourism destination has to offer to the tourism market a greater value than its competitors (Petrović, Milićević, 2015). According to Buhalis (2000), destinations are amalgams of tourism products and services, offering an integrated experience to consumers. However, to be competitive, a destination's tourism development must be economically, ecologically, socially, culturally and politically sustainable (Ritchie, Crouch, 2000).

There are several models of tourism destination competitiveness: Ritchie and Crouch (1993, 2000, 2003), De Keyser and Vanhove (1994), Chon and Mayer (1995), Hassan (2000), Heath (2002), Dwyer and Kim (2003), Gooroochurn and Sugiyarto (2005), etc. Certainly, in the literature special attention was paid to the Crouch and Ritchie (1993, 2000, 2003) Conceptual model of destination competitiveness, Integrated model of destination competitiveness by Dwyer and Kim (2003), and Model for measuring the competitiveness of tourism destinations that was developed by the World Economic Forum (WEF) (Petrović, Milićević, 2015).

Crouch and Ritchie Conceptual model of destination competitiveness comprises five main groups of factors: Supporting Factors and Resources; Core Resources and Attractors; Destination Management; Destination Policy, Planning and Development; and Qualifying and Amplifying Determinants. Each of these groups contains different attributes of destination competitiveness. In total, the model identifies 36 destination competitiveness attributes (Crouch, 2011).

Integrated model of destination competitiveness by Dwyer and Kim comprises six main groups of factors: Endowed Resources; Created Resources (the Resources category is divided into two types: Endowed and Created); Supporting Resources; Situational Conditions; Destination Management; Demand Conditions (Dwyer, Kim, 2003). This model explicitly recognises demand conditions as an important determinant of destination competitiveness (Petrović et al., 2017).

For the purpose of determining and comparing the competitiveness of the countries as tourism destinations, the WEF made the Travel & Tourism Competitiveness Index (TTCI). The TTCI measures four broad factors of competitiveness. These factors are organized into sub-indexes (Enabling Environment; T&T Policy and Enabling Conditions; Infrastructure; Natural and Cultural Resources),

which are further divided into 14 pillars. The aim of the TTCI, which covers 136 economies in 2017, is to provide a comprehensive strategic tool for measuring the set of factors and policies that enable the sustainable development of the travel & tourism sector, which in turn, contributes to the development and competitiveness of a country (WEF, The Travel & Tourism Competitiveness Report 2017).

Based on model of Crouch and Ritchie (1993, 2000, and 2003) and model of Dwyer and Kim (2003), the questionnaire was made with aim to quantify and analyse the competitiveness of Donje Podunavlje as tourism destination.

Hotels and other subjects in tourism „tend to be labour intensive" (Hayes, Ninemeier, 2009:5) because only employees can provide the service quality that tourists and quests expect. Employees and their continuously education, development and training represent important factors of achieving and maintaining the competitiveness in tourism (Bakić, 2002). „Request for better-qualified human resources is a key requirement for improving the destination competitiveness" (Janković Milić et al., 2011:444). Although, „the human resources are the source of competitiveness" (Bulatović et al., 2016:145), insufficient attention is paid to human resources as a factor of destination competitiveness in the literature.

The hypotheses to be tested in this study are the following:

H1: There is correlation between the average length of stay of tourists and the destination competitiveness;

H2: There is the statistical significant impact of human resources in hotels on destination competitiveness.

Bearing in mind that the average length of stay of tourists records the decrease in all municipalities of Donje Podunavlje in period from 2000 to 2016 in the paper special attention is paid to the analysis the independence between the average length of stay of tourists and tourism competitiveness. The paper examines whether increasing competitiveness of observed destination would contribute to the average length of stay of tourists. Because the human resources represent source of competitiveness (Bulatović et al., 2016:145), in the paper special attention is paid the analysis the influence the human resources in hotels to the destination competitiveness.

Analysis of tourist offer of Donje Podunavlje

The Municipality of Veliko Gradište is located at the foothill of the Carpathians and Homolje Mountains, at the confluence of Pek in the Danube. It represents the "vestibule" of Đerdap and one of a large port on the Danube. Đerdap covers an area of 64,000 ha and it is located on the right bank of the Danube from Golubac to Karataš (near Kladovo) (Nešković, Savić, 2018).

The important elements of natural heritage of Veliko Gradište are: Danube River, Srebrno Lake, Gorica Hill, Labudovo Okno and Ada Čibuklija. The important elements of cultural heritage are: the old city charm, the Ram fortress, the Roman military fortress Lederata, the Roman city Pinkum and the sacred objects - the monastery Nimnik and the church of St. Anarchist Gavrilo.

Veliko Gradište has a share of 17,74% in total beds of Donje Podunavlje. The structure of accommodation consist three hotels, five apartments and nine villas (Tourism Organization Veliko Gradište).

The Golubac is located in the north-eastern part of Serbia and belongs to the Braničevo district. The Golubačka gorge is the most well-known geomorphological form in the Golubac and the first narrowing point on the Danube in the Đerdap gorge.

After the Golubac Gorge, the Danube River enters in the Ljubovska valley (12km) that excels in large area. The sides of the valley reach the height of 150m. Downstream the Ljubovska valley a short Gospođin vir gorge appears, with steep slopes, which reach the height of 550m featuring colossally above the Danube" (Stanković, 2002:39).The most important elements of cultural heritage in Golubacare: the medieval fortress Golubac, the Golubac town, the Čezava, the monastery Tuman, the church of St. Nikola and ethno museum.

Golubac has share a share 8,17% in total number of beds in Donje Podunavlje. It records the lowest share in the relation to the other municipalities of Donje Podunavlje. The accommodation capacities in Golubac consist of one hotel, one villa, five apartments and three guesthouses (Tourism Organization Golubac).

The municipality of Majdanpek is located in northeast Serbia along the Danube. It covers the southern parts of the hilly and mountainous area of the Carpathi-

an wreath. The territory of Majdanpek is predominantly mountainous, where the most significant forms of mountain relief are: Miroč, Šomrda, Deli Jovan, Veliki krš, Mali krš, and the mountain Starica. In the territory of the Majdanpek stand out: the Đerdapska gorge, canyon Boltinjska Reka, the Gradašnica, the Rajkov cave, the cave Gradašnica on the slopes of Miroča (one of the deepest caves in Serbia), lake Veliki Zaton, lake of Kazan stream, Danilov vrelo, river Pek, Porečka river and Beli izvor. Biogeographical values are most represented in the zone of National Park "Đerdap". It is divided into the three zones of protection. The first zone represents „the strict protection of natural and cultural heritage" (Macura et al., 2013:369). The second zone covers the area surrounding the first zone, while the third zone covers the area surrounding the first and second zone. In third zone is permitted the following activities: „tourism, sports, forestry, water use, potential exploitation of mineral resources, urban construction and development (Macura et al., 2013:369)."„Well-preserved eco-systems and landscape diversity provide possibilities for developing different forms of special interest tourism, as well as different types of sporting activities" (Popović et al., 2012:49).

The Djerdap gorge on the territory of Majdanpek is considered to be the most beautiful valley of the Danube because it includes the Donji Milanovac valley and Veliki Kazan canyon. Veliki Kazan (12 km) excels with its rocky sides that reach height of 300m (Stanković, 2002:39).

„Miroč Mountain, Veliki and Mali Srbac, the Danube River, the Djerdap Gorge, Veliki and Mali Kazan are the real place of world permeation both on land and in the water" (Valjarević et al., 2015:99). Mountain Miroč is located in the Djerdap National Park and it is surrounded by the Danube from all the sides. The highest peak of Miroc is Veliki Strbac, while Mali Strbac is the second highest peak.

The most important elements of cultural heritage in Majdanpek are the following: the archaeological locality "Lepenski vir", the archaeological locality "Stara Topionica", the locality "Okno", the ski centre "Rajkovo", the Tenkina house, the church of Sv. Nikola and Church of St. Apostles Peter and Paul. The significant events attracted by tourists are "Women painters", "Village sports Olympiad", exhibitions "Majdan art" and many others.

Majdanpek has share a share 24,47% in total number of beds in Donje Podunavlje. It records the second place in the relation to the other municipalities of Donje Podunavlje. Its accommodation structure is consisting by two hotels and one guesthouse (Tourism Organization Majdanpek).

The cultural and historical monuments and archaeological sites in Majdanpek are Trajan′s Bridge, Trajan′s Table, Fetislam Fortress, Roman settlement - "Egeta", Haiduk′s Mill and Etnopark, Archaeological museum "Djerdap".

Kladovo is located in the north-eastern part of Serbia, at the foothill of mountain Miroč in the Ključ area. The most important natural resources of Kladovo are Dunav and Djerdap gorge. The most attractive part of the Đerdap gorge in the territory of Kladovo is Veliki and Mali Kazan canyons. Mali Kazan represents the narrowest part of the Djerdap gorge, with only 180m wide (Stanković, 2002:39). Riparian area of Mali and Veliki Kazan is more difficult accessed by road than by the waterway (Stanković, 2002:39).

Kladovo has a dominant share with 37.98 % in total number of beds in Donje Podunavlje. Two hotels, ten apartments and two guesthouses are located in Kladovo (Tourism Organization Kladovo).

Negotin is located in eastern Serbia on the border of the Republic of Serbia, the Republic of Bulgaria and the Federal Republic of Romania. It extends between the Danube and Timok flows to the north and east and the mountain Deli Jovan and the Great Reef on the west.

The most important elements of natural heritage in Negotin are: mountains (Deli Jovan and Veliki Greben), rivers (Vratna, Zamna, Dunav and Timok), caves (Resava cave and Duduć cave) and nature reserve "Bukovo".The centre of the Negotin is a protected cultural heritage. It includes the birthplace of Stevan Mokranjac, the museum of Haiduk Veljko with a gallery and the building of the Pedagogical Academy from the XIX century.

"Negotinske pivnice" represent an ethnological complex of wine cellars, built in the late XVIII and early XIX centuries in the village of Rajac, Rogljevo, Smedovac and Štubik. They were built in the period when Negotin was known for wine export to France, Germany, Austria and Russia.

Negotin has a share with 11.63 % in total number of beds in Donje Podunavlje. The accommodation services are provided by one hotel, one hostel, three villas and three lodgings (Tourism Organization Negotin).

The observed destinations have favourable natural and cultural heritages for the tourism development. At the same time, it is necessary to point out that they have hotels and other facilities for tourist accommodation.

Analysis of tourist traffic and economic aspect of sustainability of Donje Podunavlje

Donje Podunavlje records the increase number of tourists and the decrease of number of tourist nights in the period from 2000 to 2016 (Table 1 and Table 2). All observed municipalities of Donje Podunavlje except Golubac and Majdanpek record the increase of number of tourist in the period from 2000 to 2016.

Table 1. *Tourists in Donje Podunavlje in period from 2000 to 2016 (in index)*

Municipality	2000	2005	2010	2015	2016
Veliko Gradište	100.00	160.50	149.45	289.50	289.50
Golubac	100.00	89.28	88.23	52.81	52.81
Majdanpek	100.00	100.58	86.83	82.80	82.80
Kladovo	100.00	93.39	123.03	103.33	103.33
Negotin	100.00	172.62	140.82	154.67	154.67
Donje Podunavlje	100.00	105.64	107.75	108.98	108.98

Source: *Statistical Office the Republic of Serbia, www.stat.gov.rs/en-us/publikacije/*

Veliko Gradište records the increase of tourist nights from 2000 to 2005 and from 2010 to 2015. Golubac, Majdanpek, Kladovo and Negotin record the decrease of tourist nights in period from 2000 to 2016.

Table 2. *Tourist nights in Donje Podunavlje in period from 2000-2016 (in index)*

Municipality	2000	2005	2010	2015	2016
Veliko Gradište	100.00	118.70	67.08	188.41	63.77
Golubac	100.00	74.91	79.97	45.04	31.61
Majdanpek	100.00	69.55	60.02	43.43	24.32
Kladovo	100.00	81.59	125.48	73.35	37.49
Negotin	100.00	63.02	72.69	94.10	33.31
Donje Podunavlje	100.00	79.22	82.71	74.27	34.24

Source: *Statistical Office the Republic of Serbia, www.stat.gov.rs/en-us/publikacije/*

All observed municipalities of Donje Podunavlje record the decrease of average length of stay of tourists in the period from 2000 to 2016. Majdanpek records the highest decrease of average length of stay of tourists while Golubac records the lowest decrease of average length of stay of tourist in the period from 2000 to 2016.

Table 3. *Average length of stay of tourists in Donje Podunavlje in period from 2000 to 2016 (in index)*

Municipality	2000	2005	2010	2015	2016
Veliko Gradište	100.00	74.01	66.96	64.98	64.98
Golubac	100.00	83.83	113.17	85.03	85.03
Majdanpek	100.00	69.12	115.29	52.65	52.65
Kladovo	100.00	80.80	81.16	71.01	71.01
Negotin	100.00	36.64	71.12	60.78	60.78
Donje Podunavlje	100.00	73.27	92.77	68.24	68.24

Source: *Statistical Office the Republic of Serbia, www.stat.gov.rs/en-us/publikacije/*

Research methodology

The survey was conducted in hotels that are located in the Donje Podunavlje (Veliko Gradište, Golubac, Majdanpek, Kladovo and Negotin). 1000 guests were surveyed. After elimination of questionnaires with incomplete answers, we got a useful sample of 992 questionnaires.

Table 4. *Respondents profiles*

Attributes/distribution	Sample number	Frequency (%)
Gender		
Male	532	53.63
Female	460	46.37
Age		
18 or younger	52	5.24
19-29	259	26.11
30-39	205	20.67
40-49	223	22.48
50-59	98	9.88
60 or older	155	15.63
Education		

Attributes/distribution	Sample number	Frequency (%)
Primary	32	3.23
Secondary	336	33.87
College	249	25.10
Faculty	214	21.57
Doctorate	163	16.43

Source: *Prepared by the authors.*

Guests are respondents rated the main competitiveness factors with a score from 1 to 5 from the standpoint of the competitiveness of Veliko Gradište, Golubac, Majdanpek, Kladovo and Negotin as tourism destinations. Starting from the average score of the main competitiveness factors, the tourism competitiveness of observed destinations are quantified.

Starting from the main competitiveness factors, it can be concluded that the nature resources of Kladovo recorded by the highest score in relation to other observed factors. The cultural and historical heritage in Negotin recorded by lowest score whiles the cultural and historical heritage in Majdanpek recorded by the highest score. Image of Golubovac recorded by the lowest score, followed by tourism offer i.e. hotels offer. The main problems of competitiveness of observed tourism destinations are: accessibility, infrastructure and price/value.

Majdanpek records the highest destination competitiveness while Negotin records the lowest destination competitiveness. According to destination competitiveness, Kladovo is found on the second place, after Majdanpek.

Table 5. *Tourist perception of main competitiveness factors of Donje Podunavlje*

Main competitiveness factors	Veliko Gradište	Golubovac	Majdanpek	Kladovo	Negotin
1. Nature resource	3.80	3.74	3.68	4.50	2.78
2. Cultural and historical heritage	3.24	4.14	4.32	3.90	2.84
3. Special events	3.32	2.96	3.98	4.12	3.22
4. Entertainment	3.04	3.68	4.3	3.72	4.16
5. Accessibility	3.16	2.96	3.52	3.04	3.22
6. Infrastructure	3.10	3.04	2.90	3.70	2.34
7. Price/value	3.46	3.42	3.86	3.10	3.36

Main competitiveness factors	Veliko Gradište	Golubovac	Majdanpek	Kladovo	Negotin
8. Safety/security	4.52	4.44	3.54	4.32	4.14
9. Image	2.00	1.68	4.48	3.52	2.20
10. Hotels	4.42	1.94	4.04	3.72	2.46
11. Human resources in hotels	3.42	3.54	3.64	3.84	4.02
12. Services quality	3.42	2.86	2.84	3.00	2.96
13. Tourism competitiveness	3.41	3.20	3.76	3.71	3.14

Source: *Prepared by the authors (SPSS Statistics 19).*

Correlation between the economic aspect of tourism sustainability and tourism competitiveness in the observed destinations was tested by calculating the Pearson correlation coefficient between the average length of stay of tourists and the level of tourism competitiveness. Results of the correlation analysis are shown in Table 6.

Based on the results of correlation analysis, it can be concluded that there is no significant correlation between the average length of stay of tourists and tourism competitiveness, since the value of Sig. is greater than 0.05. Based on the results of correlation analysis, it can be concluded that the first hipothesis has not been confirmed because the increase of tourism competitiveness of observed destination does not contribute the increase of average length of stay of tourists.

Table 6. *Pearson's correlation coefficient - the interdependence between the average length of stay of tourists, tourism competitiveness and human resources in hotels*

		Average length of stay of tourists	Tourism competitiveness	Human resources in hotels
Average length of stay of tourists	Pearson Correlation	1	-.286	.162
	Sig. (2-tailed)		.641	.794
	N	5	5	5
Tourism competitiveness	Pearson Correlation	-.286	1	-.112
	Sig. (2-tailed)	.641		.858
	N	5	5	5

		Average length of stay of tourists	Tourism competitiveness	Human resources in hotels
Human resources in hotels	Pearson Correlation	.162	-.112	1
	Sig. (2-tailed)	.794	.858	
	N	5	5	5

Source: *Prepared by the authors (SPSS Statistics 19).*

Table 7. *The value of regression coefficients – the impact of human resources in hotels on destination competitiveness*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig.
1	.112[a]	.012	-.317	.32643	.858

Source: *Prepared by the authors (SPSS Statistics 19).*
a. Predictors: (Constant), Human resources in hotels
b. Dependent Variable: Tourism competitiveness

Based on the results of the regression method, one can conclude that the human resources in hotels have not a significant impact on the competitiveness of the municipalities of Donje Podunavlje. Based on the results of regression analysis, it can be concluded that the second hypothesis has not been confirmed because the human resources in hotels is one of the most important factors of destination competitiveness.

Conclusion

The paper has paid special attention to the analysis of competitiveness of the municipalities of Donje Podunavlje as tourism destinations. A compare analysis of foreign tourists, foreign tourist nights and destination competitiveness has led to the conclusion that Majdanpek is the leader both in terms of the tourism traffic and in the field of competitiveness as tourism destinations. Kladovo records the highest total and domestic number of tourists while Veliko Gradiste records the highest total and domestic night of tourists in 2016. All municipalities of Donje Podunavlje record the decrease of average length of stay of tourists in period from 2000 to 2016. Correlation analysis between the average length of stay of tourists and competitiveness of the observed tourist destinations has indicated that there is no significant independence between observed variables.

The natural resources and cultural and historical heritage are not enough that one municipality or town become an attractive and competitive tourism destination. First of all, investments are needed, in infrastructure and tourism superstructure. Second, it is necessary to create and implement marketing strategy and promotion strategy with the aim to development the image of Donje Podunavlje and its municipalities.

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INTEGRATION OF MARKET OF AGRI-FOOD PRODUCTS OF WESTERN BALKANS COUNTRIES IN PROCESS OF ACCESSION TO THE EUROPEAN UNION[1]

Stanislav Zekić[2], Bojan Matkovski[3]

Abstract

The current integration processes in the countries of the Western Balkans have induced numerous changes on the market of agri-food products. Namely, all countries of the Western Balkans have been in the process of adjusting the economic system to the EU rules, and are currently in different phases of the EU accession. In order to improve regional cooperation and preparation for the EU membership, all Western Balkan countries have signed the CEFTA agreement, which is the highest factor in intra-regional trade, bearing in mind the fact that these countries are natural trading partners with convergent economies of similar level of competitiveness. In order to analyze the level of integration of the agri-food market of the Western Balkan countries, using the index of intra-industry trade (GLIIT), the level of integration of the market of agri-food products with the regional, European and world market was determined. The results of the research point to the specialization in foreign trade exchange of agri-food products, e.g. to the high degree of market integration of these products with world markets.

Key words: *Western Balkans, agri-food products, index of intra-industry trade.*

Introduction

The current policy of the Western Balkans, which is characterized by integration with the international market, has been faced with a number of changes in the sector of agriculture and food industry. As the Western Balkan countries are in

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2 Stanislav Zekić, Ph.D., Full Professor, University of Novi Sad, Faculty of Economics in Subotica, Department of Agricultural Economics and Agribusiness, Segedinski put no. 9-11, 24000 Subotica, Serbia, Phone: +381 21 48 52 923, E-mail: zekics@ef.uns.ac.rs

3 Bojan Matkovski, Teaching Assistant, University of Novi Sad, Faculty of Economics in Subotica, Department of Agricultural Economics and Agribusiness, Segedinski put no. 9-11, 24000 Subotica, Serbia, Phone: +381 24 628 046, E-mail: bojan.matkovski@ef.uns.ac.rs

the process of adjusting the economic system to the rules of the European Union (EU) and the World Trade Organization (WTO), there have been numerous changes to the market of agri-food products, that are results from actual integration, but also results of needs of these countries to respect the rules and principles in the international trade of these products that are regulated within the WTO.

Table 1. *Progress of the Western Balkan countries in the EU accession process*

Country	Autonomous Trade Measures (ATM)	Stabilization and Association Agreement (SAA)	Status in EU accession negotiations
Serbia	2000	2013	Candidate country (candidate status from 2012)
Bosnia and Herzegovina	2000	2015	Potential candidate country (submitted an application for EU accession in 2016)
Croatia	2000	2005	Member State (EU Member State from 2013)
FYR Macedonia	2000	2004	Candidate country (candidate status from 2005)
Montenegro	2000	2010	Candidate country (candidate status from 2010)
Albania	2000	2009	Candidate country (candidate status from 2014)

Source: *European Commission, 2018*

After the turbulent period of transformation from a centrally-planned to a market-oriented economy, all the countries of the Western Balkans clearly highlighted integration into the EU as their strategic goal. Considering the geographical position of the Western Balkan countries, this region is very important for the EU because of security, stability, trade, and transit. For this reason, the economic and political prospect of these countries, as well as their future within the EU, is one of the important priorities in the EU. Economies of the countries of the Western Balkans are already closely related to the EU; the EU is their most important trading partner, the largest source of foreign direct investment and other financial resources, and the main destination for external migration (Dabrowski, Myachenkova, 2018). The countries of the Western Balkans are currently at different stages of accession to the EU (Table 1); In 2013, Croatia became a member state of the EU, while all remaining Western Balkan countries are in the process of European integration; Bosnia and Herzegovina has the status of

a potential candidate for membership, while the other Western Balkan countries are candidate countries for EU membership.

In order to improve regional cooperation and better prepare for EU membership, all the Western Balkan countries have become members of CEFTA (*Central European Free Trade Agreement*) since 2007. CEFTA represents the highest factor in intra-regional trade between the countries of the Western Balkans because these countries are natural trading partners with convergent economies of similar level of competitiveness (Dragutinović Mitrović, Bjelić, 2015). Geographical proximity, as well as cultural similarity, generally has a deeper connection, and the countries of the Western Balkans have specific characteristics that give them good prerequisites for regional cooperation (World Bank, 2008):

- The majority of the Western Balkan countries were part of the single market of the Socialist Federal Republic of Yugoslavia, so significant benefits could be achieved in reintegration, for example, in supply chains;
- The countries of the Western Balkans are generally small economies, and many benefits can be achieved through participation in a larger regional market;
- The numerous geographical and ethnic factors lead to the growth of interdependence of these countries: the similarity of language, the common ethnic minority, the geographical specificity of Croatia that surrounds Bosnia and Herzegovina, and
- All the countries of the Western Balkans are striving to be member of the EU, which means they have the same long-term regulatory framework.

Additional prerequisites for regional market integration can be consumer habits, good recognition of products by consumers. Also, these countries have a generally lower level of market complexity in relation to the EU market, because the different standards are applied in the process of production, processing, and distribution of agri-food products. The CEFTA agreement has achieved several positive effects on inter-regional cooperation (Michele, 2011): there has been an improvement in commercial relations and the growth of trade between these countries, but also a better flow of information, ideas and production methods. Improving business cooperation in the Western Balkans region has further strengthened the links between people and cultures, because the previous period for these countries was characterized by numerous disagreements, and even wars between certain countries.

Material and methods

To determine the significance of intra-industry trade of a particular section, division, or commodity group in total trade between the two countries (regions), the most commonly used is the index of intra-industry trade (*Grubel-Lloyd intra-industry trade - GLIIT*) which is established by Grubel, Lloyd (1975):

$$GLIIT_j = \left[1 - \frac{\sum_j | X_{ij} - M_{ij} |}{\sum_j | X_{ij} + M_{ij} |}\right] * 100$$

Where is: X – export; M – import; i – country; j – section, division, commodity group.

The index of intra-industry trade determines the level of integration of a particular section, division or commodity group with a particular market, as well as the ability to compete with main competitors. The index of intra-industry trade in literature has been widely used in the analysis of intra-industry specialization, e.g. in papers Bojnec et al., 2005; Nikolić et al., 2011; Božić, Nikolić, 2013; Matkovski et al., 2017. The value of this index closer to 100% indicates intra-industry trade, which implies a higher level of economic integration of the section, division or commodity group with a certain market, as well as adjustment of market conditions at lower costs. The value of this index greater than 15% indicates intra-industry trade, which implies that the section, division or commodity group is significantly integrated with a particular market or that there is significant intra-industry trade of that section, division or commodity group (Bojnec et al., 2005; Božić, Nikolić, 2013).

In this paper, using GLIIT, the level of integration of the markets of certain countries of the Western Balkans is analyzed, and the data from the UN Comtrade database was used in the analysis. The period of analysis is 2005-2016 and the level of specialization in the trade of agri-food products for all Western Balkan countries on the international market, as well as in the regional market (CEFTA), has been analyzed. Also, the level of integration of certain section and divisions within agri-food products are analyzed in order to identify the differentiations in the degree of integration of different segments of market of agri-food products.

Results and discussion

The largest exporter of agri-food products in the Western Balkans region is Serbia, which, on average, exported these products over 2 billion USD annually, followed by Croatia which exported these products annually about 1.5 billion USD. Regarding the dynamics of exports of agri-food products, the growth of exports in the analyzed period was recorded in all countries of the Western Balkans; the largest increase in exports of agri-food products was in Serbia, where exports grew at an average annual rate of 10.3%. Also, high growth rates recorded Bosnia and Herzegovina and Albania, where exports had an average annual growth rate of 9.8% and 9.0%, respectively (Table 2).

The growth of exports of agri-food products is a consequence of the changed conditions of trade, as well as the established export liberalization in the form of ATM with the EU, as well as the CEFTA agreement within the Western Balkan countries. Although the global economic crisis is present in the analyzed period, based on the analyzed indicators, it can be noticed that it did not negatively affect the export of these products, primarily due to the specific role of these products. Namely, agri-food products are used for satisfying the basic human needs, so the usage of these products cannot be easily reduced. Because of that, the global economic crisis has not hit the agri-food sector, as is the case with other sectors (Stojanović et al., 2013). In this period, as a consequence of liberalization of market (EU and CEFTA), the volume of foreign trade of agri-food products increased significantly. According to previous researches, the bilateral trade of agri-food products in the Western Balkan countries increased 48% on average as a consequence of EU integration, while the CEFTA agreement affected the growth of bilateral trade averagely for 129% (Matkovski et al., 2018).

Table 2. *Tendencies in foreign trade of agri-food products of the Western Balkan countries*

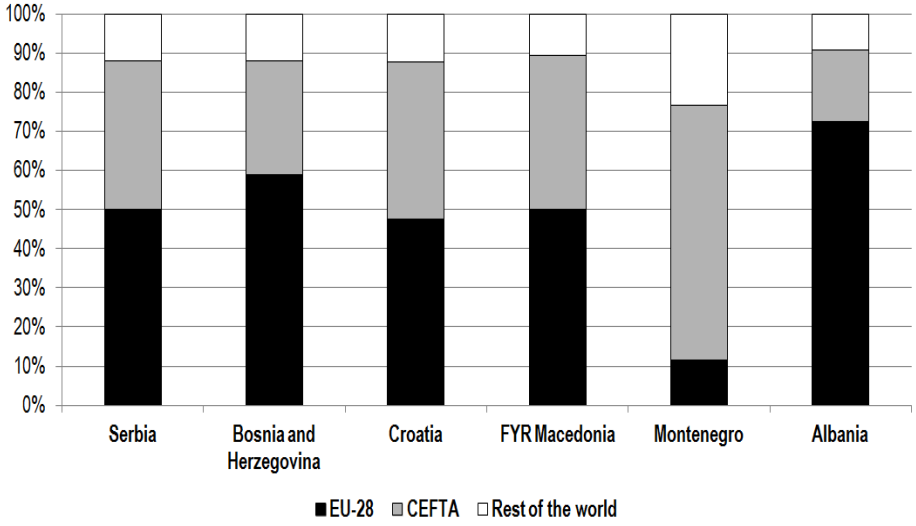
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
EXPORT OF AGRI-FOOD PRODUCTS												
Serbia	923	1.267	1.686	1.956	1.945	2.244	2.480	2.707	2.804	3.072	2.870	3.186
Bosnia and Herzegovin	181	217	272	344	333	408	471	456	504	481	492	553
Croatia	949	1.215	1.334	1.415	1.372	1.373	1.585	1.612	1.596	1.766	1.751	1.961
FYR Macedonia	345	399	474	487	499	559	651	614	668	644	539	586
Montenegro		52	56	64	60	67	79	82	82	128	64	60
Albania	60	71	87	96	87	99	123	131	151	99	146	202
IMPORT OF AGRI-FOOD PRODUCTS												
Serbia	779	914	1.129	1.472	1.006	1.040	1.331	1.490	1.630	1.646	1.496	1.405
Bosnia and Herzegovin	1.268	1.332	1.601	1.999	1.634	1.746	2.033	1.922	1.932	1.938	1.679	1.703
Croatia	1.648	1.880	2.165	2.621	2.236	2.169	2.592	2.541	2.791	3.071	2.806	2.907
FYR Macedonia	430	460	631	779	693	704	857	870	865	855	773	791
Montenegro		292	432	625	556	534	612	572	603	640	521	538
Albania	460	545	696	871	788	836	912	859	878	547	638	673
FOREIGN TRADE BALANCE OF AGRI-FOOD PRODUCTS												
Serbia	143	353	557	484	938	1.204	1.149	1.217	1.174	1.427	1.374	1.781
Bosnia and Herzegovin	-1.087	-1.116	-1.329	-1.656	-1.301	-1.339	-1.562	-1.466	-1.428	-1.457	-1.187	-1.150
Croatia	-699	-665	-832	-1.206	-864	-796	-1.007	-929	-1.195	-1.305	-1.055	-946
FYR Macedonia	-85	-61	-157	-293	-194	-145	-207	-255	-197	-211	-235	-205
Montenegro		-241	-376	-561	-496	-467	-533	-490	-521	-513	-457	-478
Albania	-400	-474	-609	-776	-701	-738	-789	-728	-727	-448	-492	-471

Source: *UN Comtrade, 2018.*

The highest value of imports of agri-food products in the analyzed period was realized in Croatia, where value of import was about 2.5 billion USD averagely annually. It is followed by Bosnia and Herzegovina and Serbia, where averagely annual import of agri-food products was about 1.7 billion USD and 1.3 billion USD, respectively. In all Western Balkan countries, imports of agri-food products increased in the analyzed period: the largest increase in imports of agri-food products was in Serbia, where imports grew at an average annual rate of 5.6%, and high growth rates were in FYR Macedonia and Croatia, where imports had an average annual growth rate of 5.3% and 4.7%, respectively.

As the foreign trade balance of agri-food products in the countries of the Western Balkan is concerned, it is obvious that only Serbia permanently achieves a positive foreign trade balance with these products, with the tendency of growth by annual growth rate of 20%, averagely. All other Western Balkan countries have a negative foreign trade balance in the exchange of agri-food products, and the biggest deficit is evident in Bosnia and Herzegovina and Croatia.

Figure 1. *Regional structure of export of agri-food products of the Western Balkan countries*

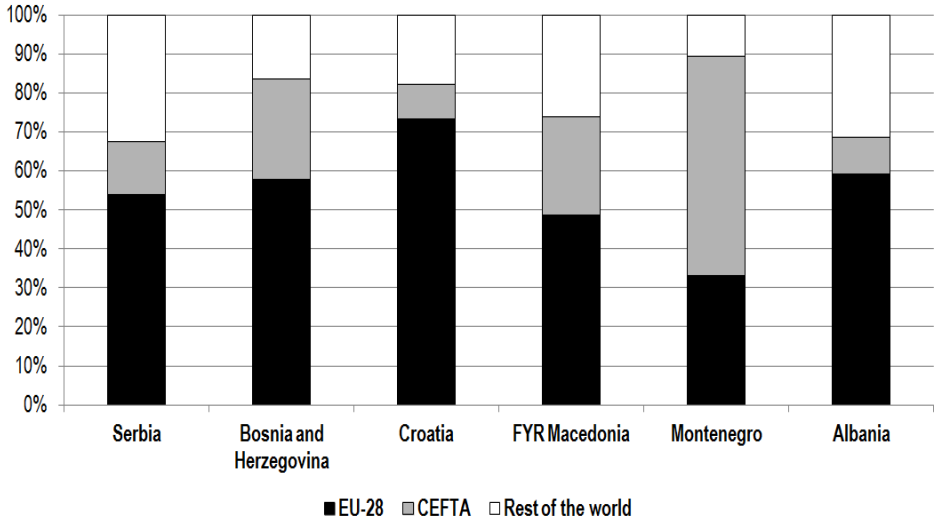


Note: *Average for period 2005-2016*
Source: *Authors calculations on basic of UN Comtrade, 2018.*

Analyzing the regional allocation of exports of agri-food products of the countries of the Western Balkans (Figure 1), the largest percentage of these products is placed in EU countries: in Serbia, about 50.0% of agri-food products were exported to EU countries in the period 2005-2016. At the same time, other countries of the Western Balkan were exported significant part of agri-food products to the EU: Bosnia and Herzegovina 58.9%, Croatia 47.4%, FYR Macedonia 50.1%, Albania 72.5%. On the other hand, export of agri-food products from Montenegro to EU countries accounted for about 11.5% of exports of these products. CEFTA countries are dominant export market for agri-food products from Montenegro (65% of agri-food export was in CEFTA countries). In the rest of the Western Balkan countries, the CEFTA market is also very

important, so in the analyzed period, on average, exports to this market were: in Serbia 38.0% of total exports of agri-food products, in Bosnia and Herzegovina 28.9%, in Croatia 40.2%, and FYR Macedonia 39.2%. The percentage of exports of agri-food products to other countries of the Western Balkans is only slightly lower in Albania (18.2%), which is logical bearing in mind the great differences between the markets of Albania and other Western Balkan countries that were part of the Former Socialist Federal Republic of Yugoslavia. Foreign trade between Albania and other Western Balkan countries is at a low level primarily due to large differences in language, religion, and historical circumstances that also have an impact on trade. Namely, the ability of the population to communicate directly, as well as the similar religious structure of the population, are two important factors that influence the formation of foreign trade between countries (Trivic, Klimczak, 2015).

Figure 1. *Regional structure of import of agri-food products of the Western Balkan countries*



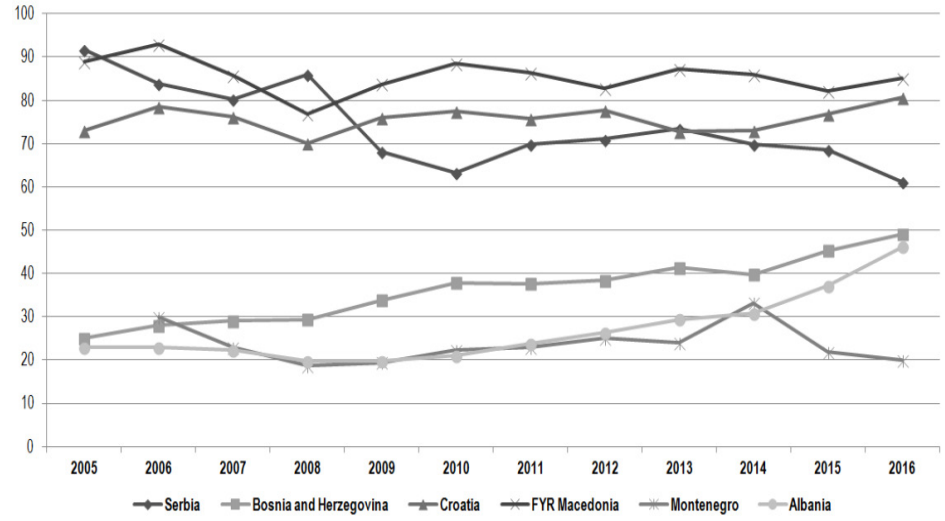
Note: *Average for period 2005-2016*
Source: *Authors calculations on basic of UN Comtrade, 2018*

The regional structure of imports of agri-food products in certain Western Balkan countries (Figure 2) shows that EU countries are the dominant import market, as it was case in the export of these products. In Croatia, the EU is the dominant import market for agri-food products, and in the analyzed period, about 73.3% of

these products were imported from EU member states. In the other Western Balkan countries a large part of the imports of these products was also realized from the EU: in Albania 59.1%, in Bosnia and Herzegovina 57.8%, in Serbia 53.9%, in FYR Macedonia 48.5%, and in Montenegro 33% of these products were imported from the EU. The CEFTA market is very important in the import of agri-food products in Montenegro, where 56.5% of the total imports of these products were realized from CEFTA countries, while on the other hand in Albania only about 9.5% of the import of agri-food products was realized from CEFTA countries.

In order to analyze the level of specialization of market of the Western Balkan countries on the world market, as well as in the markets of EU countries and CEFTA countries, the values of the index of intra-industry trade for agri-food products of these countries are examined (Figure 3). Considering the values of the intra-industrial exchange index, it can be concluded that the intra-industry specialization of agri-food products prevails in all countries of the Western Balkans. The high values of the index of intra-industrial exchange of agri-food products point to the specialization in foreign trade, as well as the high level of market integration of these products with the world market.

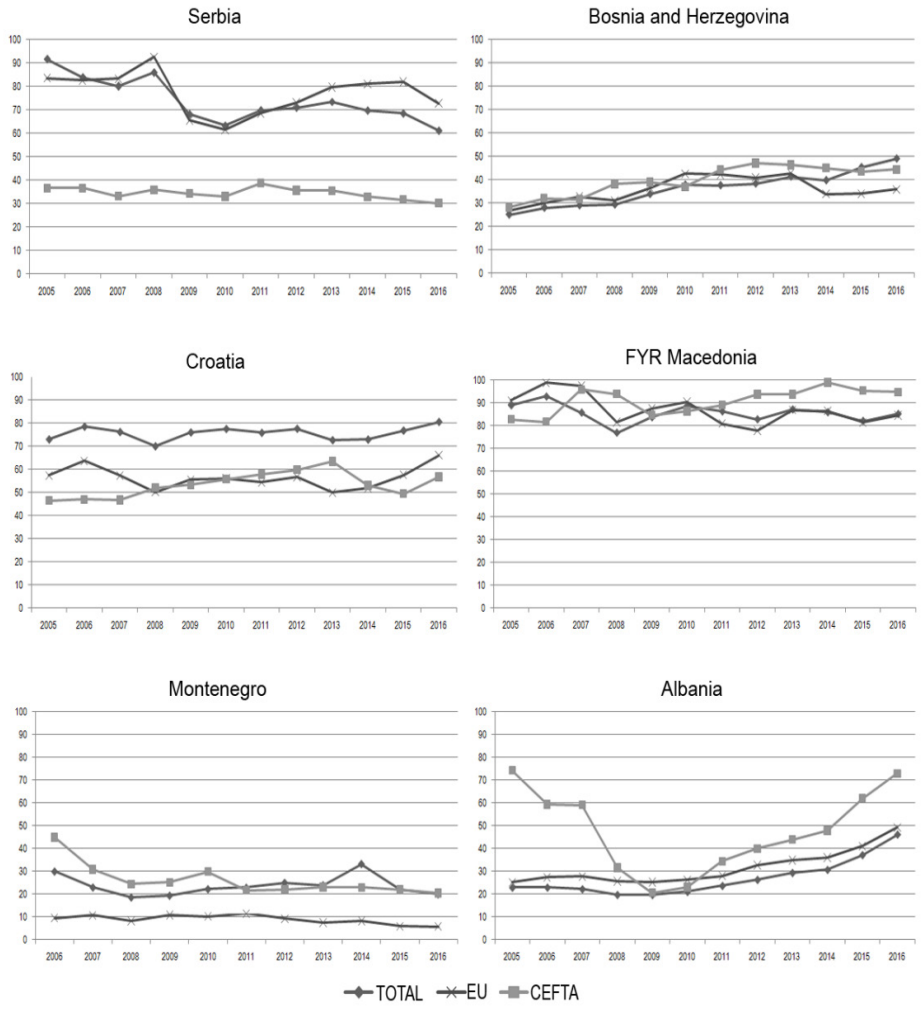
Figure 3. *Index of intra-industry trade of agri-food products of the Western Balkan countries*



Source: *Authors calculations on basic of UN Comtrade, 2018.*

The highest level of integration, i.e. the highest value of the index of intra-industry trade of agri-food products is realized in FYR Macedonia, and it is followed by Croatia and Serbia. Significantly lower level of integration of agri-food market, but still at the level of significant intra-industry trade above 15%, have the markets of agri-food products of Bosnia and Herzegovina and Albania. These two countries are characterized by the highest growth of level of integration of agri-food market in the analyzed period. The lowest level of integration of agri-food products with the international market was in Montenegro.

Figure 4. *Index of intra-industry trade of agri-food products of the Western Balkan countries by main foreign trade destinations*



Source: *Authors calculations on basic of UN Comtrade, 2018.*

The index of intra-industry trade is analyzed for foreign trade of agri-food products on the international market, as well as on the main trade destinations: EU and CEFTA countries (Figure 4). Considering the values of the intra-industry trade index, it can be concluded that the intra-industry specialization of agri-food products is dominant, both on the world market and on the markets of EU countries and countries of the CEFT. High degree of integration with all analyzed markets is noticeable in FYR Macedonia, while in Montenegro is the worst situation. Integration of Montenegro market of agri-food products with EU market is even lower than 15%, which points to inter-industry trade. A higher degree of integration with the EU market is noticeable in Serbia and Croatia, the countries of the Western Balkans where the highest value of trade of agri-food products is achieved. In all other analyzed countries, it is noticeable a higher level of integration with the regional market (CEFTA) than integration with the EU market.

Considering the differences in the level of integration of the agri-food market in certain sections and divisions (Table 3), it is noticeable that the section of crude materials (section "2") has the highest degree of market integration in almost all analyzed countries. Also, the section of beverage and tobacco (section "1"), whose products are well integrated with the international market in all countries, except in Albania, has also good level of integration. Section of food and live animals (section "0") has a high degree of integration in Serbia and Croatia, while the lowest level of integration is noticeable in Albania. In the majority of Western Balkan countries, the largest degree of integration in this section has a division of vegetables and fruit.

The analysis of the degree of integration of agri-food products of **Serbia** with the international market in certain sections and divisions indicates that the highest level of integration have tobacco and tobacco products (the average for analytical period is 98.43%), and this division also records the highest increase in integration, at an average annual rate of 14%. High degree of integration with the international market is also noticeable in the following divisions of Serbia's agri-food products: miscellaneous edible products and preparations, animal or vegetable fats and oils, oil-seeds and oleaginous fruits, as well as meat and meat preparations.

High level of integration, i.e. high values of the index of intra-industry trade of agri-food products in Bosnia and Herzegovina, is noticeable in divisions hides, skins and furskins, then fixed vegetable fats and oils, as well as divisions from the section "0": dairy products and eggs and vegetables and fruit. The highest increase

in the integration of the agri-food products market of Bosnia and Herzegovina with the international market is noticeable in divisions meat and meat preparations, as well as tobacco and tobacco products.

Table 3. *Index of intra-industry trade of agri-food products of the Western Balkan countries in period 2005-2016*

SECTON/DIVISION	Serbia	Bosnia and Herzegovina	Croatia	FYR Macedonia	Montenegro	Albania
FOOD AND LIVE ANIMALS	**70,88**	**34,30**	**71,65**	**65,59**	**14,32**	**0,00**
Live animals	71,51	9,12	43,23	92,16	0,18	4,89
Meat and meat preparations	87,33	37,87	49,20	35,06	20,88	5,70
Dairy products and birds' eggs	72,11	56,47	58,64	31,53	1,06	15,43
Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof	13,10	44,89	83,43	42,40	6,02	90,48
Cereals and cereal preparations	24,48	27,86	88,66	68,94	12,70	3,34
Vegetables and fruit	65,86	54,92	31,16	65,47	31,98	40,90
Sugars, sugar preparations and honey	38,30	46,94	87,79	31,47	4,85	1,08
Coffee, tea, cocoa, spices, and manufactures thereof	58,83	18,02	61,24	30,31	11,97	7,86
Feeding stuff for animals (not including unmilled cereals)	81,44	18,85	46,52	7,15	1,79	19,52
Miscellaneous edible products and preparations	92,20	16,58	97,23	39,05	12,83	2,01
BEVERAGES AND TOBACCO	**78,35**	**20,60**	**94,38**	**46,97**	**54,30**	**10,96**
Beverages	59,09	19,63	95,13	61,67	60,65	10,84
Tobacco and tobacco manufactures	98,43	22,99	76,93	36,39	26,60	11,08
CRUDE MATERIALS, EXCEPT FUELS	**97,35**	**68,14**	**94,42**	**63,12**	**82,70**	**47,49**
Hides, skins and furskins, raw	76,15	89,29	77,85	62,30	16,71	18,33
Oil-seeds and oleaginous fruits	88,42	5,68	49,18	28,70	2,13	3,24
Crude animal and vegetable materials, n.e.s.	63,44	25,03	35,82	38,30	97,55	78,24
Silk, cotton, jute, vegetable textile fibres, wool and other animal hair	81,10	36,14	38,94	61,30	11,00	52,81
ANIMAL AND VEGETABLE OILS, FATS AND WAXES	**50,36**	**70,30**	**45,04**	**31,08**	**20,15**	**4,23**
Animal oils and fats	70,22	0,07	50,68	2,00	92,91	0,60
Fixed vegetable fats and oils, crude, refined, or fractioned	44,46	76,85	40,44	32,62	12,37	4,50
Animal or vegetable fats and oils, processed	90,96	3,55	73,44	19,75	41,55	5,06

Source: *Authors calculations on basic of UN Comtrade, 2018.*

Analyzing the index of intra-industry trade of agri-food products of Croatian market, it could be concluded that all sections and divisions are integrated with the international market, i.e. the intra-industry character of the exchange prevails. Division of miscellaneous edible products and preparations has the highest integration level with international market, and this division is followed by divisions: beverages, cereals and cereal preparations and sugars, sugar preparations and honey.

The highest value of the index of intra-industry trade in FYR Macedonia has division of live animals (92.16% on the average for the analyzed period), and level of integration of this division has also the highest growth rate in the observed period. The divisions that are lower integrated with the international market, i.e. the divisions which index of intra-industry trade is less than 15%, are divisions of feeding stuff for animals and animal oils and fats.

Montenegro has the worst results of all Western Balkan countries when it comes to the levels of market integrations of agri-food products. A large number of sections and divisions in which agri-food products are classified have an index of intra-industry trade on level less than 15%. High level of integration with international market is recorded for the commodity groups silk, cotton, jute, vegetable textile fibres, wool and other animal hair, as well as divisions animal oils and fats and beverages.

As in the case of Montenegro, Albania also has a relatively low level of integration of market of agri-food products with the international market, and a large number of divisions have an index of intra-industry trade on level less than 15%. The highest values of the index of intra-industry trade in Albania are realized by a divisions fish, crustaceans, molluscs and aquatic invertebrates, and preparations thereof, as well as silk, cotton, jute, vegetable textile fibres, wool and other animal hair. It is noticeable that significant growth of integration with the international market is recorded in division vegetables and fruit.

Conclusion

Adapting the markets of the Western Balkans to the market economies of the developed European countries began at the end of the 20th century, and the reform processes have progressed differently in these groups of countries. In the context of the current adjustment to actual international economic integration, a gradual liberalization of the markets of these countries has been established. The

extent of the changes that has been done under the influence of the liberalization achieved with the EU and the CEFTA countries is different, but it is evidently that the free trade agreements with these countries have significantly influenced the intensity and structure of foreign trade of agri-food products. Namely, according to the results of the research in this paper, the growth of exports of agri-food products is present in all Western Balkan countries. By analyzing the geographical allocation of exports, it is noticeable that most of these products are placed in EU countries, followed by CEFTA countries. On the import side, the situation is very similar; there is an increase in imports of agri-food products in all Western Balkan countries, and the EU is the dominant import market. The highest growth rate of foreign trade in agri-food products is noticeable in Serbia, which is the only one country that has a positive foreign trade balance with these products. The results of the research also point to an intra-industry specialization with the international market of agri-food products in all countries of the Western Balkans. Also, all countries have a high level of specialization with the market of these products in EU countries, as well as with CEFTA countries. The highest level of integration with the international market is observed in the crude materials section (section "2"), and the section of beverages and tobacco (section "1"), whose products are well integrated with the international market in all countries, except in Albania. Regarding the section of food and live animals (section "0"), a high degree of integration is evident in Serbia and Croatia, while the situation in Albania is not particularly favourable. In order to examine the impact of the achieved levels of intra-industry specialization with the international market, the levels of comparative advantages of certain segments of the agri-food market, as well as the factors determining the competitive positions of these products on the international market, will be analyzed more detailed.

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CHARACTERISTICS OF THE AGRICULTURAL LAND MARKET IN THE REPUBLIC OF SERBIA[1]

Vanja Erceg[2], Tihomir Zoranović[3]

Abstract

Agricultural land is a good of general interest for the entire society. It is used for the production of agricultural and food products necessary for the survival of society, and therefore requires specific treatment. Also, the market valuation of natural resources must be on different basis compared to the application of the standard supply and demand model. In 2006, the Republic of Serbia adopted the Law on Agricultural Land, which regulates planning, protection, organization and use of agricultural land, as well as other important issues related to agricultural land. Under the political pressure and in interest of certain social groups, new legal measures were adopted in 2017. Namely, since September 1st 2017, foreign citizens have been able to purchase agricultural land on the territory of the Republic of Serbia, under certain conditions. The question is why the Republic of Serbia agreed to this step before joining the European Union. The paper analyzes the ownership structure, the plant production structure and the Serbian land market.

Key words: *agricultural land, market, legal regulations, prices*

Introduction

The land is the basic factor of the environment created by the interaction of biotic and abiotic factors. The land creation processes very slow and is therefore considered conditionally renewable resource and belongs to natural resources. With growing awareness of the importance of environmental protection and human

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2 Vanja Erceg, M.Sc., University of Novi Sad, Faculty of Agriculture, Department of Agricultural Economics and Rural Sociology, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: + 381 21 485 32 33, E-mail: vanja.erceg@polj.uns.ac.rs

3 Tihomir Zoranović, Ph.D., Associate Professor, University of Novi Sad, Faculty of Agriculture, Department of Agricultural Economics and Rural Sociology, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: + 381 21 485 32 31, E-mail: tihomir@polj.uns.ac.rs

impact on the environment, as well as the fact that the land has apronounced socio-economic and agro-ecological dimension, it is necessary to develop a system of sustainable land management.

Intensive agriculture, in addition to the production of fossil fuels, is considered to be one of the most aggressive human influences on nature. Inadequate land use leads to its degradation. The concept of degradation can be defined as a set of human activities which reduce the present and future potential of the land, necessary for the survival of the living world on planet Earth. Some of the most significant processes that have a negative effect on the soil quality are floods, salinisation, erosion, land consolidation, construction of buildings and roads, reduction of soil biodiversity, reduction of organic matter, avalanches, pollution, etc.

The Environmental Protection Agency has identified 384 contaminated or potentially contaminated locations on the territory of the Republic of Serbia. The largest number of registered sources of localized soil pollution is related to waste disposal processes (43.5%), extraction and production of oil (22.5%) and industrial and commercial activities (10.2%). The Law on Land Protection (Sl. glasnik RS, no. 112/15) was adopted as the supreme act for resolving the above mentioned problems. This law regulates land protection, systematic monitoring of the condition and quality of the land, recovery measures, remediation, recultivation, inspective supervision and other issues of importance for the protection and conservation of land as a natural resource of national interest. The goal of this law is to preserve the areas and functions of the land as a natural resource and to prevent or eliminate detrimental changes in the land that may occur.

Observing the agricultural land market, it is noticeable that demand for agricultural land derives from demand for agricultural products. Growth in demand for agricultural products means growth in demand for agricultural land, as well as other inputs necessary for agricultural production. A large number of exogenous and endogenous factors effect changes in the extent to which agricultural land is used, such as the price elasticity of demand and supply of agricultural products and the price elasticity of the supply of agricultural land (Lovre et al., 2017).

Unlike other tradable goods, land is immobile. The land market exists if it is possible to exchange land use rights for an agreed amount of money. The efficiency of the land market varies around the world, along with openness towards public control and support for the concept of sustainable development. In less econom-

ically developed countries, it is not always possible to develop an efficient land market. The continuing globalization will inevitably affect the land market, especially since information technologies allow greater and faster access to information about national land resources (Mahoney et al., 2007).

The fact is that the sale and lease contracts of agricultural land are not transparent enough. The proof for this is that countries do not incorporate mechanisms for protection of the rights of domestic population in these contracts. Namely, imprecisely defined land rights, inadequate registration procedures and unclearly defined production requirements all greatly endanger the position of the domestic population. A particular threat affecting food safety and self-sufficiency in food production stems from the ubiquitous trend of control tranfer of agricultural land from domestic to foreign citizens. The increasing popularization of largeproperties is a factor that threatens the rural population. A large number of small farmers, who use traditional production methods, become discouraged and quit agricultural production. This then leads to migration of rural population and freeing the allotmentsfor investors who wish to buy or lease agricultural land. Long-term contracts for leasing agricultural land and extensive acquisition of agricultural land do not contribute to rural development (Lovre et al., 2017).

The agricultural land market size is largely dependent on the ownership structure, the structure of the current production, prices, locations, etc. It is especially important for foreign investors whether national legaslation allow or restrict the ownership of agricultural land or whether there are some conditions on the volume of investments or some other production.

National legislation on property relations and disposal of agricultural land

The Constitution of the Republic of Serbia (serbian: Ustav Republike Srbije), as the supreme legal act, guarantees the equality of all forms of property (Sl. glasnik RS, no.98/06). The Constitution knows the category of private property, public property and cooperative property. Disposal of all forms of ownership is left to the law regulations, as well as the possibility of acquiring certain rights, including the right of ownership over agricultural land. The use and disposal of agricultural and forest land in private ownership is free, but the law can regulate the forms of use and disposal.

The Law on Agricultural Land regulates planning, protection, arrangement and use of agricultural land and other issues related to agricultural land (Sl. glasnik

RS, no. 62/06, 65/08, 41/09 and 112/15). The law directs that agricultural land is a good of general interest. Also, the law directs that the owner of the agricultural land cannot be a foreign natural or legal person. However, the Republic of Serbia has reached a decision that from September 1st 2017, the sale of agricultural land to foreign citizens will be possible under certain conditions. In order for foreigners to buy Serbian agricultural land, they must have had a residence on the territory of the Republic of Serbia for at least ten years, more precisely on the territory of the local administration unit in which they wish to buy agricultural land, and they must have a registered agricultural property. It is also necessary that they own machines and equipment for agricultural production and they must have been cultivating the land for at least three years. As for the agricultural land in private property, foreign citizens may have ownership rights over two hectares at most. Also, it is forbidden to sell agricultural land to citizens of EU state members in the zone of ten kilometers from the border. These restrictive stipulations have practically suspended the right of foreign citizens to become owners of agricultural land. The aim of such legal provisions is to prevent the complete liberalization of agricultural land traffic, which was predicted in the Stabilization and Association Agreement.

Agricultural land in state ownership can be alienated only under the conditions prescribed by the Law on Agricultural Land. The sale of state-owned agricultural land was first enabled by the Law on Amendments to the Law on Agricultural Land, adopted by the parliament in 2015 (Sl. glasnik RS, no. 62/06 and 65/08). In the process of alienation, the agricultural land in state ownership may be acquired by a natural person by freight legaltransaction,with the area being limited to 20 hectares, and under the conditions (Zakon o poljoprivrednom zemljištu, Sl. glasnik RS, no. 62/06, 65/08, 41/09, 112/15 and 80/17):

- that they are a citizen of the Republic of Serbia,
- that the registered agricultural property has been in active status for at least three years or that they are a holder of an active agricultural property,
- that they meet the technical conditions ie. that they have machinery and other necessary equipment for agricultural production,
- that they own a maximum of thirty hectares of agricultural land,
- that they have had a residence in the municipality in which the agricultural land is being sold for at least five years,
- that in the last three years they have not alien at Edmore than three hectares of their own agricultural land, unless in order to satisfy public interest,
- that the total area that the natural person will own after purchasing does not exceed forty hectares and

- that they have no unsettled commitments regarding the lease of state-owned agricultural land.

At the same time, the law determines that the object for sale can be agricultural land in state ownership if it is at least ten kilometers away from the state border. With the approval of the Government of the Republic of Serbia, that distance may be reduced, and this is assessed for each individual case after previously obtaining the opinion of the Ministry responsible for defense affairs and the Ministry responsible for internal affairs, provided that the land is not intended for another purpose by a valid planning document, that it is not an object of restitution, that it does not belong to protected natural areas, that it does not belong and does not border with a security zone or a military zone. Also, a natural person cannot acquire ownership of agricultural land in the area of the administrative line towards the AP Kosovo and Metohija.

The law allows the leasing of state-owned agricultural land to a natural or a legal person (if it is predicted for this purpose by the annual program of protection, arrangement and use of agricultural land) for a period which may not be shorter than one year, but not longer than thirty years, while for vineyards and fish ponds, a lease period of forty years is predicted. The law does not explicitly specify whether foreign legal and natural persons can be leaseholders of agricultural land, but does not prohibit the said persons from leasing.

The privatization process

According to the Report on privatization and disposal of agricultural land in the public property of the Republic of Serbia, due to disobeying the Law on Agricultural Land and the Law on Privatization, tens of thousands of hectares of publicly owned agricultural land have been turned into private property without any compensation and confirmation that the buyer has settled obligations fromthe sales contract. Namely, the property for which the buyer has settled obligations could not have included the land since the seller did not have the property right, only the right to use the land. Bearing in mind that the information on ownership over agricultural land after privatization is not publicly available, it is concluded that the procedure of turning public property into private property without compensation has caused a great damage to the state.

According to the Privatization Agency information, in the period from 2002 to 2015, 148 agricultural enterprises and combines have been privatized. The revenue generated from the sale of 141 agricultural enterprises amounts to 260 million euros, while for the other seven privatized agricultural enterprises, theinformation on the selling price are not available. Namely, the Anti-Corruption Council (serbian: Savet za borbu protiv korupcije) sent a request to the Republic Geodetic Authority in 2014 to provide information on the total area of agricultural land of the 148 agricultural enterprises and combines that were in the process of privatization. Based on the obtained information, it was calculated that the area after the privatization of these agricultural enterprises and combines was 132,347 hectares. The state land had an area of 36,865 hectares, the privateland 75,674 hectares, or more than 57%, and the area of social land was only 8,647 hectares. In addition to the state, private and social ownership, an area ofapproximately 11,000 hectares waslabeled as undefined ownership of land, an area of 7,650 hectares as mixed property and an area of 3,511 hectares labeled as other forms of property (Savet za borbu protiv korupcije, 2017).

By changing the character of the society by entering the multi-party system, over 80% of the land, as the main production factor, was privatised. In agriculture as well, privatization has been set as agoal, and not as a mean to achieve some desired goal. Instead of setting goals, defining priorities and analyzing options for a new systemic approach, the privatization process has broken the existing agrarian structure, leaving long-term consequences on responsible use and land management, material, economic and social position of participants in the food chain (Simanović, 2017).

Today, in the Republic of Serbia there are several large conglomerates with the ownership of tens of thousands of hectares of agricultural land, which at the same time are owners of large processing plants and trade chains. In such a system there is no business independence of small producers, they are merely work force for the production of cheap raw materials. Also, the state leases its agricultural land and often gives it or exchanges it for poorer quality and local administrations collect part of annuities to use and spend on their local needs. Undeveloped market infrastructure needed to support small farmers, purchasing and distribution centers, and unorganized market in agricultural products all contribute to a low degree of overall competitiveness.

Restitution process

In addition to correcting the decades-long injustice that the state has committed against its citizens, restitution is also one of the key systemic changes. Without it there is no breaking free from the previous totalitarian system.This can be seen from the European Commission report, which puts restitution among the ten main conditions for faster progress of the Republic of Serbia towards EU membership (Davidović et al., 2017).

In the Republic of Serbia, the Law on Restitutionof Seized Property and Compensation was adopted in 2011. This law regulates the conditions, ways and procedures of restitution of confiscated property and compensation for seized property on the territory of the Republic of Serbia which was, by applying the regulations on agrarian reform, nationalization, sequestration and other regulations after 1945, seized from natural and legal persons and transferred to national, state, social or cooperative property (Sl. glasnik RS, no. 72/11, 108/13, 142/14 and 88/15). The Law also refers to returning the property that was seized during the Holocaust on the territory that is now part of the Republic of Serbia.

According to the information from the Restitution Agency, by the end of 2017, based on the Law on Restitution of Property to Churches and Religious Communities, the right of ownership over 58,549 hectares has been restored, out of which an area of 26,251 hectares was agricultural land, an area of 32,206 hectares was forests and forest land and 91 hectares was construction land. According to the latest information from the Centralized Database of Landed Cadastre Plots, by the September 18th 2018, in the Republic of Serbia, property rights over 46,044 hectares of land have been returned, while the remaining area is 56,391 hectares.

Available agricultural land by categories of use

The Republic of Serbia is considered to be one of the European countries with favorable land resources. Observing the structure and the extent of available agricultural land, the Republic of Serbia has 0.46 hectares of land per capita at disposal. Out of the total territory of the Republic of Serbia, about 60% represents agricultural land, and 82% is in the AP Vojvodina. With adequate measures for protection against erosion and other forms of degradation, preventing the placement of agricultural land at locations that are attractive to industry and trade, implementing agro-technical measures by avoiding their adverse effects and exploiting the ben-

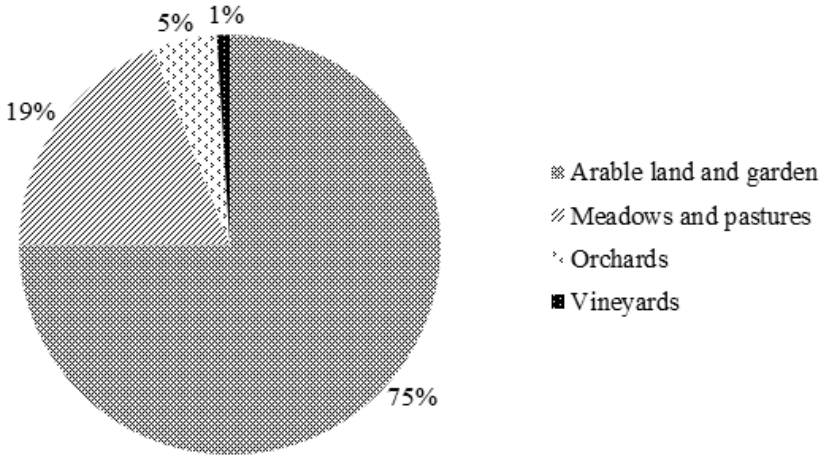
efits for the production of organic food, it is possible to achieve optimal utilization of this resource, which would provide the domestic market with quality products and make it competitive on the international market.

Regarding the land structure, the Republic of Serbia has about 5 million hectares of agricultural land at its disposal, of which 71% is extensively used in the form of orchards, arable land and vineyards, while the other 29% of the agricultural land is meadows and pastures. Most of the agricultural land, more precisely about 3 million hectares or 65%, is used as arable land, while about 7% is not used at all for agricultural production (Sl. glasnik RS, no. 85/14).

Preservation of rich land resources is endangered by widespread erosion, the application of inadequate agro-technology and factors of socio-economic nature. During the last decade, arable land has been reduced by 65.7 thousand hectares, orchards by 4.5 thousand hectares and vineyards by 13.5 thousand hectares, with the increased permanent lawns by almost 50 thousand hectares, which in total reduces the total agricultural area by 133.7 thousand hectares. The main causes of these opposing tendencies by purpose of use are using the most fertile soil for construction and other non-agricultural purposes, economic and socio-cultural demotivation for working in agricultural production, depopulation of infrastructural unequipped villages and institutional problems of agro-industrial combines (Sl. glasnik RS, no. 88/10).

In the Republic of Serbia, out of the total agricultural land area of 5,346,597 hectares, the used agricultural land dominates with 64.3%, which combined with the unused agricultural land with a share of 7.9% makes 72.2% of the total available land, followed by forest land with 19.1% and other land with 8.7% (Ševarlić, 2015). Based on the information published by the Ministry of Agriculture, Forestry and Water Management, the area of agricultural land used in 2017 has amounted to 3.4 million hectares.

Chart 1. *Structure of utilised agricultural area (UAA) by categories of use in the Republic of Serbia in 2017.*

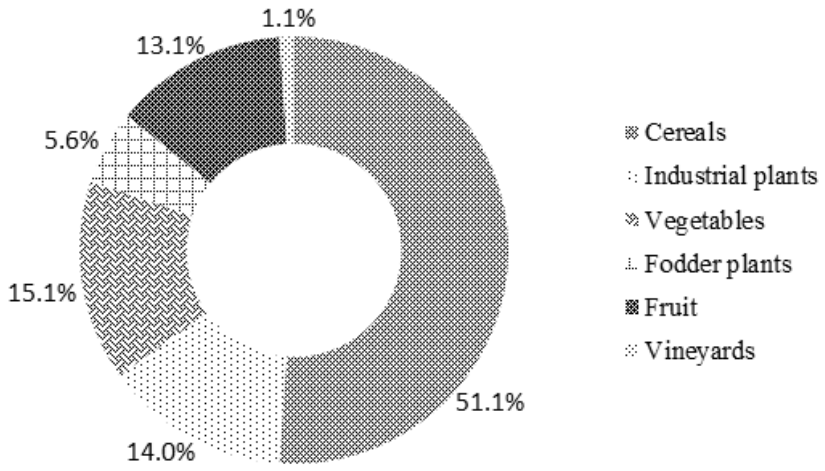


Source: *Authors calculations based on the data from the Ministry of Agriculture, Forestry and Water Management, 2017.*

The largest part, which is three quarters of the total used agricultural land, goes to fields and gardens, then, with much smaller share, meadows and pastures, and finally orchards and vineyards with the smallest share (Chart 1). The fact is that the Republic of Serbia has relatively favorable natural conditions for different types of agricultural production, both plant production and animal husbandry. However, in the total agricultural production in the Republic of Serbia, the plant production area has a dominant role with over 60%.

In the structure of plant production in the Republic of Serbia, grain production area takes first place with over 50%, arable land followed by vegetables with 15%, industrial plants with 14%, fruit growing with 13%, while fodder plants and viticulture have the smallest share (Chart 2).

Chart 2. *Plant production area structure in the Republic of Serbia in 2017*



Source: *Authors calculations based on theDatabase of the Republic Statistical Office of the Republic of Serbia, 2017.*

Purchase and lease of agricultural land in the Republic of Serbia

The price of a hectare of quality cultivable agricultural land in Vojvodina can reach up to 15,000 euros. For a hectare of land in Eastern and Southern Serbia, except in the vicinity of Požarevac and Prokuplje, it reaches a maximum of 4,500 euros, while in Vojvodina, especially around Srbobran, Stapar and Inđija, the land is soldat even3 times that price. In Central and Western Serbia, the price of land is around 5,000 euros per hectare. Values vary depending on the micro location, which is one of the most important factors regarding the soil. However, the price of agricultural land depends on many factors, such as the quality of the land, whether it is a bigger or a smaller parcel, whether it has drainage cannals or irrigation wells, whether it is near the road or deep into the area. Also, the cause of such regional price difference on the territory of a single state is also related to the problem of depopulation of villages. Namely, where there is no population, there are no interested parties in purchasing, that is, in cultivation of land, and for land, just like for everything else that is sold, the supply and demand ratio applies, and it affects the price formation.

Out of the total available agricultural land used in the Republic of Serbia, around 70% of the agricultural land is owned and the remaining 30% is on the leasingmarket. In accordance with the type of settlement, the largest area of utilised agricultural land is in rural areas. Observed regionally, the total utilised agricultural land in the Republic of Serbia is almost equally divided among the regions Serbia - North and Serbia - South. However, in the region Serbia - North there is a smaller relative difference between areas of owned agricultural land and the ones that are leased. On the other hand, in the Serbia-South region, a significantly larger share of used agricultural land is owned, while the area of leased land is relatively smaller (Table 1).

Table 1. *Utilised agricultural area (UAA) according to the ownership structure, type of settlement and regions*

	Type of settlement	Total UAA(ha)	OwnUAA (ha)	Leased UAA(ha)
Republic of Serbia	**Total**	**3,437,423.5**	**2,418,416.0**	**1,019,007.5**
	City	715,309.6	491,943.7	223,366.0
	Mixed	329,663.1	185,235.4	144,427.7
	Village	2,392,450.8	1,741,236.9	651,213.9
Serbia - North	**Total**	**1,745,285.30**	**998,421.10**	**746,864.20**
Serbia - South	**Total**	**1,692,138.20**	**1,419,994.90**	**272,143.30**

Source: *Retrieved from the paper Mitrović, M. (2015): Villages in Serbia - changes in the structure and problems of sustainable development, p. 254.*

According to the latest agriculture census from 2012, there are 631,552 registered farms in the Republic of Serbia, and approximately 71% of them are located in the region Serbia - South. Therefore, the structure of farms in certain regions in the Republic of Serbia also varies. Namely, the region Serbia - South is dominated by farms smaller than 10 hectares. On the other hand, in the region of Serbia –North, the size of farms greater than 50 hectares is more dominant. Generally speaking, a conclusion can be made that the Republic of Serbia mostly has farms with area of agricultural land being smaller than two hectares (Table 2).

Table 2. *Agricultural holdings by size of utilisedagricultural area (UAA) by region*

	Number of farms	<2ha	≥2 <5ha	≥5 <10ha	≥10 <50ha	≥50 <100 ha	≥100 ha
Republic of Serbia	**631,552**	**303,877**	**185,090**	**90,273**	**46,011**	**4,386**	**1,915**
Serbia - North	180,868	92,031	38,377	22,879	21,889	3,963	1,729
Serbia - South	450,684	211,846	146,713	67,394	24,122	423	186

Source: *Retrieved from the paper Mitrović, M. (2015): Villages in Serbia - changes in the structure and problems of sustainable development, p. 250.*

In recent years, the price of agricultural land in the Republic of Serbia has doubled. In the AP Vojvodina, the price of one hectare of agricultural land goes up to 20,000 euros, which is three times less than in the Netherlands, where agricultural land is sold for 63,000 euros. Due to the relatively low price compared to the countries of the European Union, if the Republic of Serbia does not prevent the sale of agricultural land to foreigners by legal restrictions, the demand for domestic land could be high.

Table 3. *Realized prices of agricultural land in market transactions by regions in Republic of Serbia in 2017*

Region	Number of transactions	Total sales area (ha)	Average area per transaction (ha)	Realized sales price (€)	Average price (€ / ha)
Bačka	24	44.6001	1.8583	460,633	10,328
Banat	25	33.4379	1.3375	230,735	6,900
Srem	22	37.1875	1.6903	341,467	9,182
Western Serbia	20	17.5597	0.8780	69,748	3,972
Šumadija	24	15.0696	0.6279	64,323	4,268
East Serbia	22	12.5164	0.5689	55,210	4,411
South Serbia	22	6.9999	0.3182	32,289	4,613
Total	159	167.3711	1.0526	1,254,405	7,495

Source: *Retrieved from the paper Drašković, B., Branjas, Z. (2017): Market condition of agricultural land prices, p. 191.*

From a regional point of view, the largest market prices of agricultural land were recorded in Vojvodina. In the territory of this autonomous province the prices of agricultural land ranged from 6.9 to 10.3 thousand euros per hectare. The lowest prices of agricultural land were recorded in Western Serbia, as low as 3.9 thousand euros per hectare. The average price at the level of the Republic of Serbia in 2017 was about 7.5 thousand euros per hectare (Table 3).

According to the official data of the Republic Geodetic Authority of the market of agricultural land sales in the Republic of Serbia in the period 2014-2017, the largest number of sales was realized on the territory of the municipality of Zrenjanin. The lowest price of agricultural land in 2014 was recorded in the municipality of Crna Trava, 593 euros per hectare, while in the same year the highest price of agricultural land sale was recorded in the municipality of Medijana near Niš, it being almost 63,000 euros per hectare. In the following year, the lowest selling price of agricultural land on the territory of the Republic of Serbia had a tendency to grow. Namely, the lowest price for agricultural land in 2015 was 752 euros per hectare, and it was recorded in the municipality of Boljevac. The highest price of agricultural land in the same year has also increased compared to the previous year, and amounted to about 75,200 euros per hectare in the territory of the municipality of Rakovica near Belgrade. In 2016, the lowest price of agricultural land sale declines. In the municipality of Majdanpek, the price of agricultural land was 722 euros per hectare. On the other hand, the maximum sale price of agricultural land continues to grow. On the territory of Novi Beograd municipality, the price of agricultural land was estimated at about 78,000 euros per hectare. The trend ofthe decreasing minimum selling price continued in 2017, with proof found in the recorded selling price in the municipality of Mali Zvornik of only 690 euros per hectare.

On the territory of the AP Vojvodina is a bigger part of the agricultural land that is leased and the price of the rent vary from municipality to municipality. The lease price of agricultural land depends on the land class and the region in which the arable land is located.

Based on the official data of the Republic Geodetic Authority of the market of lease of agricultural land in the Republic of Serbia in the observed period from 2013 to 2017, oscillations in prices of lease of agricultural land are noticeable. Namely, in 2013 the largest lease price for agricultural land was recorded in the municipality of Temerin, which was 627 euros per hectare, while the lowest price for agricultural land in the Republic of Serbia leased in the same year was 9.5 euros per hectare in the municipality of Crna Trava. In the following year, the

maximum lease price of agricultural land is also recorded in the municipality of Temerin, but there is a noticeable mild tendency of price increase compared to the previous year. The lowest purchase price of agricultural land in 2014 was recorded in Babušnica municipality, which was 7.9 euros per hectare. After a slighttrend of the increasinglease price of agricultural land in the Republic of Serbia, in 2015 there was a reverse tendency. The maximum lease price of agricultural land recorded in the municipality of Inđija was 597 euros per hectare, while the minimum lease price for agricultural land was 8.4 euros per hectare and it was recorded in Svrljig municipality. Once again in the municipality of Inđija, in 2016 the highest purchase price of agricultural land of 581 euros per hectare was recorded. The same year, the minimum lease price was recorded in the municipality of Pirot, amounting to 4.1 euros per hectare. Even at the end of the observed period, in 2017, the declining trend continues. The lowest lease price was recorded again in the municipality of Pirot, it being slightly lower than in the previous year, while the maximum lease price was recorded in the municipality of Irig, in the amount of 377 euros per hectare.

The Anti-Corruption Council has published a Report on Privatization and disposability of agricultural land in the public property of the Republic of Serbia in which the leasing of state-owned agricultural land in the period 2013-2017 was analyzed in detail at the level of local administrations. The Council's report shows some alarming facts. Namely, the state offered to lease 180-423 hectares of land hectares. This means that in the years when less than 423 thousand hectares were needed, the state did not lease 800 thousand hectares in total for 5 years, assuming that these 423 thousand hectares arethe total state-owned agricultural land. The land that had beenoffered but not leased has been illegally processed and income has been collected without any legal sanctions. Also, according to the Council's Report, the state loses about 40 million euros a year on unleased land, given the fact that this land is leased for an average price of 202 euros per hectare. If we add the losses based on price disbalances to the equation, it shows that the state has lost a total of around 860 million euros in 5 years. The question is why the state is ready to give up revenues from basically the most valuable and non-renewable resource in public ownership (Lovre, 2018).

Conclusion

The opportunity for development of the domestic agrarian sector lays in relatively favorable agro-ecological conditions and relatively good availability of natural resources, above all, agricultural land. Unfortunately, agricultural land has been

irrationally used for decades, which is confirmed by the presence of a large number of small agricultural holdings. Starting from this fact, a conclusion is reached that without adequate measures of agrarian policy, which will influence the improvement of the ownership land structure; there will be no adequate development of the domestic agricultural sector.

The land market, above all, depends on the long-term elasticity of supply and demand for agro-food products. On the world market there are extensive acquisitions of agricultural land both in developed and underdeveloped countries. The main investors are developing countries and developed countries.

Considering that the prices of agricultural land in the Republic of Serbia are far lower in comparison to the prices in the developed countries, a large number of foreign investors are interested in the Serbian land. The fragmentation of the land parcels and the inability to consolidate the plot due to the existence of a large number of owners is a big obstacle for big investors. That is why only a few large investments were realized, mainly for the purchase of large farms that already had plots of large areas.

By adopting regulations organizing the management, use and protection of agricultural land, the Republic of Serbia has fulfilled the role of the protector of one of the vital resources of the society. Namely, the Law on Agricultural Land prescribes various measures aimed towards preserving the quality of agricultural land. However, in order to implement the policy of conservation of agricultural land in real terms, it is necessary to introduce mechanisms for protecting land from devastation, non-processing and prevention of changes in purpose of agricultural land.

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LEMON BALM (*Melissa officinalis* L.) – TECHNOLOGY OF CULTIVATION AND PRODUCTION COST ESTIMATE[1]

Vladimir Filipović[2], Vladan Ugrenović[3]

Abstract

The demand for lemon balm (Melissa officinalis L.) is growing with years, is it dried leaves (Melissae folium), the above-ground parts (Melissae herba) or lemon balm essential oil (Melissae aetheroleum). The reasons for the increase in the demand lie in the fact that lemon balm is one of the few plants that are simultaneously medicinal, decorative, spice, aromatic and honey plants, and they have industrial application. The demand for the raw material, semi-finished products and final products from lemon balm lies in the fact that the lemon balm raw material from our area is of exceptional quality, and meets the criteria prescribed by appropriate documents for this particular field. As there continues to be self-sown lemon balm, some people still continue to acquire it from nature. The percentage of those who acquire lemon balm from nature is almost negligible. The bulk of the raw material is obtained from cultivated plants. In this regard, in the case of perennial species, it is necessary to follow the guidelines concerning the good practice of lemon balm production and the methods used to improve the existing cultivation technology. This paper represents the author's knowledge on the technology of lemon balm production, its use and the cost estimate showing the investments made in the process of its cultivation.

Key words: *lemon balm, Melissa officinalis L., production, use, production cost estimate.*

Introduction

Lemon balm or common balm, melissa plant, bee balm, balm mint and sweet balm (*Mellisa officinalis* L.) is a perennial herbaceous plant belonging to the mint or

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2 Vladimir Filipović, Ph.D., Senior Research Associate, Institute for Medicinal Plants Research *"Dr Josif Pančić"*, Tadeuša Košćuška no. 1, 11000 Belgrade, Serbia, Phone: +381 13 377 855, E-mail: vfilipovic@mocbilja.rs

3 Vladan Ugrenović, Ph.D., Research Associate, AES Institute *"Tamiš"*, Novoseljanski put no. 33, 26000 Pančevo, Serbia, Phone: +381 13 313 092, E-mail: vladan.ugrenovic@gmail.com

deadnettle family (Lamiaceae). The lemon balm plant was particularly appreciated by the French herbalist Maurice Mességué. According to him, this plant is the queen of all stimulating plants. According to him, lemon balm helps "an unhandy lover, the troubled head of the family, the women who are burdened with problems, the desperate ones and those who are haunted by the sense of defeat in life. I recommend this magical plant that regenerates the body, and restores strength and the joy of living." Lemon balm is one of the few plants that are medicinal, fragrant, decorative, spice, aromatic and honey plants at the same time, and they also have industrial application. In the last few years it has been extremely demanded as a raw material for the production of essential oils, but also as fresh material (for preparing ice teas and cocktails) and dry material (for the production of monocomponent teas and tea blends).

Chemical composition and use. For medicinal purposes, the following are used: (1) dried leaves (*Melissae folium*), (2) the above-ground parts of lemon balm (*Melissae herba*), as well as (3) lemon balm essential oil (*Melissae aetheroleum*). The leaf of lemon balm is used in medicine as a tranquiliser, whereas its essential oil is used in the cosmetic and chemical industry, pharmacy, and for the flavouring of beverages and some food products. It is most often utilised in case of the disorders of digestive organs, acts as a mild tranquiliser, and helps with sleep disorder. In the form of extracts rich in rosemaryric acid, it is used externally in herpes virus infections. Lemon balm has been used for more than 3,000 years in Tibetan medicine as a bioactive plant for the treatment of psychological problems. Today, the effects of the oral use of lemon balm preparations are the subject of numerous studies and various sorts of research, which deal with its effects on anxiety, insomnia, depression, dyspepsia, vomiting, flatulence, attention deficit and hyperactivity disorder (ADHD), dysmenorrhea, cramps, headache, toothache, infections, tumors, insect stings, Alzheimer's disease, tranquility, melancholy, palpitations, rheumatism and high blood pressure. The German Commission E approves the use of lemon balm for the treatment of nervous sleep disorders and functional disorders of the gastrointestinal tract.

In keeping with the World Health Organization guidelines in the WHO monograph *Monographs on Selected Medicinal Plants – Volume 2* of 2004 (WHO, 2004), the *Melissae folium* drug is used externally for the symptomatic treatment of herpes labialis, or, commonly known as cold sores, it actually arises as the consequent reaction to coming in contact with the herpes virus. It is used as a carminative (an agent that relieves gastrointestinal problems) for gastrointestinal disorders, as well

as a sedative (a substance that has a calming psychological effect) for the treatment of nervous sleep disorders.

Traditional European medicine includes the use of lemon balm as a calming tea for calming, for the treatment of migraine, toothache, headache and high blood pressure. In phytotherapy, lemon balm is known for its carminative, gastric, sedating, antiseptic, antiviral, antimicrobial, and antioxidant properties.

Lemon balm is also a honey plant, and bees love it, so, because of that, it bears the name of lemon balm. Blooming can last from the end of May to mid September (Bekić et al., 2014). Lemon balm blossoms have an average lifespan of one day. The best bloom is in the morning. The most common polynators on lemon balm blossoms are bees and bumblebees, which represent primary polynators (Božek, 2000; Chwil, 2009). Lemon balm essential oil is highly appreciated, and has a high price in the perfume and cosmetics industry. Large quantities of lemon balm essential oil are used in the concentrate and flavour industry and in the liquor industry (e.g. the beverages Benediktin and Shartrez). Lemon balm essential oil has an extremely strong antimicrobial activity, and, as such, could have more application in various spheres of human life (Grujić-Jovanović et al., 2003; Aničić et al., 2005; Jovanović et al., 2016). In this connection, the interest in the cultivation of lemon balm and the purchase of its seeds has increased to a great extent, primarily for the purpose of obtaining the mass for the distillation of essential oil. For the lemon balm variety by the name of "Citron", which is produced and sold at the Institute for Medicinal Plants Research "Dr Josif Pančić" from Belgrade under favorable conditions of growing, two mowings are performed in a single year (Filipović, 2018). It yields from 4,000 to 6,000 kg/ha for the above-ground parts (herba), about 2,000 kg/ha of dry leaves and 3 to 4 kg/ha of essential oil.

Morphological characteristics. Lemon balm is a perennial herbaceous plant that reaches a height of up to 100 cm, with a highly developed and strong root. The underground spawns, which are large in number, develop horizontally, and new mother trunk emerges from them. The above-ground part trunk is very branchy, and it is foursquare at the cross-section. Its leaves are like nettle leaves: egg- and heart-shaped, jagged-edged on the periphery, slightly hairy, greenish and yellowish in colour. They are oppositely arranged on long leaf pedicels. There are glands on a leaf. The leaf contains 0.1–0.3% of essential oil, vitamins and bitter substances. The essential oil of lemon balm is obtained by distilling the leaves and herbs by the means of water vapor. The main ingredients of essential oil are: citral (geranial –

citral A and neral – citral B), citronellal, linalol, geraniol and β-carfylene oxide. Due to the presence of citruses (about 11%), the whole plant has a pleasant lemon-like smell, and is covered with small and fine hairs. The essential oil of lemon balm also has the smell of lemon. Because of this, it is commony called lemon grass. The flowers are white to reddish, up to 1.5 cm in length, in groups of 6–10, located in spleen blooms, in the armpit of the upper leaves. It blooms from June to August. The seeds are small, glossy and dark, egg-shaped. The weight of 1,000 seeds is about 0.6 g. The germination of the seed is 85-90% and decreases with the seed age.

Agroecological conditions. According to its breeding region within the Republic of Serbia, lemon balm is grown in both production regions: the lowland one (Vojvodina) and the mountainous one (Central Serbia), (Filipović, Popović, 2014). Lemon balm grows in quite a variety of climatic conditions. As a wild flower, the plant grows throughout Europe, except in the extreme north and south. It can be grown everywhere in our region, but only up to 1,000 m above sea level. It grows best in the areas with an average rainfall of 600 mm. Due to the tendency of lemon balm to suffer from some leaf diseases, the positions with good air circulation are recommended. Shady or semi-shade surfaces should be avoided, as they affect the reduction of ethereal oil content. Lemon balm is resistant to low temperatures, so in our agroecological conditions, there is no danger of freezing during winter.

Fertile soils are beneficial for lemon balm. Moderately wet, loose and humus-rich soils, with poorly acidic to neutral pH reaction, are suitable for its ciultivation. Heavy and wet soils should be avoided.

Production technology

Crop rotation. As a perennial species, lemon balm does not enter the classic crop rotation, because it can remain in the same place for up to ten years. For pre-crops, it is necessary to use species that leave the soil unweeded, because weeds are a major problem in lemon balm seedlings when harvesting. Regarding the previous crop, lemon balm does not set any specific requirements. Since lemon balm is planted in the autumn, every pre-crop that is early removed from the plot is good for it. Therefore, it can come in a crop rotation following stubble cereals, row crops and industrial plants. It is also successfully grown on ploughed natural meadows and pastures, with good soil preparation and adequate fertilisation. However, the best results in the production practice are achieved on those plots on which the pre-crop has been fertilised with burnt manure. Lemon balm is a

suitable pre-crop for most medicinal and field crop species, except for the representatives of the mint or deadnettle family (Lamiaceae). It populates the same place again only four or five years later.

Soil tillage systems. Basic processing depends on pre-crops. In the case of stubble cereals or some plant species that leaves the field early, it is shallow-ploughed immediately after the harvest, at 10 to 15 cm depth. At the end of September or in October, it is ploughed full depth, which should not be less than 30–35 cm, because this perennial species stays in the same place for several years. If the crops are formed on leas (meadows), shallow ploughing sets off as early as the early summer, and is repeated several times. By this method, the weeds are almost completely destroyed, particularly those perennial ones, which are extremely undesirable in a plantation of lemon balm (creeping thistle, Johnsongrass, Quackgrass, Bermuda grass). Light soils are ploughed to a somewhat smaller depth (22–25 cm). However, on extremely light soils, soil cultivation is necessary to be performed in the spring, when sowing or the planting of seedlings is planned. All actions, as well as terrain alignment, should be carried out by the end of October at the latest if lemon balm is planted in autumn. Planting preparation is done just before the planting of lemon balm, and above all, it should provide a loose surface layer up to 15 cm deep. This will create better conditions for root development.

Fertilisation with organic and mineral nutrients. Lemon balm gives the best yield if it is grown on a plot that was fertilised with manure the year before. For the basic mineral nutrition, it is organic fertilisers that are mainly utilised, such as manure and compost, and one of the compostable plants is also lemon balm itself. The total above-ground part biomass (without gathered leaves) represents compostable leftovers, which, depending on weather conditions, amounts to 12 to 15 t/ha on average, which makes up about 50% of the total mass that occurs in the processing of lemon balm leaf (Filipović, Ugrenović, 2013). For the production of lemon balm, certain mineral fertilisers are used in the amount of about 160–180 kg/ha of nitrogen, 60–70 kg/ha of phosphorus and 180–200 kg/ha of potassium. These quantities should be corrected depending on the results of soil fertility control. The basic treatment applies the total amount of phosphorus and potassium and 30% of nitrogen, whereas the rest of 70% nitrogen is applied in pre-sowing soil preparation. In the spring, supplementation is done with 60–70 kg/ha of nitrogen. Lemon balm responds well to foliar fertilisers, too.

Different types of basic mineral fertilisers can be applied in lemon balm plantations (NPK (15:15:15), DAP, MAP, MKP and other commercial fertilisers). To the listed fertilisers, "supplements", mainly nitrogenous ones, are added, such as: K_2SO_4 (potassium sulphate) or NH_4NO_3 (ammonium nitrate). One of more suitable fertilisers (52% of P_2O_5 and 34% of K_2O), or so-called Monopotassium Phosphate (Tepecik et al., 2016). In terms of essential oil contents, it has been found that the application of MKP affords significantly more essential oil compared to the use of other commercial fertilisers. The highest content of the essential oil component, such as: gerenial, neral, citronellal and β-caryophyllene.

The assortment. There are a large number of lemon balm varieties in the world, and they are mostly selected for certain regions of growing. In our country, only the variety called "Citron" has been registered, and is produced and sold at the Institute for Medicinal Plants Research "Dr Josif Pančić" from Belgrade. It is resistant to frosts and drought, it is a good bee pasture and successfully prevents erosion. There are many varieties grown in the world such as: *Aurea*, *Citronella*, *Lemona*, *Lorelei*, *Erfurter Aufrechte*, *Soroksari*, *Gold Leaf*, *Dutch Duck*, *Quedlinburger Niederlegende* and others.

Sowing/planting. For the successful production of lemon balm, it is necessary to properly establish seedling production, which, in the case of this plant, represents the most adequate production technology. The sharing of roots or the use of cuttings, as well as the direct sowing of seeds, do not meet either technological or economic indicators of production. To form one hectare of seedlings, it takes 1.0 to 1.2 kg of lemon balm seeds. The sowing for the production of seedling is carried out in warm and/or cold beds. In practice, almost always, the production of seedlings is applied through cold beds. The soil for the beds is well prepared and aligned. Sowing is done in the period from May to July. The soil on which seedlings will be based is prepared according to tried and tested methods, with previously performed sterilisation. In practice, however, ready-made sterilised substrates are used, enriched with the necessary nutritional macro- and microelements with the appropriate pH value and excellent water-air regimen. These substrates have the advantage over the substrates that can be prepared on one's own. After the application of the substrate, one moves on to the sowing of seedlings. The sowing is done in rows at a distance of 10-15 cm between rows. The rows are formed as shallow furrows, from 0.5 cm to the maximum of 1.0 cm. For seeding of 1 m2, 5-7 g of seed is needed. The seedlins are left in the beds until the autumn, when when they are planted at an inter-row distance of 70 cm, and in the row of 30 cm. As stated in

the section "Agroecological conditions", for this fragrant plant, originating in the Mediterranean, it is best to provide soils exposed to sunlight and rich in humus, low-acid to neutral, with low alkaline reaction. Planting is done at a depth of 6 to 8 cm. Planting is carried out manually (dibble) or mechanically (vegetable planters).

Care measures. Seedling care includes hilling, inter-row cultivation, additional fertilzation, irrigation and possibly, filling empty spaces. Inter-row cultivation and hilling should be done at least two to three times a year. The first hilling is done as soon as the first weeds or epidermis appear, and another 15-20 days after the first ones. Hilling is done by need, i.e. according to the state of weediness on the plot. In practice, the last hilling in a season is performed immediately before mowing. Given that lemon balm is grown because of its above-ground part biomass, the additional fertilzation with nitrogenous fertilisers is of prime importance for yield. It is best to apply nitrogen fertilisers on two occasions. The first feeding is carried out immediately before the first hilling with about 30-35 kg/ha of nitrogen. The second additional fertilzation is done with the same amount after the first mowing. As far as the older seedlings are concerned, they need to be fertilised with 50 to 60 kg/ha of active NPK matter. After this fertilization, some deeper hilling should be carried out in order to "put down" the phosphorus and potassium to the available level of the root system. It is desirable to irrigate lemon balm, primarily because lemon balm is a plant species of humid areas. If there is no possibility of irrigation, the yields will be reduced, as will the number of mowings. When planting seedlings, in order for the plant to start better, it is mandatory to irrigate it before and after planting, as well as in the initial stages of plant starting. As lemon balm is one of the plants for which larger amounts of water are favourable, if possible, it is necessary to irrigate it (Filipovic & Kljajic, 2015). Although in some cases the application of this measure has a slight influence on the decrease in the yield and quality of the raw material obtained (Ozturk et al., 2004). In the Republic of Macedonia, in lemon balm seedlings grown according to organic methods, after each mowing, the seedlings are irrigated with 50 mm of water (Mihajlov et al., 2013). The filling of empty places for lemon balm seedling is of great importance, because for many years it remains on the same soil. This is done until the fourth or fifth year of growing, and only stronger and more developed seedlings are used.

The characteristic disease of lemon balm are lemon balm leaf freckles, caused the appearance of grayish and black spots on the leaves, as well as rust. Lemon balm leaf freckless of the matrix leaf is economically the most important disease in our area. This disease is caused by the fungus *Septoria melissae* Desmazieres. It con-

sists of ubiquitous and annual damage in nursery gardens and old plantations. The first symptoms of the disease appear as early as the spring, and under favorable conditions (high humidity), the presence of leaf freckless increases. The appearance of this disease is noticeable in the form of mostly black or brown spots in the internervous parts of the leaves. The disease develops during most of the season and, in a severe attack, the damaged leaves fall off the tree. In order to suppress its presence, copper, benomyl and potassium bicarbonate based products are used more as a preventive measure, and treatments should begin at the first signs of the disease. During the vegetation period, one can, for example, use the combined systemic and preventive Signum fungicide in the amount of 1.2 kg/ha and the contact preventive fungicide Polyram DF in the amount of 1.8 kg/ha. The lemon balm rust disease (*Puccinia melissae* Pers.), which is mentioned in literature, has not been observed in our country. In literary sources (Stanev, Lambev, 2011) the following are also mentioned: *Phylosticta melissae* Bub., *Cilindrosporium melissae* Massal., *Erysiphe galeopsidis* De et Merat. And very rarely *Sclerotinia sclerotiorum* Lib. The most commonly occuring pests are: Halticinae flea beetles, certain cycadas (*Eupterix atropunktata* Goeze, *E. collina* Flor., *Empoasca flavescens* Fabricius) and shielded hardheads, whose number is usually small, and, as such, does not endanger the survival of the seedling, so it is not necessary to implement their suppression. The twospotted spider mite (*Tetranychus urticae* Koch.) can be found here and there, and they feed on leaves where there may be a phenomenon known as bronze leaf disease. Sporadically, the presence of plant lice can be recorded, whose appearance and number does not endanger the sustainability of seedlings.

Harvest. In order to get high quality drugs, among other things, it is necessary to take into account the time and the method of mowing. Lemon balm is mowed twice a year, and with full agrotechnology and suitable agroecological conditions, this number can be increased. The mowing time depends on the purpose of the raw material, whether the raw material will be used for dry leaf drug or for the production of essential oil. If lemon balm is cut to produce dry leaf drug (*Melissae folium*), it is physiologically mature when the stem reaches a height of about 60 cm, and the ratio of the leaf and stem quantity should be 60:40%. In our production conditions, the percentage of dry leaf and stems in dry overhead mass (herba) is approximately 70:30% on average for five-year-old seedlings (Stepanović, Vukomanović, 1991). Lemon balm is mowed before blossoms appear on the plant (Saeb, Gholamrezaee, 2012). At that time, the leaves are the largest, and that is when it has the highest essential oil content, which is the best quality in that period. In the conditions of dry farming, two swaths are achieved, and with a regular distribution of precipitation,

sometimes, there even occurs a third, somewhat scarcer swath. If seedlings are irrigated, it can give three, sometimes four, swaths annually. The most frequent is the first crop in the first half of June and the second one during the month of August/ September, which depends on external conditions. In the case of older seedlings, it often happens that the beginning of mowing takes place as early as mid-May.

It frequently occurs that, if mowing is done for the purpose of obtaining essential oil (*Melissae aetheroleum*), the mowing takes place a month later in relation to the mowing for the production dry leaf drug (*Melissae folium*). The main components that can be found in the leaf of lemon balm are neral, geranial, and citronellal. Under the conditions of the research organised at our Institute for the Institute for Medicinal Plants Research "Dr Josif Pančić" in Pančevo, the average content of essential oil in the lemon balm leaf was 0.16% (Stepanović, Vukomanović, 1991). After the first mowing in the phase prior to the beginning of blooming, on average, 0.08% of essential oil was obtained, in the second mowing, i.e., in the bloom stage, the content of essential oil was 0.19%, and in the third mowing in the stage following the blooming – the stage of seed production, 0.26% of essential oil was recorded. As for the age of seedlings, the highest content of essential oil was in the fourth year, and the smallest content of essential oil was in the third year of growing.

Their presence makes the lemon balm smell like lemon. Their content is higher in earlier stages of vegetation (Kitzler, 2008). In practice, for this purpose, this term of mowing is more common than mowing for the needs of distillation of essential oil in the phase before flowers appear on the plant. According to Singh et al. (2014), the highest percentage of essential oil in the above-ground part of the lemon balm in the first year of the plant is at the moment after 160 days of planting. If the first digestion is used for distillation, intensive irrigation is not recommended, because the content of essential oil in the plant is reduced, and after the first cut in the third decade of July, it can be counted with just another crack at the beginning of October, for obtaining a dry leaf drug (*Melissae folium*).

Mowing is done in a quiet, beautiful and sunny time when there is no longer rose. It is cut at a height of 5 to 10 cm above the ground. Low mowing stimulates the emergence of a large number of shoots for the next mowing. In the case of smaller surfaces, manual mowing is carried out with sickle or hair. Machine mowing can be done in several ways: a self-harvesting combine harvester, a chamomile combine with the pickup mechanism replaced by a grain cutter or a tractor side piece. It only needs to mow as much as it can accumulate, because the mass of the mass

that remains outside overnight is no longer for use because it is completely dark. The above-ground part mass must not be compressed and crushed but must be taken to dry in a loose state.

Drying. The lemon balm can be dried naturally, in a protected breathable area or in baskets, if it is a minor production. If it is not immediately put on the drying leaves, the matrix quickly loses dew and its quality decreases if it dries naturally, then it must be in a thin layer (up to 2 cm high layer). Drying can also be done in thermal dryers, at a temperature of up to 40 °C. In this part, special attention should be paid to the drying temperature, which should not exceed 40 °C, because at a higher temperature the essential oil is evaporated, and such a lemon balm is of no value as it loses its smell and healing properties. Dried leaves must be green in color, without any admixture, pleasant smell on lemon and must not be crushed. The relationship between fresh and dry above-ground part mass is 4: 1.

In order to get the right drug *Melissae folium* it is necessary that the leaves of the matrix be separated from the stem. In the past, today a smaller number of producers are separating the leaf from the stem before drying. More recently, the separation of the leaves from the stem (whether fresh or in dry condition) is carried out on specially designed machines for this purpose.

Yield. In the first year of production, fresh above-ground part weights can be obtained in the amount of 5-8,000 kg/ha or 1,500-2,000 kg/ha of dry herba. Regarding dry leaves, in the first year, the yield of dry leaves amounts to 700-1,000 kg/ha. In the following years, the yield of fresh above-ground part weight would range 12-15,000 kg/ha, or of dry herba 4,500-6,000 kg/ha. The dry leaf yield would be 2.500-3.000 kg/ha. If irrigation is applied, the yield increases by 30-40%. The yield of essential oil from the surface area unit is low, and the content of the active substances varies depends on the characteristics of the variety, the characteristics of the climate and the soil, the applied agro-technology, etc. The content of essential oil in the *Melissae folium* drug is 0.01-0.35% in relation to dry matter. The calculated yield of essential oil from fresh above-ground part mass varies from 8 to 12 kg/ha.

Packaging and storage. The best way to pack the lemon balm leaves is in cardboard boxes coated with dark paper, making sure that the leaf is not crushed. Thus, essential oil is best preserved. A good quality leaf should preserve natural green colour. The pleasant lemon-like smell is the basis of the good quality of lemon balm

leaves. A good way to pack is to press it into 50 kg bundles. This method is most often used if lemon balm is prepared for export. It can also be packaged in paper bags, but it must be ensured that the leaves do not crush. Dried and packed lemon balm is kept in clean ventilated warehouses on wooden stands or on pallets, taking care that the height of the arranged goods does not exceed 2 m. It is kept in a cool, dry and airy place. It is important not to store it with other aromatic drugs, because it will take their smells. The arranged goods in the warehouse must be kept from the presence of harmful insects and rodents.

Quality for lemon balm leaf. Regarding the quality norms, it is important that the lemon balm leaf keeps the natural green color and that it preserves the smell. The Yugoslav Institute for Standardization prescribed JUSE.B3-062 for the *Melissae folium* drug:

Criteria	**Class I**	**Class II**
essential oil – at least	0.1	0.05
chopped leaves that can go through a sieve hole of 2 mm – at the most	3	10
leaves with changed colour – at the most	4	8
other parts of the plant (peaks) – at the most	3	5
trunk parts – at the most	2	5
organic impurities (plant impurities) – at the most	-	1
non organic dirth, at the most	0,5	1
moisture – 12% at the most		
ash – 12% at the most		

On the other hand, the required quality standard Ph. Eur. 7 for the lemon balm leaf (*Melissae folium*) according to the European Pharmacopoeia (Ph Eur 7.0., 2011) is that the dry lemon balm leaf contains the total hydroxy-amino derivatives expressed as rosmarinic acid (C18H1608, Mr = 360.3) at a minimum 1.0 per cent (dried drug). Foreign matter: Trunks size greater than 1 mm max. Max. 10%; Other foreign matter 2%; loss by drying: max. 10.0% and total ash, max. 12.0%. According to the World Health Organization guidelines in the WHO Monographs on Selected Medicinal Plants - Volume 2 of 2004 (WHO, 2004) for the drug of *Melissae folium*, it is prescribed that, in addition to drug testing, the presence of specific microorganisms, pesticide residues and heavy metals, determine the presence of other foreign matter, loss of drying and total ashes for which the values from the aforementioned European Pharmacopoeia are prescribed (Ph Eur 7.0., 2011).

Cost-benefit analysis of lemon balm. In the following section are given Tables 1-3, which show the indicative cost benefit analysis of production of lemon balm leaf, designed for an area of one hectare.

Table 1. *Cost benefit analysis of lemon balm leaf production in the first year of cultivation, for an area of 1 ha*

Variable production costs	(€)
Mineral fertilization: starting and in the supplemental feeding	400
Preparations for plant protection	40
Manure	225
Seed	110
Ploughing to 30 cm	90
Application of mineral fertilizers 2x	26
Loading manure	15
Exporting and spreading manure	30
Harrowing (disking)	20
Presowing treatment	20
Seedling production	380
Watering	80
Seedling planting	28
Inter-row cultivation 2x	35
Tretmant with preparations for plant protection	25
Moving (2x in vegetation season)	40
Transport to dryer	60
Seasonal working labor	850
Drying	120
Total costs (T)	**2.594**
Income	
Leaf yield (600 kg) x price 2,8 (€) (P)	**1.680**
Total income	
Profit (P – T)	**-914**

Note: *The middle exchange rate of NBS on: October 22, 2018. it was 118.9350 dinars for 1.0 euros (Euro). Mechanical services are given on the basis of the price list of the Cooperative Association of Vojvodina for 2017. Part of the data presented was obtained from the production part of the Institute for Medicinal Plant Research "Dr Josif Pančić" from Belgrade, located in Pančevo.*

Table 2. *Cost benefit analysis of lemon balm leaf production in the second year of cultivation, for an area of 1 ha*

Variable production costs	(€)
Mineral and foliar fertilization	160
Preparations for plant protection	40
Application of mineral fertilizers 2x	26
Inter-row cultivation 2x	35
Tretmant with preparations for plant protection	25
Moving (2x in vegetation season)	40
Transport to dryer	120
Seasonal working labor	510
Drying	400
Total costs (T)	**1356**
Income	
Leaf yield (2000 kg) x price 2,8 (€) (P)	**5.600**
Total income	
Profit (P – T)	**4.244**

Note: *The middle exchange rate of NBS on: October 22, 2018. it was 118.9350 dinars for 1.0 euros (Euro). Mechanical services are given on the basis of the price list of the Cooperative Association of Vojvodina for 2017. Part of the data presented was obtained from the production part of the Institute for Medicinal Plant Research "Dr Josif Pančić" from Belgrade, located in Pančevo.*

The cost statement for the production of lemon balm leaf in the first year of growing on an area of one hectare is shown in Table 1. The profit is -914 €, that is, it was not realised. Since the yield of lemon balm leaf increases from year to year, the profit is also increased. The profit in the second year of the growing of lemon balm amounted to 4,244 € (Table 2), whereas in the third year, it amounted to 5,414 € (Table 3). In this regard, as in our agro-ecological conditions the seedlings of lemon balm are maintained on the average of four to five years, for the sake of maters, for an average of four to five years, from what is shown here, one can see how much achieved profit can be expected. Accordingly, it can be noted that this production is beneficial or profitable.

Table 3. *Cost benefit analysis of lemon balm leaf production in the third and other years of cultivation, for an area of 1 ha*

Variable production costs	(€)
Mineral and foliar fertilization	240
Preparations for plant protection	40
Application of mineral fertilizers 2x	26
Inter-row cultivation 2x	35
Tretmant with preparations for plant protection	25
Moving (2x in vegetation season)	40
Transport to dryer	120
Seasonal working labor	560
Drying	500
Total costs (T)	**1.586**
Income	
Leaf yield (2500 kg) x price 2,8 (€) (P)	**7.000**
Total income	
Profit (P – T)	**5.414**

Note: *The middle exchange rate of NBS on: October 22, 2018. it was 118.9350 dinars for 1.0 euros (Euro). Mechanical services are given on the basis of the price list of the Cooperative Association of Vojvodina for 2017. Part of the data presented was obtained from the production part of the Institute for Medicinal Plant Research "Dr Josif Pančić" from Belgrade, located in Pančevo.*

Conclusion

As stated, in our country ranging from agroecological, human and technological conditions, there are favorable conditions for successful production of leaf, aboveground part mass and essential oil of lemon balm. However, the insufficiently stable market for this type of raw materials (one year of demand is high, next year is small), as well as the lack of workforce in the countryside, reluctance and rapid abandonment of growing, greatly "endanger" the production of lemon balm as a species that can satisfy domestic and export needs. It seems that, even though we possess appropriate agroecological and technological conditions, the human factor, the technical and organisational one in particular, as well as that with the provision of unskilled workforce, make the current production of lemon balm at a low level, which is in contrast to the fact that the production of lemon balm leaf, but also of its essential oil, is more profitable compared to a large number of types

production in some other branches of agriculture. The wide use and the possibility of developing new, as well as a large number of official and traditional preparations, make it possible to increase the area under the grown lemon balm.

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THE QUALITY OF SUPPLY CHAIN ARRANGEMENTS AND WHEAT FARMING SUSTAINABILITY IN SERBIA

Žaklina Stojanović[1], Bojan Ristić[2]

Abstract

Strong negotiating power of upstream and downstream sectors over farmers in the supply chain are often nominated as important factors that negatively affect farming sustainability in the long run. The paper objectives are to map existing institutional arrangements in the wheat sector in the Region of Vojvodina (Serbia). Additionally, the research explores the sustainability through producers' opinions regarding quality of institutional arrangements and its role in achieving sustainable farm businesses including collection of information on the adoption of good environmental practices. The analysis generally explains the drivers of change and possible set of future farmers' strategies aiming to improve their position within supply chain. Sustainability is observed using the triple bottom line as unity of economic, social and environmental goals. Additionally, the research shed light on market failures and protection policy directed toward prevention from unfair trading practices in Serbia.

Key words: *wheat, supply chain, institutional arrangements, sustainability, strategies.*

Introduction

From the theoretical point of view, modernisation in agricultural sector has contributed to a sort of bimodal transformation - reduction in farm numbers is usually followed by capital concentration. However, community-based coordination mechanisms has led to further sector development by creating a new form of institutional arrangements that more intensively include different aspects of farms sustainability (Renting, Van der Ploeg, 2001). Institutional arrangements are also seen as important factor of overcoming market failures as well (Eaton

1 Žaklina Stojanović, Ph.D., Full Professor, University of Belgrade, Faculty of Economics, Kamenička Street no. 6, 11000 Belgrade, Serbia, Phone: +381 11 3021 162, E-mail: zaklina@ekof.bg.ac.rs

2 Bojan Ristić, Ph.D., Assistant Professor, University of Belgrade, Faulty of Economics, Kamenička Street no. 6, 11000 Belgrade, Serbia, Phone: + 381 11 3021 049, E-mail: bristic@ekof.bg.ac.rs

et al., 2007). Basically, there are four level systems of institutions that describe overall quality of arrangements set among stakeholders (Williamson, 2000). First level is linked with complementary institutions - formal and informal (so-called the social embedded-ness level). The institutional environment is recognized as the second level and refers to formal rules implemented in the sector. The governance of contractual relations are in the focus of the third level, while ex ante incentive alignment and efficient risk bearing belong to the final - fourth level. If the system is described mostly using different formal-informal relations, economizing is less possible and system is less efficient.

Because of the historical, but also environmental and social factors, agriculture in Vojvodina significantly differs from agriculture in the central part of Serbia. The average farm size is quite larger; the agriculture is more specialized and based mostly on crop production. This region is generally more open to agricultural innovations than the rest of Serbia. The objectives of this paper are to map existing institutional arrangements across in the Region of Vojvodina in the wheat sector and to identify the main attributes characterizing institutional arrangements. Having in mind previously mentioned, this paper explores sustainability of farms practices in the region through producers' opinions regarding quality of institutional arrangements and its role in achieving sustainable farm businesses (in economic, social and environmental context). The research explores the extent to which some institutional arrangements are more likely to be adopted by certain farmers groups, based on the key socio-demographic characteristics of farms.

It is also important to stress that the food chain stakeholders' attitudes towards farms sustainability were explored using qualitative research techniques during the preliminary phase of the research. Two focus groups discussions were conducted in May 2017. Additionally, all obtained results were tested during discussion with food chain stakeholders in the form of participant workshop (participatory approach). The understanding of sustainability in the region is connected with the environmental point of view - our farmers usually emphasize importance of different sustainability aspects such as biodiversity, use of chemicals and the importance of four-course system in crop production. However, producers mainly link sustainability with economic conditions such as wheat price, price volatility, production cost and input-output parity. The identified approach reflects certain "traditionalism". Our experts pointed out also that farmers less than 40 years old might have a different approach. According to the experts opinion farmers think about economic part of their business mostly, while social or environmental aspects are less important for them.

The analysis is based on farms performance in 2016/17 (production, average price for the commodity, self-perceived efficiency etc.). Sales channels are observed either as collective (cooperatives, POs and unions) or individual (wholesalers, retailers, exporters, local shop and markets, restaurants or processors). Different characteristics of dominant institutional arrangements (the main sale channels) are further observed by asking more specific questions about characteristics related to formal or informal sale contracts, duration of contract arrangements, involvement of different criteria for price definition, payments and standards involved etc. Farmers were also asked to mark overall quality of sale arrangements, particularly on the context of achieving sustainable farm practices.

The research method and sample

The exploratory producers' survey is based on structured questionnaire (qualitative research insights was previously obtained by the focus groups discussions in 11 European countries). A random selection of the sample units is based on two main levels of stratification: the district level in the Region of Vojvodina, and farm size. The analysis is focused on young farmers (less than 40 years) and farms above 20 ha of agricultural area of wheat as the additional criteria. The sampling frame, i.e. the list of primary producers is obtained using the Census data (2012). The sample of primary producers in the region for study is representative for the targeted population. The data collection was supported by the agricultural extension service in the Region of Vojvodina. The interviewing procedure was based on the H2020 SAUFISA guidelines[3]. The interviews were conducted in December 2017 / January 2018. The interviews were lasting on average 35 minutes and conducted using the face-to-face method. The sample size is 140.

Table 1. *The interviewed farms characteristics & farm size*

Characteristics	< 2 ha	2 to 10 ha	10 to 50 ha	50 to 250 ha	> 250 ha
Wheat_Total_Area					
Total_area_av	-	5.60	23.59	102.91	612.50
Comm_area_av	-	2.24	8.08	35.53	181.67
Comm_income_av	-	1138	7700	32486	198860
Comm_price_av	-	0.139	0.160	0.146	0.143

3 The material that lies at the basis of this paper was collected during the European research project H2020 SUFISA. This project has received funds from the EU's Horizon 2020 research and innovation programme under Grant Agreement No 635577.

Characteristics	< 2 ha	2 to 10 ha	10 to 50 ha	50 to 250 ha	> 250 ha
Cost_share_(%)	-	79.50	78.73	75.36	74.17
Comm_sold_(%)	-	72.00	77.69	87.15	87.50
Coll_channel	-	11	41	46	3
Ind_channel	-	12	19	16	9
Total_no	-	20	52	56	12
Age_av	-	45.90	46.25	47.69	44.25
Wheat_Comm_Area					
Total_area_av	7.44	18.84	70.89	244.60	1380.00
Comm_area_av	1.12	4.52	22.22	74.35	510.00
Comm_price_av	0.142	0.142	0.158	0.144	0.143
Cost_share_(%)	70.63	79.30	77.23	75.00	71.67
Comm_sold_(%)	73.75	72.73	86.89	84.75	90.00
Coll_channel	5	32	53	12	0
Ind_channel	3	19	17	14	3
Total_no	8	44	20	20	3
Age_av	44.88	47.48	47.05	45.45	41.67

Source: *SUFISA farms survey (RS – wheat)*

The larger farms dominate in our sample (the smallest number of farms belongs to the group of less than 10 ha of total area). Young farmers represent a slightly more than one third of our sample. On average, the youngest farmers belong to the group of the largest farms (44.25 years based on total area and 41.67 based on wheat area on average). Higher educated farmers manage the largest farms on average (around 260 ha in total and 93 ha in wheat area). Traditional gender structure is manifested by larger share of male farmers, while the share of lower secondary education level among farmers is almost 70%. Self-reported income is calculated using data on average price and quantity sold per farm during the observed period. The average income per farm is 33,418 euro (based only on wheat production). The information about the cost of wheat production is collected as well, and the average share of cost in total income collected only in the wheat production is 76.5% (self-reported).

Based on the data of total area of the surveyed farms, both rented and owned, and also area used for wheat (Table 1), as expected, the higher average income in total is generated on farms of larger size. However, it is interesting to notice that the average wheat price is higher for the group of farms from 10 to 50 ha in comparison with other firm size groups (both in total and wheat area). In addition, collective sales channel dominates the individual in all firm size groups except

for farms above 250 ha. However, the youngest farmers on average belong to the group of the largest farms (44.25 years based on total area and 41.67 based on wheat area on average).

Concerning the age of farm owners/managers (see Table 2), the highest number of farms (n=48) is in the age range under 40 years with an average age of 34.59, while the group of older farmers (>65 years) with an average age of 68 years consists only of 7 interviewed farmers. The total wheat income generated is highest for the group of farmers under 40 years, while farmers from 50-65 years old are capable to achieve the best price of wheat at the market. However, the highest share of cost in generated farm income is reported in this group as well, referring to implementation of old technology or absence of innovations. Implementation of low input technologies also appears in the oldest group of interviewed farmers.

Table 2. *The interviewed farms characteristics & age structure*

Wheat_age	<40	40-50	50-65	>65
Total_area_av	138.88	103.22	74.14	47.57
Comm_area_av	45.88	37.04	18.77	16.14
Comm_income_av	46434	36306	19057	16064
Comm_price_av	0.141	0.145	0.165	0.145
Cost_share_(%)	76.67	74.00	81.48	69.29
Comm_sold_(%)	83.78	81.00	79.27	81.43
Coll_channel	28	34	34	7
Ind_channel	21	15	17	3
Total_no	48	40	44	7
Age_av	34.59	46.10	57.16	68.00

Source: *SUFISA farms survey (RS – wheat)*

As far as farmers education is concerned, higher educated farmers manage the largest farms on average (around 260 ha in total and 93 ha in wheat area). The highest number of collective arrangements is present in the group of lower secondary educated farmers (n=71), while higher secondary educated farmers report the highest share of collective arrangements in total number of arrangements. The individual arrangements are overrepresented in the group of higher educated farmers with traders/exporters as the main counterpart. Relative importance of individual sales is higher also for the group of primary educated, oldest farmers who decide to sell their products at the local markets.

The research results - collective and individual sales arrangements

As far as sales frequency related to collective (Coll) and individual (Ind) sales channels in the wheat sector are concerned, results are n=99 for collective and n=41 for individual. Notably, there are four types of wheat producers in the Republic of Serbia – individual producers (family-owned farms), agricultural holdings, agricultural companies and agricultural cooperatives. However, small family-owned farms dominate the total number of producers. The fact is that farms with more than 20 ha represent only 3% of the total number of farms. So, the orientation of small producers towards collective sales channels and still existing trust in them is inherited from the socialist era. Large producers mainly sell directly to the wholesalers or exporters. Concerning collective and individual arrangements in general, characteristics of farmers in our sample are presented in Table 3.

Table 3. *Collective and Individual sales arrangements*

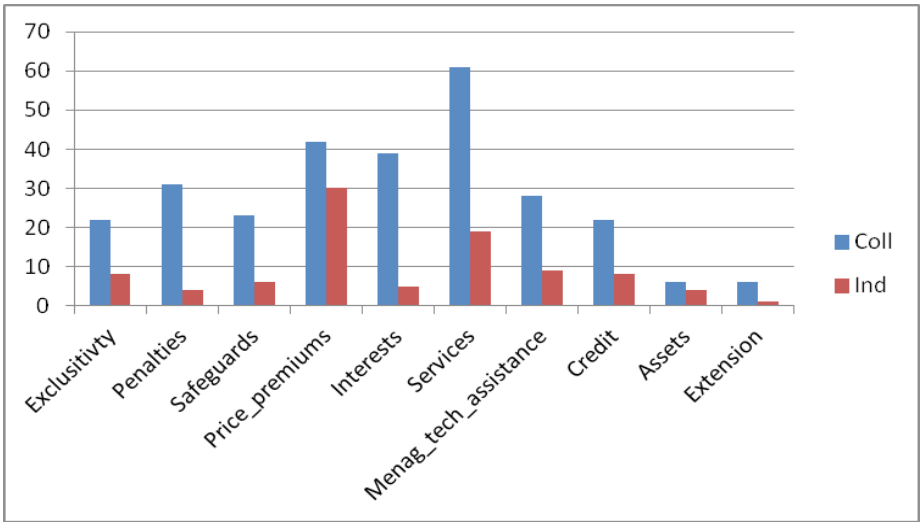
Wheat_sale_channel	Coll	Ind
Total_area_av	63.09	202.02
Comm_area_av	19.69	66.32
Comm_income_av	17511	71827
Comm_price_av	0.143	0.166
Cost_share_(%)	176.51	78.90
Comm_sold_(%)	82.91	77.93
Total_no	99	41
Age_av	46.00	43.95

Source: *SUFISA farms survey (RS – wheat)*

Figure 1. depicts primary characteristics of collective and individual sale arrangements. In relative terms needed exclusivity of sales (Exclusivity) and primary producers crediting (Credit) and eventually, managerial support or technical assistance they receive from buyers (Menag_tech_assitastance) are rather similar in both "collective" and "individual". On the other side penalties if you fail to deliver the agreed quantities (Penalties) can be considered as residual in the case of an "individual", but are quite significant in the case of "collective" selling arrangements. The same could be underlined in the case of safeguards if the buyer fails to fulfil the agreement (Safe), interest in case of delayed payments from the buyer (Interest), and services that buyers provide to the primary producers (Service) – like storage, transport and handling. However, regarding the price premiums for delivering higher quality products (Price_premiums) "individual" significantly outperforms "collective". This can be partly explained by higher bargaining

power of large farms relative to the small ones – which mainly use collective sales channels. Providing special assets, technology and/or machinery (Assets) and use of the automatic extension mechanism in the agreement (Extension) can be neglected in both cases in relative terms.

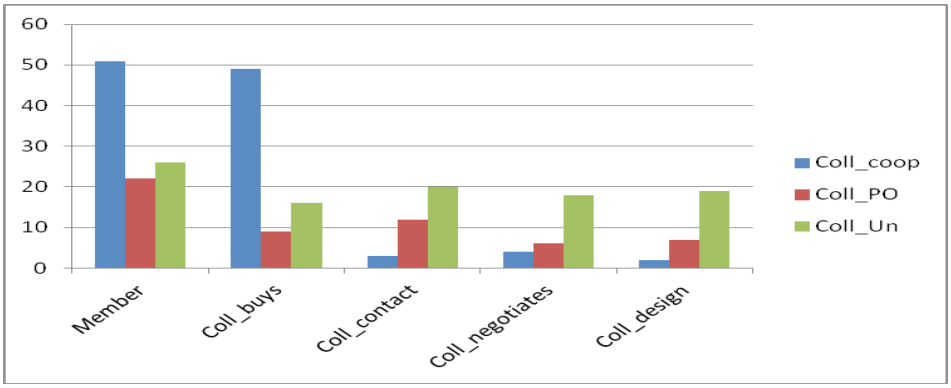
Figure 1. *The characteristics of collective and individual sale arrangements*



Source*: SUFISA farms survey (RS – wheat)*

Figure 2. further shows the statistics related to collective sales channels by answering the question what collective organisations do on behalf of their members. There are three categories of interviewed farmers that use some aspects of the collective sales channels in their practices – members of cooperatives (Coll_coop), members of producers' organisation (Coll_PO), and members of farmers' union/association (Coll_Un). The dominant portion of the total of these three categories belongs to the cooperatives. This organisation mainly serves as the buyers of their member's production, and in sporadic cases they help them to define and design their buying contracts, negotiate with final buyers and provide them with necessary contacts. The frequencies of producers' organisations and farmers' union/associations are similar. However, it seems that farmers' union/ associations are more valuable to the farmers than producers' organisations, regarding the buying, contracting, negotiating and contracts design activities.

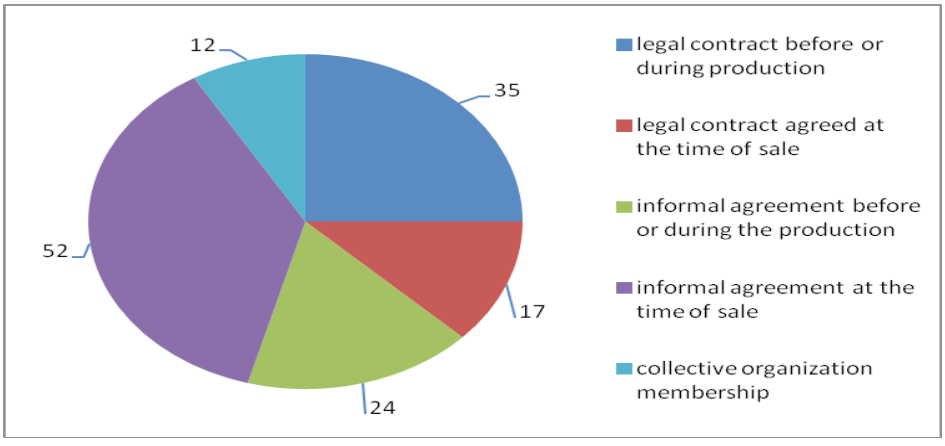
Figure 2. *Collective sale characteristics – What do collective organisations do on behalf of their members?*



Source: *SUFISA farms survey (RS – wheat)*

Formal and informal arrangements co-exist (Figure 3), although the informal arrangements are more popular and therefore, widely accepted. The informal agreement at the time of sale is most represented in our sample (n=52), followed by legal contract before or during production (n=35). The lowest frequency is recorded for collective organization membership (n=12). It might be controversial as collective type of sale dominates our sample. It can be explained by specific characteristic of the Serbian "cooperative" sector were limited number of farmers hold membership, while the majority of farmers are only the coop-partners (so-called "kooperanti"), referring that membership is not precondition for institutional arrangement with cooperatives in Serbia.

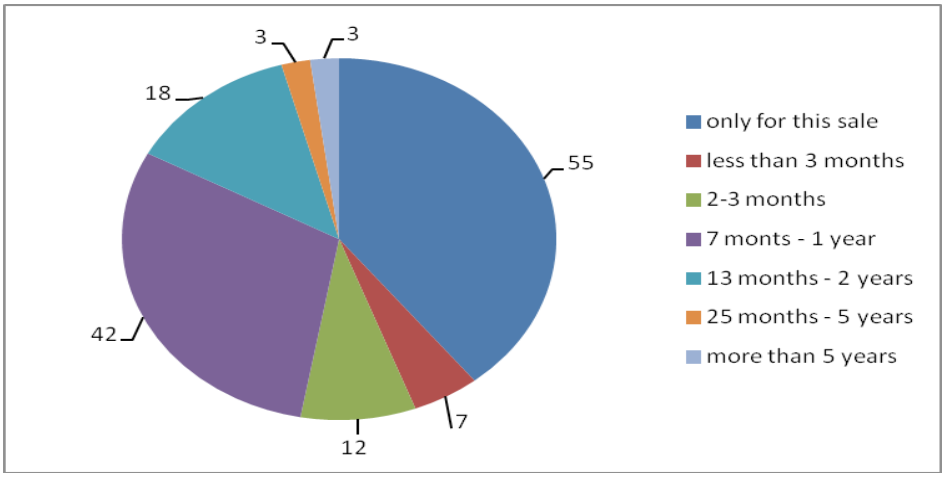
Figure 3. *Type of agreements*



Source: *SUFISA farms survey (RS – wheat)*

Most sales agreements are made either for particular sale (n=55), or they last between 7 months and 1 year (n=42). Surveyed farms reported limited number of medium (n=21) or long run contracts (n=3). As the short run arrangements between farmers and other stakeholders prevail (Figure 4), a lot of problems arise for our wheat farmers as they cannot count on stability of price arrangements. Without stable price arrangements, it is hard to run the farm business successfully.

Figure 4. *Duration of agreement*



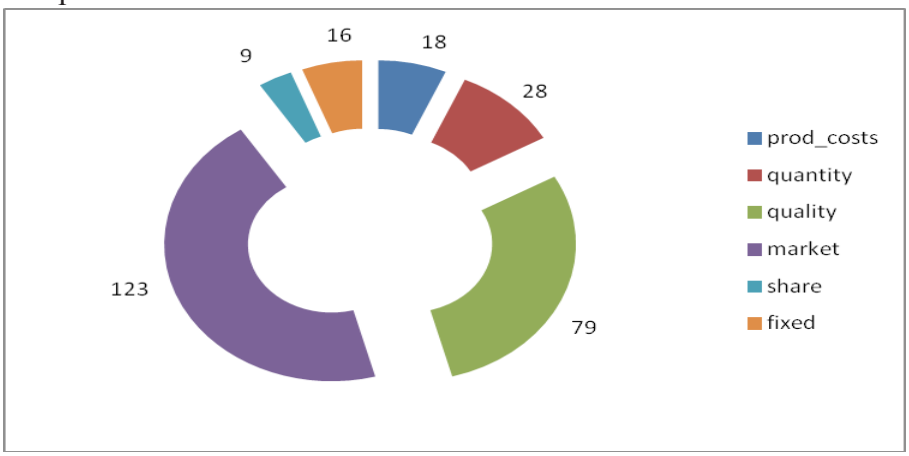
Source: *SUFISA farms survey (RS – wheat)*

The price is self-reported and based on average wheat price during the observed year (2016/17). The average price reported by farmers for the year 2016-17 is 0.15 EUR per kg. However, farmers who are involved in individual sale channels managed to reach a higher wheat price of EUR 0.166 per kg in comparison to the collective who get a price of EUR 0.143 per kg, on average. In the total sample of farms, production costs as share of selling price vary between 40-100%, being on average 76.69%.

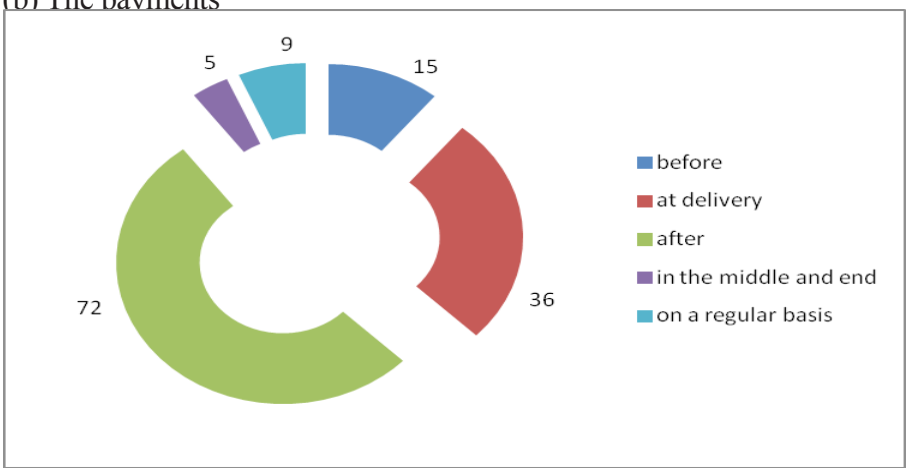
The interviewees were also asked to explain how the contract arrangement was set related to price discovery and payments to farmers. Figure 5 - panel (a), shows interviewed farmers reasoning of how the price they received is defined. Predominant frequency belongs to the market supply and demand conditions, while the rest of the pricing formation rests on the product quality. Other elements, such as farmer real production costs, quantities they produce, share in organisation's to which they sell, or relying on fix price based on the predefined agreement is the extremely rare reasoning of primary producers regarding the wheat pricing formula.

Figure 5. *Price and delivery settlement*

(a) The price



(b) The payments

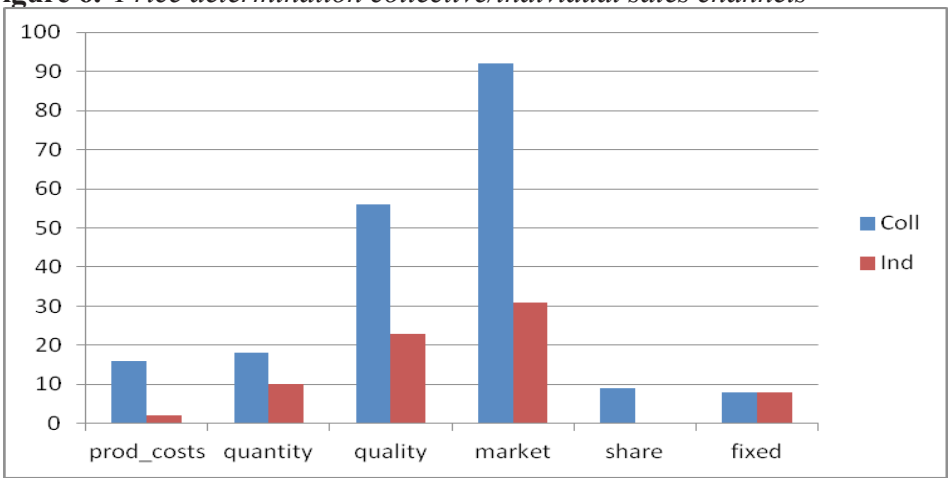


Source: *SUFISA farms survey (RS – wheat)*

On the other side, Figure 5 - panel (b), shows when the farmers get paid for delivered products. Most of the payments in this sample belong to the category "at delivery" of the product or even "after" that. Other categories are quite rare. "At delivery" category is an obvious consequence of normal market relations of primary producers with their buyers, and pricing formula mentioned above – which suggests the standard price formation. The category "after" may suggest the unfavourable position of the primary producers in the supply chain as they have to sell their products in advance, usually below the market price. If they had the opportunity to store their products and sell them in six to nine months after the harvest, the price would be much better.

Figure 6. separates the frequencies of collective and individual sales channels regarding the question "How is the price defined?" (See figure 5a) In relative terms, there are pretty close beliefs of farmers from both types of the sales channels that prices are based on delivered quality. With minor deviation, it can be said that this could also be the case with quantity. Production cost is almost unimportant in pricing formula in individual sales channels, but it is not the same regarding "collective" part of the sample. On the other side, demand and supply conditions determining price are present in both cases – with a slightly higher relative frequency in the case of "collective" arrangements. Beliefs that the price is based on the share of buying organisation's profit are negligible, and this can even be said for the facts related to the price fixing at the beginning of the agreement.

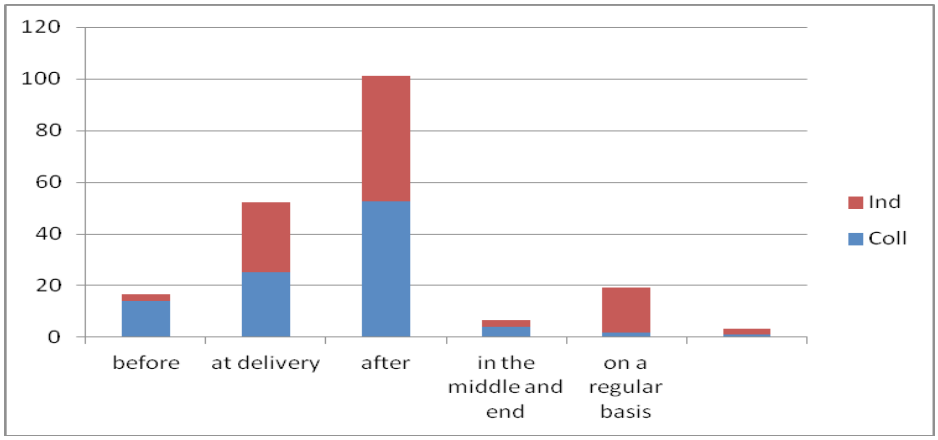
Figure 6. *Price determination collective/individual sales channels*



Source: *SUFISA farms survey (RS – wheat)*

From Figure 7, based on the relative frequencies, we can see that at delivery payments are more common to the individual sales channels, while payments before are more common to the "collective" ones. The last statement is in line with our previous finding of the inferior status of the small farmers and their apparent shortage of funds for working capital and therefore need to sell in advance. Finally, other elements of the graph show low and negligible frequencies, with important notice that payments on the regular basis are more important for individual arrangements than for collective ones.

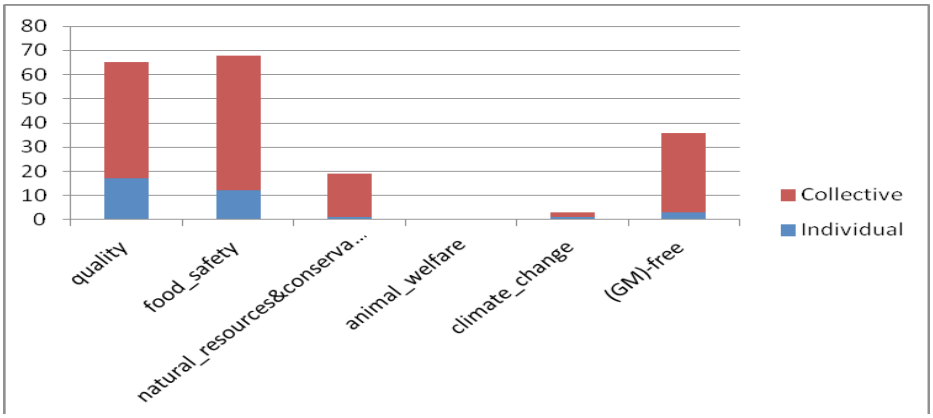
Figure 7. *Payments and collective/individual sales channels*



Source: *SUFISA farms survey (RS – wheat)*

Among the relevant standards, quality and food safety are mainly imposed to both collective and individual sales channels (see Figure 8). Animal welfare standards are not mentioned at all, while other sustainability-oriented standards (such as nature conservation and adaptation to climate change) are less frequent. Producers in Serbia are obliged to implement GM free practices.

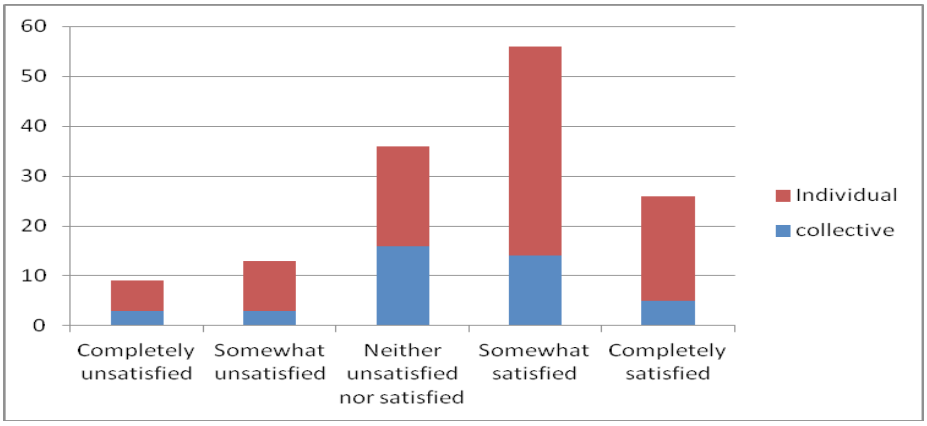
Figure 8. *Standards involved in two types of arrangements*



Source: *SUFISA farms survey (RS – wheat)*

Finally, the level of satisfaction in both sub samples indicates that farmers are generally more satisfied than unsatisfied with sales agreements (see Figure 9). However, the specific characteristics of analysed institutional arrangements still leave a lot of opportunities for further improvements.

Figure 9. *Level of farmers' satisfaction with contract arrangement*



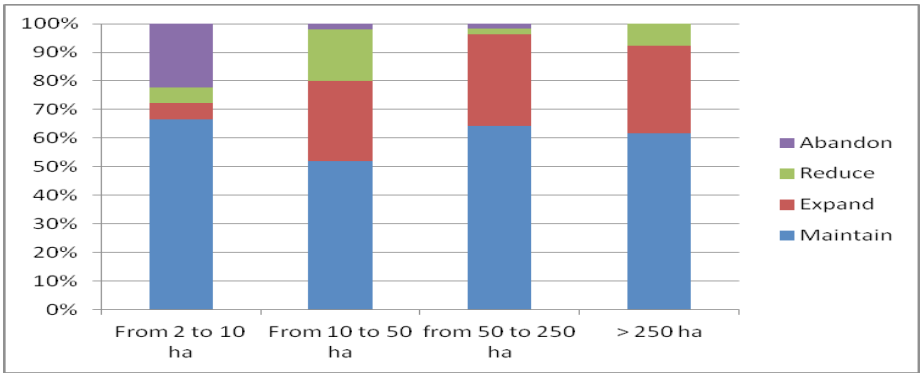
Source: *SUFISA farms survey (RS – wheat)*

The main aspects concerning benefits of existing types of contracts to farmers' sustainability are related to possibility to obtain higher prices than with some other types of arrangements. Generally, our respondents report a lower level of agreement with the following statements: (1) there are delays in the payments; (2) the production/quality standards required are too restrictive; (3) this sale agreement provides more possibilities for negotiating prices. In the case of the first statement a lower level of agreement is positive for the quality of arrangement applied in practice, while the third statement addresses reduced space for negotiation that farmers have in the context of price definition. Non-existence of production/quality standards or existence of lower requests for standards implementation cannot be considered as positive.

Discussion - farms strategies and main drivers

One of the main goals of this research is to stress out the future perspectives of wheat farmers in the Region of Vojvodina having in mind their own point of view, as well as to define the importance of different factors that will influence sustainability of farmers businesses in the long run. Farmers were asked to mark importance of different factors that were previously identified during the qualitative research such as climate change, price fluctuations (both of inputs and outputs), changing of consumer preferences, access to loans and credit, and changing regulation and policy measures.

Figure 10. *Strategies in the next 5 years*



Source: *SUFISA farms survey (RS – wheat)*

In the strategic context, the surveyed farmers reported what their strategies for the development of wheat within the context of their farm business in the coming five years are. The majority of farmers reported to maintain production. A slightly different pattern becomes for the group of farmers with total area from 10 to 50 ha, where a higher share of other strategic alternatives was noticed. Further expansion of production is more important for larger farmers (above 50 ha) than for other groups, while the highest share of response option "to abandon farming" was reported in the group of 10 to 50 ha. When it comes to age structure of farmers, younger farmers (below 40 years) are more prone to expand farm activity, while abandonment or reducing of farm activity is more present for older farmers. It is also important to notice that among farmers from 50 to 250 ha the group of older farmers is overrepresented, and many of the interviewed farmers in this group have no expectations regarding successors. It also refers to unfavourable demographic situation (aging population in the rural areas in Serbia).

When it comes to the specific strategies to be implemented in farmers' production activities, our research shows that insurance and investments dominate among selected options of the interviewed wheat farmers, which can be considered a favourable result from the aspect of preserving the financial stability of farms. While insurance is important for future activities for all farm size groups, investments are more present in the groups of larger farmers (above 50 ha of total area). The small farms (below 10 ha) have no plans or will try to externalize production activities. Similar to production, market plans include diversification and new forms of partnership in the context of better coordination and cooperation both among farmers and between farmers group and other food chain stakeholders

in Serbia. Furthermore, the active role of farmers is recognized in the area of sales channels innovation and income insurance as the strategic response to price fluctuations. However, almost one third of the interviewed farmers have no plans for their production activity in the future, while the lowest number of responses belong to farmers intentions to organize organic or other forms of production with added value.

Final remarks

It seems that formal and informal arrangements co-exist, although the informal arrangements are more popular and therefore, widely accepted in the observed sector. The informal agreement at the time of sale is most represented in our sample, followed by legal contract before or during production. The average wheat price is higher for the group of farms from 10 to 50 ha in comparison with other farm size groups (both in total and wheat area). Farmers who are involved in individual sale channels managed to reach higher wheat price of EUR 0.166 per kg in comparison to the collective price of EUR 0.143, on average. The price of wheat is in most cases defined based on the market supply and demand conditions.

Most sales agreements are made either for particular sale, or they last between 7 months and 1 year. Without stable price arrangements (in medium and long run), it is hard to run the farm business successfully. Additionally, most of the farmers in this sample get paid "at delivery" of the product or even "before" that, which implies standard form of price formation. At delivery payments are more common to the individual sales channels, while payments before are more common to the "collective" ones. The level of satisfaction in both sub samples (individual and collective arrangements) indicates that wheat farmers are generally satisfied with sale agreements.

The surveyed farmers mainly report that they plan to maintain the existing production scale. The larger wheat farmers (above 50 ha) report that they want to expand production (it is more important for this group than for other groups), while the highest share of response "to abandon" farming was reported in group of 10 to 50 ha. Among farmers from 50 to 250 ha the group of older farmers is overrepresented, and many of the interviewed farmers in this group have no expectations regarding farm succession (the strong demographic problem is present). Insurance and investments dominate among selected strategies, while market plans mainly include diversification and new forms of partnership in the context of

better coordination and cooperation. It might be directly caused by domination of informal agreements and, consequently, very low level of institutional support to the food chain functioning. There are different institutions at the second level, but most of the problems occur at third and fourth level (the less efficient regulations control and non-existence of diversified risk-bearing mechanisms). Whenever low level of institutional arrangements exists, the meaning of sustainability is limited mostly to economic and financial aspects of farms functioning. Are the policy makers fully aware of market failures importance and why don't they protect primary producers from unfair trading practices?

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FADN DATABASE AND STRUCTURAL STANDARD OPERATING RESULTS ACHIEVED ON FARMS IN THE REPUBLIC OF SERBIA

Zorica Vasiljević[1], Mirjana Bojčevski[2]

Abstract

The Farm Accountancy Data Network (FADN) system represents a source of data of a high reliability level that is suitable for carrying out economic analyzes in the field of agriculture. The FADN methodological framework enables the extrapolation of data on economic results obtained from a predefined sample of farms to the entire agricultural sector. In addition, it is also possible to compare the obtained results with relevant indicators from all EU member states. Standard results calculated at the level of the Republic of Serbia represent weighted average for farms, which show the state of the entire agricultural sector in Serbia. Only farms of economic size over 4,000 € make up the field of research of the implemented FADN system in Serbia (total population). The completed sample for 2016 was made up of 1,104 farms that exceeded the set threshold at the time of data collection. The field of research of the FADN system covers about 31.8% of the total number of farms, which had about 90% of the used agricultural area (UAA) and generated a dominant part of the agricultural production value. The paper presents the structural standard results achieved in 2016 at the level of two regions of the Republic of Serbia, as well as the comparison of these indicators with the same ones achieved in the EU member states.

Key words: *farms, standard results, FADN, Serbia.*

Introduction

All EU countries through FADN system collect annually the technical, financial and economic data from over 82,000 farms which represent about 5 million farms in European Union. The FADN concept was established in 1965. After

1 Zorica Vasiljević, Ph.D., Full Professor, University of Belgrade, Faculty of Agriculture, Nemanjina Street no. 6, 11080 Belgrade-Zemun, Serbia, Phone: +381 64 14 39 942, E-mail: vazor@agrif.bg.ac.rs

2 Mirjana Bojčevski, M.Sc., Adviser, Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia, 11000 Belgrade, Serbia, Phone: +381 11 36 10 604, E-mail: mirjana.bojcevski@minpolj.gov.rs

many years, FADN has developed into a unique system that represents the obligations of the EU member states and which is regulated by EU regulations. The candidate countries also have an obligation to establish this system before accession to the European Union and in that process they are assisted by the European Commission which has financed the projects of FADN system establishment.

The first attempts to collect and analyze accounting data on family farms in Serbia were recorded in the first half of the 20th century. The first book-keeping researches on family farms in Serbia were organized at the Bureau for Science on Agricultural Management with experimental field (1921) at the Faculty of Agriculture and Forestry in Belgrade (Vasiljević et al., 2008).

After the Second World War the book-keeping research on family farms was carried out on the basis of an extensive survey made by the Institute for Agricultural Economics in Belgrade, but these investigations were discontinued in 1981 due to the lack of financial resources and the absence of interested financiers for this type of research (Vasiljević, 2012).

After two decades of interruption, attempts have been made to establish again the book-keeping researches on family farms. The Institute for Science Application in Agriculture from Belgrade, in cooperation with regional agricultural services, conducted in 2001-2004 period a survey and collected some accounting data for 1,774 family farms, on the basis of which the analyzes and researches have been carried out. Unfortunately, this survey was not continuous as well, i.e. it was interrupted in 2004 and 2005, and then again since 2006 it has been continued on a representative sample of 3,590 Serbian family farms.

Until 2011 there was no systematic and continuous monitoring of accounting data on family farms in Serbia. At the end of 2011 it started realization of the project "Establishment of the accounting data network on the family farms in Serbia". The system of recording accounting data on family farms in Serbia is based on the so-called FADN (Farm Accountancy Data Network) methodology, which is applied in EU countries. This is a unique system of microeconomic data, which is compatible with the systems existing in the EU member countries and whose function is to monitor the results of operations in agricultural enterprises, cooperatives or at the family farms. In the initial year (2011) of the FADN system establishment and beginning of functioning in Serbia, the collection of data was based on 40 family farms. In the next year (2012), the sample was in-

creased to 172 family farms with a successive annual increase in order to reach the volume of 1,104 family farms in 2015. The data collection cycle for 2016 included 1,300 farms, of which 1,292 were validated and included in the analysis. It is planned that the sample will increase up to 2,000 farms, which would be a representative sample for commercial farms in the Republic of Serbia.

Methodology

The greatest challenges of the FADN system in the EU member states is an application of the methodology for selecting farms in terms of number, type and economic size, as well as the motivation of farmers to agree to be part of the system. The dissemination of FADN results are based on "Standard Results" generated on the basis of validated and aggregated FADN Farm Returns and checked by the European Commission. The standard results are a set of statistics, computed from the Farm Returns that are periodically produced and published by the Commission. These are available in a Public Database. They describe in considerable detail the economic situation of farmers by different groups throughout the EU (Bojčevski et al., 2016).

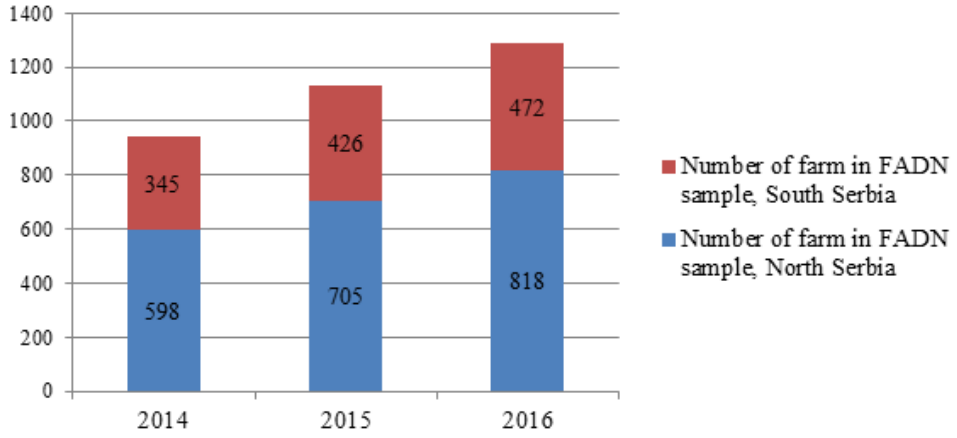
The Commission has defined each variable in the Standard Results, attempting to ensure a close correspondence between the definitions of its own variables and those of other organizations producing agricultural statistics. The Commission has also defined a method to derive main income and capital variables (Bojcevski et al., 2015).

The standard results calculated at the level of the Republic of Serbia represent weighted average for farms, which show the state of the entire agricultural sector in Serbia. According to the 2012 Agricultural Census for the Republic of Serbia, 631,552 farms were listed. Out of this number, 200,895 farms exceed the pre-defined lower limit of economic size (around 430,000 small farms are excluded). Only farms of economic size over 4,000 € make up the field of research of the implemented FADN system in Serbia (total population). The completed sample for 2016 consisted of 1,300 agricultural holdings that, at the time of data collection, exceeded the set threshold, of which 1,292 were validated and included in the analysis. The field of research of the FADN system covers about 31.8% of the total number of farms, which had about 90% of the used agricultural land, and generated the dominant part of the agricultural production value. The paper presents the structural results at the level of the two regions of the Republic of Serbia (Ser-

bia-North and Serbia-South) for 2014, 2015 and 2016, as well as the comparison of these indicators with the same ones in EU Member States.

The FADN National Committee of the Republic of Serbia has established the following criteria for determining the field of FADN research: two FADN regions - Serbia-North and Serbia-South, a threshold of economic size of 4,000 €, 10 basic types of farms, 14 basic groups of economic size and a representative number for the FADN sample of about 2,000 farms.

Graph 1. *The size of the FADN sample for the Serbia-North and Serbia-South regions (2014-2016)*



Source: *Authors based on data from FADN database*

For the purpose of this paper, the desk research method and method of interview with relevant experts have been used, method of descriptive statistics, comparative method and theoretical analyses as well. Analyzes were conducted for the period 2014-2016.

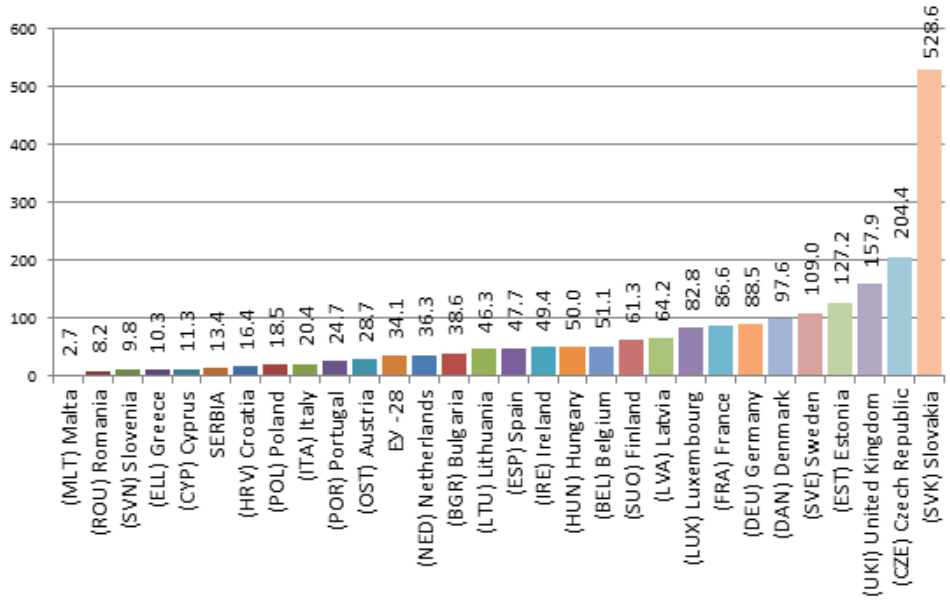
Results and Discussion

The reports obtained from the FADN database clearly show that the structure of farms varies considerably in Serbia in relation to the EU member countries, but also among the member countries themselves. One of the indicators with the most significant differences is the physical size of the farm expressed in the average size of agricultural land per farm (UAA).

Utilyzed Agricultural Area (UAA)

The farms represented in FADN are as an average the largest in Slovakia (528 ha), then in Czech Republic (204 ha) and the United Kingdom (157 ha). The farms are the smallest in Greece (10 ha), in Cyprus (11.3 ha) and in Malta (2.7 ha). The EU average in 2016 was 34.1 ha. The Republic of Serbia with an average of 13.4 ha is below the EU-28 average. The average size of the farms was generally below the EU-28 average in some countries (Austria, Poland and Romania). The utilized agricultural area in some EU countries and in Serbia is shown on Graph 2.

Graph 2. *Total utilized agricultural area (UAA) in the EU member states and Serbia (an average per farm in ha)*[3]

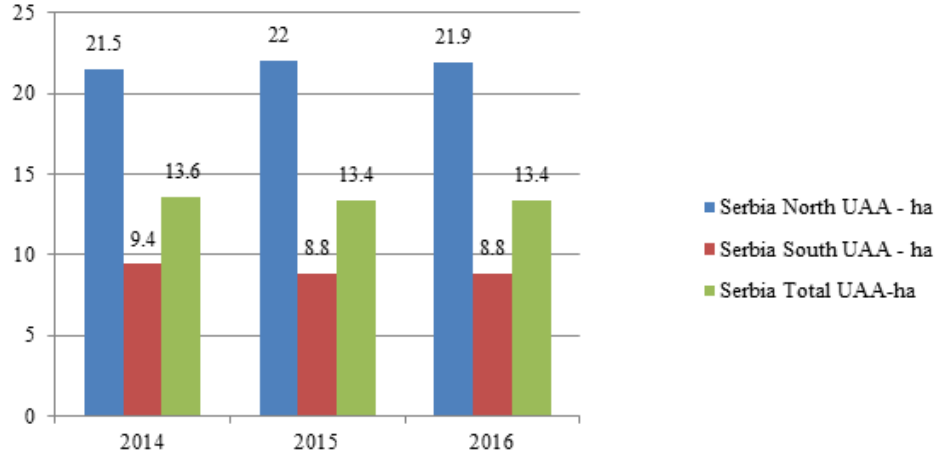


Source: *FADN database of MAFWM and FADN EU database (2015)*[4]

3 The average farm size is based on the FADN research, which does not cover all agricultural branches in the EU, but only those that can be considered as the commercial ones due to their size. Therefore, the interpretation and use of the above mentioned average farm size should be carefully considered.

4 FADN EU database - Directorate General for Agriculture and Rural Development (DG AGRI) EU-FADN, (http://ec.europa.eu/agriculture/rica/database/database_en.cfm).

Graph 3. *Total used Agricultural Area (UAA), (2014-2016), Serbia-North and Serbia-South, (an average per farm in ha)*



Source: *FADN database of MAFWM*

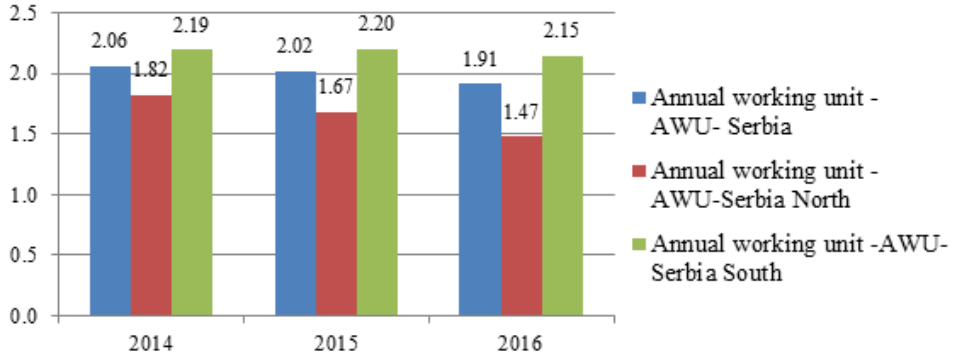
The average size of used agricultural land per farm in Serbia in the 2016 sample was 13.4 ha. The results confirm significant differences in the UAA between Serbia-North and Serbia-South regions, which can be seen in Graph 2.[5]

Labor Consumption

The average labor consumption per farm in the Republic of Serbia in 2016 was 1.9 annual working unit (AWU), of which 84% makes unpaid labor, while 16% is paid labor. Due to larger farms and the significant representation of crop production, where the mechanized work is mostly used, the labor consumption in the Serbia-North region is considerably lower than in the Serbia-South region.

5 The total utilized agricultural area includes arable land, meadows, permanent pastures and perennial plantations. The value is obtained through the statement of the agricultural producer, and it is recorded as the sum of the total agricultural land, whether owned by the farm or rented, or used for own agricultural production during the accounting year.

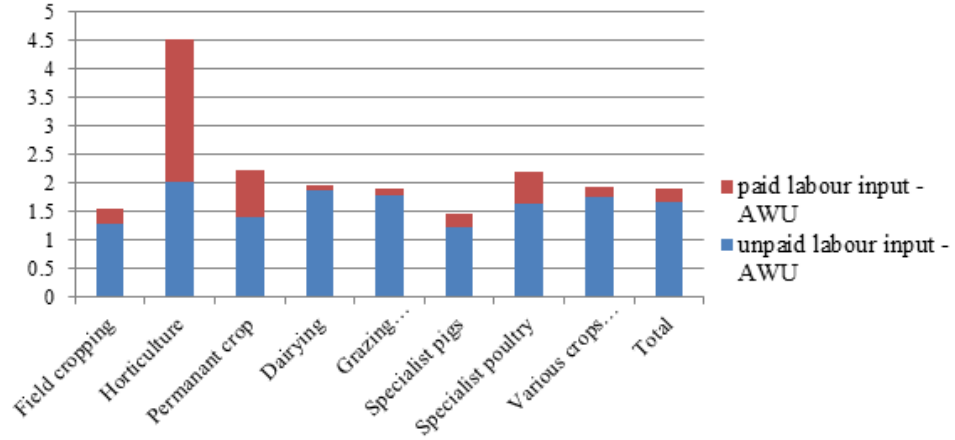
Graph 4. *Annual working unit in Serbia, Serbia-North and Serbia-South (an average per farm)*



Source: *FADN database of MAFWM*

The largest labor consumption is on the vegetable production farms (production in greenhouses and plastichouses), which employ four people on average (4.5 AWU, of which 2.5 AWU makes unpaid labor), which confirms the fact that vegetable production is more intensive than other types of production. On the other side, the smallest consumption of labor, (1.5 AWU) exists on the farms dealing with crop production and pig farming[6].

Graph 5. *Annual working unit by type of farming (AWU)*



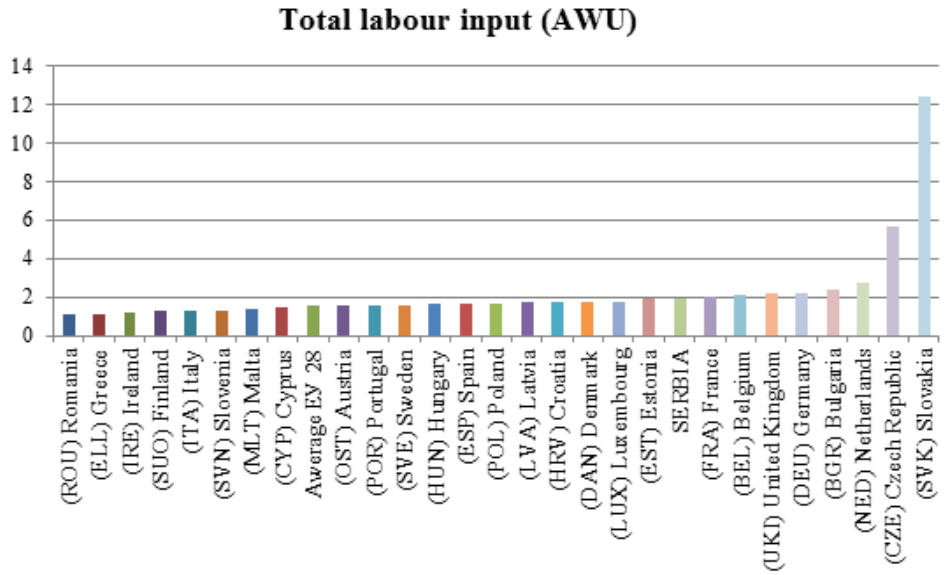
Source: *FADN database of MAFWM*

6 The total labor cost is expressed in Annual working units (AWU) and represents the equivalent of the full-time worker. In the Republic of Serbia one Annual working unit corresponds to the work of one person full-time engaged on the farm. One AWU is defined at the level of 1,800 working hours (equivalent to 225 working days with 8 working hours).

The average number of labor per farm in EU-28 in 2016 was 1.5 AWU. However, the number differed considerably in individual member states and ranged from 15.5 AWU in Slovakia to 1.1 AWU in Greece.

The average number of Annual working units (AWU) per farm in horticulture (the sector with higher participation) was about 2.5 times higher than for perennial plantations (the sector with the least number of working units). The share of unpaid labor (expressed as working hours of the family members) accounted for 77% of the total labor force in the EU-28 and it was the prevailing form of labor in most member countries, except in Slovakia, Czech Republic, Hungary, Estonia, Denmark and Bulgaria. In these EU member countries, the share of family labor in total labor was below 50%.

Graph 6. *Annual working unit (AWE) in Serbia and* EU-*28*



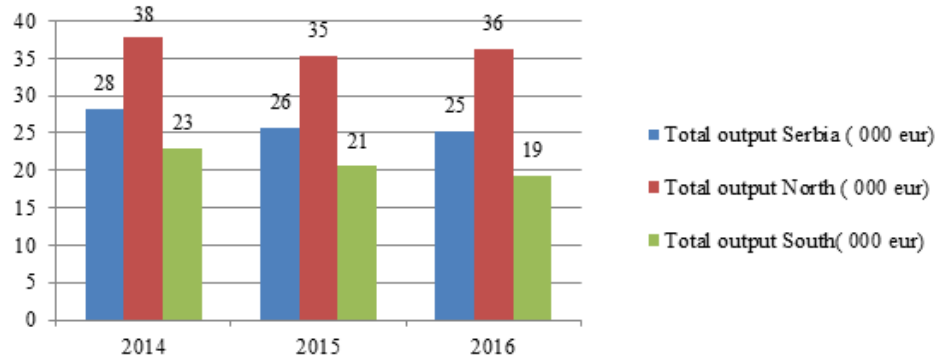
Source: *FADN database of MAFWM and FADN EU database (2015)*[7]

7 FADN EU database - Directorate General for Agriculture and Rural Development (DG AGRI) EU-FADN (http://ec.europa.eu/agriculture/rica/database/database_en.cfm).

Total Value of Production (Output)

The total value of production (output) in the Republic of Serbia was in 2016, on average, about 2.7 million dinars or 25 thousand €.[8] The results of the FADN research show that there are major differences between the Serbia-North and Serbia-South regions. The reason for such a large differences lies in the structure of the farms in the FADN sample, mainly those belonging to categories of larger economic size.

Graph 7. *Total output in Serbia, Serbia–North and Serbia-South (average per farm)*

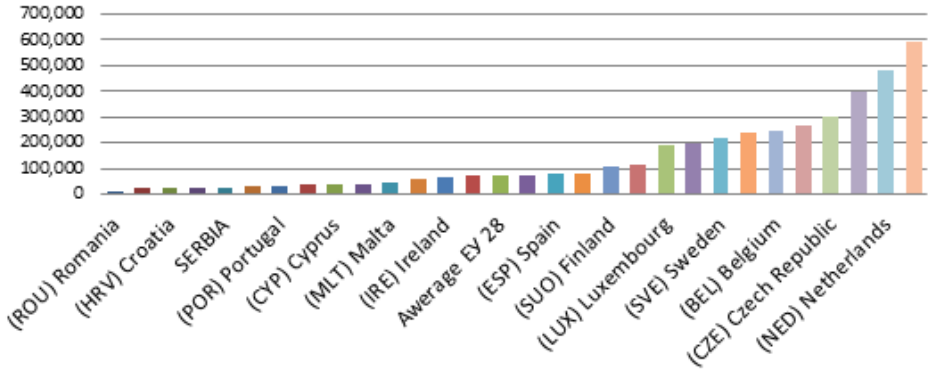


Source: *FADN database of MAFWM*

By comparing this indicator for Serbia with EU member countries, it can be concluded that the Republic of Serbia belongs to the group of countries with the lowest, below-average values (72 thousand € in 2015). The highest total value has Slovakia (about 600 thousand €), the Netherlands (480 thousand €) and Denmark (396 thousand €).

8 The total value of production expressed in dinars is the value of crop production and products, livestock production and products and other products and services.

Graph 8. *Total output in Serbia and EU-28 in 2015*



Source: *FADN database of MAFWM and FADN EU database (2015)*[9]

Farm Net Value Added

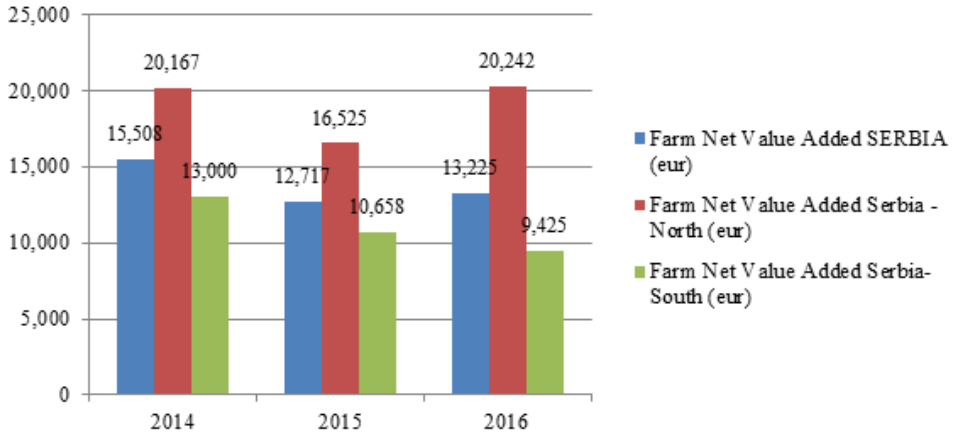
Very important indicators in FADN databases, which indicate the success of the farm's business, are the Farm Net Value Added (FNVA) and the Farm Net Income (FNI).

The Farm Net Added Value (FNVA) points to the contribution of all factors of production (land, capital and labor), both owned by the farm and externally engaged.[10] In 2016, the average Farm Net Added Value per farm in Serbia was just over 13 thousand €, and it was significantly higher in Serbia-North region (20 thousand €) compared to the Serbia-South region (9.5 thousand €).

9 FADN EU database - Directorate General for Agriculture and Rural Development (DG AGRI) EU-FADN (http://ec.europa.eu/agriculture/rica/database/database_en.cfm)

10 The Farm Net Value Added (FNVA) is equal to the sum of the total value of production and support from public funds (the difference between the current values of subsidies and taxes) minus intermediate consumption (specific and overheads) and depreciation. It represents an indicator of the farm economic performance from whom it is necessary to pay salaries, leases and interest, as well as its own factors of production. When it is expressed in terms of the Annual Working Unit (AWU), it takes into account the differences in the compensation for the farm labor force.

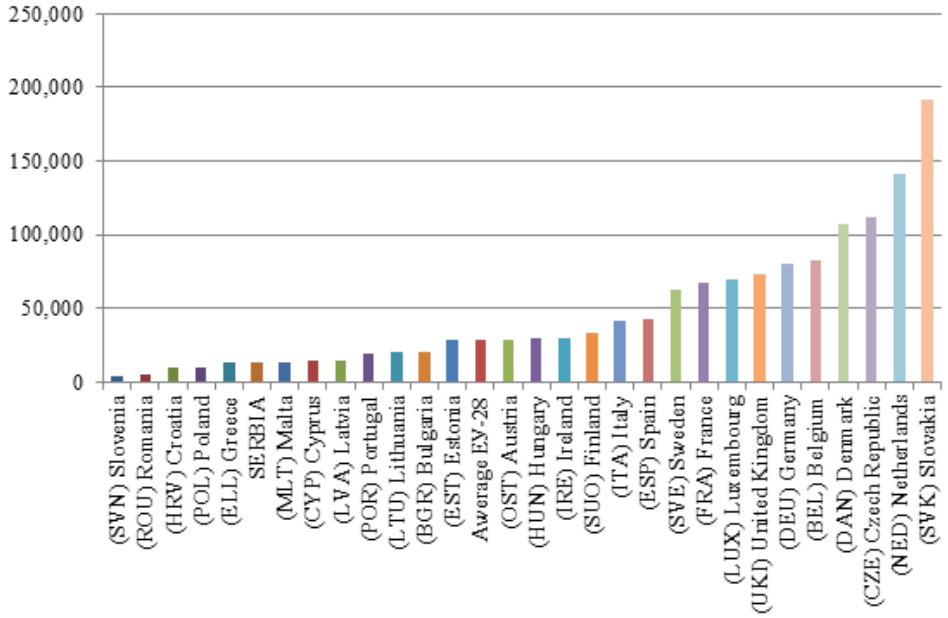
Graph 9. *Farm Net Value Added in Serbia, Serbia-North and Serbia-South (average per farm)*



Source: *FADN database of MAFWM*

The Farm Net Value Added (FNVA) varies considerably in the EU member countries. The highest FNVA in 2015 was in Slovakia and it amounted to 176 thousand € per farm. This is almost 30 times more than in Slovenia, the country where the lowest value of FNVA was recorded in the same year. Denmark, the Netherlands and the Czech Republic also had high FNVA values. The average EU-28 amounted to about 28 thousand €. The increased value of the average FNVA per farm (agricultural holdings) depends on the size of the agricultural holding, the type of agricultural business, and the pace of structural reduction in the labor force employed in agriculture. In order to overcome these differences, FNVA is usually expressed per AWU, which can be considered as a measure of partial labor productivity.

Graph 10. *Farm Net Value Added in Serbia and* EU-*28 in 2015*



Source: *FADN database of MAFWM and FADN EU database (2015)*[11]

The Farm Net Value Added (FNVA)[12] is an indicator that measures remuneration for all fixed production factors, whether external or internal-family ones (gross profit of a farm minus the depreciation costs). When calculating this indicator, external factors of production (paid salaries, paid rent, paid interest and financial charges) must be excluded, by which we calculate the Farm Net Income (FNI).[13]

The analysis of these indicators shows that there is a different profitability of farms in EU member countries, so that the indicator of the Farm Net Income (FNI) in Slovakia was the lowest of all countries in 2015, while in the same country the Farm Net Value Added (FNVA) was the highest. The reason for these indicators in Slovakia is that in this EU member countries the small family farms use a small percentage of total agricultural land, while 80% of agricultural land is used by large farms which have legal status and paid labor force.

11 FADN EU database - Directorate General for Agriculture and Rural Development (DG AGRI) EU-FADN (http://ec.europa.eu/agriculture/rica/database/database_en.cfm).

12 FNVA/Farm Net Value Added in the member countries in 2015 (an average per farm in €).

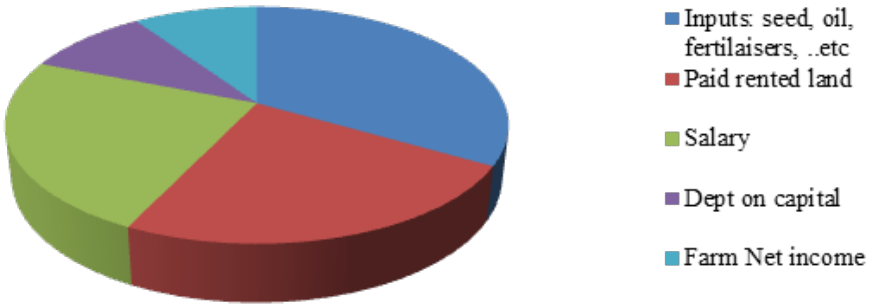
13 FNI/Farm Net Income added in the member countries in 2015 (an average per farm in €).

The agriculture of Serbia is characterized by the high share of small farms that produce relatively small production value, and accordingly, the amount of the Farm Net Value Added in Serbia is relatively small and it is below the average of the EU member countries.

Farm Net Income

The structure of total farm income distribution shows the profitability of the farm. When analyzing the business of the farm, it is important to determine the value of the Farm Net Income, i.e. the return realized on own capital, unpaid labor and own management.[14]

Graph 11. *Structure of total farm income distribution in Serbia in 2016*

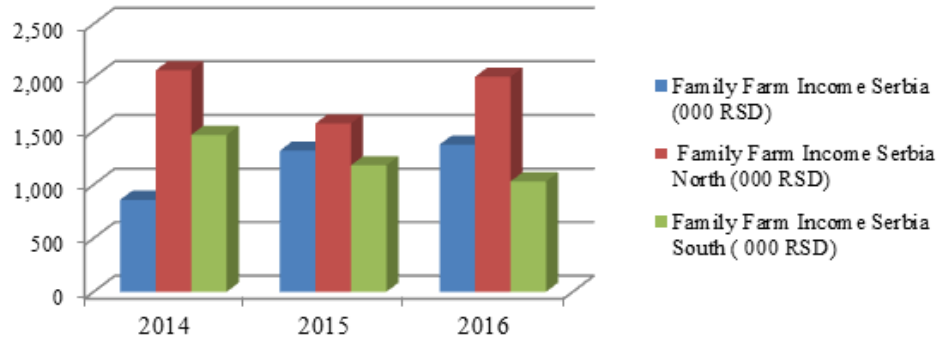


Source: *FADN database of MAFWM*

The Farm Net Income (FNI) in 2016 in Serbia amounted to 1.37 million dinars or about 11 thousand € per year, which is below the average of EU member countries. The FNI in the Serbia-North region is significantly higher than in the Serbia-South region, indicating to the higher volume of production (a greater number of hectares, a greater number of livestock heads, etc.), and consequently to the realized value of production i.e. more efficient use of resources at the farms in the Serbia-North region.

14 The Farm Net Income (FNI) represents the profit left to the agricultural producer and his family after covering all costs.

Graph 12. *Farm Net Income in Serbia, Serbia-North and Serbia-South (average per farm)*

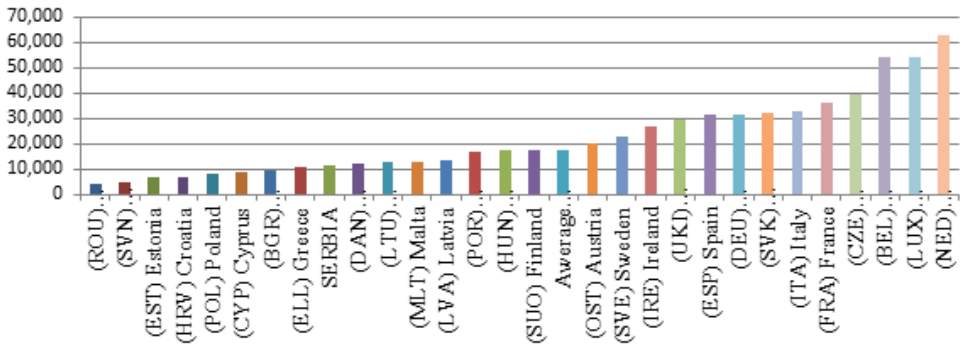


Source: *FADN database of MAFWM*

The average Farm Net Income in 2015 in EU member countries was about 17 thousand € per year, while some member countries realize over 50 thousand € per year. The Netherlands has maintained its leading position in terms of the Farm Net Income (62 thousand €), which indicates that income is still sufficient to finance estimated family production factors, even after all external factors have been exempted.

The farms based on family labor (unpaid), as it is the case in the Netherlands, Belgium and Luxembourg, have the largest Farm Net Income.

Graph 13. *Farm Family Income in* EU-*28 and Serbia*



Source*: FADN database of MAFWM and FADN EU database (2015)*[15]

15 FADN database of EU - Directorate General for Agriculture and Rural Development (DG AGRI) EU-FADN (http://ec.europa.eu/agriculture/rica/database/database_en.cfm).

Conclusion

Since 2011, Serbia has started the process of establishing a network for collecting and monitoring accounting data on selected family farms according to the FADN methodology applied by EU member countries and candidate countries. The obtained data serve as an instrument for increasing the efficiency of production and profitability of family farms in Serbia, but also for guiding more successful agricultural policy and the concept of support to family farms. Given that FADN is a unique methodology applied in all EU member countries and candidate countries, this also allows comparisons and comparative analyzes between Serbia and other countries.

The paper presents and explains the structural standard results of the farm business operations that can be monitored on the basis of the FADN database. It has been made a time comparative analysis of the achieved results in Serbia in three consecutive years (2014-2016), as well as a spatial comparison between Serbia and the EU-28 countries. The data on farms in Serbia in general and in two separate regions of Serbia-North and Serbia-South were analyzed. The analysis has shown that the structure of farms varies considerably in Serbia in relation to the EU member countries, but also among the member countries themselves.

One of the indicators with the most significant differences is the physical size of the farm expressed in the average size of agricultural land per farm (UAA). The Republic of Serbia with an average of 13.4 ha is below the EU-28 average. The average labor consumption per farm in the Republic of Serbia in 2016 was 1.9 annual working unit (AWU), of which 84% makes unpaid labor, while 16% is paid labor. Due to larger farms and the significant representation of crop production, where the mechanized work is mostly used, the labor consumption in the Serbia-North region is considerably lower than in the Serbia-South region.

The total value of production (output) in the Republic of Serbia was in 2016, on average, about 2.7 million dinars or 25 thousand €.[16] The results of the FADN research show that there are major differences between the Serbia-North and Serbia-South regions. The Farm Net Income (FNI) in 2016 in Serbia amounted to 1.37 million dinars or about 11 thousand € per year, which is below the average of EU member countries. The FNI in the Serbia-North region is significantly

16 The total value of production expressed in dinars is the value of crop production and products, livestock production and products and other products and services.

higher than in the Serbia-South region, indicating to the higher volume of production (a greater number of hectares, a greater number of livestock heads, etc.), and consequently to the realized value of production i.e. more efficient use of resources at the farms in the Serbia-North region.

The agriculture of Serbia is characterized by the high share of small farms that produce relatively small production value, and accordingly, the amount of the Farm Net Value Added in Serbia is relatively small and it is below the average of the EU member countries.

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