UNIVERSITY OF BELGRADE
FACULTY OF AGRICULTURE

Book of Proceedings

The Seminar

AGRICULTURE AND RURAL DEVELOPMENT - CHALLENGES OF TRANSITION AND INTEGRATION PROCESSES

50th Anniversary
DEPARTMENT OF AGRICULTURAL ECONOMICS

Belgrade-Zemun, 2013.

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The Seminar
Agriculture and Rural Development -
Challenges of Transition and Integration Processes

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PREFACE

Over two decades have passed since the process of transition from the socialist system started in Central and Eastern Europe in the early 1990s. During this time, countries in the region have undergone substantial structural change in agriculture, with extensive differences in the scope of transformation in rural areas. Many authors state that the intensity, the comprehensiveness and the dynamics of these changes have been unexpected if compared to previous experiences. Having in mind the magnitude of the transitional changes and the heterogeneity of the initial conditions, it is not surprising that even after two decades the agricultural systems of the Central and Eastern European countries still maintain relevant differences. Many authors consider that the differences among the former socialist countries are considerably higher in 2010 than in the 1990s, and that is why the transition in agriculture is certainly an issue that still deserves attention.

The Seminar "Agriculture and Rural Development - Challenges of Transition and Integration Processes" organized on the occasion of 50th anniversary of the Department of Agricultural Economics - Faculty of Agriculture University of Belgrade. The aim of seminar was to bring together the recent theoretical and empirical works dealing with economic, social, environmental and policy aspects of the transition and accession process in the field of agriculture, particularly in the Balkan and Central and Eastern European countries. This Seminar provided an excellent opportunity to discuss the process and the status of transition in agriculture as well as to review of the status of agricultural economics profession.

The seminar's major objectives were to discuss the transitional topics relevant for the actual progress and current situation in Central and East European countries, as well as for Western Balkan countries. The topics covered by the papers include the following:

1. Economic, social and environmental performances of transition - experiences, theories and lessons learned from overall progress in transition in the region; macroeconomic, policy support for agriculture and rural development, trade policy.
2. Rural development from the territorial perspective - place based development concepts; territorial capital of rural areas; rural labour market in transition;

3. Economic efficiency and performance of different types of farms and subsectors; Efficiency of Small and Medium Scale Agribusiness Enterprises.
4. Patterns of investments and financing in agribusiness and farm investment analysis.

The Program and Organizing Committees are grateful to everyone whose hard work made this conference possible. Most of all, we are grateful to all of the authors who submitted their papers to this conference, and to reviewers for their dedication in reviewing of submissions.

President of Programme Committee

Prof Natalija Bogdanov

ECONOMIC, SOCIAL AND ENVIRONMENTAL PERFORMANCES OF TRANSITION

SIGNIFICANCE AND COMPARATIVE ADVANTAGES OF THE AGRARIAN SECTOR IN SERBIAN FOREIGN TRADE[1]

Dragica Božić[2], Marija M. Nikolić[3]

Summary

The agrarian sector plays an important role for the overall economic development of Serbia as shown by the main macroeconomic indicators, including the contribution to equilibrium of payment and trade balance of the country. Serbia has a large trade deficit, therefore the agrarian sector, which is constantly (starting from 2005) achieving a positive trade balance, has an important role in overcoming the unfavourable condition of Serbian foreign trade. The share of this sector in Serbia's total exports is increasing and in recent years exceeds 20 percent.

The goal of this paper is to establish the importance of the agrarian sector in the total foreign trade of Serbia, as well as its comparative advantages on the markets of major trading partners (EU, CEFTA-2006 and some members, and countries in the neighbourhood) between 2004-2011. In the first part of the paper we analyse the importance and participation of the agrarian sector in the total foreign trade of the Serbian economy. The second part includes the basic flows, developing trends and the structure of foreign trade of the agrarian sector in Serbia by products and by most significant trading partners. Then, the revealed comparative advantage (RCA – Revealed Comparative Advantage) index, which was used for the analysis of the position and comparative advantages of the agricultural sector, is determined.

Key words*: agrarian sector, foreign exchange, revealed comparative advantage*

JEL classification: *Q17*

1. Introduction

Agricultural products are traditionally important in the Serbian foreign trade and contribute to its balance. Since 2005 Serbia has consistently positive trade balance

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of agricultural and food products, which makes this sector one of the few with positive trade balance. Certain changes happened in the structure and territorial orientation of foreign trade of agricultural and food products from Serbia. This applies to foreign trade regime, which is adjusted to the requirements of the World Trade Organization in anticipation of acquiring the status of member state and to the Stabilisation and Association Agreement between Serbia and the EU, and CEFTA agreement, whose members are the most important trade partners of the country. Serbia's membership in CEFTA (Central European Free Trade Agreement) in 2006, as well as the Stabilisation and Association Agreement, means major (full) market liberalization. Accessing to certain economic integration or trade liberalization, despite the positive can have adverse effects by increasing the competition and the rational use of resources, but it may cause the decrease of employment, increase of the deficit, and could pose a serious threat to some agricultural sector in our country.

Therefore, in terms of an increasingly competitive international environment, particular importance is to determine indicators of comparative advantage of the Serbian agrarian sector.

The aim of the paper is to establish the importance of the agrarian sector in the total foreign exchange of Serbia, as well as its comparative advantage in the global markets and the major trading partners (EU, CEFTA-2006 and its members) in the period 2004-2011. In the structure of work, after part with theoretical framework research, there is a part showing the working method and data sources, then (fourth) part where is analyzed the importance and participation of the agrarian sector in the total foreign trade of the Serbian economy. In the fifth and sixth part are analyzed the trends, development and the structure of foreign trade of the Serbian agrarian sector by product and major trading partners. In continuation, the revealed comparative advantage index was calculated and used for the analysis of the position and comparative advantages of the Serbian agrarian sector in the global (world) market and the markets of major trading partners for the period 2004-2011. The last part of the paper contains some concluding remarks.

2. The theoretical framework of the research

In terms of open and integrated world economy competitiveness is a particularly important element. Competitiveness is a key factor of success on national and international market and can be observed at the level of economy, sector (industry), company or individual products or groups of products.

The measurement of competitiveness and comparative advantages based on diferent theories (Rikardo, Hecksher-Ohlin) creates a number of difficulties that are primarily related to the coverage of a large number of factors of comparative advantage as well as the difficulty of measuring and comparing these factors across countries and

sectors (*Utkulu, Seymen, 2004*). Balassa B. (1965), in an effort to overcome these difficulties of calculating the actual comparative advantages of individual sectors and their comparison between countries, started from the actual trade patterns (data on exports and imports) and based on that defined the concept of revealed comparative advantage (RCA) of the country.[4] In practice, this is a generally accepted method for the analysis of trade data called "Balassa index" which measures a country's comparative advantage. Index of revealed comparative advantage actually indicates that, if the share of exports of certain group of product of a country in total world exports is higher than the share of these products in total world exports, then the country has a comparative advantage in the export of these products.

Balassa index allows to determine whether a country (sector) has "revealed" comparative advantage, but it doesn't show the main sources of these advantages. In following decades the Balassa index or definition of RCA was often changed, and today there are a number of modified parameters (*Vollrath, 1991*, *Dimelis, Gatsios, 1995; Fertö, Hubbard, 2002; Utkulu, Seymen, 2004*).

The literature emphasizes the problem of implementation of various measures of RCA, which arise due to the impact of government intervention, such as import restrictions, export subsidies and other protectionist policy measures, which may affect the level of calculation and create a "distortion" of calculated RCA indicators. This also means that based on such calculated indicators one can make wrong conclusions about the level of open comparative advantage. Therefore, in some studies (*Fertö, Hubbard, 2002*) some derived indicators are used in order to minimise the effects of various protectionist policy measures on level of RCA (*Utkulu, Seymen, 2004*).

Due to the use of a large number of different indicators for the calculation of RCA given in the literature, inconsistent results about the level of comparative advantage for certain product groups (sectors) may appear. Therefore, policy makers need to be careful when interpret RCA indexes and draw conclusions about the (none)existence of competitive advantages.

For countries with low market potential, such as Serbia, the international market is an important element for the analysis of competitiveness and comparative advantages, but they have been analysed a relatively small number of studies. Similar researches conducted the *Jefferson Institute (2003)* and *Milanović, Stevanović (2012)*.

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[4] Before Balassa introduced index of revealed comparative advantage (RCA) in 1965, Liesner (1958) already gave his contribution to the empirical research of RCA.

3. Method of work and data sources

Standard mathematical and statistical indicators were used for the analysis of the main trends and characteristics of foreign trade of agricultural and food products and their importance in the total trade of Serbia in the period 2004-2011 (indices, the average growth rate, relative indicators of the structure).

In order to determine the position of the Serbian agricultural sector in relation to major trading partners (EU, CEFTA-2006 and individual members) the Revealed Comparative Advantage – RCA index was used. This index was first applied in 1958,[5] but it was popularized by Balassa B. (*1965*), and over time it has been modified and revised by number of authors. The methodological approach is known as the "Balassa index" and is used to discover the advantages (weaknesses) of sector of any country in exports. Original Balassa index, which is calculated by the formula (*Balassa, B., 1965*):

$$RCA_1 = (X_{ij} / X_{it}) / (X_{nj} / X_{nt}) = (X_{ij} / X_{nj}) / (X_{it} / X_{nt}); \qquad (1)$$

where: X – export; and i – country; j – product (sector); t – a set of products (sector); n – a group of countries.

This index measures a country's export of one product related to the total export of the country and on the proper performance of total export (all countries of the world-total). If the share of export of a product of a country in its total export exceeded the share of export of the product in all the (remaining) countries in total world exports (other than the product), that products has an open competitive advantage ($RCA_1 > 1$). Similarly, if the share of export of a product of a country in total world export of that product is higher than the share of total export of the country in total world export ($RCA_1 > 1$) then there is an open comparative advantage of that country in export of that product.

However, there are critics of this method of calculation of RCA index, since it does not involve the import (*Greenaway, Milner, 1993*). There are number of ways of calculating RCA index in the literature listed, all derived from the original Balassa index (*Vollrath, 1991; Bojnec, 2001; Fertö, Hubbard, 2002; Utkulu, Seymen, 2004*).

The calculation of RCA_2 includes the possibility of simultaneous exports and imports (only "own" trade – imports and exports) of product (sector) as follows:

$$RCA_2 = (X_{ij} - M_{ij}) / (X_{ij} + M_{ij}) \qquad (2)$$

where: X – export; M – import; i – country; j – product (sector).

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[5] Liesner (1958) first proposed a simple method of calculating revealed comparative advantage according to the formula: $RCA = X_{ij} / X_{nj}$ where X – export; i – country; j – product (or sector); n – groups of countries, e.g. EU (Utkulu, Seymen, 2004).

The index is calculated as the ratio of trade balance (of a product or sector) of a country and the total volume of trade (of product or sector) with the world.

In determining the RCA_2, value can range from -1 to 1. If the value of RCA_2 is from 0 to +1 there is an open comparative advantage of a product (sector). If the RCA_2 ranges from -1 to 0, product (sector) doesn't have a comparative advantage, but some restrictions. In particular, in this way of calculating RCA, one can highlight the problem of ambiguity if the index value is close to zero (*Greenaway, Milner, 1993*).

Besides the given formula, we can specify another version of RCA calculation or Balassa index, which is commonly used, and is calculated according to the following equation (*Balassa, 1965; Utkulu, Seymen, 2004*):

$$RCA_3 = (X_{ij} / X_{it}) / (M_{ij} / M_{it}) = (X_{ij} / M_{ij}) / (X_{it} / M_{it}) \tag{3}$$

X – export; M – import; i – country; j – product (sector); t – group of products (sectors).

In fact, RCA_3 index of open comparative advantage is the ratio of the relative share of the value of export of products (sector) in total export of the country in a particular market and the relative share of the value of import of product (sector) in the value of total import of a country from that particular market.

RCA_3 index was determined in this paper (according to the formula 3) for the agrarian sector in Serbia, for the markets of major trading partners and indicates the position and comparative advantage of the agrarian sector in relation to the overall economy of our country in these markets. RCA index is calculated for each group of agricultural and food products for total export and import of the agrarian sector in Serbia, and for individual countries, our most important trading partners. This gives an insight into the comparative advantages of certain groups (divisions) of agrarian products in relation to the total economy of Serbia and exchanges with all countries, but also in the markets of some major trading partners. If the value RCA_3 index is greater than 1 this indicates that the product (division, sector) has a comparative advantage in a given market relative to other sectors of the economy.

As the main source of data for analysis in this study were used the database, publications and documentation material of the Statistical Office of Republic of Serbia, particularly data on exports and imports-total and by major trading partners (EU, CEFTA and some of its members). SMTK rev.4 was used. According to this classification, the agrarian sector (agro-food products) include the following sectors 0-Food and live animals (commodity divisions: 01-09), 1-Bevereges and Tobacco (11, 12), 2-Crude materials, inedible, except fuels (21, 22, 29), 4-Animal and vegetable oils, fats and waxes (41, 42, 43). These data for global level (for world-total export and import, and by SITC division) were used from the UN COMTRADE Database.

4. The importance of agrarian sector in
foreign trade in the overall Serbian economy

Foreign trade and the value of export, import and trade deficit of the overall Serbian economy grows by 2008 in which it recorded the largest trade deficit in the analyzed period of over $ 13 billion (Table 1). The negative impact of the overall global economic conditions caused a significant decline in total export in 2009 (about 24%) and import (about 35%) and, consequently, of the total trade deficit of Serbia (about 44%). In the coming years was experienced a rise in the value of foreign trade of Serbia. These data suggest that relatively available natural resources cannot be a sufficient precondition for the development of foreign trade of Serbia and dynamic growth of exports.

Table 1: Foreign trade, balance and the coverage of import by export in overall economy and Serbian agri-food products

	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Export-total *(mil. US $)*	3,522.4	4,480.8	6,426.6	8,824.0	10,972.2	8,342.9	9,793.0	11,777.9
Import-total *(mil. US $)*	10,750.6	10,458.6	13,169.5	19,161.2	24,327.9	15,804.5	16,467.7	19,859.1
Balance-total *(mil. US $)*	-7.228.2	-5,977.8	-6,742.9	-10,337.2	-13,355.7	-7.461.5	-6,674.7	-8,081.2
Cov. of import by export (%)	32.8	42.8	48.8	46.0	45.1	52.8	59.5	59.3
Export-afp *(mil. US $)*	797.2	919.0	1.263.6	1.684.0	1,955.5	1.942.7	2,240.8	2,696.5
Import-afp *(mil. US $)*	853.4	770.1	903.3	827.6	1,113.0	997.7	1,199.3	1,404.5
Balance-afp *(mil. US $)*	-56.2	148.9	360.3	856.4	842.6	945.0	1,041.5	1,292.0
Cov. of import by export (%)	93.4	119.3	139.9	203.5	175.7	194.7	186.8	192.0

Source: Authors' calculations based on data from databases of the SORS, Belgrade

According to the World Economic Forum (WEF) Serbian economy is among the least competitive economies in Europe.[6] Among other things, this points to the outdated technology, leading to poor quality of production and the decline in export competitiveness, and growth in foreign trade deficit. A small number of products

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[6] Recent reports by the World Economic Forum – WEF on competitiveness indicate a decline of already low competitiveness of Serbian economy starting from the financial and economic crisis. Thus, according to the report in 2011 Serbia was on 95th place (out of 142 countries); and only the economy of Bosnia and Herzegovina was ranked lower of the transition countries of Central and South-eastern Europe (on 100th place). According to the Report on competitiveness for 2012 Serbia is still at 95th place out of 144 countries (only Greece was ranked lower from countries in the region).

adapted to the new international standards, small scale of production, loss of previous export markets and others also contributes.

An important indicator of the competitiveness is the index of coverage of import by export. In Serbia, the index of coverage of import by export for overall economy was mainly increasing, and the highest level was recorded in 2010. Coverage of import by export of agricultural products was the lowest in 2004 and continues to increase up to 2007 when it reached the maximum, or when export revenues were more than twice the size of payments for import of agricultural products.

Agricultural and food products have an important role in foreign trade exchange. Their share in the total export of Serbia is relatively high and has settled in recent years, on about 23%, and in import on about 7% (Table 2).

Table 2: Share of agro-food products in the total foreign trade of the Serbian economy in the period 2004-2011   (%)

	2004	2005	2006	2007	2008	2009	2010	2011
Share of export of agri-food products in total export	22.6	20.5	19.7	19.1	17.8	23.3	22.9	22.9
Share of import of agri-food products in total import	7.9	7.4	6.9	4.3	4.6	6.3	7.3	7.1
Share of deficit of agri-food products in total deficit	10.8	-	-	-	-	-	-	-

Source: Authors' calculations based on data from databases of the SORS, Belgrade

In all years, except 2004, when the deficit of the agrarian sector accounted for about 10% of the total trade deficit, significant surplus in foreign trade of agri-food products from Serbia was created. Given the observed trends in the following years, it can be concluded that the agrarian sector is an important factor in balancing the foreign trade and macroeconomic stability.

5. Flows of foreign trade of agricultural and food products from Serbia

Exports of agricultural and food products from Serbia is predominantly focused on the EU and CEFTA-2006 (Table 3). The share of the EU countries in total Serbian agrarian export in the early years of the analysis was about 55%, but after the signing the CEFTA agreement in 2006 was significantly reduced at the expense of increased export of these products to countries in the region (which is 2008 exceeded 52%). However, after the entry into force of the Interim Agreement with the EU (from 2009 unilateral application by Serbia and from 2010 from the EU), the share of exports of the agrarian sector in these countries was increased and reached almost 50% in 2011, while its share in CEFTA countries has declined (to

about 40% in 2011). In other countries of the world we export only 6-9% of the value of agri-food products (with the trend of the increase that can be explained, among other things, by signing trade agreements with some countries, such as the Russian Federation, Turkey, EFTA, etc).

Table 3: The territorial focus of foreign exchange of Serbian agrarian sector

		2004	2005	2006	2007	2008	2009	2010	2011
mil US$	**Export**	**797.2**	**919.0**	**1.263.6**	**1.684.0**	**1.955.5**	**1.942.7**	**2.240.8**	**2.696.5**
	EU-27	**54.9**	**55.4**	**46.4**	**43.1**	**40.6**	**47.5**	**48.2**	**49.9**
	CEFTA-2006*	**39.5**	**38.0**	**47.0**	**50.2**	**52.3**	**46.1**	**43.0**	**40.9**
	B&H	64.6	65.9	42.2	40.3	40.7	41.9	43.7	42.0
%	Montenegro	-	-	32.9	32.9	35.6	33.8	29.4	30.2
	Croatia	8.9	9.0	6.6	5.3	6.2	6.5	6.7	10.1
	Macedonia	22.7	21.4	15.0	17.9	15.8	15.8	17.4	15.8
	Ot countries	**5.6**	**6.6**	**6.6**	**6.8**	**7.1**	**6.4**	**8.8**	**9.3**
mil US$	**Import**	**853.4**	**770.1**	**903.3**	**827.6**	**1113.0**	**997.7**	**1199.3**	**1404.5**
	EU-27	**46.8**	**47.3**	**42.6**	**40.0**	**40.0**	**39.9**	**43.7**	**45.2**
	CEFTA-2006*	**11.3**	**14.0**	**19.8**	**24.2**	**24.6**	**24.9**	**23.3**	**22.6**
	B&H	21.4	17.4	16.8	19.0	19.9	22.6	22.1	20.5
%	Montenegro	-	-	14.7	13.8	10.5	9.0	7.3	6.4
	Croatia	31.1	33.4	30.4	27.5	29.8	30.4	30.0	32.5
	Macedonia	47.1	48.8	36.6	37.4	36.3	35.6	38.7	39.4
	Ot countries	**41.9**	**38.7**	**37.5**	**35.9**	**35.4**	**35.2**	**33.0**	**32.2**
	Balance	**-56.2**	**148.9**	**360.3**	**856.4**	**842.6**	**945.0**	**1.041.5**	**1.292.0**
	EU-27	**37.5**	**144.6**	**201.7**	**394.3**	**349.0**	**524.3**	**557.1**	**709.4**
	CEFTA-2006*	**218.9**	**241.3**	**414.6**	**644.7**	**748.7**	**646.7**	**683.8**	**784.5**
	B&H	182.9	211.4	220.4	302.7	361.3	318.7	358.9	398.2
mil US$	Montenegro	-	-	168.9	250.6	335.4	280.0	263.4	312.6
	Croatia	-1.9	-4.7	-15.0	-10.4	-18.6	-17.1	-18.8	7.5
	Macedonia	26.3	22.0	23.7	76.8	61.6	52.9	59.6	48.7
	Ot countries	**-312.6**	**-237.0**	**-255.9**	**-182.5**	**-255.1**	**-226.0**	**-199.4**	**-201.9**

* Because of the low value of foreign exchange, individual values for Albania and Moldova were not displayed, but are included in the totals for CEFTA

Source: Authors' calculations based on data from databases of the SORS, Belgrade

The analysis of the territorial orientation of export of the Serbian agrarian sector in the neighbouring countries and our direct competitors, members of CEFTA-2006 in the global market, shows that the greatest part is realised in Bosnia and Herzegovina, but with noticeable decline of the share (from more that 60 to about 40%). Export of agrarian sector in Montenegro, recorded since 2006, accounted to about one third of the value of export to the CEFTA. According to the share in the regional structure of Serbian agrarian export on CEFTA market follows Macedonia and then Croatia.

EU-27 countries have the largest share in import of agri-food products in Serbia, which was at maximum of 47.3% in the 2005 but then was reduced to 39.9% in the

2009. Application of the Interim Trade Agreement has caused an increase of import from the EU, which in 2011 accounted for 45.2% of import of agri-food products. Share of CEFTA in 2004 amounted to only 11.3%, but in the subsequent of the analyzed period, especially after the signing of the Agreement, have been significantly increased and reached almost a quarter of agrarian import of Serbia. The share of other countries in imports of agri-food products in Serbia were constantly reducing, from over 40 to around 30%.

In the structure of import of agrarian products from CEFTA in Serbia, the most represented are the products from Macedonia, followed by Croatia, Bosnia and Herzegovina and Montenegro.

In the exchange of agri-food products with EU-27, Serbia has a positive balance, which is continuously increasing (from about 37 to more than 709 million U.S. $). With most of the CEFTA countries, the Serbian agrarian sector also achieved a positive trade balance, with the largest surpluses in trade with Bosnia and Herzegovina, and then with Montenegro. The exception is Croatia (though in 2011 there was a surplus with this country as well).

6. The structure of foreign trade of the Serbian agri-food sector

The particular importance for the analysis of foreign trade of Serbian agrarian sector has its structure. Determining the presence or participation of certain groups of products in export and import, can serve as an important indicator for taking specific measures in the field of foreign trade and agricultural policy.

According to the representation in the export of Serbian agrarian products, during analysed period, three divisions distinguish: 04-Cereals and cereal preparations; 05-Vegetables and fruits and 06-Sugar, sugar preparations and honey (Table 4). In the early years of analysis (2004-2008) the highest share of export of agricultural products had the division 05-Fruits and vegetables. The share of these products was constantly reducing, from about 30% to 25%, and starting from 2009 the primacy in the realized value of Serbian export took over division 04-Cereals and cereal preparations. Commodity group 06-Sugars, sugar preparations and honey, that took advantages of autonomous trade preferences with the EU has achieved a high level of export in the early 2000's, while in the continuation of the analyzed period, it decreased to about 7%. The participation of other sectors in export commodity does not reach 10% in any year of the analysis (except sector 11-Beverages in 2008). The current structure of export of the agrarian sector can be described as unsatisfied, since the dominant role is played by the primary, unprocessed, and products at lower level of processing that achieve lower export prices. Therefore, it is important to use various measures of economic and agricultural policy, harmonized with WTO requirements, to encourage increased representation of

products of higher processing stages, which provide a higher value of total exports. It is important to pay more attention to diversification of product range and improvement of quality products harmonized with the requirements of developed, modern markets.

Table 4: Structure of exports of Serbian agrarian sector in period 2004-2011 (%)

SITC divisions	2004	2005	2006	2007	2008	2009	2010	2011
00-Live animals	0.3	0.3	0.2	1.0	3.0	2.9	3.0	2.7
01- Meat and prepar.	2.9	3.6	6.1	5.7	4.5	3.3	2.7	2.2
02- Dairy prod&eggs	1.1	1.3	3.4	3.2	3.6	3.3	3.1	3.4
03- Fish and prepar.	0.1	0.2	0.2	0.2	0.4	0.3	0.2	0.2
04- Cereals& prepar.	13.0	20.0	23.1	20.3	18.5	24.6	25.8	27.1
05- Vegetables&fruit	30.1	28.5	25.8	27.7	24.5	23.3	23.6	24.4
06- Sugars and honey	20.9	19.1	13.3	9.9	9.0	8.2	9.6	6.9
07- Coffee, tea, cocoa	4.9	4.8	4.6	4.4	4.4	4.3	3.8	3.1
08-Feeding stuff for an.	2.5	2.0	2.1	3.6	3.6	3.2	3.3	3.8
09-Miscell. edible pr.	4.6	4.6	5.5	4.5	4.5	4.3	3.9	3.7
11-Beverages	6.0	5.6	7.9	8.7	10.5	9.9	7.9	8.0
12-Tobbaco&manuf	1.0	0.4	1.1	1.7	2.3	2.9	2.5	2.2
21-Hides, skins,furskins	1.8	1.8	1.7	1.3	1.1	0.7	1.2	1.4
22-Oil-seeds&ol.fruits	1.1	1.3	1.1	0.8	1.2	1.2	1.9	2.3
29-Crude an&veg. mat	2.2	2.1	1.6	1.3	1.5	1.3	1.2	1.2
41-Animal oils & fats	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
42-Fixed veg fats&oils	7.0	4.1	2.0	5.3	7.0	6.0	6.2	7.0
43-An.or veg fats&oils, pr	0.3	0.2	0.2	0.3	0.4	0.2	0.2	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Authors' calculations based on data from databases of the SORS, Belgrade

In the structure of the value of import of the agrarian sector, the most significant share during whole analysed period had division 05-Vegetables and fruit, about 20-26% (Table 5). According to the share in the total Serbian import follow 07-Coffee, tea, cocoa, spices, about 15% and then division 09-Miscellaneous edible products and preparations (about 10%).

There is no significant diversification of products in the structure of the agrarian exports from Serbia to the EU-27, dominant are primary products and products with lower levels of processing that are used as inputs in the food industry (fruits and vegetables, grains, sugar), while the export of more sophisticated products with higher added value is small. This can be explained with non-harmonized standards. In the structure of Serbian agrarian imports from the EU-27, in the early years of the analysis, the dominant position had miscellaneous edible products and preparations, but their share decreased and starting from 2007 vegetables and fruit takes precedence.

Table 5: Structure of import of Serbian agrarian sector in period 2004-2011 (%)

SITC divisions	2004	2005	2006	2007	2008	2009	2010	2011
00-Live animals	0.5	1.1	0.6	1.0	0.8	1.4	0.7	1.2
01- Meat and prepar.	2.0	2.0	1.9	2.3	3.5	4.5	3.9	4.1
02-Dairy prod&eggs	2.1	1.6	1.3	2.4	2.7	2.1	4.0	4.1
03- Fish and prepar.	5.8	6.9	6.8	6.4	6.2	7.5	6.6	6.9
04- Cereals& prepar.	8.8	5.4	5.7	5.9	6.1	5.7	5.1	6.0
05-Vegetables&fruit	17.5	20.8	21.2	26.5	25.3	24.2	21.8	21.5
06-Sugars and honey	3.4	5.3	4.1	4.3	3.6	3.4	2.3	2.8
07-Coffee, tea, cocoa	14.3	15.6	14.5	15.5	15.9	14.2	15.3	15.2
08-Feeding stuff for an.	8.2	6.4	6.4	5.5	5.5	3.9	4.2	3.8
09-Miscell. edible pr.	10.6	11.6	9.3	8.5	8.0	8.0	9.1	9.5
11-Beverages	4.4	3.9	6.7	7.1	6.2	6.3	5.4	5.8
12-Tobbaco&manuf	14.5	11.1	11.0	3.8	3.5	5.4	8.8	8.3
21-Hides, skins,furskins	0.3	0.2	0.1	0.2	0.6	0.7	1.3	1.6
22-Oil-seeds&ol.fruits	2.0	1.8	2.4	2.9	3.6	4.8	4.6	2.9
29-Crude an&veg. m	3.7	3.9	3.6	4.3	4.2	3.5	3.5	3.1
41-Animal oils & fats	0.1	0.2	0.2	0.2	0.3	0.4	0.3	0.3
42-Fix veg fats&oils	1.3	1.7	3.5	2.8	3.4	3.5	2.7	2.6
43-An.or veg fats&oils	0.4	0.5	0.4	0.4	0.5	0.6	0.4	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Authors' calculations based on data from databases of the SORS, Belgrade

The structure of the agrarian export from Serbia to CEFTAcountries is more significantly diversified than export to the EU-27, which can be explained by the higher degree of compliance with the standards and requirements of the consumers and market of CEFTA. In the structure of export throughout the period, most represented are cereals, followed by beverages, fixed vegetable fats and oils, crude, and vegetables and fruits. The most significant share in import of agri-food products in Serbia from CEFTA countries, had vegetables and fruit, then beverages, tobacco and tobacco products.

7. Comparative advantages of the Serbian agrarian sector

For the analysis of comparative advantage of sector or particular groups (divisions) of the Serbian agri-food products in the global (world) market and in the markets of key trading partners were used three indicators of RCA. These indicators can be useful to decision-makers, especially for certain segments of public policy, primarily agricultural. It is important to determine which sectors (divisions) of agricultural and food products contribute the most to export (and import), and improve the unfavourable trade deficit and have a comparative advantage in relation to the overall economy of the country, as well as what changes occur in the process of liberalization through integration processes.

7.1. Comparative advantages of Serbian agrarian sector on the global market

For consideration of comparative advantage or position of the Serbian agrarian sector and some divisions – specific groups of product on the world market, we have calculated "original Balassa index" that measures the export of one product of a country related to the total export of the country and the proper performance of the total global export.

Table 6: Indexes of revealed comparative advantage-RCA$_1$ of individual SITC division of the Serbian agrarian sector on the global market

SMTK divisions	2004	2005	2006	2007	2008	2009	2010	2011
00-Live animals	0.64	0.42	0.28	1.60	4.52	4.66	5.44	5.36
01- Meat and pr	0.89	0.99	1.76	1.60	1.02	0.86	0.77	0.64
02-Dairy pr&eggs	0.50	0.57	1.58	1.21	1.29	1.51	1.43	1.57
03- Fish and pr.	0.02	0.07	0.07	0.06	0.11	0.09	0.06	0.06
04- Cereals& pr.	3.70	5.65	6.59	4.72	3.37	5.69	6.77	6.35
05-Veget.&fruit	5.95	5.16	4.69	4.96	3.89	4.03	4.39	4.74
06-Sugars&honey	20.70	16.44	10.31	10.99	7.49	6.52	7.14	5.14
07-Coffee,tea, coc	2.52	2.30	2.17	2.62	1.81	1.80	1.55	1.25
08-Feeding stuff	1.71	1.38	1.49	2.36	1.82	1.62	1.86	2.19
09-Misc. edible pr.	2.95	2.71	3.27	2.36	2.18	2.27	2.22	2.13
11-Beverages	2.25	2.01	2.85	2.74	3.26	3.66	3.19	3.34
12-Tobbaco&man	0.86	0.33	0.93	1.64	1.91	2.37	2.38	2.21
21-Hides, skins,fur	4.68	4.61	4.25	3.43	3.16	2.89	3.91	4.14
22-Oil-seeds&fruits	0.98	1.15	1.05	0.74	0.61	0.68	1.10	1.30
29-Crude an&veg.	1.75	1.59	1.26	0.97	1.06	1.01	1.01	1.01
41-An. oils & fats	0.61	0.55	0.86	0.63	0.43	0.55	0.51	0.76
42-Fixed veg fats	4.89	2.84	1.32	5.04	4.63	4.22	3.24	3.16
43-An.or veg fats	1.16	0.87	0.72	2.22	1.92	1.31	1.14	1.44

Source: Authors' calculations based on data from databases of the SORS, Belgrade and UN COMTRADE Database

RCA$_1$ values higher than one in all years of analysis and revealed comparative advantage in the global market for export of the Serbian agrarian sector has nine commodity divisions: 04-Cereals and cereal products; 05-Vegetables and fruits; 06-Sugars, sugar preparations and honey; 07-Coffee, tea, cocoa, spices, and manufactures; 08-Feeding stuff for animals; 09-Miscellaneous edible products and preparations; 11-Beverages, 21-Hides, skins and furskins, raw, and 42-Fixed vegetable fats and oils, crude, refined or fractionated (Table 6). The highest value of the RCA$_1$ in all but the last year, had the division 06-Sugars, sugar preparations and honey, and the primacy of the 2011 took over the division 04-Cereals and

cereal preparations. Regarding the level of comparative advantage behind these two is division 05-Vegetables and fruits.

The lowest index value RCA_1, less than 1 in all years of analysis, which indicates that these Serbian divisions are uncompetitive on (global) world market are: 03-Fish and preparations and 41-Animal oils and fats.

7.2. Comparative advantages of Serbian agrarian sector on markets of most important trading partners

In order to perceive the comparative advantage of the agrarian sector, or particular groups of agri-food products from Serbia compared to the total economy exchange (all countries), as well as in the markets of the most significant trading partners, we determined indexes of revealed comparative advantage RCA_2 and RCA_3.

Measured by two indicators (RCA_2) and (RCA_3) revealed comparative advantage in trade with all trading partners (total agrarian export and import of Serbia), have six commodity divisions: 01-Meat and meat preparations; 04-Cereals and cereal preparations; 05-Vegetables and fruits; 06-Sugars, sugar preparations and honey; 11-Beverages and 21-Hides, skins and furskins, raw. In addition to these agricultural and food products, according to the values of calculated index RCA_3, comparative advantages in relation to the overall economy (but slightly below) has six more divisions: 02-Dairy products and birds' eggs; 09-Miscellaneous edible products and preparations; 22-Oil seeds and oleaginous fruits; 29-Crude animal and vegetable materials; 42-Fixed vegetable fats and oils, crude, and 43-Animal or vegetable fats and oils, processed (Table 7).

The highest level of comparative advantage (according to both indicators: RCA_2 and RCA_3) in the first year of the analysis had the division 06-Sugars, sugar preparations and honey, which used in best manner the privileges of the EU market, while in all other years the highest level of competitiveness achieves division 04-Cereals and cereal preparations.

The lowest RCA_2 value, less than 0 or RCA_3 less than 1 in all years of analysis, are characteristic for the divisions 03-Fish and preparations, indicating that there are no comparative advantage in trade of these products in relation to the overall economy of Serbia with all trading partners. Measured by the index RCA_2 this statement applies also to section 07-Coffee, tea, cocoa, spices, and manufactures.

RCA_3 index was used for the determination of revealed comparative advantages of the Serbian agri-food sector in trade with major trading partners, the EU-27 and CEFTA, as well as its members.

Table 7: Indexes of revealed comparative advantage – RCA$_2$ and RCA$_3$ for SITC division of the agrarian sector in Serbia trade with all trading partners

SITS division	2004	2005	2006	2007	2008	2009	2010	2011
RCA$_2$								
00-Live animals	-0.23	-0.55	-0.44	0.35	0.75	0.60	0.77	0.64
01- Meat and pr	0.14	0.37	0.64	0.67	0.39	0.18	0.12	0.01
02-Dairy pr&eggs	-0.36	-0.03	0.57	0.46	0.41	0.51	0.18	0.22
03- Fish and pr.	-0.98	-0.92	-0.91	-0.88	-0.82	-0.86	-0.90	-0.91
04- Cereals& pr.	0.16	0.63	0.70	0.75	0.68	0.79	0.81	0.79
05-Veget.&fruit	0.23	0.24	0.26	0.36	0.26	0.30	0.34	0.37
06-Sugars&honey	0.70	0.62	0.64	0.65	0.63	0.65	0.77	0.65
07-Coffee,tea, coc	-0.52	-0.46	-0.38	-0.27	-0.35	-0.26	-0.37	-0.43
08-Feeding stuff	-0.55	-0.45	-0.36	0.14	0.07	0.23	0.19	0.32
09-Misc. edib pr.	-0.42	-0.35	-0.09	0.04	-0.01	0.03	-0.11	-0.15
11-Beverages	0.11	0.26	0.24	0.43	0.50	0.51	0.47	0.45
12-Tobbaco&man	-0.88	-0.92	-0.76	-0.04	0.08	0.02	-0.31	-0.33
21-Hides, skins,fur	0.72	0.79	0.89	0.84	0.51	0.31	0.28	0.23
22-Oil-seeds&fruits	-0.33	-0.08	-0.23	-0.26	-0.26	-0.35	-0.14	0.20
29-Crude an&veg.	-0.29	-0.22	-0.23	-0.24	-0.22	-0.15	-0.23	-0.14
41-An. oils & fats	-0.26	-0.41	-0.08	-0.06	-0.34	-0.41	-0.33	-0.16
42-Fixed veg fats	0.67	0.49	-0.11	0.59	0.57	0.53	0.63	0.68
43-An.or veg fats	-0.15	-0.29	-0.24	0.15	0.14	-0.11	-0.05	0.34
RCA$_3$								
00-Live animals	1.90	0.68	0.79	4.55	14.91	7.41	13.12	7.66
01- Meat and pr	4.03	5.05	9.24	10.85	5.01	2.74	2.16	1.74
02-Dairy pr&eggs	1.44	2.20	7.48	5.86	5.29	5.80	2.42	2.65
03- Fish and pr.	0.03	0.10	0.10	0.13	0.22	0.14	0.09	0.08
04- Cereals& pr.	4.23	10.32	11.64	15.15	11.80	16.02	15.78	14.65
05-Veget.&fruit	4.92	3.81	3.48	4.62	3.77	3.55	3.40	3.67
06-Sugars&honey	17.50	10.07	9.19	10.07	9.67	8.94	12.97	7.92
07-Coffee,tea, coc	0.97	0.86	0.92	1.24	1.07	1.12	0.77	0.67
08-Feeding stuff	0.88	0.88	0.96	2.89	2.55	3.02	2.46	3.24
09-Misc. edib pr.	1.25	1.12	1.70	2.34	2.19	2.00	1.35	1.26
11-Beverages	3.84	3.98	3.36	5.42	6.60	5.85	4.62	4.45
12-Tobbaco&man	0.20	0.10	0.28	2.00	2.58	1.98	0.88	0.85
21-Hides, skins, fur	18.54	19.89	34.39	24.55	7.29	3.56	2.99	2.69
22-Oil-seeds&fruits	1.55	1.99	1.29	1.29	1.30	0.92	1.27	2.55
29-Crude an&veg.	1.69	1.50	1.29	1.34	1.41	1.40	1.06	1.27
41-An. oils & fats	1.81	0.97	1.75	1.92	1.09	0.79	0.86	1.23
42-Fixed veg fats	15.26	6.84	1.63	8.52	7.99	6.24	7.29	8.80
43-An.or veg fats	2.24	1.29	1.26	2.93	2.94	1.51	1.53	3.40

Source: Authors' calculations based on data from databases of the SORS, Belgrade

SITC divisions	2004	2005	2006	2007	2008	2009	2010	2011
00-Live animals	1.46	0.48	0.10	0.04	0.09	0.05	0.05	0.06
01- Meat and pr	1.12	1.24	1.58	2.31	1.12	0.46	0.38	0.27
02-Dairy pr&eggs	0.01	0.00	0.06	0.00	0.00	0.05	0.03	0.03
03- Fish and pr.	0.01	0.01	0.02	0.00	0.00	0.01	0.02	0.01
04- Cereals& pr.	1.85	6.22	9.79	11.70	6.76	24.56	21.99	14.44
05-Veget.&fruit	10.30	8.78	7.74	10.44	8.41	8.02	6.33	6.44
06-Sugars&honey	24.51	11.96	12.31	21.69	24.46	16.42	14.80	10.98
07-Coffee,tea, coc	0.57	0.57	0.43	1.06	1.03	1.02	0.45	0.36
08-Feeding stuff	1.82	0.89	0.56	1.92	1.75	2.03	1.35	1.67
09-Misc. edib pr.	0.37	0.23	0.30	0.56	0.54	0.55	0.40	0.36
11-Beverages	0.57	0.50	0.32	0.80	1.02	1.48	0.98	1.19
12-Tobbaco&man	0.21	0.09	0.20	1.31	1.05	1.83	1.05	1.18
21-Hides,skins,fur	4.05	2.11	2.03	18.77	5.69	2.91	1.59	1.22
22-Oil-seeds&fruits	4.73	4.14	2.61	2.31	7.13	6.94	3.43	17.40
29-Crude an&veg.	0.90	0.59	0.58	0.49	0.38	0.50	0.43	0.56
41-An. oils & fats	0.97	0.52	0.39	0.96	0.48	0.16	0.37	0.83
42-Fixed veg fats	7.16	3.52	0.64	6.00	7.57	9.59	9.49	10.06
43-An.or veg fats	0.01	0.03	0.01	0.00	0.01	0.00	0.11	0.11

Source: Authors' calculations based on data from databases of the SORS, Belgrade

Values of this index for the EU market (in all years of analysis) are greater than 1 for five divisions: 04-Cereals and cereal preparations; 05-Vegetables and fruits; 06-Sugar, sugar preparation and honey; 21-Hides, skins and furskins, raw; and 22-Oil seeds and oleaginous fruits (Table 8). The highest values of RCA$_3$ had division 06-Sugar, sugar preparations and honey until 2009. In terms of competitive advantage follows division 04-Cereals and cereal preparations with increasing values of the index in the specified period. All these groups of agricultural and food products, under the conditions of liberalization, experienced the decrease or reducing the comparative advantages of Serbian agricultural and food products on the EU market (excluding sections 22-Oil seeds and oleaginous fruits).

Seven SITC division of agrarian products from Serbia that do not have a comparative advantage in EU market, throughout the period of analysis, are: 00-Live animals (except in 2004), 02-Dairy products and birds' eggs; 03-Fish and preparations; 09- Miscellaneous edible products and preparations; 29-Animal and vegetable raw materials; 41-Animal oils and fats, and 43-Animal or vegetable fats and oils, processed.

Table 9: Indexes of revealed comparative advantages-RCA$_3$ of SITC divisions of agrarian sector of Serbia in foreign trade with CEFTA-2006

SITC divisions	2004	2005	2006	2007	2008	2009	2010	2011
00-Live animals	2.03	118.75	11.24	89.14	24.21	5.79	11.82	7.31
01- Meat and pr	3.93	7.21	8.66	6.55	2.67	1.71	1.44	1.12
02-Dairy pr&eggs	1.54	3.10	8.90	5.38	5.48	3.30	1.89	2.51
03- Fish and pr.	0.03	0.15	0.15	0.19	0.44	0.21	0.17	0.17
04- Cereals& pr.	5.07	7.30	5.46	8.79	7.01	5.36	5.74	6.55
05-Veget.&fruit	0.84	0.71	0.73	0.69	0.45	0.46	0.46	0.53
06-Sugars&honey	1.23	0.90	0.78	0.52	0.64	1.34	7.13	2.12
07-Coffee,tea, coc	3.01	2.46	2.64	2.33	1.77	2.20	2.09	2.26
08-Feeding stuff	2.11	1.60	0.99	2.76	1.49	3.74	2.20	3.43
09-Misc. edib pr.	1.32	1.41	2.17	2.32	2.20	2.53	1.41	1.30
11-Beverages	1.84	2.58	1.40	1.83	2.23	2.22	2.23	2.18
12-Tobbaco&man	0.17	0.08	0.23	0.64	0.97	0.61	0.44	0.55
21-Hides,skins,fur	10.65	25.69	76.98	7.20	1.88	1.22	2.30	1.57
22-Oil-seeds&fruits	1.64	0.80	0.46	0.52	0.20	0.17	0.36	0.24
29-Crude an&veg.	4.56	5.56	3.12	3.66	4.19	6.14	4.93	3.75
41-An. oils & fats	1,871.68	97.77	45.89	9.68	2.86	5.76	3.42	3.22
42-Fixed veg fats	121.85	226.77	2.69	16.82	7.28	2.60	4.61	6.48
43-An.or veg fats	6.10	9.62	40.25	1,123.00	60.70	56.40	123.84	-

Source: Authors' calculations based on data from databases of the SORS, Belgrade

Serbian agricultural and food products have a significantly higher level of comparative advantage in relation to the overall economy (RCA$_3$) on CEFTA then on the EU market. This is understandable since most of the present members of CEFTA countries accounted for one economy, and that they all have the approximate level of economic development, achieved GDP per capita, similar spending habits and standards for agricultural products.

It may be noted that the relatively small number of agrarian divisions-products from Serbia have index RCA$_3$ less than one or the lack of comparative advantage in the CEFTA market during the whole period (Table 9). These are the divisions: 03-Fish and preparations; 05-Vegetables and fruits, 12-Tobacco and tobacco preparations, and 22-Oil seeds and oleaginous fruits. In addition to these, division 06-Sugar, sugar preparations and honey expressed a lack of competitiveness in the CEFTA market in period 2005-2008.

All other SITC divisions or groups of agricultural and food products have a significant level of comparative advantage in the CEFTA market and RCA$_3$ indexes higher than 1.

For consideration of revealed comparative advantages of certain groups of agricultural and food products from Serbia compared to the total economy in the markets in neighbouring countries (member of CEFTA-2006) and direct competitors to our agrarian products, we calculated RCA_3 indexes for these countries (except for Albania and Moldova for which the volume of trade with Serbia is very small).

In Bosnia and Herzegovina, which is the most important export destination for products of the Serbian agrarian sector within CEFTA members, the majority of the divisions of agrarian sector of Serbia (almost everyone) has a comparative advantage. RCA_3 index value less than 1, for the entire period of analysis, had only division 03-Fish, crustaceans, molluscs and preparations which indicates the lack of comparative advantages of these products.

On the Montenegro market most of the commodity divisions of agri-food products from Serbia have comparative advantages, while a small number of divisions that don't have comparative advantages through the entire period. They are: 03-Fish, crustaceans, molluscs and preparations fish products, 11-Beverages, and 21-Hides, skins and furskins, raw. Division 41-Animal oils and fats recorded in some years lack of comparative advantage, while division 05-Vegetables and fruits, in recent years has lost comparative advantage in the market of Montenegro.

In the Macedonian market there are a significant number of divisions of agri-food products from Serbia that have lost revealed comparative advantage in recent years, after more market liberalization. In addition to the divisions: 05-Vegetables and fruits, 11-Beverages, and 12-Tobacco and tobacco preparations, which did not have comparative advantages during the entire period, these are: 00-Live animals; 01-Meat and meat preparations; 06-Sugar, sugar preparations and honey, and 22-Oil seeds and oleaginous fruits. Other departments of the agricultural sector are characterized by a comparative advantage in the Macedonian market, but also with the deterioration of their position under the conditions of liberalization after the signing of CEFTA Agreement.

On the Croatian market, there is generally much lower number of divisions of the agrarian sector in Serbia with revealed comparative advantage, where the values of the calculated index are relatively low, and after signing of the Agreement they are decreasing in significant number of products, which indicates a deterioration of the position of the sector. Only four divisions of the Serbian agrarian sector have revealed comparative advantage during the entire period of analysis (RCA_3>1): 04-Cereals and cereal preparations; 05-Vegetables and fruits: then 29-Crude animal and vegetable materials, and 42-Fixed vegetable fats and oils, crude, refined or fractionated. There are four division of the agrarian sector of Serbia that didn't have a comparative advantage in the Croatian market during the entire period of analysis, and they are: 03-Fish and preparation, 09-Miscellaneous edible products and

preparations; 12-Tobacco and tobacco preparations, and 22-Oil seeds and oleaginous fruits. It can be noted that the majority of these products are of higher stage of processing which indicates the achieved level of development and the lack of competitiveness of agro-industry. Hence, it is important to focus efforts to increase the competitiveness of the products of the agrarian sector with higher level of processing, or on products with higher value-added.

8. Conclusion

Agrarian sector plays an important role as a balancing factor of the trade balance, since the share of this sector in Serbia's total exports is growing and exceeding 20% in recent years. The liberalization of the market, which takes place in the integration process that include Serbia (the membership in the WTO and the EU), led to a certain change in the regime, scope and structure of export and import, the main trading partners and positions, and the comparative advantage of the agrarian sector. According to the representation in the structure of export of agrarian products from Serbia, during the analysed period, three divisions stand out: cereals and cereal preparations, vegetables and fruit, and sugar, sugar preparations and honey. Most of the value of agrarian export (about 50%) is focused on the EU market and 40% in the CEFTA-2006; while about 45% of the value of agricultural import comes from the EU, and about one-fourth from CEFTA members. The structure of the agrarian export from Serbia into CEFTA countries is significantly more diversified than export to the EU, which can be explained by the higher degree of compliance with the requirements of the consumers, and the applicable standards of the countries of the region.

Revealed comparative advantage in the global market in export of agrarian products from Serbia and RCA_1 index higher than 1 in all years of the analysis had nine divisions. The highest value of the index RCA_1 had a division sugar, sugar preparations and honey, and the primacy in 2011 took over the division cereals and cereal preparations; followed by vegetables and fruits.

The lowest value of RCA_1 index less than 1, in all the years of observation, which indicate that these Serbian divisions are uncompetitive in the (global) world market, had the divisions: fish, crustaceans, molluscs and preparations, and animal oils and fats.

These findings are mostly confirmed by the other two calculated indexes of revealed comparative advantage (RCA_2 and RCA_3) for some SITC divisions of Serbian agrarian sector in trade with all trading partners.

The value of RCA_3 index calculated for some individual divisions of the Serbian agrarian sector in the markets of the EU, CEFTA and its members, indicate that Serbian agrarian sector has a comparative advantage in the markets of Montenegro,

Bosnia and Herzegovina, and Macedonia, while show no significant comparative advantage in most group / divisions of agri-food products in the markets of Croatia and the EU. A large number of commodity divisions of agricultural and food products have, under the conditions of liberalization, experienced decrease of the comparative advantage (relative to the entire economy) in the EU and individual member states of CEFTA.

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CREDIT AS THE FINANCIAL SOURCE
OF THE SERBIAN AGRICULTURE

Gordana Radović[1], Radovan Pejanović[2], Zoran Njegovan[3]

Summary

The aim of this paper is to describe the role of credit as a source financing agriculture in the Republic of Serbia in the recent period, and to determine the advantages and disadvantages of the use of this financial instrument for financing agricultural production. Agriculture, given its specific production is not capable self-financing. And that they it needs to be informed by proper financing models. In the Republic of Serbia in the recent period there was not an adequate funding model was used, and the problem of financing agricultural production is still very actual. This is the most serious and complex problem of domestic agriculture and agricultural policy. Main obstacle to a higher use of loan funds in Serbian agricultural economy are: the instability and uncertainty of the agricultural and food production, unsafe placement of unknown prices of agricultural crops in the torque delivery and inconsistent agricultural policy measures. Ese factors add to the limiting factor for greater investments in agriculture and a low rate of return of agricultural production, which is limited by low yields, low productivity, and price disparity. On the other hand, there are few banks in the reporting period, as part of their loans, and investments have directed towards agriculture. The reasons are the high risks of agricultural production, its dependence on weather conditions, the risk of disease outbreaks and large-scale as well as large fluctuations in prices of agricultural products. Risk adverse banks generates a high degree of dispersion of demand for financial services, high costs of obtaining information and performing financial transactions for farmers, and the lack of quality of loan collateral, due to unregulated or poorly regulated property rights. The demand for agricultural credit is not evenly distributed throughout the year, but is significantly higher in the sowing period, which requires a larger book of business assets of banks in this period, and thus the inability to qualify it in profitable economic activities and in the short term. Farmers have limited confidence in the banking sector, and they lack experience in dealing with the banks. Based on the research it can be concluded that loans are not performing source of funding in agriculture. In order

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to provide more favorable bank loans for agricultural development in the Republic of Serbia, autonomous involvement of commercial banks is not sufficient. It is necessary to introduce coordinated activities of all state bodies, which would allow the reduction of the political, institutional and financial risk in these economic conditions.

Key words: *agriculture, agricultural finance, credit as the financial source, the Republic of Serbia.*

1. Introduction

The word "credit" derives from the Latin word "creditum", which means credit or credit, i.e. from the word "credo" which means to believe or trust. The essence of such a relation is maintaining liquidity of businesses, in order to mobilize and transfer the fragmented funds into production. During the process of crediting funds to agricultural production, it is extremely important to place the funds in a timely manner, as the investment must be realized in the optimum deadline for starting the production. If there is a delay during the fund placement in the agriculture, the consequences can include low yields and lower production volume, which leads to inability of paying the credits in the agreed deadline.[4]

The agriculture needs a constant financial and credit support because of: (a) the need to invest the funds into production at once and in high volume in accordance with the nature of the production; (b) long period of retaining the funds, or low turnover of the invested funds; (c) low profit, characteristic for primary agricultural production, which disables the forming of its own accumulation, or own financial sources. [5]Farmers usually take credits in order to buy necessary raw materials, i.e. working assets in order to start and provide the quality production. The credit is necessary if they are considering buying agricultural machinery and equipment, more land or building the facilities for agricultural production.

In recent years, agricultural credits in domicile conditions have been realized through; (1) natural-commodity credits; (2) subsidies from primary issue of the Central bank; (3) commercial bank credits; (4) bank credits supported by the Ministry of Agriculture; (5) special credits supported by state financial institutions.

Commodity credit is an informal credit arrangement and represents the least favourable form of credit for farmers. Basically, this credit arrangement means that a certain amount of the necessary production input, provided by manufacturing

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[4] Radović G., (2009), MSc Thesis: *Models of Financing Agriculture in the period of Transition*, University of Novi Sad, Faculty of Economics, Subotica, p.40.
[5] Pejanović R., (2013), *Essays on Agrarian and Rural Economy*, University of Novi Sad,. Faculty of Agriculture

industry, is exchanged for agricultural products. The interest rate is not stated in percentage, but by parity, and its vagueness of rates does not give the farmers clear picture of how much money this kind of credit actually costs.[6]

Agriculture in domicile conditions had beneficial credit facilities up to 1994, which were selected credits with favourable interest rates, approved by primary issues of the Central bank. This type of credit was canceled as it proved to be the generator of inflation, even though those credits were commodity based. At the same time, other financing sources that would replace this model were not introduced, which is why farmers had to take credits with commercial banks that offered extremely high interest rates.[7]

The aim of this paper is to determine the role of credit as the source of financing of agriculture in the Republic of Serbia, as well as to establish strengths and weaknesses of this model, as the means of financing the agricultural production.The basic hypothesis we will start our research from, is that in order to achieve agricultural development in the Republic of Serbia, we need to have an adequate credit support. In order to test the hypotheses, the paper used analytic-empirical, comparative, qualitative and quantitative methods.The research conducted suggests that the credits, which are granted to farmers by commercial banks in the past in our environment characterized by: high interest rates, short repayment periods, high demands for collateral, and high associated costs of the credit approval procedure.The credit support should be tailor made for placement of funds, portion of annuity, credit processing costs, seasonal character, dynamics and specific nature of certain types of agricultural production. Credit support to domicile agricultural producers is more than necessary, as they do not have the means to finance their own production, while the agrarian budget funds, that allow the right to subsidies, are limited. In order to test the hypotheses, the paper will be used as sources of data obtained from five commercial banks, which are in terms of domicile leading in terms of lending to agriculture and agricultural lending, which results in the past implemented with the support of the Ministry of Agriculture and Government of the Autonomous Province of Vojvodina.

2. Commercial bank credits

According to the attitudes of the relevant authors, an adequate credit policy can lead to positive effect on agricultural production. It is possible to influence faster development of certain types of agriculture by establishing selective credit policy

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[6] Pejanović R., Njegovan Z., (2011), *Principles of Economy and Agrarian Policy,* University of Novi Sad,. Faculty of Agriculture
[7] Radović G., (2009), MsC Thesis*: Models of Financing Agriculture in the period of Transition*, University in Novi Sad, Faculty of Economics, Subotica, p.29.

(lower interest rates, longer repayment period with the existence of grace period), and make possible for modern means for production to be introduced, and at the same time, accelerate the process of agricultural modernization. Inadequate credit policy, which does not account for unique features of agricultural production, can lead to excessive indebtedness of agricultural enterprises and preclude them from further development.[8]

Domicile market of agricultural credits is limited due to the following factors: (a) high risk of agricultural production; (b) low percentage of agricultural insurance; (c) non existence of credit history (d) low level of productivity and accumulation of agricultural production; (e) non existence of adequate warranty because of disorganized cadastre offices, as well as long and quite expensive legal processes that these warranties require; (f) lack of expertise when it comes to drafting business plans; (h) lack of experts for agrarian business plan assessment in banking sector, and their lack of knowledge of specific types of agricultural production.

Credit facilities in agriculture are not appealing to commercial banks, not only because of the great risks, but also because of the high costs. Cooperation with agricultural entities requires extremely good territory coverage, or the existence of extended branch network, available to the producers in the most remote rural areas, which is impossible for smaller banks to offer. Furthermore, the demand for agricultural credits is uneven during the year, as it is considerably higher during sowing period, which also requires greater reserves of funds available at commercial banks in this period. At the same time, it also means that the banks can not use them for more profitable economic activities in a shorter period of time.[9]

It is important to emphasize that the banks can not treat the same all the lines of production, because there are more intense lines in agriculture, that need greater financial investments and extensive lines that require less investment. There is also a difference in profitability of certain agricultural production lines and their products' marketability. Due to different profitability of certain production lines, the banks should develop a system of selective interest rates.[10]

In the past, commercial banks on domicile credit market were not particularly interested in giving credits to agriculture because of the risks, insecure product placement, high costs of obtaining information and conducting financial transactions for the farmers. However, in the past five years, there has been a considerable rise of interest for rural financing of the banking sector, which can be explained by the arrival of the foreign banks that have had long traditions in

[8] Božić D., Bogdanov N., Ševarlić M., (2011), *Economics of Agriculture,* University of Belgrade, Faculty of Agriculture, p.109-110
[9] Radović G., (2009), MSc Thesis: *Models of Financing Agriculture in the period of Transition,* University in Novi Sad, Faculty of Economics, Subotica p.44-45
[10] Ibid

agricultural credits. Furthermore, we will present the conditions of credits found at five banks that, are currently key players and take the biggest share in agricultural credits in the Republic of Serbia.

Table 1: The terms of agricultural credit in ProCredit bank

I) Credits for sowing and purchase of raw materials (seed, livestock feed, fertilisers, crop protection products, fuel)		
	Credit amount:	RSD or indexed credits
	Repayment period:	up to 36 months;
	Repayment scheme:	bullet repayment for credits with the maturity up to 12 months, at the end of the repayment term, , option for seasonal adjustment of the repayment scheme
	Interest rate:	from 0.85% per month;[11]
II) Credits for puchase of new and used machines		
	Credit amount:	RSD or indexed credits
	Repayment period:	up to 120 moths for indexed credits;
	Repayment scheme:	not stated in the credit conditions;
	Interest rate:	EIR from 7.74%;
	Collaterals:	Machines purchased with the credit can be put up as collateral
	Notice:	Down payment is not mandatory ; Credit support for VAT payments
III) Credits for puchase, construction or expansion of agricultural facilities		
	Credit amount:	adjusted to the client's credit worthiness
	Repayment period:	long term indexed credits of up to 15 years;
	Grace period:	up to 12 months;
	Repayment scheme:	monthly, quarterly or semi-annual instalments, depending on seasonal character of agricultural production
	Interest rate :	not stated in the credit conditions;
	Collaterals:	not stated in the credit conditions;
IV) Credits for purchase of agricultural land		
	Credit amount:	adjusted to the client's credit worthiness
	Repayment period:	long term indexed credits of up to 20 years;
	Grace period:	up to 12 months;
	Repayment scheme:	not stated in the credit conditions
	Interest rate :	from 6.9% plus six-month Euribor;[12]
	Collaterals:	not stated in the credit conditions

Source: : http://www.procreditbank.rs/en/strana/3531/loans-for-agricultural-production-improvement (June 14, 2013)

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[11] Radović G., (2013), *Banks offer credit*, "Poljoprivrednik" (Magazine of Agriculture), No. 2512, June 14, 2013, p.3

[12] Ibid

ProCredit bank was the first bank on our market to form the model of „granting the agricultural credit on your door step" , and today it has over 100 experts, working closely with the farmers. Procredit bank started granting agricultural credits in the Republic of Serbia in 2002, and it has invested over half a billion euro in agricultural credits, granted to individual producers. Besides these placements, the bank realised the credits to the agricultural sector, as well as the funds realised through ProCredit leasing.[13]

Besides the above mentioned credits in Table 1, ProCredic bank also offers the credits for improvement of energy efficiency of agricultural machinery, livestock expansion, planting orchards and vineyards, as well as building hot houses and greenhouses. ProCredit Bank has signed co-operation agreements with over 70 well-known producers and suppliers of livestock feed, seedlings and other agricultural goods and materials.

A ProCredit Bank credit allows the clients to make purchases from these suppliers and lets them receive unique benefits– interest rates for the credit are paid by the supplier, so the producers just have to repay the product purchase price.

Table 2: The terms of agricultural credit in Banca Intesa

I)FarmerObrt Credits for purchase of raw materials for the current season, fodder, fattening livestock, maintenance and other current expenses.

Credit amount:	from 1000 up to 100 000 euro; indexed in EUR or RSD
Repayment period:	from 6 to 24 months;
Grace period:	up to 12 months;
Repayment scheme:	in monthly, quarterly or semi annual installments
Interest rates :	22% to 28% annually for RSD credits
	14% to 19% annually, for credits indexed in EUR
Effective rates:	25.72% to 29.17% for RSD credits
	16.01% to 19.23% for credits indexed in EUR
Collaterals:	promissory notes, co-debtor ship, mortgage or lien

II) FarmerInvest Credits for puchase of land, silo building, barns, agricultural buildings, greenhouses, cold storage facilities, irrigation systems, investment in the foundation stock or perennial plants, etc.

Credit amount:	from 5000 up to 500 000 euro; indexed in EUR
Repayment period:	from 12 to 120 moths for indexed credits;
Grace period:	up to 24 months;
Repayment scheme:	in monthly, quarterly or semi annual installments
Interest rates :	22% to 28% annually for RSD credits for repayment period of up to 2 years
	from 11% + 3M Euribor up to 20% + 3M Euribor for credits indexed in EUR for repayment period of up to 10 years

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[13] Ibid.

Effective rates:	25.72% to 26.46% for RSD credits
	13.15% do 13.45% for credits indexed in EUR
Collaterals:	promissory notes, co-debtor ship, mortgage or lien

III) Credits for puchase of agricultural land	
Credit amount:	up to 100 000 euro;
Repayment period:	up to 120 months;
Grace period:	up to 12 months;
Repayment scheme:	monthly instalments,
Interest rate :	not stated in the credit conditions;
Effective rates:	not stated in the credit conditions;
Collaterals:	promissory, bonds, mortgage on land

IV) Credits for purchase of insurance policy in agriculture in cooperation with Delta Generali	
Credit amount:	from 30 000 RSD up to 500 000 RSD
Repayment period:	up to 12 months;
Repayment scheme:	Model I – 3,6,9 months, repayment of the principal and interest rate one-off, upon maturity
	Model II – 12 months, repayment in 12 monthly installments
Interest rate :	22% annual, fixed
Effective rates:	from 22.90%
Collaterals:	promissory note; insurance policy transferred in favour of the bank

Source: http://www.bancaintesa.rs , (June 14, 2013)

Banca Intesa has been engaged in granting the credits to the registred agricultural enterprises since 2008 and by December 31, 2012, it has granted the total of 20 000 agricultural credits, worth over 100 million euro.[14]

Commercial Bank, in addition to these types of credits and approves credits and grants for energy efficiency improvements, Kombank credits based on 100% of deposits, credits from the KfW credit line, credits from local programs and economic development in the Balkans - Program LEDIB and lcredits for the purchase of agricultural land by the guarantee of the Guarantee Fund of APV.

Table 3: The terms of agricultural credit in Komercijalna Banka

I)KomBank short-term Credits for financing working capital and current liquidity	
Credit amount:	minimum of 1000 euro in RSD counter value; maximum – depending on the client's credit worthiness; credits are granted in RSD, with and without currency clause

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[14] Radović G., (2013), *Banks offer credit*, "Poljoprivrednik" (Magazine of Agriculture), No. 2512, June 14, 2013, p.3

Repayment period:	up to 12months;
Grace period:	up to 12 months;
Repayment scheme:	at once or in monthly, quarterly or semi annual installments
Interest rates :	18.50% to 22% annually for RSD credits
	10.95% to 14.45% annually, for credits indexed in RSD
Collaterals:	depend on the client's credit worthiness

II) KomBank Credits for investments and permanent, working capital (purchase of livestock, new machinery, paying the rent, building greenhouses and hothouses, irrigation systems, planting perennial plants)

Credit amount:	minimum 1000 euro in RSD counter value; maximum – depending on the client's credit worthiness; credits are granted in RSD, with and without currency indexed
Repayment period:	up to 36 months – RSD; up to 84 months- RSD indexed; up to 36 months for permanent working capital; up to 6 months for machinery purchase
Grace period:	up to 12 months for other purposes; up to 24 months for planting perrenials
Repayment scheme:	in monthly, quarterly or semi annual installments
Interest rates :	20.50% to 23% annually RSD
	9.45% to 12.45% annually credits indexed in RSD
Collaterals:	depend on the client's credit worthiness

III) Kombank Credits for puchase of agricultural land

Credit amount:	minimum 1000 euro in RSD counter value; maximum – depending on the client's credit worthiness; credits are granted in RSD indexed
Repayment period:	up to 120 months;
Grace period:	up to 12 months;
Repayment scheme:	monthly, quarterly or semi annual installments
Interest rate :	from six-month EURIBOR + 7,5% annual rate
	from six-month EURIBOR +10% annual rate
Security instruments:	depend on the client's credit worthiness

IV) Credits for purchase, construction or extension of agricultural facilities

Credit amount:	minimum 1000 euro in RSD counter value; maximum – depending on the client's credit worthiness; credits are granted in RSD indexed
Repayment period:	up to 120 months;
Grace period:	up to 12 months;
Repayment scheme:	monthly, quarterly, semi annual or annual installments
Interest rate :	from six-month EURIBOR + 8,6% annual rate
	from six-month EURIBOR +11 % annual rate

Source: http:/www.bancaintesa.rs/code/navigate.aspx?id=116 (June 14, 2013)

Agricultural credits are very important segment of Credit Agricole bank. This bank has been financing agricultural production for more than 120 years. From 2009,

they have directed their focus on financing primary and food processing industry on domicile market[15]. In the following months, Credit Agricole bank in Serbia in cooperation with European Bank for Reconstruction and Development (EBRD) has prepared a special purpose credit line, worth 20 million euro, intended for financing agricultural companies in Serbia. Based on this credit line, the bank will grant short-term credits for working capital. The credits are indexed in EUR, the repayment period is up to 12 months with the conditions more favourable than the ones found on the market, while the colleterals are commodity bills.[16]

Table 4: The terms of agricultural credit in Credit Agricole Bank

I) Credits for working capital (for procurement of raw materials for agricultural production, cattle for fattening, fodder etc).	
Credit amount:	minimum of 5000 euro in RSD, credits are granted in RSD or indexed in EUR
Repayment period:	up to 12months;
Grace period:	-
Repayment scheme:	in monthly, quarterly or semi annual installments or upon maturity
Interest rates :	depend on the client's solvency;
Collaterals:	depend on the client's credit worthiness
II) Fixed Asset Credits (for financing of agricultural machinery, equipment, renovation or reconstruction of the agricultural facilities, purchase of greenhouses, hot houses and irrigation systems	
Credit amount:	depends on the client's credit worthiness, indexed in EUR required down payment in investment is minimum 10%
Repayment period:	up to 7 years
Grace period:	up to 12 months
Repayment scheme:	in monthly, quarterly or semi annual installments
Interest rates :	nominal interest rate from 5.2% to 9% annually[17]
Collaterals:	depend on the client's credit worthiness
III) Investment Credits for puchase of agricultural land, building farms or silos	
Credit amount:	minimum 5000 euro in EUR , credits are indexed in EUR required down payment in investment is minimum 10%
Repayment period:	up to 7 years;
Grace period:	up to 12 months;
Repayment scheme:	monthly, quarterly or semi annual installments
Interest rate :	nominal interest rate from 5.2% to 9% annually[18]
Collaterals:	depend on the client's credit worthiness

Source: http://www.creditagricole.rs/credit-agricole/english/agrobusiness/loans (June 15, 2013)

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[15] Ibid

[16] Press release, Credit Agricole Bank Serbia, June 4, 2013

[17] Radović G., (2013), *Banks offer credit*, "Poljoprivrednik" (Magazine of Agriculture), No. 2512, June 14, 2013, p.3

[18] Ibid

Financing agricultural production with commodity bills as collateral is the model found in other banks as well, in case it is in association with Indemnity Fund of the Republic of Serbia. According to the fund's data, 210 million dinars were granted in 2011, and 394 million dinars were granted in 2012 in Serbia. Their credit conditions, primarily interest rates, are more favourable than the market's rates. The reason lies in the fact that commodity bill is a short-term quality security and EBRD and Indemnity Fund have active part in these credit lines.[19]

Table 5: The terms of agricultural credit in AIK Bank

I) Short-term Credits for financing working capital	
Credit amount:	depend on the client's solvency, no down payment or deposit needed
Repayment period:	up to 12months;
Grace period:	-
Repayment scheme:	in monthly, quarterly or semi annual installments, fixed installments in RSD
Interest rates :	nominal rate 19.75% annually effective rate 24% annually
Collaterals:	not stated
II Long –term Credits for purchase of new machinery	
Credit amount:	from 10 000 to 30 000 EUR , indexed in EUR
Repayment period:	up to 72 months
Grace period:	up to 12 months
Repayment scheme:	in monthly, quarterly, semi annual or annual installments
Interest rates :	from six-month EURIBOR + 9% annual rate Interest rate is variable every January 1 and July 1
Collaterals:	depend on the client's credit worthiness
III) Long term Credits for puchase of agricultural land, new machinery, irrigation system and hail protection	
Credit amount:	depend on the client's solvency, no down payment or deposit needed, credits indexed in EUR
Repayment period:	up to 10 years for purchase of land; up to 6 years for purchase of new machinery worth more than 30 000 EUR; up to 5 years for purchase and installment of irrigation system and hail protect
Grace period:	up to 12 months;
Repayment scheme:	monthly, quarterly or semi annual or annual installments
Interest rate :	from six-month EURIBOR + 8,5% annual rate Interest rate is variable every January 1 and July 1

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[19] Radović, G. (2013), "Poljoprivrednik"(Magazine of Agriculture) No.2512, June 14, 2013, p.3

Collaterals:	depend on the client's credit worthiness
IV) Long term Credits for purchase of agricultural land	
Credit amount:	depend on the client's solvency, credits indexed in EUR
Repayment period:	up to 10 years;
Grace period:	up to 12 months;
Repayment scheme:	monthly, quarterly, semi annual or annual installments
Interest rate :	from six-month EURIBOR + 6.5 % annual rate
	Interest rate is variable every January 1 and July 1
Collaterals:	depend on the client's credit worthiness

Source: AIK bank leaflet, May 2013

Analysis of current credit conditions, agriculture by five commercial banks, which in the domestic credit market has a leading position to the extent approved agricultural loan refers to the following conclusions: (a) commercial banks were included in the study recognized the financial needs of agriculture in terms of different types of credits; (b) in terms of interest rates, terms and repayment period, foreign currency clause of collateral credit and high related costs in the approval process, analyzed the adverse credit financing source of local agriculture; (c) from commercial banks participating in the survey is the only ProCredit Bank adjusted repayment plan, individual credits, seasonal nature of agricultural production.

3.   Credits with the Ministry of Agriculture's support

In 2004, Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia started granting the short-term and long-term credits, whose conditions were more favourable than the commercial banks' credits, aiming to support the development of the market of agricultural credits and the local farmers who were "building credit history". The primary source of funds was the agrarian budget, and the credits were granted by the Development Fund and commercial banks. The beneficiaries were only registered agricultural estates.[20]

The short-term credits were fully granted from the agrarian budget's funds, and the beneficiaries were individuals. The amount of the credit depended on the area of land registered as agricultural estate. The annual interest rate was 5%, and the credits were granted with the repayment period up to 12 months. This model of short-term lending was in use until the year 2007. At the same time, long-term credits were granted to the registered agricultural estates through commercial banks for: (a) planting perennial plants/crops; (b) construction of greenhouses and hothouses; (c) investing in livestock production; (d) purchase of new agricultural

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[20] Regulation on the Register of Agricultural Holdings, Official Gazette of the Republic of Serbia, No. 45/2004.

machinery; (e) construction and purchase of irrigation systems. From 70 % to 90 % of financing sources came from the agrarian budget's funds, while the rest came from the commercial banks. The repayment period was up to 5 years, with the grace period from one to three years, included in the repayment period, and effective interest rate of 3% annually for the amount from 5 000 to 200 000 euros.The Investment Fund of the Republic of Serbia was founded in 2005 with the aim to grant agricultural credits to farmers. The financing funds were collected through the repayment of short-term and long-term credits, the budget's funds for the current year and other funds.[21]

The model of financing agriculture with the support of the Ministry of Agriculture was adjusted in 2008. According to the new model, short-term credits were fully granted by commercial banks. The annual interest rate was 5%, and every year, the Ministry participated by subsidizing the interest with 300 million dinars. The model of short- term credit was in use during 2009 and 2010. From 2008, the commercial banks participated with 80-90% in funding the long- term credits, while the Ministry participated with 10-20%, bearing in mind that the funds from the budget were placed as non refundable means – the subsidies. A new model was introduced in 2009 and was in use for the next two years. According to this model, the commercial banks participated with 60% in funding, while the Ministry participated with 40%. The credits were granted with the repayment period of up to 5 years (except for construction, planting vines and nuts fruits, where the repayment period was eight years), but in the first three years there was the bank's interest rate, and in the last two years (a 40% participation provided by the Ministry), there was not any interest rate, and therefore the annual interest rate was 5% for the total amount of the credit.[22]

In 2010, local governments and Provincial Fund for the Development of Agriculture joined the system of granting the credits to the agriculture. The credits with the help of local governments were granted, as the local governments participated with 25% of the funds, just like the Ministry, and there was no charge of interest. The commercial banks participated with another 50% of funds and calculated their own interest rates. The agricultural credits for agricultural development, granted in cooperation with Provincial Fund for the Development of Agriculture, were placed to the registered agricultural estates on the territory of AP Vojvodina. The Fund participated with 300 million dinars annually in funding these credits, while the Ministry participated with 100 million dinars. The model of agricultural credits with the support of the Ministry of Agriculture was adjusted again in 2011, and the same model was in use the following year. According to the new model, the Ministry supported the agricultural production through credit

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[21] Source: http://www.minpolj.gov.rs , (June 10, 2013)
[22] Ibid

support by subsidies for a part of the interest rate. The credits were not granted with currency clause, but the credit amounts were limited, just like the repayment period which was shorter – three years maximum. The credits were granted in 2011 with the interest rate of 8%, while the annual rate in 2012 was 6%. Regulation on the allocation of subsidies in agriculture and rural development in 2013 (Official Gazette of the Republic of Serbia br.10/2013) will provide funding for credit support to agriculture in the amount of 500 million.

4. The credits of specialized state institutions

The development of agricultural production in the Republic of Serbia is supported by favourable credit placements of:

  (a) The Development Fund of the Republic of Serbia

  (b) Provincial Fund for the Development of Agriculture

  (c) The Guarantee Fund of Autonomous Province of Vojvodina

The Development Fund of the Republic of Serbia was established by the Law on Republic of Serbia Development Fund.[23] The Fund is a state organization and its main goal is funding the investment programs of small and medium enterprises. The Fund was founded in 1967 as the Fund for development of affected areas, but it changed its name in 1992 when the Law on Development Fund was passed. The Fund can not grant credits to individual producers but only to agricultural enterprises – legal entities, and in the previous years, those were the credits granted to processing and food industry.[24]

The Development Fund issues the guarantees to the entities with the commission of 1.8% of the amount annually. If the guarantee is issued in order to secure receivables with a currency clause, it is also applied for guarantee calculation.[25]

Based on the data presented in Table 6, we can conclude that the credits granted by the Development Fund of the Republic of Serbia, is characterized by favorable interest rates, but very short repayment periods, bearing in mind that the maximum length of just six years, and for investment credits.

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[23] Official Gazette of the Republic of Serbia, No.20/92 ; No. 107/05.
[24] Radović G., (2009), MSc Thesis: *Models of Financing Agriculture in the Period of Transition,* p.127
[25] Ibid

Table 6: The terms of agricultural credit, The Development Fund
of the Republic of Serbia

I) Short term Credits for working capital	
Credit amount:	minimum of 2 000 000 RSD for legal entities; 500 000 for entrepreneurs maximum of 100 000 000 RSD for small enterprise maximum of 200 000 000 RSD for medium enterprise maximum of 300 000 000 RSD for big enterprise maximum of 5 000 000 RSD for entrepreneurs
Repayment period:	from 3 to 12months;
Grace period:	-
Repayment scheme:	according to the repayment scheme
Interest rates :	3% annual; with applied currency clause
Collateral :	blank promissory notes with the bank's aval; bank's guarantee; blank promissory note
II) Investment Credits for permanent working capital	
Credit amount:	minimum of 2 000 000 RSD for legal entities; 500 000 for entrepreneurs maximum of 100 000 000 RSD for small enterprise maximum of 200 000 000 RSD for medium enterprise maximum of 300 000 000 RSD for big enterprise maximum of 5 000 000 RSD for entrepreneurs
Repayment period:	for investment credit up to 6 years for permanent working capital up to 2 years
Grace period:	up to 12 months for investment credits and permanent working capital
Repayment scheme:	quarterly installments
Interest rates :	for investment credit 2.5% annually, if there is guarantee or bank's avalised bill 4% annually in other cases 2.8% for permanent working capital if there is guarantee or bank's avalised bill 4% annually in other cases
The terms for credits:	The right to the credit has a legal entity registered in the Republic of Serbia, that has been operating without a loss in the past two years; The credits are granted for building, construction and reconstruction, adaptation, repairs or purchase of commercial property, industrial facilities, purchase of new or used machinery, as well as for procurement of permanent working capital of the enterprises which are predominantly private or state owned, except public companies and enterprises with the state ownership less than 40%.

Source: http://www.fondzarazvoj.gov.rs , Plans and programs of the Fund's activities in 2013 (June 16, 2013)

Based on the data presented in Table 7 it can be concluded that during the period in question of long-term credits of the Development Fund of the Republic of Serbia placed for primary agricultural production and the production and processing of food products in total long-term credits of Fund.The average share was 33% and in the 2010 -2012 or 1/3 of the total long-term credits of the Development Fund of the Republic of Serbia was placed in the agricultural and food industries.

Table 7: Long-term credits of the Development Fund of the Republic of Serbia placed in the agriculture and food industry in the 2010 -2012

Year	Long term credits for primary product. (mil. RSD)	Long term credits for product. food product (mil. RSD)	Long term credits for product. and process. of food product (000 RSD)	Total long term credits for agricult. and processin. of food product (mil. RSD)	Total long term credits of the developm. fund of the Serbia (mil. RSD)	The share of long term credits for agricult. and food process. in total long credits of the developm. fund
2010.	1,2	6.820	-	6.821	15.625	43%
2011.	21,7	4.096	7.000	4.125	15.020	27 %
2012.	592,3	3.749	5.307	4.347	15.000	28%
Total	615,2	14.665	12.307	15.293	45.645	33%

Source: http://www.fondzarazvoj.gov.rs, (sajtu pristupljeno 12.09.2013.)

Provincial Fund for the Development of Agriculture was founded by the Assembly of Autonomous Province of Vojvodina in 2001.[26] in order to create the conditions needed to encourage the development of agriculture of the Autonomous Province of Vojvodina. The main idea was to allow producers to access the necessary funds in a faster and easier manner.[27]

In 2011, Provincial Fund for the Development of Agriculture decided to focus its activities and to: (a) encourage the agricultural development in AP Vojvodina; (b) encourage the even agricultural development; (c) improve the competitiveness of domestic agriculture; (d) improve the living standard of the food producers, and to offer safe, healthy and quality food to their consumers at favourable prices; (e) encourage the employment.[28] By the end of 2011, Provincial Fund for the Development of Agriculture granted 1 875 credits, placed with the aim to help the

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[26] Official Gazette of AP Vojvodina, No. 3/01.

[27] The Report of the Activities of the Government of AP Vojvodina from 2000 to 2003 p.58

[28] Source: http://www.fondpolj.vojvodina.gov,.rs

agricultural development on the territory of Vojvodina province, with the total amount of 8 063 560.13 euro.[29]

Based on the data presented in Table 8, it can be concluded that the credits, which had previously been approved Agricultural Development Fund of Vojvodina, characterized by favorable interest rate,the existence of a grace period, but rather short period of credit repayment.

Table 8: The terms of agricultural credits, Provincial Fund
for the Development of Agriculture

I)Credit "Reconstruction of irrigation system"	
Credit amount :	1) up to 5.000 EUR;
	2) from 5001 EUR to 15.000 EUR;
Repayment period:	1) up to 24 months;
	2) up to 30 months;
Grace period:	1) from 9 months (during grace period there is no interest);
	2) from 12 months (during grace period there is no interest);
Repayment scheme:	semi annual installments
Interest rate:	1,3% annually
II) Credits for production in closed spaces (greenhouse, hot house) and necessary equipment	
Credit amount:	minimum of 1.000 EUR, maximum of 15.000 EUR;
Repayment period:	up to 36 months;
Grace period:	up to 12 months (during grace period there is no intercalate interest);
Repayment scheme:	semi annual installments
Interest rate:	2 % annually
III) Credits for livestock production	
A) For purchase of basic herd for sheep and goat breeding	
B) For purchase of bee swarms	
C) For purchase of quality calves for fattening	
Credit amount:	A) minimum of 1.000 EUR, maximum of 12.000 EUR;
	B) minimum of 1.000 EUR, maximum of. 5.000 EUR;
	C) minimum of 5.000 EUR, maximum of 15.000 EUR;
Repayment period:	A) B) up to 18 months;
	C) up to 12 months;
Grace period:	A) up to 12 months (during grace period there is intercalate interest)
	B) up to 24 months (during grace period there is intercalate interest)
Repayment scheme:	A) B) semi annual installments
	C) one-off; after the duration of credit
Interest rate :	A) B) C) 2% annually
III) Credits for planting perennial plants fruit and wine and establishing hail protection	
A) Credit for planting orchards	
B) Credits for planting vineyards	
C) Credits for hail protection nets in orchards and vineyards	
Credit amount:	A) minimum of 1.000 EUR, maximum of 10.000 EUR;
	B) minimum of 1.000 EUR, maximum of. 10.000 EUR;
	C) maximum of 15.000 EUR;
Repayment period:	A) up to 36 months - berries; up to 24 months -apples; up to 12 months -nuts
	B) C) up to 36 months;
Grace period:	A) up to 24, 36, 48 months (during grace period there is intercalate interest)

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[29] Ibid

	C) up to 12 months (during grace period there is intercalate interest)
Repayment scheme:	A) B) C) semi annual installments
Interest rate :	A) B) C) 2% annually
V) Credits for agricultural machinery	
Credit amount:	minimum of 1.000 EUR, maximum of 20.000 EUR; minimal down payment of 15% for power generating machinery
Repayment period:	up to 48 months
Grace period:	up to 12 months (during grace period there is intercalate interest)
Repayment scheme:	semi annual installments
Interest rate :	2% annually
VI) Credits for building and furnishing of storage space	
Credit amount:	minimum of 10.000 EUR, maximum of 20.000 EUR;
Repayment period:	up to 48 months;
Grace period:	up to 12 months (during grace period there is intercalate interest)
Repayment scheme:	semi annual installments
Interest rate :	2% annually

Source: http://www.fondzarazvoj.gov.rs , Plans and programs of the Fund's activities in 2013 (June 16, 2013)

The Guarantee Fund of Autonomous Province of Vojvodina was founded in December 18, 2003 by the Founding Decision for the Guarantee Fund of Autonomous Province of Vojvodina, and it was registered as The Fund in April 15, 2004.[30] The main goal of The Fund is to ensure conditions for providing incentive to development and operations of small and medium enterprises, entrepreneurs and individual agricultural producers on the territory of Vojvodina. With its activities stated, the Guarantee Fund supports: (a) purchase of mineral fertilizers; (b) purchase of new agricultural machinery; (c) the export-oriented programs of small and medium enterprises; (d) female entrepreneurship.[31]

Every year, The Guarantee Fund determines the guarantee potential and then organises its activities in accordance with the limits. Therefore, they use multiplier, which was 2,5 for the period between 2004 to 2007 and in 2010, whereas in 2008 and 2009 the multiplier's value was 2,75. The Guarantee Fund charges the guarantee issue with the commission of 0.5% of the uarantee's value. The smallest amount of the commission is 5000 dinars, one-off and 0.25% upon maturity of each annuity, which is calculated on the remaining debt.[32]

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[30] The Report of the activities of AP Vojvodina, from 2004 to 2007, p.149.

[31] Source: www.garfondapv.gov.rs , (June 11,2013)

[32] Mr Vesna Paraušić,dr Drago Cvijanović: *The Serbian Agriculture-state and banks' programs of financial support from 2004 to 2006*, Institute of Agricultural Economics, Belgrade, p.198.

Table 9: The competitions of The Guarantee Fund of AP Vojvodina for the agricultural development by the end of 2010.

Competition	Effects	Engaged guarantee potential (RSD)	Number of guarantees
Purchase of mineral fertilisers	20 148 tons NPK	334. 053. 488,80	42
Purchase of machinery- tractors	813 units	2. 260 .575 .711,57	715
Purchase of land	307 ha	44. 152. 861,77	86

Source: www.garfondapv.gov.rs , (June 11,2013)

Based on the data presented in the Report on the activities of The Guarantee Fund of Autonomous Province of Vojvodina, by the end of 2010, the participation of the guarantees for the agricultural credits was 84%, while the participation of the above mentioned guarantees in the total amount of the engaged guarantee potential was 91%.[33]

5. Conclusion

Based on the research, we can conclude that the credits granted by the commercial banks to the farmers in the previous period have had several things in common: high interest rates, short repayment period, high collateral requirements, and high supporting costs during the credit granting period. The main obstacles to using more credits in domestic agrarian industry are as follows: instability and disorganization of the market of agricultural and food products, uncertain placement, unknown prices of the crops at the time of delivery and inconsistency of the agrarian policy measures. Another limiting factor for a greater placement of funds into the agrarian sector is low level of profitability of the agricultural production, conditioned by low yields, low productivity and accumulation, and price disparity. In domicile conditions, the lack of farmers' trust in banking sector is obvious, as well as the lack of experience in doing business with banks.

The Ministry of Agriculture of the Republic of Serbia since 2004. began with the granting short-term and long-term credits, whose terms were more favorable than those of commercial banks in order to support the development of the agricultural credits, or assistance to agricultural producers to "build a credit history." The original source of credit funds was the agricultural budget, and credits should be approved by the Development Fund of the Republic of Serbia, as well as

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[33]Source: http:///www.garfondapv.gov.rs , Bulletin of the Activities of the Guarantee Fund of APV, (June 11, 2013)

commercial banks. Credit users might have to be a registered farms. The Ministry has, since 2011, has changed the way of support, and the new conditions of agricultural budget to co-subsidize only the interest on agricultural credits. However, it is uncertain whether this method of support to agriculture to continue because of the current 2013, although he made a decree that provided that the agricultural budget set aside 500 milion for lending to agriculture, its implementation has not been carried out.

Therefore, based on the research presented, we can also conclude that the bank credit in domicile conditions, is an extremely unfavourable source of agricultural financing, unlike the credits granted by specialized state institutions. These credits have extremely favourable interest rates, but they also have a very short repayment period, grace period and the amount limitations. Thus, it is necessary to engage more state funds in agricultural credit granting. Credits for agricultural production by commodity bills as security, is an innovation in the domestic credit market. This method of financing is more advantage ous than conventional bank credits, primarly in terms of the interest rate. The reason for this is the fact that the collateral for these credits, commodity bills-quality short-term securities, but also to support this credit line respectable financial institutions Compensation Fund of the Republic of Serbia and the EBRD.

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PARTIAL EQUILIBRIUM MODEL
AS A TOOL FOR POLICY ANALYSIS IN AGRICULTURE:
AN EMPIRICAL EVIDENCE OF MACEDONIA

Ana Kotevska[1], Dragi Dimitrievski[2], Emil Erjavec[3]

Summary

Agricultural sector modeling based on partial equilibrium modelling of the supply and demand has become standard approach in the market outlooks and policy impact studies. The model builders and users reveal many pros and cons of the process and results of modelling. The Macedonian experience confirms some typical obstacles and at the same time faces some new ones with a local perspective. The paper provides a summary of the milestones in modelling the partial equilibrium model for the livestock-feed sector in Macedonia with main focus on the obstacles and limitations in the process. This experience is expected to be useful for the countries in the Western Balkan region planning to build a sector models based on partial equilibrium concept as a policy analysis tool.

Keywords: partial equilibrium agricultural sector models

JEL classification: Q110

1. Introduction

Models, as a simplified representation of a real situation by identifying the key factors and the relationship among, are sophisticated method for analyzing and solving real problems (Lee & Olson, 2006; Howitt, 2005; Garforth & Rehman 2006). They are used to explain certain events being observed and to improve economic theory as well. They are a good tool for building projections, simulation and 'what if' analysis, as well as a tool for assessing the impact of market-price measures on agricultural markets, or the changes in the internal and international market (Buckwell 1989; Erjavec and Kavcic 2005; Bienfield et al. 2001; Jensen et

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al. 2002). A range of models in terms of used method (general or partial equilibrium models, synthetic or econometric), subject of analysis (agricultural policy, trade policy, environmental policy, etc) or the geographical coverage (national, regional or global) have been developed through the last decades in agricultural economics (Bienfield et al. 2001; Lehtonen, 2001; Salvatici et al. 2001; Jensen et al., 2002; Erjavec, 2004).

The partial equilibrium models are comprehensive market models describing specific sub-sectors or groups of agricultural sub-sectors, analyzing in detail both sides of the equation between supply and demand, the price formation, interdependency of agricultural inputs and outputs between different product lines, the policy impact on supply and producers' income, etc. The general concept behind the model is the neo-classical approach by which the supply and demand rich their equilibrium while producers and consumers tend to maximize profits and product utility.

The partial equilibrium models forecasting the agricultural sector in Macedonia develop gradually. First, the partial equilibrium model for a single commodity (pig meat sector) was built. Since livestock production uses the crop production commodities and transforms them in other final or semifinal products, the interrelationship between the crop production and livestock production is of vital importance for the policy analysis (Halcrow, 1984). Hence, the interaction among livestock and feed sectors has been subject of forecast of three other multi-commodity partial equilibrium models: the comparative-static model, and two dynamic synthetic models. They are all academic documents, thesis and dissertations.

The aim of this paper is to provide a summary of the milestones in modelling the partial equilibrium model for the livestock-feed sector in Macedonia with main focus on the obstacles and limitations in the process. This experience is expected to be useful for the countries in the region planning to build a model as a policy simulation and analysis tool. Presenting all the limitations of the model, the paper also explain why a partial equilibrium model is chosen as a method for assessing the development of the Macedonian livestock-feed sector. More details about the model and it results can be found in Kotevska (2010) or Kotevska et al (2013).

2. Method

The method used to evaluate the future development of the Macedonian livestock-feed sector is a synthetic multi-commodity national partial equilibrium model. The model follows the general principles and structure of the AGMEMOD model (Salamon et al. 2008; Chantreuil et al. 2012). It is based on a set of multiproduct

linear regression analysis of certain elements in the food balance sheet for grains, meat and milk for the period from 1995 to 2008, producing projections up to 2020.

The model is composed of set of modeled and derived variables. Modeled variables are the commodity prices, production units (area in crop sub-models and breeding heads in livestock models), yield, consumption (per capita and for feed), and trade (export), as well as slaughter heads and slaughter weight in the livestock sub-model as intermediate-steps in production forecasting. The derived variables complement the picture of each market. They include the expected gross income in crop models, production, total consumption, import, net trade and self-sufficiency rate. Some of the modeled variables are used in others sub-models as endogenous variables, while others, some macroeconomic data, are taken or modeled outside the model as exogenous variables. The link with the external markets is through the price projections of the key agricultural markets from the combined AGMEMOD model.

For each individual commodity a sub-model is built, which is later integrated into a single model. The model includes seven commodities, grouped into three sub-models with similar structures. Thus, the grain group includes the wheat, barley and maize sub-models, the meat group includes beef, pig meat and lamb sub-models, and the milk sub-model covers the market of raw cow's milk, without taking into account its processed products.
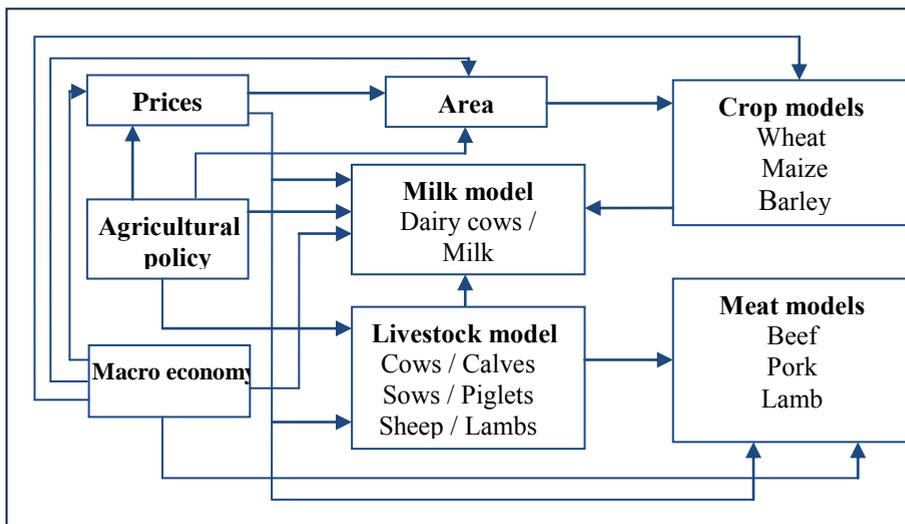

Figure 1 Sub-models interrelations

The linkages among sectors are presented in Figure 1. The crop models are linked through the distribution of total arable land used for crops, and their prices since they are substitute inputs in the livestock production. Crop models are additionally

linked through the use of grains as feed in livestock models. On the other hand, the volume of livestock production defines the demand of grains for animal nutrition. The linkage between meat models is by their relative price, assuming they are being partial substitutes. The milk model is linked with the beef model by the total number of cows.

The policy included in the model is structured by simplifying the method for harmonizing policy developed within AGMEMOD partnership (Salputra, Miglavs, & van Leeuwen, 2008). This system is set up to cover the recent reforms of CAP, distinguishing among different direct payment, regional and historical payments, as well as different national policy before accession and the topping up rates in the new member states. The allocation of agricultural budget in Macedonia to sectors and different measures is based on APM methodology (Rednak & Volk, 2010), and data from the national program for agricultural policy and rural development (MAFWE 2009). The integration of the agricultural policy in the model is through the calculated support (so-called reactive price) which by complementing the commodity market price affects the production decisions of farmers.

The assumptions behind the model are small country economy, free price formation, no changes in supply and demand factors, and stable macroeconomic indicators, such as real GDP and GDP deflator; population growth; and fixed exchange rate.

The model analyses four scenarios:

- The first, *baseline scenario*, assumes no EU accession, neither change in policy measures, but includes an increase of the budget for support of agriculture as planned and projected by the Ministry of Agriculture Forestry and Water Economy (MAFWE 2009).

- The second scenario, *price convergence scenario*, assumes EU accession in 2015 and price adjustment (appropriate increase or decrease) of the covered commodities due to the integration into the common European market.

- The third scenario, *EU–optimistic scenario*, assumes EU accession in 2015, price adjustment and application of CAP with an optimistic projections of budget volume and measures allowed (national ceiling as expected from MAFWE (2009); a topping-ups rate from the national budget, as in case with Slovenia in 2004; different levels of regional payments for pastures, arable land and perennial crops; coupled payments for beef and lamb; no historic payments).

- The fourth scenario, *EU–pessimistic scenario*, assumes EU accession in 2015, price adjustment and application of CAP with restricted budget and allowed policy measures (national ceiling is 75% of EU-OPT values; topping-ups from national budget is fixed at 30% in the period 2015-2020; regional payments are equal per unit capacity for arable land and pasture; no coupled and historical payments).

3. Limitations and problems of the Macedonian PE model

In the past, modelling the agricultural supply and demand is mainly done by explaining the past behavior while lately the main focus is in making projection on the future market development. Since the future is not known, modelling is performed on econometric analysis of the past data and on a bunch of assumptions. Thus, the success of gathering quality data and making good assumptions and consequently making good approximations of reality is the key factor affecting the usefulness of the model results.

4. Data requirements and statistics as limitation

The vast data requirements from one side and data availability from other side are weak points in modelling the Macedonian agriculture. In order to fulfill the quite demanding database required by the model, data used are from various sources: State Statistical Office (balance sheet, except trade), Customs Administration (trade), Ministry of Finance (historical data and future projections on GDP, GDP deflator and exchange rate), Ministry of Agriculture, Forestry and Water Economy (historical data and future projections on agricultural policy budget). The lack of available data is being supplemented by derivatives from available data (Table 2 and 3) as well as by including expert opinion and interdisciplinary collaboration for making enhanced adjustments and achieving data and results consistency.

Table 1: Grain balance sheet items and calculation

Item	Symbol	Unit	Source/Calculation
Area harvested	AHA	1,000 ha	SSO
Yield	YHA	t/ha	=SPR/AHA
Production	SPR	1,000 t	SSO
Import	SMT	1,000 t	SSO
Export	UXT	1,000 t	SSO
Consumption	UDC	1,000 t	=SPR+SMT-UXT
Feed consumption	UFE	1,000 t	=UDC*c
Food consumption	UFO	1,000 t	=UDC*c
Share in grain area	ASH	ratio	=AHA/GRAHA
Per capita consumption	UPC	kg	=UDC/POP
Self-sufficiency	SSR	ration	=SPR/UDC

c – Coefficient, according to an expert opinion
SSO = State Statistical Office of Republic of Macedonia, official data

Table 2: Livestock balance sheet items and calculation

Item	Symbol	Unit	Source/Calculation
Total number of heads	CCT	1000 heads	SSO
Number of female breeding heads	CCT	1000 heads	SSO
Number of slaughtered heads	KTT	1000 heads	*calculated**
Offspring crop	SPR	1000 heads	SSO
Production	SPR	1000 t	SSO
Import	SMT	1000 t	SSO
Export	UXT	1000 t	SSO
Consumption	UDC	1000 t	=SPR+SMT-UXT
Slaughter weight	SLW	kg/ head	=SPR/KTT
Weighted number of heads	WCI, WSI, WEI	1000 heads	$=0.8 \cdot CCT + 0.2 \cdot CCT_{(-1)}$
Offspring (yield) per breeding head	YPC, UPS, YPE	heads	=SPR/CCT
Per capita consumption.	UPC	kg	=UDC/POP
Self-sufficiency	SSR	ratio	=SPR/UDC

SSO = State Statistical Office of Republic of Macedonia, official data

The partial equilibrium model is based on a regression analysis of items in the food balance sheet for the selected commodities (Table 2 and 3). Thus, the quality of the model is directly dependent on the data needed for fulfilling the food balance sheets.

By definition, the food balance sheet, as a comprehensive picture of the country's supply and demand for a certain commodity during a given reference period (OECD 2007), gives the total quantity of products produced in the country, added to the total imported quantity and the beginnings stocks on one side, and the exported quantity, the quantity used for livestock feeding and human consumption, as well as the ending stock on the other side.

Production + Import + Beginning stocks = Consumption + Export + Ending stocks

Data availability caused some difficulties in preparing the balance sheets. The most problematic in constructing Macedonian food balance sheets are the assessment of ending stocks, the commodity consumption, and the allocation of the feed among different livestock productions. None of them is covered by the national statistics.

The first have been resolved by the assumption that the country has small amount of ending stocks that overflow from year to year, and are being estimated as equal to zero in long run (Dimitrievski and Ericson 2010).

Regarding the commodity consumption, the state statistical office collects data about the household consumption, but not on public consumption and from food processing industries. Following the principle that supply equals demand, and assuming zero ending stocks, total consumption is calculated as a sum of production and import reduced for the amount of export. Hence, the consumption is an aggregate amount comprised of quantities used as unprocessed food, used in processing industry (for food), as feed, as seed, waste and loss.

Total consumption = Production + Import – Export

The allocation among different livestock productions was made on the basis on interdisciplinary collaboration on expert opinion from agricultural economists and animal nutritionists.

Balance sheets proved to be a good tool for noticing inconsistencies in the statistical data set. For example, when building the database on the Macedonian livestock sector, it was observed that the number of slaughtered heads didn't correspond with the production volume. A deeper examination reveals that the problem lays in the methodology of data collection. Namely, the number of heads sold to slaughterhouses for slaughtering was registered as 'sold' not as 'slaughtered'. In order to include those heads, but to avoid double evidence, the data were corrected by the calculation* of slaughtered heads as a sum of 'slaughtered heads' and 'sold heads', reduced by 'bought heads'. Another example is the small number of piglets per saw. The question in the questionnaire was ambiguous, not asking for the number of farrowing per year or the number of piglets per saw per year. A discussion with pig experts reveals that some share of small farmers has only one farrowing per year, and other small yielding saws. Still, it doesn't cover all pig population and doesn't give the correct picture on this issue.

The change of the policy regime initiated changes in the methodology of data collection in the statistical office. These cause another limitation for the model - the limited size of comparable data series of 13 years. When used for forecasting, the size of the time series makes a difference, because as Gold reports (in Allen 1994), series of 20 years give better results than do series of 15 or 10 years.

Concerning the problems in obtaining data, it is normal to expect problems in parameter estimation and model validation. To solve this issue, the parameters produced with the regression analysis are included in the model, and then calibrated, which makes the model synthetic rather than econometric. Calibration method or so-called 'synthetic approach' is used to "generate a set of parameters that is consistent with both the benchmark data and the theory underlying the

model" (Lehtonen 2001:42). The model validation is performed by sensitivity analysis of price changes and by extension of the projection period. The sensitivity analysis evaluates the influence that price changes have on the model behavior (results). By extending the years of projections, the viability of the model results is additionally evaluated.

5. Linkages as limitations

The partial equilibrium models are comprehensive market models because they analyze in detail both sides of the equation between supply and demand of specific agricultural sub-sectors, including the price formation and interdependency of agricultural inputs and outputs between different product lines. The presentation of the interrelationship among sub-sector is considered strength to these models. Still, there are some critiques regarding the use of partial equilibrium models for a single product or group of closely related agricultural commodities without linkages to other production lines in agriculture. The reason behind this is because, when speaking about agriculture, the demarcation of certain sub-sectors is not enough because used agricultural area of different crops is dependent of the profitability of all other crops, and because resource allocation between the sectors is not taken into account (Lehtonen, 2001).

Concerning the linkages with the rest of the economy, sectoral models often ignore them in much detail or they are integrated through variables forecasted as well. The value of the forecasted variables comes from their accuracy. Thus, the future projections or assumptions they are based on are important for making a good model. Price projections, GDP growth, population size are few of the externalities in the model as linkages with the rest of the economy.

As a small country opened to the world market, domestic prices are sensitive to the external/international price development. Therefore, domestic prices are modeled as a function of the key market prices (determined within AGMEMOD partnership), thus directly linked to the price projections made for them. This national model does not have a capacity to make projections of external prices (world prices or the prices of the major suppliers to the world market). These price projections are product of the combined AGMEMOD model for EU 27 Member states (Chantreuil et al. 2012).

The gross domestic product (GDP) per capita is used as an indicator of the standard of living of the population, as an element in the function of consumption. The future growth is based on official projections by the corresponding ministry, later extrapolated with a fixed rate.

The projection of population growth is important for making demand projections. So far, the population in Macedonia shows a trend of steady growth 0.32% per

year, but following the Malthus's principle of population about the periodic increase and decrease of population, it is not expected this trend to continue at the same pace. On the other hand, the UN projection on Macedonian population is a slow, almost stagnant growth in the next 40 years at an average annual rate of 0.13% (United Nations, 2004: 206). Therefore, since the model makes projections for the next ten years only, the current growth is buffered to 0.22%, taking something greater rate than projected by the UN.

As a final point, for easier comparison of the results with other AGMEMOD or similar models the model is built in euro currency, assuming the fixed exchange rate to the euro to remain in the future period.

6. Assumptions as limitations

The assumptions are made in order to complement missing segments, to ease the analysis or to rule out other factors that could make a change. Although assumptions are usually made to fixate some factors and expert opinion is often behind the estimations, still one can pose several questions suspecting the future.

Regarding the factors affecting the market supply and demand, the model assumes no significant changes in climate, neither in the number of market participants, or any other major structural change that would affect the agricultural markets. Can one predict the force of nature or the long-term effects it causes? For example, the model does not take into account the droughts and floods in the recent years. The combined AGMEMOD model takes into account the world food price crisis. The resulting key prices are used in the Macedonian model as well. But, what Macedonian model doesn't take into account is the real effect it had on the Macedonian economy. In addition, with such an extensive globalization, can one put a border and distinguish domestic producers as major local market players?

The assumptions on market price convergence are based on experience from the previous enlargements in 2004 and 2007, indicating that the adjustment of domestic prices of agricultural products at lower or higher prices in the EU occurred in the first few years after EU accession. Due to the fact that CAP is subject to considerable changes, or in other words it is 'a moving target', the assumed levels and measures of support in the EU accession scenarios are based on the expert knowledge and expected conclusion on the continuous and ongoing reforms of CAP.

Expert opinion is often used to resolve problems in the presence of uncertainty. In policy analysis, the uncertainties from the future or gaps in the current data are often filled in with an expert opinion. Thus it is a valuable input in the research or decision making process. And the accuracy of scientific viewpoint has an impact at the final model results.

In practice it is difficult to gather a number of expertises large enough to bring an objective assessment. Thus, the results of comprehensive policy analysis based on combined expert opinion are often subjective, producing different answers by different analysts (Keith, 1996). Keith also distinguishes three choices as appropriate analytical tools in combining expert opinion: consensus building methods, the best available method or punt. But, when working with a smaller group of experts, the scientific views should be weighted by the individual analyst.

7. Applicability

The paper so far described certain issues that raise the question why a partial equilibrium model is chosen as a method for assessing the development of the Macedonian livestock-feed sector. To answer this, a brief description of the AGMEMOD partnership is required. The AGMEMOD Partnership comprises universities, research institutes and government agencies from EU Member States, EU Candidate Countries (Macedonia, Croatia and Turkey) and other European countries (Russia, Ukraine, and Kazakhstan). The AGMEMOD model is a product of a joint collaboration, combining the modelling capacities of researchers with the agricultural sector knowledge of in-country experts, keeping focus on economic and policy plausibility (Chantreuil, et al, (2012). Despite all constraints coming out of the data quality and data availability, the possibility to have a model comparable with models for such a large number of countries, is a challenge both for the researchers and policy makers.

As mentioned previously, all partial equilibrium models on Macedonian agriculture are academic documents, master thesis and doctoral dissertation. As academics the motivation behind is own curiosity and the need to contribute to the social community by explaining observed phenomena. On the other side, according to the scenarios analyzed within models, they could be a practical tool for policy analysis of the governmental bodies supporting policy decision making.

The Macedonian model of livestock-feed sector proved to be a useful tool for understanding the effects of the application of different agricultural policy measures. On the other side, in the existing version it is less appropriate for market forecasting, in terms to anticipate market opportunities and threats for the commercial users (farmers, agribusiness companies, consumer organizations).

Table 3: Basic reasons for modelling

For whom?	Why?	What is expected?	Reasons behind communication gap	How to improve the relationship?
Us (act of curiosity)	Improving economic theory, explaining observed phenomena			Clear and professional approach in presenting results
Social community				
Commercial user	Building projections, simulation and 'what if' analysis	Ensuring commercial advantage	Price, impatience and lack of trust in results	Availability of quality data needed to build a good model
Governmental bodies		Data on market structure and performance and public expenditures on agricultural policy		

Source: Adjusted from Buckwell (1989).

Generally speaking, ensuring the usefulness of the model projections is a continuing problem among agricultural economists. Buckwell (1989) distinguish four groups of beneficiaries of the models, and also suggest reasons behind the communication gap between the modelers and the users (Table 1). The lack of trust in model result is one of them; and consequently motivating other institutions for providing quality input data for the model are given as a means to improve this relationship.

8. Conclusions

Agricultural sector modelling has become useful approach for market outlooks and policy impact assessments. Partial equilibrium models are often used to model agriculture sector, but practitioners find many pros and cons of using them as a method. The Macedonian experience confirms some typical obstacles and at the same time faces some new ones with a local perspective from the case of one transitional country.

Problems in data enquiry often appear to be a limiting factor. First, this is due to quite demanding database required by the model. In addition, the process of transition and consequently institutional reforms forced changes in the statistical

methodology of data collection, hence problems in data availability. The availability and quality of data subsequently affects the parameter estimation and model validation process.

Expert opinion and assumptions are used to complement missing segments and to define the ceteris paribus factors. The attempts to lower the level of subjectivity in building assumptions are often difficult, especially when a smaller group of experts are consulted and when their scientific views are weighted by the individual analyst.

The quality of assumptions explaining the operational environment in agriculture is factor affecting the usefulness of the model results. Furthermore, the success of representing linkages with other agricultural sectors and the rest of the economy to a large extend influence the model and it depends on the quality of assumptions they are supported with as well.

Despite all constraints coming out of the data quality and data availability, the possibility to have a model comparable with other AGMEMOD models, is a challenge both for the researchers and policy makers. With so many doubts on data quality in Macedonian case, the existing version should be used with precautionary for market forecasting.

The model proved to be suitable for policy simulations. By understanding the effects of the application of agricultural policy measure, it can assist the policy analysis of the governmental bodies, thus supporting policy decision making. Nevertheless, none of the existing partial equilibrium models on Macedonian livestock–feed sector found practical use so far. Besides motivating institutions for providing quality input data, the model builders should reveal the reasons behind the communications gap and try to improve the relationship with the local users.

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I-SQUARED DISTANCE IN ORDER OF RANKING COUNTRIES OF CENTRAL, EASTERN AND SOUTHEASTERN EUROPE ACCORDING TO THE LEVEL OF PRODUCTIVITY IN AGRICULTURE[1]

Svjetlana Janković Šoja[2], Dana Bucalo[3]

Summary

Agriculture is a specific sector of the economy, and it is a driving force of the economic development of a country, because it has got a significant share of the gross domestic product. According to the fact that the development of agriculture depends on a number of factors, in this paper we will examine the level of the productivity of agricultural production of the countries in three regions, Central, Eastern and Southeastern Europe, for the period 2005-2009. The level of agricultural productivity is represented by four agricultural indicators: intensity of agricultural production, labor productivity in agriculture, potato yield per hectare, corn yield per hectare. Policy development in the field of agriculture should be directed to the faster development of the less developed countries. In order to find them we used the I-squared distance. This method has ranked countries of the observed regions on the basis of the average values of mentioned indicators.

Key words: *ranking, I-squared distance, countries of Central, Eastern and Southeastern Europe, level of agricultural productivity.*

JEL classification: *C38; O13; L26; R11;*

1. Introduction

Economic development of a country depends on its international cooperation within the region to which it belongs. Due to the fact that agriculture is one of the driving forces of the economic development, regional cooperation and

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development are very important in the field of agriculture. Countries of Central, Eastern and Southeastern Europe also have different level of economic development whose cause can be found in a different level of productivity of the agricultural production. For this reason it is necessary to reconsider their level of productivity in agriculture and make some comparison.

The paper considers the productivity of the agricultural production in the countries of these regions. The main reason for this is that agriculture has a significant share of gross domestic product. Thus, in these regions there is a tendency for a faster and harmonized development; analysis of the degree of productivity of the agricultural production is of a great importance. The reason for this is that the aforementioned analysis may represent a guideline for the policy that should be directed to less developed countries. (see more *Maletic et al., 2011; Popovic and Maletic, 2007).*

Level of agricultural productivity can be viewed through several indicators, which are specific and unique and each of them measures a level of productivity in its own way (see more *Bukvić, 1986; Maletić and Popović, 2011*). The selection of indicators has been made, taking into account the investigations carried out by Bogdanov et al. (2012) in which they researched the structural changes in agriculture of Serbia. Structural changes have been observed through four dimensions, and one of them is the performance of productivity. For consideration in productivity as a measure of productivity in agriculture, in this paper we analyze the following indicators: intensity of agriculture production, labor productivity in agriculture, potato yield per hectare and corn yield per hectare. The last two indicators are there to give a picture of the level of yields of agricultural crops, which in the above-mentioned survey partly describe the performance of productivity. This paper analyzes the yields of potatoes and corn crops because they are present in all observed countries.

The aim of this paper is that the countries of Central, Eastern and Southeastern Europe should be ranked according to the level of development of agriculture, taking into account the average values of the analyzed agricultural indicators for the period 2005-2009. For this purpose, we used the I-squared distance method.

2. Materials and Methods

The paper considers the level of productivity of agricultural production in the Central, Eastern and Southeastern Europe for a five-year period, 2005-2009. For the end of the period we took the 2009., because the data were not available for all indicators of all the countries for the year after. Data were taken from the site's: WORLD BANK, UNDATA (http://databank.worldbank.org/ddp/home.do; http://data.un.org/).

According to the geographical division of Europe, following countries belong to Central Europe: Austria, Czech Republic, Germany, Hungary, Poland, the Slovak Republic, Switzerland and Liechtenstein. However, the analysis does not include the last country, Liechtenstein, because there were no available data for this country. Eastern Europe includes countries: Belarus, Estonia, Latvia, Lithuania, Moldova, Ukraine and Russia partially. Data for Russia were available only for the country as a whole, so parts of Russia in the Eastern Europe were not taken into consideration. Estonia and Latvia were also omitted from the analysis because the data for the variable corn yield were not available for these countries. Southeast Europe is analyzed in its entirety: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Macedonia, Montenegro, Romania, Serbia, Slovenia and Turkey.

The indicators that were chosen to represent the level of productivity of agriculture are:

- *intensity of agriculture production,* which is the agricultural value added on 1 ha of agricultural land (X_1);
- *labor productivity in agriculture,* which is the agricultural value added per a worker (X_2);
- *potato yield expressed in kg per hectare* (X_3);
- *corn yield expressed in kg per hectare* (X_4);

The method that applied for the purpose of ranking countries according to the level of productivity of agricultural production is I-squared distance. Value of the I-squared distance is calculated for each country of Central, Eastern and Southeastern Europe, according to the formula (*Ivanović, 1963; Lakić and Maletić,1996*):

$$D^2(r,s) = \sum_{i=1}^{k} \frac{d_i^2(r,s)}{\sigma_i^2} \prod_{j=1}^{i-1}\left(1 - r_{ji.12...j-1}^2\right) \tag{1}$$

where

$$d_i = \left| x_{ir} - x_i^- \right|, \; i = 1, 2, ..., k \tag{2}$$

represents discriminatory effect of the indicator X_i of the observed country and the fictive unit X_i^-, which is, in this case, defined by the minimum values for each observed indikator, σ_i is standard deviation of indicator X_i, and r_{ij} is correlation coefficient between indicators X_i and X_j. Due to the definition of a fictive unit,

the country with the largest value of the I-squared distance has the highest level of productivity of the agricultural production.

3. Results and Discussion

Descriptive statistics of indicators that have been selected to determine the level of agricultural productivity of individual countries is presented in Table 1. The analysis includes the average values of indicators for the five-year period, 2005-2009.

Table 1: Descriptive statistics of the observed indicators of agricultural

Indicators	Min value	Max value	Average value	Stand. deviation	Coefficient of variation (%)
X_1	203,95	3318,32	1082,80	749,94	69,26
X_2	1391,12	59152,04	10804,87	13181,32	121,99
X_3	90156,80	417422,40	199835,11	91076,86	45,58
X_4	26836,20	102952,60	59424,85	23258,72	39,14

Source: authors' calculations

Table 1 points to the high value of the coefficient of variation of the observed indicators which means that the values of indicators vary by country, so we can conclude that the data are non homogeneous. The highest value of the coefficient of variation was noted in the indicator labor productivity in agriculture (121.99%), while the smallest variation of data between countries has indicator corn yield per hectare (39.14%). Coefficients of variation of the two remaining indicator amounts 45.58% for the indicator potato yield per hectare and 69.26% for the indicator intensity of agricultural production.

It is known that, while ranking the observation unit using the procedure I-squared distance, the most important is to choose the proper indicator that will be the primary indicator. It is also known that this subjective selection of the primary indicator is a basic weakness of this procedure. Having in mind agricultural indicators that we considered in this paper, the labor productivity, as the primary indicator, could be used as a possibility for the future development of agriculture. The order of other indicators will determine the Pearson's correlation coefficient with the primary indicator. Their values are given in Table 2.

The table 2 shows that the highest degree of dependency with chosen primary indicator has the intensity of agricultural production, then the order of indicators for calculating the I-squared distance follows:

1. Labor productivity in agriculture	1,000
2. Intensity of agriculture production	0,592
3. Potato yield per hectare	0,540
4. Corn yield per hectare	0,491

To avoid the subjective judgment of a researcher in the selection of the primary indicator, the correlation matrix is calculated in the further analysis. On this basis, the degree of correlations between all observed indicators and the values of the I-squared distance is determined. In the first iteration the correlation matrix confirmed the exactness of the subjective choice of the primary indicators and the order of the others.

Table 2: Correlation matrix of the Pearson's correlation coefficient

	Labor productivity in agriculture	Intensity of agriculture production	Potato yield kg/ha	Corn yield kg/ha
Labor productivity in agriculture	1,000	0,592	0,491	0,540
Intensity of agriculture production		1,000	0,691	0,752
Potato yield kg/ha			1,000	0,833
Corn yield kg/ha				1,000

Source: authors' calculations

Based on the above order of indicators and the procedure of I-squared distance, the ranking list of countries of Central, Eastern and Southeastern Europe for the five years period 2005-2009 is obtained (Table 3).

The table 3 shows that Slovenia has the best position on the ranking list, although not significantly lag behind Switzerland, which takes the second place. The next four places are taken by countries: Germany, Austria, Greece and Croatia whose values of I-squared distance are quite different. These six countries have values of I-squared distance above the average, which is 27.27% of the surveyed countries. The remaining 72.73% of the countries is below the average value of I-squared distance, and their corresponding values of I-squared distances are in the interval from 0.00 to 4.06. These countries do not show a big difference in the value of I-squared distance compared to a country that precedes them. The worst ranking country is Moldova. Taking into account the percentage of countries above and below the average value of the I-squared distance, it can be concluded that there is

a significantly higher percentage of countries that have poor productivity performance in agriculture.

Obtained ranks of countries are shown in Figure 1, on which are particularly marked regions of Central, Eastern and Southeastern Europe, in order to gain insight about the level of the agricultural production productivity of those regions.

Table 3: Ranking list of the countries of Central, Eastern and Southeastern Europe, according to the level of productivity in agriculture, 2005-2009.

Rank	Country	I-squared distance	Rank	Country	I-squared distance
1	Slovenia	25,51	12	Poland	1,60
2	Switzerland	21,61	13	Bosnia and Herzegovina	1,03
3	Germany	13,27	14	Belorus	0,75
4	Austria	11,36	15	Romania	0,74
5	Greece	7,06	16,5	Macedonia,FYR	0,68
6	Croatia	5,83	16,5	Bulgaria	0,68
	AVERAGE	**4,91**	18	Serbia	0,52
7	Turkey	4,06	19,5	Lithuania	0,28
8	Slovkia	3,42	19,5	Ukraine	0,28
9	Czech Rep.	3,39	21	Montenegro	0,21
10	Albania	3,17	22	Moldova	0,00
11	Hungary	2,66			

Source: authors' calculations

Looking at the image of the regions with the corresponding ranks of countries leads to interesting conclusions. Most of the countries that are better placed on the ranking list belong to the boundary of the regions Central Europe and Southeastern Europe. These are mostly countries that have access to the sea, except Switzerland and Austria. In the region of Central Europe, Switzerland stands out as the country with the highest level of agricultural productivity while the position of Poland is the worst. The top-ranked country in the region of Southeast Europe is Slovenia. It is also the best positioned country when one considers all regions. The worst ranking country in the region is Montenegro. Finally, there is the region of Eastern Europe, with the countries that are generally badly ranked. Best rank has Belarus, which is on the fourteenth place, and the worst rank has Moldova, which is also at the last place when we look all three regions together.
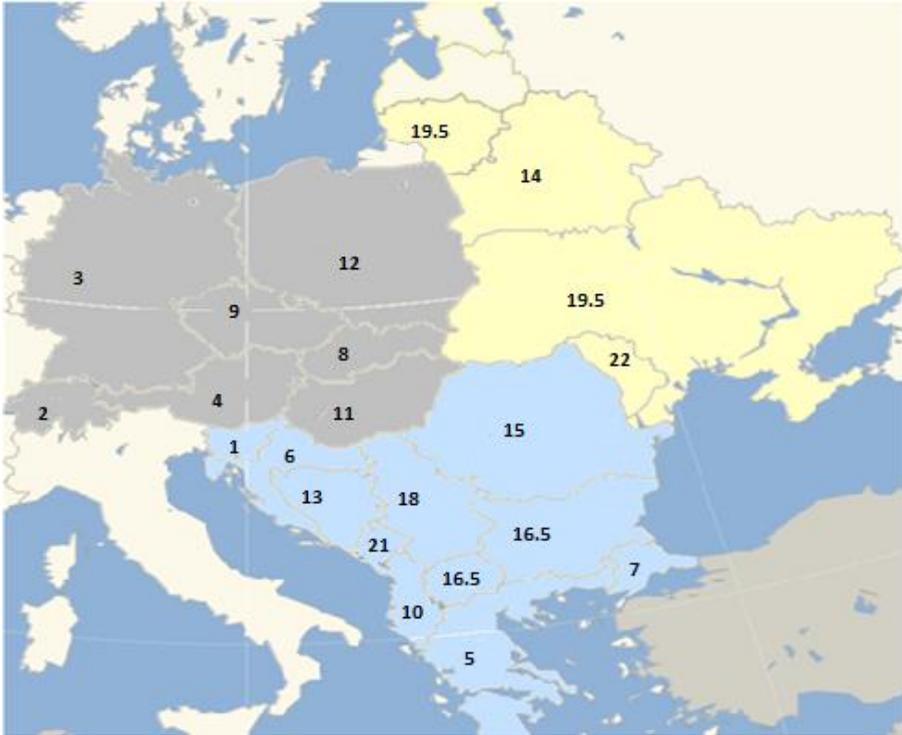
Figure 1 Central (gray), Eastern (yellow) and Southeast (blue) Europe with corresponding ranks for each country

4. Conclusion

One of the significant problems at the level of a region is the unbalanced economic development of the countries which belong to it. For this reason and for coherent development of the observed regions, special attention should be paid to the faster development of the countries with a low level of economic development. In order to identify the countries in Central, Eastern and Southeastern Europe, which could potentially have slower economic growth due to the lower level of production in agriculture, the procedure of I- squared distance was applied.

Ranking the countries of the mentioned regions based on the average values of selected agricultural indicators in the period 2005-2009, it is concluded that more than one-third, precisely, six surveyed countries have values of the I-squared distance above the average. Slovenia has the first position and the rest of the countries have very different values of the I-squared distance. The remaining 16 countries have values of the I-squared distance below the average and these values do not differ significantly and a lot. Moldova is a country with the lowest rank.

It is interesting to note that Slovenia as the best positioned country territory is much smaller than the lowest-ranking countries, Moldova. Also, Slovenia, on average, for the observed period, owns 80.10% less agricultural land than Moldova. As a result, we can conclude that despite the availability of human and land resources in agriculture, an important role is played by the degree of their utilization, as well as the way they are used with other agricultural resources.

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SERBIA IN TRANSITION FROM SELF-GOVERNING SOCIALISM TO LIBERAL CAPITALISM[1]

Simo Stevanović[2], Milan R. Milanović[3]

Abstract

The transformation of the socialist system and economy in the East-European countries and in the former SFR of Yugoslavia began with the pulling down of the Berlin Wall in 1989. For ten Countries from the Baltic, Central and Eastern Europe, this process was ended by their membership in the EU in 2004. With the exception of Slovenia, which has been an EU member state since 2004, and Croatia, which has been the 28th full member country of the EU since July 2013, the transformation into the "welfare state" (market economy and democratic society) in the other countries in the Western Balkans has been lasting for almost 25 years, without clear indications of whether it has reached an end.

With the collapse of the socialist ("eastern") bloc, liberal capitalism became the winner and the universal model of a future regulation of the world. "The invisible arm of the free market", as liberal capitalism used to be referred to, should automatically have ensured that the states have economic stability, a high rate of growth, welfare and peace. Transition countries accepted this concept of economic development and started joining the process of market liberalization, privatization and the deregulation of economy at a quick pace. It was believed that this concept would establish a welfare society in such countries.

As it turned out, transition per se does not lead a country to the "welfare state". On the contrary, the process of the transformation from socialism to liberal capitalism per se does not mean the welfare state, either; it rather brings with itself certain problems which are being faced by smaller developed countries of the market economy. It was anticipated that, in the developed countries of the market economy, in the shadow of the "invisible arm", there would always be the "invisible role of the state", whose shadow could have been seen in the periods of a crisis only, forcefully directing economic flows, putting them back to the wanted framework, surrendering them to the "invisible arm" of the market again.

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By accepting a liberal concept, Serbia, as well as the majority of other East-European countries, exposed itself to the powerful market competition of developed economies. In that way, for a longer period of time, developed countries assured their privileged position in less developed ones and ensured for themselves a high rate of economic growth. Although nowhere in the world has the liberal model of the development of an economy fully become a reality in its original form, a very deformed neoliberal model of the development of economy is forced on transition countries via financial institutions. The imposed concept is identified with the model of the free market in developed economies although, every step of the way, it reflects a visible interference of the state in economic flows, which failed to appear in transition countries. The attractivities of liberal capitalism, which the majority of insufficiently developed economies are not prepared to accept without bigger negative consequences, are excessively elongated.

An additional confusion in the development of the concept of neoliberal capitalism in East-European countries is created by the fact that such development has been founded on the concept of liberal capitalism, whereas the negative consequences of such development have been dealt with according to the socialist model of the development of economy. So, today, on the one hand, we have the development of economy based on the model of neoliberal capitalism, and, on the other, problems we deal with according to the socialist model of development.

The insufficient interference of the state in the transition process in former socialist countries led to the uncontrolled creation of monopolies and the market chaos instead of free market. The creation of monopolies is supported by the globalization processes. In the grip of these processes, Serbia has accepted such a concept of transition and economic development irrespective of the clearly visible negative consequences. The unprepared economy of Serbia is exposed to the competition of developed countries without having previously restructured its enterprises and accepted the economic role of the state in compliance with the new world environment.

This paper is aimed at applying a comparative analysis in order to determine the strengths and weaknesses of the model of neoliberal capitalism in Serbia and in countries in transition, imposed on and directed by international financial institutions as the only one breakthrough model of economic development.

Key words: *transition, neoliberalism, the welfare state, the European Union.*

JEL classification: *P21*

1. Introduction

At the beginning of the 1990's, significant economic and political changes that will have a big influence on the future global development of both socialist and capitalist systems in the world happened. That is reflected in the dominant impact

of the "service" economy and information technology in the economic structure, the victory of the neoliberal over socialist economic doctrine, which restricted the role of the state and promoted the unlimited role of the free market in economic processes, the globalization of flows of goods, capital, workforce, and ideas, the disintegration of the USSR and the Warsaw Pact and the victory of the capitalist over socialist ideology. The USA remained as the only one great power in the world, but not for long, since an unexpectedly fast development and modernization would transform China into economically the most promising great power. That was the time of the triumph of capitalism, namely its most radical form – the neoliberal model[4]. It was believed to be "the final historical victory of the capitalist social-economic system, which proved its superiority and irreplaceability. After about ten years or so of its development, the structural weaknesses and contradictions of the capitalist system came to surface, accelerated by its radical neoliberal variant, which abolished all the limitations with a wild drive for profit maximizing and wealth accumulation". (Jurcic, 2012:767)

However, the deep financial crisis in the USA, which, in the year 2008, quickly transformed into the world financial and economic crisis, challenged the basic principles of the neoliberal model and undermined the faith in their long-term sustainability as the only one example of the successful economic and political organizing of the society and the economy in the world. So, the economies of Serbia and countries in transition were faced with the dilemma of which is the future successful self-sustainable model of economic development.

The consequences of the world crisis overflowed into the EU countries, too. As it showed, the weaknesses of the uniform system of the monetary union, the insufficient adaptation of the systems of socialist countries to the EU membership criteria and the consequences of the unevenness in the development of the economies of the old and new member countries rose to surface.

The paper is aimed at determining – by means of a comparative analysis – the advantages and weakness of the model of neoliberal capitalism in Serbia and countries in transition that have become EU member states which has been imposed and directed by international financial institutions.

2. Serbia after twenty years of transition

The fall of the Berlin Wall and the disintegration of the SSSR are the events to have ended the stage of the development of socialism in the world, when all East-European socialist countries, the USSR and the former SFRY's countries definitely

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[4]The most visible consequence of the neoliberal policy was social disintegration and the deepening of the gap between the wealthy minority and the poor majority in the world. The two-thirds of the accretion of income account for 1% of the population that have at their disposal over 40% of the total value of private property.

opted for liberal capitalism as the road of the future development of the economic system. So, capitalism formally, as well, became the winner and the universal model of the future world order. It was expected that the market would be sufficient to use the strength of the "invisible hand" to ensure to the people of the world economic development, peace and welfare. Serbia accepted this concept as its road of development and, at the beginning of the 1990's, started its transition process. It was believed that the very conducting of the process of transition, primarily property transformation and the introduction of the market model of business activities, would lead to social welfare. As it later became evident, it was only a political ideology rather than an economic doctrine, which became even more visible when the world economic crisis broke in the year 2007. Namely, differently from the countries which, during the transition process, accepted liberal capitalism as a form of the organization of the economic system, developed capitalist countries behind the invisible hand of the market, there is the state in the shadow which only becomes visible once serious disturbances have occurred in the market, when the market cannot perform its due function with its mechanisms. In other cases, the role of the state is invisible, but it vigilantly controls and encourages the development of economic entities creating more efficient and more competitive products. The state does not create products, but, through the market, it provides a space for an equal game between producers.

By accepting the concept of liberal capitalism, countries in transition – unprepared – are exposed to the market competition of developed countries. In this manner, the competition of developed countries has additionally destroyed economic entities that have appeared in the world market. In such an unequal market game, with the winner already known in advance, developed countries have in the long run ensured a product market in countries in transition and, in that way, secured their own further development on account of undeveloped countries. Developed capitalist countries justified all the economic activities in transition countries by the distorted neoliberal model of the capitalist economy although such a model of a distorted market was not being used in capitalist countries. As it showed, transition countries missed an intervention by the state, which should have prevented and corrected such incurred deformations. During the transition process, East-European countries prevalently thought that market economies did not need regulation by the state. The role of the state in developed economies is "to conduct the economic policy which will ensure a sufficient number of quality jobs for labor-capable population, which means: 1) the preservation of social achievements and the development of the regulatory role of the state in the elimination of market shortcomings; 2) a reduction in unemployment, poverty, and ensuring a sufficient amount of the lowest salary and pension; 3) equal opportunities for acquiring knowledge and, through one's own work, reaching a sufficient level of the living standard, independently of one's material status and religious commitment; 4) an active role played by the state in ensuring the whole society's interest, in conducting a socially just income policy, in developing science, culture, health

care, education, the preservation of the living environment, supporting innovations and technological advancement; and 5) ensuring democratic procedures in making the most important decisions at the state level, the fair provision of information to the society about what is going on in the country and control in order to successfully manage the state." (Jurcic, 2012:771) A different understanding of the role of the market led to big deformations in the economies of transition countries. The advantages of opening the economy and including in globalization processes were being overestimated, without having previously defined a new economic role of the state, whereas risks of the premature liberalization of the market and the unprepared privatization were being underestimated.

The origination of the transition process for only one reason – that private ownership is more efficient than state, i.e. social, ownership, as well as an opinion that the privatization itself would solve the problem of the low efficiency of the economies of East-European countries – proved to be a big mistake and a delusion. "The privatization process set in such a manner made other goals, such as investing and modernizing production, retaining the existing employment and increasing it, enterprises' development plans and so forth – which should have been the most important purchase condition – secondary." (Druzic, 2005:9-10)

Although the former SFRY's countries were best prepared for transition, which George Shultz[5] did confirm by saying: "…that the SFRY has never even been classified into the real-socialist world and even if it disassociates in peace, it will still be at the head of the transition file", the effects of the process of transition are different per countries having emerged on the territory of the former SFRY, as well as per Central- and East-European countries. To our sadness and regret, there was no peaceful disassociation. The civil war in the first half of the 1990's neutralized all the advantages and chances which, in comparison with real socialism, self-governing socialism was offering the countries established on the territory of the former SFRY. Slovenia, as the most developed Republic of the SFRY, was the one to have benefited from the situation the best. However, in the first transition years, even Slovenia was recording a fall in the GDP, but it was substantially smaller when compared with the other transition countries.

The disintegration of the state, accompanied by the civil war and the sanctions imposed by the UN SC on Serbia and Montenegro, provoked additional difficulties in the functioning of the economy during the transition process in the countries on the SFRY territory. Suddenly, the uniform market disappeared, and numerous economic entities were left without raw materials or their final product markets in

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[5] The most pleasing appraisals regarding the achievements of the model of workers' self-government were made by George Shultz (the minister of foreign affairs within Ronald Reagan's Government) at the First International Conference on Transition, organized by Hoover Institution, Stanford University, in 1991. (Vojnic, 2001:505)

the seceded Republics. In a very short time, a new input- and final-product market was supposed to be found. A solution was found in opening the borders for unlimited import, which, in a very short period, compensated for the lack of domestic goods, without gaining any long-term insight into the consequences of such a move. Domestic production as neglected and, unprepared, left to the unmerciful competition of the world market. It was believed that the revival of the domestic economy would happen automatically by the operation of the free market. On the contrary, that could not have happened of itself without a serious role of the state, especially at the initial stage of the development of the economy. So, in a very short time period, unprepared domestic economic entities were "swept clean" off the market. The weaknesses of the applied model of the transition of the economy became more visible when the world financial crisis broke in the year 2007. There is a prevalent opinion that the problems of the further sustainable economic development of Serbia would have become visible even if there had not been any sanctions imposed by the UN SC, the bombing of the year 1999 and the impact of the world financial crisis, but with smaller consequences.

3. A possible manner of overcoming the problems of the so-far development

The former model of the development of the economy has not produced the expected results. It was believed that the transformation from the socialist economy into the liberal-capitalist market economy would be a sufficient condition to achieve economic prosperity. As it turned out, the results of economic growth were amongst the lowest of the CEE countries. There were both objective and subjective reasons for that. When the objective factors are concerned, we should certainly not forget the disintegration of the SFRY and the uniform market, the UN SC sanctions, the civil war, the NATO bombing and a huge number of refugees from the territories in the grip of the war. The choice of a privatization model, the dynamics of changes, slowness in the application of the legal regulations so far, as well as the model of economic development based on consumption, import and indebting represent our subjective weaknesses which we must eliminate as soon as possible. It only means that we must turn to a model of development which includes an increase in the volume of production and investments, accompanied by an increase in export, saving and employment. Therefore, "the goals of the economic policy should be an increase in domestic production and competitiveness, the provision of new jobs, export and a more even regional development. According to such goals, the measures and instruments of the economic policy should be defined, and the state administration should be organized in compliance with the set goals, measures and instruments of the economic policy." (Jurcic, 2012:775)

If we make a parallel between the possibilities of achieving the goals set today and prior to the commencement of the transition process, then we can establish a fact that, prior to the process of transition, the SFRY had been a uniform market of goods for over 20 million people, that the country had been relatively less indebted, that it had been an economy with developed production capacities and a higher GDP. Today, unfortunately, the only one advantage of this twenty years long transition of ours is our personal experience in the wrong conducting of processes, as well as the experiences of the other countries which have successfully conducted the process of the transition of the economy and the system and which, for almost 10 years, have been full EU member states.

During its transition process, Serbia has applied an atypical development model. The atypical quality reflects in that the goals of the economic policy have been equated with the instruments. So, the goals such as: an increase in domestic production, competitiveness, productivity of investments, employment, export and real income of citizens and its even distribution, have become the measures, instruments and institutions of the economic policy. The exchange rate stability and a low budgetary deficit cannot be goals, but rather instruments which will help ensure the conditions of a stable economic development. Also, the stable exchange rate of the national currency is the result of a successful, developed and export-stable economy, not the condition.

In order to ensure a better living standard to citizens, it is necessary that the GDP growth should be ensured. To achieve that goal, the economic policy must be based on an increase in the volume of production, as the basic precondition for an increase in the national wealth of the country. An increase in the volume of production is achieved by employing to the maximum all the production factors (the country, work and capital) in the fields which they are the most efficient in. However, without the development of economic fields, first of all industry, where income is generated, we cannot ensure the quality sustainable growth of the GDP. As it showed, the economic growth in Serbia during the process of transition was based on the growth of the services of the tertiary[6] sector. First of all, the banking and financial mediation services are predominant there. If that were observed without gaining an insight into the structure of the total GDP, one could conclude that Serbia has entered a higher stage of economic development, the stage which

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[6] Until the beginning of the transition process in Serbia, industry (with an over 40% share) had been the predominant economic field in the structure of the GDP and foreign-trade exchange. The second important field had been agriculture, with an around 20% share, whereas services had been treated as the third-class component in the development of the economy although it is known in economic theory that the importance of services increases, and of the primary and secondary ones (agriculture and industry) decreases, as the economy develops.

highly-developed capitalist countries such as Germany and the USA are in. A high rate of economic growth was only recorded by the service fields, whereas industry had either a zero- or a low rate of growth. That has changed the structure of the GDP.

That is why, irrespective of the high growth of the tertiary sector, developed countries pay special attention to the development of industry. In the year 2010, the European Commission sent a document to the European Parliament and other EU bodies (COM(2010) 614 as of the day of 28th October 2010) under the name of An Integrated Industrial Policy for Globalization Era…where they emphasize that: "Europe needs industry" and continue by saying that… "the uniform (European) market with its 500 million consumers, 220 million workers and 20 million entrepreneurs is the key instrument for achieving the competitive European industry. One in four jobs in the private sector in the EU is in the processing industry, and at least one in four jobs in the service sector is directly related to industry. Around 80% of all research and development activities in the private are related to industry. For that reason, it is especially important that that productivity be raised in the processing industry and related services so as to speed up the revival of the economy, increase the number of jobs and renew the vitality of the economy. An industrial policy responds to the key economic questions: what, how and for whom to produce? What to produce is determined by available resources which can be obtained under optimal conditions. How to produce is determined by available technology, education and the organization of production. For whom to produce is determined by the structure of the world and domestic markets. An industrial policy is a structural policy. It compares the existing resources with the structure of an economy, with the aim to employ all unemployed resources, first of all labor-capable people, and to raise the technological level of an economy so as to produce as high a GDP as possible from the existing resources. If there is no full employment, it means that the structure of such economy is not an optimal one. If the existing employment generates revenues below the average, it means that the technological level is low." (Jurcic, 2012:776-777)

The choice of a model of a future economic development will have an influence on the speed at which the Serbian economy will recover and leave the crisis which it has been faced with since the beginning of the 1990's. For that reason, today, Serbia "needs a pro-investment model of growth rather than a consumer one, further integration into the world economy by empowering the export sector and by increasing the share of exchangeable goods in the structure of the GDP. It is uncertain how an increase in investments in Serbia will be achieved given that they have been falling in the period of the world crisis and when foreign investments are expected to continue to fall or, in the best case, stagnate. It is even more difficult to achieve if, in the coming period, the Government is planning to reduce the budgetary deficit to 3%. The mistake made in the previous period, when the future

economic development was being based on the inflow of FDI's, is being repeated. The forecasts that the recovery of the world economy and financial flows will lead to FDI returning to Serbia are unrealistic and optimistic. On the contrary, Serbia must rely on own investments which are key for the faster restructuring of enterprises much more. At the time when EU member states have a fiscal deficit of over 6.5% of the GDP (2010), it is unacceptable for Serbia to apply drastic measures of fiscal consolidation and the reduction of the fiscal deficit to 3%. On the contrary, in the coming period, that could postpone a quicker economic recovery of Serbia's economy. At this moment, to put key economic reforms into effect is much more significant than the fiscal deficit. Reforms will require three groups of measures: firstly, Serbia needs an industrial policy ensuring the quicker restructuring of key branches of industry and agriculture in compliance with the EU industrial policy concept. The necessity of an industrial policy is based on the experiences of developed countries. Secondly, an employment policy stimulated by the salary taxation system. With a high rate of unemployment, it is clear that the existing resources will not be sufficiently exploited. Thirdly, a research and development stimulating policy correlated with a reform of the education system. Human capital is the key factor for a long-term economic development. It showed that bottlenecks on the labor market will not be eliminated as long as educational institutions have produced the manpower the economy is deficient in." (Uvalic, 2011:72)

4. Serbia and the European Union

At the beginning of the 1990's, the Cold War, personified in the fall of the Berlin Wall and the German reunification, the disintegration of the USSR and the liberation of the countries of the East Block, which then became potential EU candidate countries, from the Soviet impact and pressure, came to an end. After the reunification of Germany, an agreement on the deepest and the broadest cooperation in the EU was reached at the meeting of the heads of states and governments in Maastricht.

By the *Treaty of Maastricht*[7], the EU was created, with its "three-pillar" structure: the Community (as the supranational, first pillar), the Common Foreign and Security Policy (the second pillar) and the Police and Judicial Cooperation in Criminal Matters (the third pillar) in the field of international cooperation. The contract established the Common Policies in the fields of transportation networks, protection of the consumer, education and professional training, culture and the

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[7] Signed in February 1992, came into force in November 1993, http://europa.eu/legislation_summaries/institutional_affairs/treaties/treaties_maastricht_en.htm (10 June 2013)

young. The contract defines the Economic and Monetary Unions, which have the uniform internal market as their base. The goal of the monetary policy is to create the common currency, which is anticipated at three levels, and, thanks to this currency, to ensure price stability and respect for the market economy. One of the main innovations determined by the Contract is the creation of the European, supranational, citizenship. Every citizen who is a citizen of a member state is simultaneously a citizen of the Union.

The *Treaty of Amsterdam*[8] reformed the institutions of the European Union while preparing for the joining of future member states. The *Treaty of Nice*[9] additionally modified the other contracts, giving shape to the decision-making system in the European Union so as to make it capable of continuing to successfully operate even after a further expansion of the Union to ten new member states.

The *Treaty of Lisbon*[10] was also referred to as the *Reform Treaty*. Instead of one uniform document, there are two Treaties – the *Treaty on the European Union* and the *Treaty on the Functioning of the European Union*, thus modifying the two treaties: the Treaty of Maastricht and the Treaty of Rome on the European Economic Community that had been valid until then. By the coming into force of the so-called *Reform Treaty*, the structuring of the European Union into the three pillars was abolished. Now, the European Union represents a uniform whole with the capacity of a legal entity, which was not the case before.

After such a thorough reform, the EU was ready for another enlargement. As early as in the year 1995, the wealthiest countries became its new member states: Austria, Finland, and Sweden. So, the Europe of "the twelve" (EU12) became the Europe of "the fifteen" (EU15), which, today as well, has the key role in the creation of the EU further policy.

The *Copenhagen Criteria* [11] for joining the EU were defined due to the intention of the Central- and South-East European countries to become the EU member states. Given the fact that they were socialist countries with centrally planned economies, it was needed to define the criteria for affiliating these countries as the EU full

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[8]   Signed in October 1997, and came into force on the day of 1st May 1999. http://europa.eu/about-eu/basic-information/decision-making/treaties/index_en.htm (10th June 2013)

[9] Signed in February 2001, and came into force on the day of 1st February 2003. http://europa.eu/eu-law/treaties/index_en.htm (10th June 2013)

[10] Signed in Lisbon in December 2007, and came into force on the day of 1st December 2009. http://europa.eu/lisbon_treaty/glance/index_en.htm (11th June 2013)

[11] Defined at the European Council Copenhagen Summit, in the year 1993. http://ec.europa.eu/enlargement/policy/glossary/terms/accession-criteria_en.htm (15th June 2013)

member states. Therefore, a list of criteria and conditions that candidate states must fulfill in order to become member states and to successfully commence the transition process was established. Then, three groups of the criteria which future candidate countries must meet were defined: *1) political criteria* – candidate countries are required to have stable institutions guaranteeing democracy, rule of law, human rights, and the respect for and protection of minorities; *2) economic criteria* – the existence of an efficient market economy as well as the capability of market entities of coping with competitors' pressures and market regularities within the Union, and *3) legal criteria* – the acceptance of the European Union acquis and the capability of entering into commitments arising from the membership, including the implementation of the goals of the political, economic and monetary unions.

The speed of joining the EU was being reduced to the adoption of the Copenhagen Criteria. The advancement of a candidate country towards the EU membership depends on how well such country implements reforms needed to fulfill the Criteria. When analyzing the fulfillment of the conditions, the adoption and implementation of standards in all fields are considered in detail.

When the Western Balkan countries are concerned (Serbia, Montenegro, Macedonia, Croatia, Bosnia and Herzegovina, and Albania), there are also additional (pre)conditions defined, which were not imposed on the Central and East European countries in the process of their moving closer to the EU. It is about cooperation with the Hague International Criminal Court for war crimes committed on the territory of the former Yugoslavia and emphasized regional cooperation.[12]

For these countries, in the year 1999, the EU defined a special procedure known as the *Stabilization and Association Process*[13], which represents a combination of aid measures and conditions which countries must fulfill on the road to the EU. This process has three goals: stabilization, quick transition into a market economy, the promotion of regional cooperation and a possibility of accessing the EU. The Stabilization and Association Process was improved at the Thessaloniki Summit in 2003. Then, a strong incentive was sent and the European perspective was confirmed for the Western Balkan countries. The speed of moving closer to the EU will depend on the fulfillment of the Copenhagen Criteria and the conditions defined within the Stabilization and Association Process. The Western Balkan countries have become *potential candidate states* for the EU membership.

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[12] Todorović, B., Davidović, M., Sretić, Z., (2008), Ekonomsko-privredni vodič kroz Sporazum o stabilizaciji i pridruživanju, ISAC fund, Beograd.

[13] More about the Stabilization and Association Process in: Budimir, B., Međak, V., (2010), Pridruživanje Srbije Evropskoj uniji, ISAC fund, Beograd.

By the transition process at the beginning of the 1990's, the Central and South-East European countries began their journey to the European Union. The enlargement of the EU in 2004 encompassed former socialist countries. After having successfully gone through the ten-year transition (of their economies and systems), Poland, Hungary, Czech Republic, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Cyprus and Malta became the new member states of the EU. This enlargement of the EU, frequently referred to as "historical", was the biggest one in East Europe, the region of centrally planned economies which, until then, had been dominated by the USSR. At the beginning of 2007, there was a new enlargement, with Bulgaria's and Romania's accession to the EU, and in mid-2013, Croatia became the 28th full member state of the EU.

In October 2000, Serbia accessed the Stabilization and Association Process, which, for the other Western Balkan countries (Macedonia and Montenegro), had begun a year before. Montenegro began negotiations over accession with the EU on the day of 29th June 2012, whereas Macedonia has problems and outstanding issues with Greece[14] related to the name of the state. That is one of the reasons why Macedonia has not begun negotiations over accession with the EU[15] yet.

Serbia obtained its candidate status by the European Council's decision in March 2012. *The* decision on the giving of the candidate status had been preceded by several positive opinions regarding Serbia's readiness to obtain the status. On the basis of visible progress in the normalization of relations with Pristine and the implementation of previous decisions from Brussels related to Kosovo, at the end of June 2013, the European Council decided to commence negotiations over accession with Serbia no later by the end of January 2014[16]

The countries *potential candidates* for the EU membership are Albania and Bosnia and Herzegovina. In October 2012, the Commission's recommendation that Albania should be approved the status of a candidate for the EU membership was conditioned by bringing the key reforms in the field of justice and public administration to an end. [17] When Bosnia and Herzegovina is concerned, the Interim Agreement on Trade and Trade-related Issues came into force in 2008, and in 2010, the visa-free regime with the EU was introduced.

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[14] Greece does not recognize Macedonia under the current name and requires that it should change its name to Former Yugoslav Republic of Macedonia

[15] http://ec.europa.eu/enlargement/countries/detailed-country-information/montenegro/index_en.htm (20th June 2013)

[16] http://www.europa.rs/srbija-i-evropska-unija.html (20th June 2013)

[17] http://ec.europa.eu/enlargement/countries/detailed-country-information/albania/index_en.htm (20th June 2013)

Even though efforts have been made for the EU to function as a uniform political space, this has not been achieved yet. The effort to achieve it via the Euro as the uniform currency of the EU has not become a reality, because there have been no economic conditions to support it. Irrespective of the common currency, the countries of the EU and the Eurozone keep their national balances and have their debts towards foreign countries, not the EU debt. The implication is that the Euro does not have the role of the EU common currency but rather serves as the means of payment of the Eurozone member countries. The relations between the Eurozone member countries are similar to the relations with the other countries inside and outside the EU. The introduction of the Euro has only made easier the trade between countries but countries trade with each other as if they were not inside the Eurozone because each country keeps its own trade balance. "So far, history has shown that political sovereignty should be placed above monetary sovereignty, which is not the case with the EU. A mistake is being made by trying to use the Euro as the instrument of the political unification of the EU, although logically it should be vice versa: a political unification should be followed by a common currency." (Jurcic, 2012:783) In view of the mentioned herein, it is indicative that the EU has serious problems with building uniform supranational institutions, which requires the introduction of different relations and order in the EU, which is being confronted by the majority of the old member states. The rules of the functioning of the EU are adapted to the interest of the most developed member states. The following ones are the possible ways of overcoming current stoppages in building uniform institutions of the EU: "The first way, and simultaneously little probable, is to accelerate the political unification of Europe, which would also mean an additional transfer of national sovereignties to the EU supranational institutions, which the member countries are not prepared to do at this moment. The second way is to "force" those member countries that use the Euro to meet the economic criteria of the common currency, which is not only the matter of an "administrative" or political enactment, but rather of actual structural changes." (Jurcic, 2012:783)

5. Conclusion

The world economic crisis has changed the attitude towards neoliberal capitalism as the only one acceptable model of the development of Central and South-east European countries. Today, the prevailing opinion is that neoliberal capitalism as a doctrine, and the globalization of the world economy based on such an opinion, must change in order to make the benefits of technological progress available to a greater number of the world population. The main goal of the economic growth of each country should be an increase in employment and the improvement of the living standard of all citizens.

An intervention by the state in saving the economies of the most developed countries, such as the USA, Germany and Japan, have confirmed the thesis that, in liberal capitalism, it is necessary that a balance should be established between the market as a regulatory mechanism and the regulatory-corrective action by the state. Irrespective of the approach taken so far that the market is the only one omnipotent regulatory mechanism, the state must have a significant role in the creation of an ambience for entities to start economic development in the desired direction.

The high rate of the economic growth of the BRIC countries (Brazil, Russia, India and China) will modify the previous form of the domination of the USA, as the only one global power in the world. However, they will all have to be cooperating with each other in the preservation of the vital interest of mankind, such as peace, nuclear weapon control, the prevention of ecological incidents and reduction in poverty.

As soon as possible, Serbia must replace its atypical model of development that has been based on the development of the service sector, consumption and import, which it has applied so far, with a model based on the development of the secondary sector, first of all industry, production, saving and export. The development model that has been used so far has had as its consequence the industrialization of the economy. However, Serbia urgently needs the reindustrialization which is founded on the application of new technologies, knowledge, investments and the development of the post/industrial society. Such a model will ensure the further self-sustainable development of the Serbian economy with a clear and logical economic and social policies.

Having brought to an end the cooperation with the Hague International Criminal Court for war crimes on the territory of the former SFRY, Serbia made a great step forward in the process of joining the EU. However, the pace of such future joining the EU will to a great extent depend on the normalization of the relations between Serbia and Kosovo, regional cooperation on the Balkan territory, the adaptation of the institutions of the system to the EU legislation and their capability of conducting it in practice.

The EU has serious problems in the building of uniform supranational institutions. That requires the formulation of new relations in which the member states will renounce their national sovereignty to a greater extent on account of the common institutions of the Union. The so-far organization of the EU has been more suitable to the interests of its old and more developed member states. All efforts are being made to further build the supranational institutions of the EU and its political unification, whereas in practice, there is a fading communal spirit. The member countries of the monetary union must, as soon as possible, meet the criteria of the common currency, which in practice requires more administrative work, political consensus and structural changes inside the EU.

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VOJVODINA'S AGRICULTURE – ANALYSIS & POSSIBILITIES

Nebojša Novković[1], Beba Mutavdžić[2], Nataša Vukelić[3]

Summary

The share of agricultural population in the total population of Vojvodina is below 11%. The agricultural population of Vojvodina accounts for 26% of agricultural population, i.e. 24% of the active agricultural population of Serbia. Per 1 inhabitant there is 0.88 ha of agricultural land or 0.78 ha plough land. Having in mind that the average farm size is about 3.59 ha of used arable land and that each farm has about 3 separate parcels, it could be concluded that Vojvodina has a very unfavourable property structure.

Corn is the most dominant plant species in Vojvodina. It is grown on about 630,000 ha with average yield of 5.3 t/ha, and annual production of about 3.3 million tons. Vojvodina accounts for around 58% of corn production in Serbia. Wheat is produced averagely on 330,000 ha with average yield of about 3.7t/ha and annual production of around 1.2 million tons. Vojvodina accounts for over 56% of the total wheat production in Serbia.

The gross domestic product in agriculture is larger than the gross domestic product in food industry, which means that a significant part of agricultural production is spent or exported in raw state, and not processed within own capacities. The share of Vojvodina in gross domestic product of food industry in Serbia (47.3%) is larger than its share in gross domestic product of agriculture of Serbia (39.6%), although the structure of agricultural production in other parts of Serbia is more intensive (vegetable growing, fruit growing and animal husbandry are more dominant). This is due to the fact that in Vojvodina there are more capacities for grain and industrial crop processing.

The real capabilities of faster development of Vojvodina's agriculture lie in the multi-functional development. This means that one part of the agricultural resources will be used in conventional manner by intensifying agricultural

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production to the limits of sustainable development, a part of the resources will be used for non-agricultural purposes (agro-eco tourism, hunting, fishing and sports tourism and catering, and other services and the production of renewable energy), while a part of resources will by used for organic and safe food.

Key words: *Vojvodina, agriculture, competitiveness*

JEL classification: *C10, Q10, E23*

1. Introduction

The agriculture of Vojvodina reached its peak during the 1980s. During the 1990s, there was an extreme decline in all aspects of its agricultural development. At the beginning of the 21st century, the agriculture was recovering very slowly from the collapse in its development in the 1990s. The future development of Vojvodina's agriculture can be directed towards the resumption of positive productive and economic results from the 1980s; however, through the classical investments in agricultural development, it will be a very slow process.

The real capabilities of faster development of Vojvodina's agriculture lie in the *multi-functional development.* This means that one part of the agricultural resources will be used in conventional manner by intensifying agricultural production to the limits of sustainable development, a part of the resources will be used for non-agricultural purposes (agro-eco tourism, hunting, fishing and sports tourism and catering, and other services and the production of renewable energy), while a part of resources will by used for organic and safe food.

2. Method of work and data sources

Researches in this paper obtain analysis of agricultural capacity (agricultural population, land capacity, depends of way of usage, main (reproductive capacity in animal production in the most important sort of animals), production results (sowing area, yields, total production) of main plant producits (wheat, maize, soya, sugra beat), and animal products (meat and milk), as the conditions and producional and economics results of agriculture of Serbia in the period form 2001, to 2010.

Statistical data are processed by standard statistical methods: average value ($\overline{X}$), minimum, maximum, coefficient of variation (Cv), and change rate (r). The average year change rate was accounting directly from absolute value of time-seizure elements, by using a next formula:

$$r = (G-1); \qquad\qquad G = \left(\frac{Y_n}{Y_1} \right)^{\frac{1}{n-1}} \qquad\qquad (1)$$

where is:

r = yearly change rate
G = constant relative change of variable
Y_1 = absolute value of first element of time-serial
Y_n = absolute value of last element of time-serial
 n = number of elements of time-serial.

On the base of quantitative - statistic analysis, on the next step of research, the qulitative, SWOT analysis is implemented. The SWOT analysis of Vojvodina`s agriculture was realised, as a qualitative method of strategic possition analyses.

The SWOT analysis is a qualitative method for the strategic planning. SWOT is the acronym of the words: STRENGHTS, WEAKNESSES, OPPORTUNITIES and THREATS**.** This method is based upon the comparison of the internal features of a system, in this case of the agriculture of Serbia (advantages and shortcomings), with capabilities and perils from the surroundings. By this way, the SWOT analysis combines the evaluation of the internal features, with those coming from the external sources, upon which the system does not have a control. The SWOT analysis is the main process used in the situational analysis**.** The system should activate its powers, overcome its shortcomings, use capabilities and resist the perils. The analysis of powers and shortcomings of a business system is also called **"**an internal evaluation", because it refers to the factors within the system which can be controlled. "The external evaluation" includes opportunities and threats, which are usually outside of the system control. Opportunities and threats could be related to: market, technology, economy, society, law legislation, ecology.

The purpose of the SWOT analysis is to highlight the main opportunities and threats, and to simultaneously identify the key aspects of system ability to ensure power and mark shortcomings in dealing with the changes in surroundings. The results of such a situational analysis are the basis for the formulation of the strategy of development of agriculture in Serbia.

The data acquired from the Republic Office for Statistics of Serbia have been used in this research.

3.   Resource analysis

The share of agricultural population in the total population of Vojvodina is below 11%. The agricultural population of Vojvodina accounts for 26% of agricultural

population, i.e. 24% of the active agricultural population of Serbia. Per 1 inhabitant there is 0.88 ha of agricultural land or 0.78 ha plough land. Having in mind that the average farm size is about 3.59 ha of used arable land and that each farm has about 3 separate parcels, it could be concluded that Vojvodina has a very unfavourable property structure.

Vojvodina occupies 35% of agricultural area of Serbia. The arable land makes 39%, while plough land is even 47%. However, for the most intensive forms of land usage, i.e. orchards and vineyards, it accounts for only 7% and 16%, respectively. On the other hand, its share in the most extensive ways of land usage, i.e. lawns and pastures, is only 6% and 13%, respectively. Grain is the most dominant group of crops (66%) on the plough land of Vojvodina, followed by industrial crops (22%), vegetables (5%) and forage plants (5%). Serbia, on the other hand, has different structure. After grain, forage crops (14%) are the most dominant plants, followed by industrial crops (11%), and vegetables (9%). Vojvodina accounts for 50% of the area under grain in Serbia, 96% of the area under industrial crops, 28% of the area under vegetables and 17% under forage crops.

In Vojvodina, only between 1.2% and 4.4% of arable land is irrigated, which is intolerably low percent compared to the potentials. The irrigation systems built earlier are out of use now either because being neglected or out of order. Only a small number of them are operable at the moment.

There is relatively little animal husbandry in Vojvodina (25 of heads per 100 ha of agricultural land). Pig-breeding (49%) has the dominant position in the structure of animal livestock, followed by cattle-breeding (38%), poultry-breeding (7%) and sheep breeding (3%) at the fourth position. Vojvodina accounts for 15% in the basic cattle stock of Serbia, 17% in the reproductive capacities of pig-breeding and 11% in the basic stock of sheep.

4. Production results

Corn is the most dominant plant species in Vojvodina. It is grown on about 630,000 ha with average yield of 5.3 t/ha, and annual production of about 3.3 million tons. Vojvodina accounts for around 58% of corn production in Serbia. Wheat is produced averagely on 330,000 ha with average yield of about 3.7t/ha and annual production of around 1.2 million tons. Vojvodina accounts for over 56% of the total wheat production in Serbia.

Sugar beet is grown on the area 52 000 ha on average with average yield of 41t/ha while annual production is around 2.2 million tons. Vojvodina accounts for 96% of sugar beet production in Serbia. Sunflower is grown in Vojvodina averagely on 160,000 ha with average yield of about 2t/ha and annual production of 320,000 t.

Almost, the entire sunflower production of Serbia comes from Vojvodina (93%). Also, soybean in Serbia is predominately produced in Vojvodina (94%). Soybean is grown on about 110,000 ha with average yield of around 2.2t/ha and annual production of 250,000 t.

The fruits prevailingly grown in Vojvodina are: apple (40%), plum (22%), sour cherry and pear (11%). Apple is produced most (65,000 t), followed by plum (38,000t), sour cherry (14,000t) and peach (11,000t).Viticulture production is performed on small family farms as well as plantations. The annual grape production is about 74,000 t.

5. Economic conditions and results

The gross domestic product in agriculture is larger than the gross domestic product in food industry, which means that a significant part of agricultural production is spent or exported in raw state, and not processed within own capacities. The share of Vojvodina in gross domestic product of food industry in Serbia (47.3%) is larger than its share in gross domestic product of agriculture of Serbia (39.6%), although the structure of agricultural production in other parts of Serbia is more intensive (vegetable growing, fruit growing and animal husbandry are more dominant). This is due to the fact that in Vojvodina there are more capacities for grain and industrial crop processing.

6. Export of agricultural-food products

The average annual value of export has reached 255 million dollars. In the structure of export, the groups of the goods like sugar, honey and their products participate with 39.3%, followed by grains and their products with 18.2%, and vegetable and fruit with 13.3%.

The export potentials of agricultural complex of Vojvodina are: sugar and confectionery, edible sunflower oil, wheat and corn (mercantile and seed corn), seed soybean and sunflower, fruit (fresh and processed – sour cherry, strawberry, apple, apricot), vegetables (fresh and processed – frozen green peas, green beans, sweet corn), heifers and steers for slaughter, baby beef, lambs for slaughter, lamb, their high-quality products (foiled or canned ham and shoulder ham, etc) beer, non-alcoholic beverages, mineral water, wine, unconventional agricultural products (frogs, snails, honey, medical herbs) and safe food.

7. SWOT analysis

Developing potentials of agriculture of Vojvodina are:

- Excellent natural conditions for agricultural production (soil, climate, water resources),
- Comparative advantages of micro-regions (the hill of Fruška Gora, the sandy area of Subotička peščara, the Vršac mountains),
- Good agricultural practices in conventional agricultural production,
- Excellent precondition for multi-functional agriculture (excellent natural resources for development of tourism, hotel management, energy production from renewable sources)
- Relatively qualified and educated labour,
- Developed processing capacities,
- Educational, scientific and research institutions and agricultural extension service centres.
- Provincial institutions prepared to develop agricultural complexes.

The weak points are:

- Small and unorganized estates and parcels of farms,
- Extensive production in structure and yields,
- Poor animal husbandry,
- Inappropriate solution for the use of the state-owned land,
- Bad economic conditions for using water potentials for irrigation,
- Week organisation & management of farms,
- Insufficient support to the development of agriculture by the state.

Developing possibilities are:

- Regulation and organization of land areas,
- Extension of irrigative areas (possibility for stubble and additional crop sowing),
- Intensifying of plant and animal production,
- Higher level of product finalization in own processing capacities,
- Improvement of processing technology for agricultural products,
- Development of multi-functional production and diversification: development of agricultural-ecological tourism (agro-tourism, tourist events in rural areas, spa tourism, fishing and hunting tourism), catering (on farms, fresh and healthy food, home-made food) energy production from renewable sources (harvest residues, wind & solar energy, etc),

- Increase of competitiveness with the development of SME (small and middle sized enterprises) and cluster-integration,
- Increase of export possibilities, by ISO standardization and increase of product quality,
- Development of ecological production, medical and aromatic herbs production.

Threats for the development are:

- Market limitations (low domestic payment demand),
- Export limitations (export quotes, non-custom barriers, no export stimulations),
- Insufficient possibilities of the state to support agricultural development,
- Lack of high-quality resources for development and functioning,
- Lack of or insufficient legal regulations,
- Strong negative influence of interest groups on the measures of agrarian policy,
- Insufficient influence of professional and scientific institutions on the development of agriculture, and the economic policy measures in agriculture.

8. Conclusion

The most important conditions and incentives for development of agricultural business in rural areas of Vojvodina are:

- Stimulation of building and use of irrigation systems,
- Stimulation of increasing investment in rural areas,
- Organization and rational use of land,
- Regulation of the infrastructure and development of institutions in rural areas;
- Direct foreign and state investments of local management organs in the development of firms in rural areas,
- Consistent and professional agrarian policy which would serve the development of agricultural business,
- Development of institutions for development of small agricultural businesses and entrepreneurship,
- Education of rural population
- Improvement of organisation (cluster development, cooperatives and extension services).

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RURAL DEVELOPMENT FROM THE TERRITORIAL PERSPECTIVE

AREA BASED DEVELOPMENT APPROACH – EVIDENCE FROM BORDER RURAL REGION DRINA-SAVA[1]

Natalija Bogdanov[2] and Aleksandra Nikolić[3]

Summary

The main objective of this paper is to discuss the basic features of a strategy aiming to make one post conflict rural area more open, ready to cooperate and innovate and ready to take responsibility for its development. Therefore, we explore the possibilities for implementation of Area Based Development Approach in rural areas of Drina-Sava region.

We argue that the development of the region largely depends both on success of participatory process and its existing territorial assets. We also stress the importance of joint activities and consensus on the issues that inhibit the transition of resources in assets as essential precondition to raise regional competitiveness and to activate all currently unused resources. Implementation of Area Based Development Approach allows the formulation of transparent, clear and objective "get away" strategy which will ensure sustainable development environment based on joint resources.

Empirical evidences and explanation of the facilitation process will support our analysis.

Key words: Area Based Development, cross border regions, rural development, territorial capital

JEL classification: O21, R11

1. Introduction

Newly independent West Balkan (WB) states are facing challenges related to dysfunctionalities of socialist and post-socialist federalism (conflicts in Western

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Balkans and the CIS), including elements of transitional economies such as the democratization, a shift to a market-oriented economy and nation-state building. In the same time all WB countries are committed to the process of EU integration, which ask for deep restructuring of economy, governance, political environment etc. Due to such complex and multidimensional development constraints a broad zone with a high risk of both conflict and crisis situations has been formed on the territory of the Western Balkans. Thus, WB countries, and especially rural regions might become even less competitive, and consequently exposed to threats of marginalization. Therefore the European Commission (EC) is taking significant steps in order to improve the EU interventions at its external borders after the latest enlargement. However, the past experience gathered in the region in the decades that the existing EU-instruments of cross-border cooperation are mostly inaccessible for the beneficiaries at micro level in the rural areas (small farms, SME's, non-agricultural activities etc).

The level of IPA funds utilisation (especially CBC programs) suggests that WB countries face the same situation caused by its poor ability to access the available funds. It is partly due to fact that WB countries lack experience and capability to create and implement regional policies. Even less experience exists with cross-border and regional cooperation in rural development. Although there are some progress in implementing territorial development approaches at the national level, such solutions are still rarely used in cooperation among the rural areas of neighboring countries, mostly due to very complex consequences of the wars of the 1990's. In such setting, common cultural heritage, language and even ethnicity, do not contribute to their more intensive progress. In another words, the main reason behind low efficiency of EU interventions is lack of social capital, lack of corresponding stakeholders' capability and social interactions necessary for more proactive attitude toward fundraising. So, it is obvious that different approach to development has to be implemented in order to increase efficiency of both EU CBCs programs and national regional policies in the area of WB. The fact that Area Based Development Approach developed by UNDP as an instrument which effectively manage the problems of rehabilitation, reconciliation and social stability in areas affected by complex crisis such us military conflicts, natural disasters, poverty and exclusion, makes it suitable as an alternative approach.

In this article we discuss the experience of implementation ABDA in defining strategy aiming to make one post conflict WB rural area (Drina – Sava region) more open, ready to cooperate and innovate and ready to take responsibility for its development. We start by assuming that:

1. The development of region highly depends on its territorial capital accessibility and level of development and socio-economic capabilities that could be used for creating area based advantages as regards its competitiveness and attractiveness.

2. The conceptual considerations of ABDA with regard to participative, integrated and inclusive principles should be respected as a basic precondition in order to create sustainable partnerships in one cross-border rural area that is facing risk of future marginalization and socio-economic decline

3. Despite the efforts of regional policy and funding over the last years territorial cohesion - in terms of functional interrelations and strategic cooperative initiatives - is still one of the most important challenges (Giffinger, Suitner, 2010).

The methodological approach is based on a*ssessment of territorial capital of Drina – Sava region.* According to OECD, territorial capital refers to the stock of assets which form the basis for endogenous development in each city and region, as well as to the institutions, modes of decision-making and professional skills to make best use of those assets (OECD, 2001., p. 13). We explore the six dimensions of territorial capital - human, environmental, economic, cultural, social and institutional - and elaborate them in context of their relevance for implementation of ABD approach. The main goal is to provide detailed description about area's internal characteristics that can shape future development, but also the pressures and opportunities offered by external environment are considered.

According to Brunori (Brunori, 2006, Brunori et al., 2007) territorial capital can be defined as the interaction among all the material and non material, private and public assets characterizing a territory where territorial governance is the process of combining the interactions and the interests of the different actors and their ability to use, combine and transform local assets. In this respect, the *fundamental principles of ABDA followed* in defining strategic objectives for further development (Bogdanov, Nikolic, 2012):

- Area and problem are clearly linked by demarcation of municipalities that are faced with area-specific development problem arise from consequences of recent war and transitional process.

- The principle of integrated approach reflects in fact that proposed interventions addresses the region-specific problems in a comprehensive manner, taking into account the complex interactions between sectors, factors and actors in a given area. Active contribution of the local stakeholders took place through the work in the four stakeholder groups (SHG), which have been formed respecting the development potentials and the priority problems of the region: SHG for Agribusiness, SHG for Infrastructure and Environment, SHG for Entrepreneurship and SHG for Cultural Heritage and Tourism. SHG are not only dealt with issues of sectors development, but also with sectors contribution to the integral regional development.

- The principle of inclusive processes complied with the fact that the situation analysis, SWOT, the visioning, list of priorities and development projects,

considered at the regional level, rather than of its individual components/parts, specific target groups or sectors.

• This process was a combination of bottom-up and top down approaches. The fact that the process is inclusive and participatory, in this case does not mean that bottom-up approach is fully implemented. In the case of Drina-Sava region, ABDA was applied to the territories of three countries that were affected by the war. Therefore, in this area it is difficult to expect spontaneously creation of structures to launch a process of cooperation in economic development. However, such sophisticated and holistic concept as ABDA, contrary to other similar actions, requires external interventions.

2. Area Based development Approach – definition and objectives

The recognition that traditional and fragmented development approaches and programs were unable to effectively respond to the complex developmental problems of marginalised and backward communities, led to an increasing interest for a more holistic and sustainable concept tailored according to local community capabilities and needs. In the same time it was recognised that previously used approaches based on humanitarian assistance and donor programs were not able to ensure to answer to such complex challenges and to long-term sustainability (Harfst 2006, Brown 1996, Vrbenski 2008) due to various reasons (lack of funds, resources, underdeveloped institutions, etc.) Therefore, the aim was to find an instrument that would effectively manage the problems of rehabilitation, reconciliation and social stability in areas affected by complex crisis such us military conflicts, natural disasters, poverty and exclusion. As a part of such effort the ABDA emerged in the late 1980s, based on experiences generated within theories that dealt with various aspects of rural and regional development, decentralisation and post-conflict reconstruction (Integrated Rural Development, Community Development, Regional Planning, Decentralization & Local Governance and Response to Complex Emergencies and Post-Conflict Reconstruction). Previously used approaches based on humanitarian assistance and donor programs, have not been efficient enough in such a complex challenge, since due to various reasons (lack of funds, resources, underdeveloped institutions, etc.) they were not ensured a long-term sustainability (Bogdanov, Nikolic, 2012).

ABD concept was initially tested in three pilot initiatives by UNDP (UNDP 2003). Based on these experiences, the implementation of ABD approach continued in other vulnerable territories over the World. The approach reconcile long and short-term objectives such us: responding to immediate needs, alleviating crisis-induced economic devastation and promoting social reconciliation at the local level by facilitating the establishment of foundations for political, legal, economic, social and administrative reforms that should contribute to sustainable development.

The territorial focus of ABD approach was derived from the understanding that the space in which people live, should be the primary focus of recovery" (UNDP 2003, p.2). Harfst (2006) recognized the importance of this concept also for non-conflict areas, stressing that ABD concept "targeting specific geographical areas in a country, characterized by a particular complex development problem, through an integrated, inclusive, participatory and flexible approach". ABDA aims at addressing root causes of regional disparities, thereby allowing disadvantaged areas to participate in national development processes. As such, ABDA targets geographical areas characterized by particularly complex limitations, induced by structural, political and governance, economic and social, cultural and perceptual and environmental factors (Brown 1996, p.12-22., Vrbenski 2008).

Apart from these factors, Vrbenski particularly emphasized the factors related to dysfunctionalities of socialist and post-socialist federalism (conflicts in Western Balkans and the CIS), including elements of transitional economies that newly independent states had to undertake such as the democratization, a shift to a market-oriented economy and nation-state building. Simultaneous presence of the most of these factors caused the formation of a broad zone with a high risk of both conflict and crisis situations on the territory of the Western Balkans.

In the scientific literature there is no evidence on the implementation of ABDA in solving specific problems of rural areas. Complex problems of rural areas have not yet been examined in the ABDA context, although by its character and the factors influencing them are highly complementary to it. Testing the ABD concept on the example of the bordering rural areas of the Western Balkans is a particular complex development challenge. Current situation of rural areas, especially border, in Western Balkans characterizes by same factors of relevance to the ABD: socio/economic consequences of recently passed war, necessity to develop functional governance framework, risk of marginalization in the context of both regional/regional and EU territory, lack of "fresh" and easily recognizable image and identity of the region, insufficiently attractive economic environment, neglected and not properly managed natural resources etc. With such complex and multidimensional development constraints, rural regions might become even less competitive, and consequently exposed to threats of marginalization. So, it seems that ABDA can be an efficient tool to deal with all mentioned development issues. Therefore, the main outcomes of exercise aimed to formulate Strategic development plan, by implementing core postulates of ABDA are used to argue our position: need to apply ABDA in order to ensure more sustainable development path for one WB cross-border region, namely Drina- Sava region.

3. Drina - Sava rural region in the context of ABDA

Rural region Drina-Sava is a specific geographical area, formed from the neighboring municipalities belonging to the territory of Bosnia and Herzegovina,

Croatia and Serbia. It covers an area of the Pannonia Plain in the valleys of the Drina and Sava rivers. Although the region is geographically positioned in the part of Western Balkans with the most fertile land, with good physical/communal infrastructure, is not affected by the depopulation to the extent as the other regions of the Western Balkans are, its future development is faced with numerous particular complex development challenges: socio/economic consequences of recently passed war, necessity to develop functional governance framework, risk of marginalization in the context of regional and EU territory, lack of "fresh" and easily recognizable image and identity of the region, insufficiently attractive economic environment etc. With these development constraints, the region with its offer of goods and services might become less competitive compared to other Balkan regions, so it is exposed to threats of marginalization.

Map1. Drina-Sava region
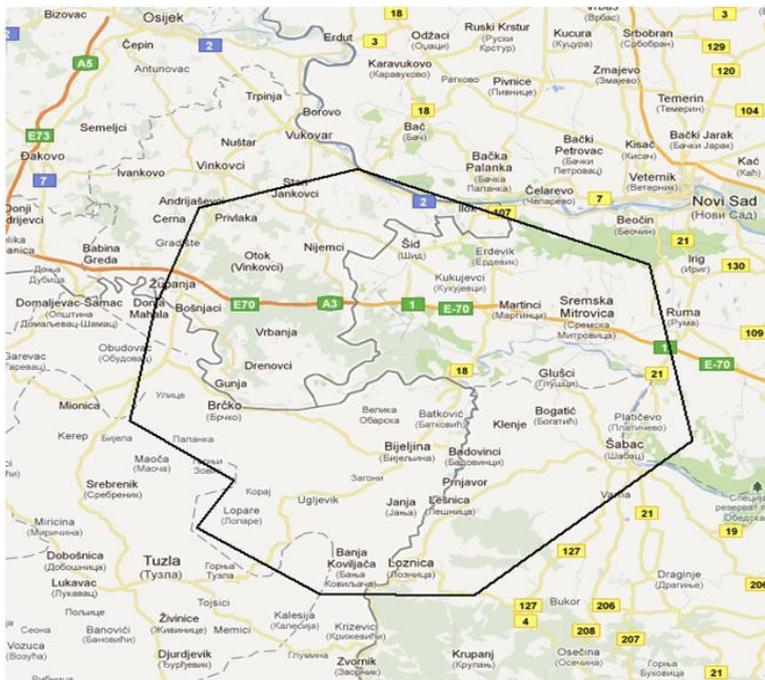
3.1. Results of territorial capital assessment

The findings of analysis of regional territorial capital can be summarized as follows:

1. All capital dimensions are currently developed to the certain, even acceptable level for one post conflict rural region (Figure 2).

2. Accessibility of all dimensions of territorial capital is low and has strong reflection on the level of capital utilization. Although capital stocks exist, there is need for skills/capabilities to turn resources into assets. It is detected that four type of skills are missing, or being poorly developed: skill to analyze environment, skill to create links and synergy between sectors and individuals in order to maximize and retain added value, skill to raise joint actions and skill to liaise with other areas in order to make Region more attractive;

3. The traditional approach to resource utilization, to the economy and to the governance and administration is main constrain of harmonized and sustainable development of the region;

4. Assessment of economic capital confirms limited competitiveness of all economy sectors, low ability to build up or to become a part of attractive value chains and to follow market trend.

5. The most of recognized weakness are caused by quite low development of social and institutional capital;

6. The flow of information, knowledge and data availability about region is recognized as a key limitation factor of future Region integral development;

The assessment of territorial capital of Drina Sava region showed that regional economy is not able to offer products, business environment and well being of local people that can be competitive on the wider WB neither in broader European context. This is mostly due to the lack of systematic, well understood approach to the development that is able to raise synergy between sectors and turn existing resources into assets. Past development was based on individual energy and activity, and on traditional approach to the business activities and resource utilization, which is main characteristic of reactive, ad-hock approach to the development. Such approach is less efficient and it put on side major part of resources.

3.2. Selection of "development paths"

Based on SWOT analysis about the perspective of economic attractiveness, all economic activities are currently positioned in matrix field that represents weaknesses-opportunities link (Figure 1).

Such relation implies that its internal regional characteristics negatively influence main economic sectors. In fact, weaknesses are more pronounced in comparison with strengths, while external environment characteristics have favorable influence to the regions' economy, and offers development opportunities. Development opportunities are shaped by following factors: excellent geo-strategic position (main transport routes are crossing the region), the administrative reforms that are driven by EU integration process, EU structural funds, Danube river management

as a very high priority of EU policy agenda (Sava and Drina are the parts of Danube river catchment), favorable market trends that put more emphasis on concept of business social responsibility, "added value for customers", "traditional and cultural heritage", "home-made", biodiversity and landscape, "green and smart", eco-services etc.
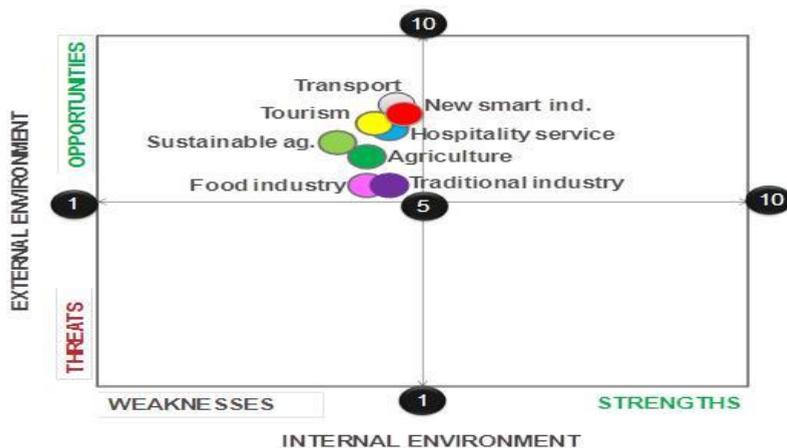

Figure 1 Assessment of current position of main economic activities
of Sava Drina region

To see the whole area's economy moving towards field "strength–opportunities", the internal cohesion and synergy, based on understanding and sharing common distinctive values, resources and concepts, has to be developed. In fact, region's capability to raise joint development actions would be driven by level of internal region cohesion, strong increase of knowledge and information about region and raising awareness about common responsibilities for its resources.

In order to address identified regional development gaps, the "gateway approach" was selected as proper tool. The aim of this exercise was to identify appropriate combination of territorial capitals and joint actions that will ensure sustainable environment for regional development. With such approach the root of problems instead symptoms are addressed. This approach is not "ready to use", it calls for change of all stakeholders behavior asking to invest "sole and mind" to "create new combinations" which is according to Schumpeter (1934 re-cited in Nijhoff-Savvaki et al., 2008) defined as innovation leading to increased quality of life. It addresses needs of populations and facilitates creation of foundations for for political, legal, economic, social and administrative reforms. It calls for area based development approach, which will ensure simultaneous intervention in multiple sectors and at all levels.

It has to be added that, the sector's approach for sure can contribute to the development, but local community benefits from such kind of development will be very different. These differences in the benefits would prevent the development of the area as an integrated socio-economic region. So, the whole process of formation and development of the region would be affected.
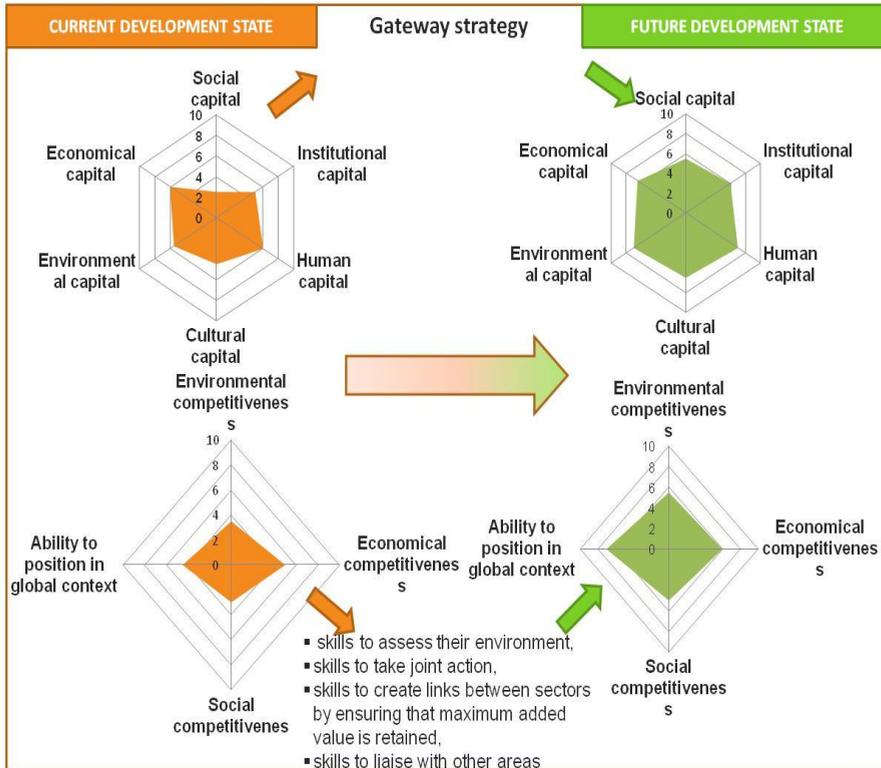

Figure 2 Assessment of territorial capital of the region and
Getaway strategy

The development of capacities necessary to raise synergy between all actors will push up regional cohesion and socio-economic development which will bring benefits to both - region as integrated socio-economic space, and all local communities. So, the focus of development intervention has to be on horizontal measures which will enable strengthening of skills which enable creation and retention of added values through joint actions and skills necessary to build up adequate position within WB and EU environment in order to attract investment and people.

4. Conclusion

According to stakeholders' opinion, expert assessment and research evidence, ABDA concept confirmed as an adequate tool to address factors hindering development of cross-border rural areas trough integrated, inclusive, participatory and flexible approach raising place-identity and sense of belonging, which is in literature recognised as a way to mitigate decline of rural areas (McManusa et al., 2012). In the same time, this approach is pushing forward concept such as leadership, professional excellence, performance and accountability for results as well as pressure to identified and engage key agents of change. In another words, it calls for development of robust social network and plan for transition which have to think about sequencing and integrating the different efforts, in order to leverage more fundamental, systemic and cultural change. Threfore, it is in near future expected to see one post conflict WB rural area (Drina – Sava region) more open, ready to cooperate and innovate and ready to take responsibility for its development.

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DEMOGRAPHIC CHARACTERISTICS OF RURAL POPULATIONS IN VOJVODINA AS A FACTOR OF RURAL ECONOMY DIVERSIFICATION[1]

Vesna Rodić, Danica Bošnjak, Dejan Janković, Jelena Karapandžin[2]

Summary

It has long been clear that rural economy involves not only agriculture, but all human, social, natural and material resources in rural areas. Human resources are of particular importance since limitations in human capital may limit the use of other resources and could be (and often they are) a 'bottleneck' of rural development. Serbia is characterised by the long-lasting lack of a viable and high-quality labour force in rural areas. That makes the inclusion of the rural population in the wider labour market difficult and limits their access to other markets (knowledge, information, and financial capital). This, consequently, leads to further impoverishment of the rural population, making poverty both a cause and a consequence.

Starting from the above mentioned importance of human resources in this paper, the main demographic characteristics of the rural population in the Autonomous Province of Vojvodina have been analysed and discussed as an important factor of rural economy diversification. The analysis conducted has shown that: i) the rural population in Vojvodina decreases (faster than the urban) ii) the ageing index in rural areas has increased more slowly in rural than in urban areas, but it is still higher iii) the level of education of the rural population is lower than that of the urban population. These findings point out that the demographic characteristics of the rural population might be a serious constraint on rural economy diversification and rural development in Vojvodina. Decision makers must be aware of this and adjust development policies to the existing conditions.

Key words: rural population, demographic characteristics, diversification, Vojvodina

JEL classification: J11, J19, R23

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1. Introduction

Since the 1980s there has been an increasing recognition that rural economy does not involve only agriculture, but all human, social, natural and material resources in rural areas (*EC, 1988; Csaki et al., 2000 cit. by Davis, 2001; Karcagi-Kovats and Katona-Kovacs, 2012*). Since then, the interest in rural economy diversification has been growing both in developed and underdeveloped countries (*Ellis, 2000; Chaplin et al, 2004; Winters et al., 2009*). In developing countries, the diversification of rural economy is seen as a way for local economic growth and poverty reduction, while developed countries focus on diversification as a tool for expanding services that rural areas can offer, thus reducing the urban/rural gap (*Niehof, 2004; Lopez-Gelats, 2011*).

Rural areas in Serbia make up a significant part of its territory (85%) and contribute significantly to the GNP (over 40%). Furthermore, 55% of the total population live in rural areas (*Bogdanov, 2007*). This clearly indicates theneed to involve the rural population much more in the process of development of rural areas and socio-economic development of society altogether.

However, inadequate treatment of these areas in the past, reflected primarily in rural development models which relied predominantly on unilinear and unisectoral (predominantly agricultural) models, has resulted, among other reasons, in the depopulation of rural areas and the impoverishment of the rural population. This is why Bogdanov (2007) insists that one of the priority tasks in Serbia has to be "defining appropriate policies (not just agricultural) which would stop the negative demographic and economic trends, and to ensure the preservation of the natural and cultural heritage of rural areas". Defining such policies and their adjustment to specific features of certain rural areas requires, among others, a good understanding of demographic problems within certain rural areas.Although it is not disputable that rural development cannot be based solely on human resources (primarily due to the mobility of the younger and more educated labour force) (*Burholt and Dobbs, 2012*), the importance of human potential should not be neglected, since limitations in human capital may limit the use of other resources and could be (and often are) a 'bottleneck' of rural development.

Sociological perception of this issue devotes special attention to the fact that rural development, especially territorial development, is oriented to the potentials i.e. competitiveness of a certain area, and it is basically an approach focusing on broadly understood *capabilities of the actors/population*. This complements the conclusion that actors in a particular rural area (together with social institutions and organizations in the area) have to recognize and exploit the potentials they have and take collective action to try to overcome the limitations of the area where they live and work (Bogdanov and Janković, 2013).

Serbia is characterised by the long-lasting lack of a viable and high-quality labour force in rural areas (*Radivojević, 1999; Raduški, 2008, Pejanović, 2009; Božić, 2011; Bošnjak, Rodić, 2012*). This is reflected, among others, in the unfavourable age (*Čobanović, Petrović, 2006; Đurđev, Kicošev and Vuksanović 2003*) and educational (*Samardžija, 2004, Markov, 2007,Čikić, 2012*) structure of the rural population, as well as in a significant disparity between the rural and urban population in terms of education level (*Subić, 2005*). That makes the inclusion of the rural population in the wider labour market difficult and limits their access to other markets (knowledge, information, and financial capital). Consequently, this leads to further impoverishment of the rural population making poverty both a cause and a consequence. Differences in the quality of life in urban and rural areas -almost double poverty rate in rural comparing to urban areas (Bogdanov and Vasiljević, 2011) - strong centralization and regional disparities (Vukmirović, 2013) have contributed to the unequal social development and rural urban migration and to the reduction of the capacity of rural areas in demographic sense.

Starting from the above mentioned importance of human resources for the rural and overall socio-economic development in this paper, the main demographic characteristics of the rural population in the Autonomous Province of Vojvodina have been analysed and discussed as an important factor of rural economy diversification. The Province of Vojvodina has been chosen because of the importance of this region for the economic development of the Republic of Serbia in general, as well as because of the fact that its specific characteristics should be taken into consideration when creating rural development policy.

2.   Method and data sources

In accordance with the research objectives, basic demographic-statistical methods have been applied. For the analysis of changes between Census years in addition to the relative structure, indexes have been used. For the analysis of age structure, the aging index has been applied (calculated as the ratio of the number of persons aged over 65 and the number of people under the age of 14).

Age dependency ratios are calculated according to the recommendations given by the UN (2009): the total dependency ratio as the number of persons under age 15 plus persons aged 65 or older per one hundred persons 15 to 64 ratio; the youth dependency ratio as the number of persons 0 to 14 years old per one hundred persons 15 to 64 years old; the old-age dependency ratio as the number of persons 65 years old and over per one hundred persons 15 to 64 years old.

As for gender structure, relative sex ratio (masculinity rate) has been calculated as the number of males per one hundred females.

The results are compared with the assumption of compatibility of Census methodologies.

The spatial analysis has been limited to the territory of the Autonomous Province of Vojvodina, while the time frame of the analysis has been limited to the period 1991-2011

The analysis has been performed on the final results of the Census of Population, Households and Dwellings in the Republic of Serbia. Availability of data is one of the reasons for limiting the scope of the paper to the basic demographic characteristics of the rural population, given that the majority of relevant data from the 2011 Census have not been published yet (nor the results of the Census of Agriculture conducted in 2012).

The authors are aware of the methodological differences that exist in urban-rural typology between Serbia and developed countries. However, the dilemma was whether to waive the analysis of this important phenomenon due to the lack of methodologically correct and comparable data or to analyse it on the basis of available statistical data. The authors have opted for the latter option, carefully drawing conclusions and avoiding inappropriate international comparisons. Hence, all population other than "urban" in this paper has been considered as "rural" due to the fact that the so-called administrative-legal criteria applied in Serbia divide settlements into "urban" (those that have obtained this status through a legal act of the respective local self-government unit) and "other", unlike the criteria applied for urban/rural distinction in the EU or OECD.

3. Results

The demographic 'picture' of Vojvodina has been significantly changed in the last 20 years. The analysis conducted has shown that, unlike the urban, the rural population in Vojvodina has continually declined in the observed period (Table 1). There were almost 95,000 rural inhabitants fewer in the province in 2011 than in 2002 and more than 100,000 inhabitants fewer than two decades ago.

The decrease of the rural population was much more intense in the last decade as a result, on the one hand, of negative natural growth and migration, and on the other, of stopping the process of refugees' arrival. Such trends have led to a further decrease in the share of the rural in the total population, which in 2011 was 40.64%.

Although methodological differences in urban-rural typology make international comparisons difficult, one can say that the tendency of deruralization, i.e.decrease ofthe share of the rural in the total population is present in most other transition countries, first of all in Lithuania, Bulgaria and Latvia (Eurostat, 2012, World Bank, 2012).

Table 1: Population in AP Vojvodina

	1991*	**2002**	**2011**
Total population	2 013 889	2 031 992	1 931 809
Index 1991=100	100.0	100.9	95.9
Index 2002=100	99.1	100.0	95.1
Urban population	1 121 594	1 152 295	1 146 731
Index 1991=100	100	102.7	102.2
Index 2002=100	97.3	100.0	99.5
Rural**population	892 295	879 697	785 078
Index 1991=100	100	98.6	88.0
Index 2002=100	101.4	100	89.2
Share of rural in total population	44,31	43,29	40,64
*Together with those residing abroad ** Non-urban			

Source: Census data and authors calculation

One of the main demographic characteristics of the rural population is aging. Table 2 shows data on the average age of the population, while in Table 3, the aging indexes (the ratio of the population aged 65 and those aged up to 14) of the rural population in Vojvodina are presented.

Table 2: Average age of the population in Vojvodina

|	**2002**		**2011**	
	Urban	**Rural**	**Urban**	**Rural**
Total	39.5	40.2	41.4	42.3
Male	38.0	38.6	39.7	40.8
Female	41.0	41.7	42.9	43.8

Source: Authors' calculation based on Census data

The given data speak for themselves. In just ten years, the population in Vojvodina has become almost 2 years older. Aging is a problem which does not exist only in our country but also in many developed countries, especially the EU (Goll, 2010, Burholt and Dobbs, 2012). The fact that the values of aging index in Vojvodina are not far from the EU-27 average value should not be comforting. Given that the aging index over 0.4 is considered to be critical, the situation is extremely serious. Moreover, the societies with average age over 40 are considered to be in an advanced age, and those with index over 43 in the most advanced age.

The working-age rural population, i.e. the working contingent (people 15-64 years old) is still relatively preserved (Figure 1), but it is clear that it directly depends on the youth cohort (people 0 to 14 years old), and that the existing age structure will (negatively) effect the potential of the rural population in the future.

Table 3: Ageing index of population in Vojvodina

	1991	**2002**	**2011**
Total population	0.62	0.98	1.14
Urban population	0.54	0.93	1.09
Rural population	0.71	1.03	1.21

Source: Authors' calculation based on Census data
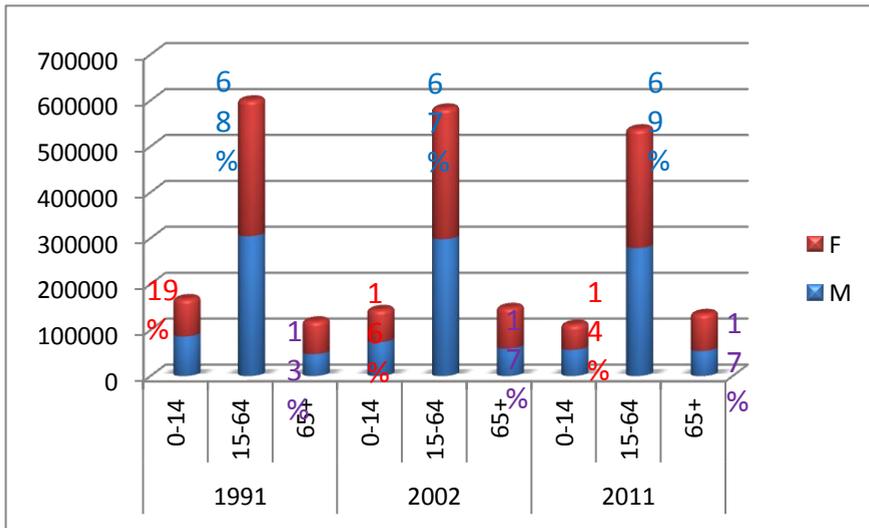
Source: Authors' calculation based on Census data

Figure 1 Age and sex structure of rural population in Vojvodina

Age dependency ratios (Table 4) are further evidence of intense demographic aging in the province, particularly of the rural population.

Although the overall dependency ratios have been relatively stable over the last 20 years, there has been a substantial change in the dependent population categories, i.e. the dependent population is less and less in the category of young people, and more and more in the category of the elderly.[3]

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[3] Over 50% of the total dependence in Vojvodina is old-age dependence. It is around the European average, but one should take into account that Europe is by far the oldest continent. The world average is much lower and, observed on a global scale, the old age dependency ratio accounts for only 22% of the total dependency.

These coefficients should not be surprising when it is known that the share of the elderly population (65+) in the total population in Vojvodina has reached almost 17%, which is slightly above the European average (16.2), but significantly above the Eastern European average (13.9%) and especially the world average (7.5%). From the point of view of human potential and possibilities of diversification of the rural economy, this is definitely an undesirable change as it indicates a decrease of demographic stocks for the workforce supply in the future. Therefore, it is urgent to define, adopt and implement measures to stop the drain of young people from rural areas.

Table 4: Age-dependency ratios of the population in Vojvodina

	Dependency ratios (%)		
	1991	**2002**	**2011**
Total dependency ratio			
Total population	45.27	45.99	44.40
Urban population	43.31	42.89	43.30
Rural population	47.82	50.25	46.04
Youth dependency ratio			
Total population	28.01	23.25	20.74
Urban population	28.08	22.17	20.68
Rural population	27.93	24.73	20.84
Old-age dependency ratio			
Total population	17.26	22.74	23.66
Urban population	15.23	20.72	22.62
Rural population	19.89	25.52	25.20

Source: Authors' calculation based on Census data

When looking at the gender structure of the population, it can be noted that the masculinity rates of the rural population are higher than those of the urban, i.e. that the share of women in the total population is lower within the rural population. The sex ratio actually varies depending on which age group is in question. While the preponderance of male over female population aged 0 to 14 is natural (due to the larger number of boys at birth), and the predominance of women over men is expected among the elderly (due to the longer life expectancy of women), the fact that there are fewer and fewer women in the working-age category (15-65 years) is something of concern as it indicates potential problems in terms of the possibility of human reproduction in the future. It is also something that should be carefully taken into account in development plans for certain activities (such as rural tourism). So unlike about aging, which definitely occurs, claims about the feminization of the rural population (which could be still sometimes heard) are completely unfounded.

Most of the illiterate population in the province is rural (63.9%), but the majority (57%) of the 17,088 illiterate persons are elderly (65+), not working age people. Three-quarters of the illiterate rural population are women, and nearly 70% of them are over 65. Although illiteracy is certainly not desirable, and zero illiteracy should be strived for, one can say that illiteracy in Vojvodina is not a big issue even now and it could be expected that in the future it will be even a minor problem.

Table 5: Masculinity rate of the rural population in AP of Vojvodina

	1991		2002		2011	
	Urban	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**
Ukupno	92.8	97.6	91.6	97.4	91.7	99.2
0-14	104.8	105.9	105.2	105.6	105.9	105.2
15-64	95.4	102.9	95.0	104.8	95.7	107.8
65+	61.3	66.6	65.6	67.6	66.2	67.7

Source: Authors' calculation based on Census data

This, however, cannot be said for the educational structure. It is slightly improved compared to the previous Census, in terms of the decrease of the share of the rural population with no education or with incomplete primary education in total population (from almost 30% in 1991 to less than 20% in 2011) and the growth of rural population with college and university degree (from 4.4% to 6.7%). However, the educational structure of the rural population is still significantly lower than the structure of the urban population (Table 6).

Almost 20% of the rural population is without any or with incomplete primary school education, while less than 9% of the urban population is in this category. At the same time, the percentage of the rural population with college or university degrees (6.71%) is almost three times lower than in urban areas (19.13%). In other words, the share of the rural population in the total population is much lower (40.64%) than its share in the population with no education (60%) and much higher than its share in the population with university education (16%).

Among the rural population without any education or with incomplete primary education, most are women (63% of the total in this category), primarily those over 65. It is interesting that among the rural population with college or university degree there are more women (54%), in contrast to the situation a decade ago, when their share among the most educated rural population was 44%. It is, therefore, of great importance for rural development to find a way to motivate these women to return to their villages after graduation.

Table 6: Education level of rural population in Vojvodina

	2002			2011		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
Total	1709778	974237	735541	1654339	981279	673060
	100	100	100	100	100	100
No education or incomplete primary education	356606	138697	217069	215213	85721	129492
	20.86	14.24	29.51	13.01	8.74	19.24
Primary education	425564	214677	210887	359761	174388	185373
	24.89	22.04	28.67	21.75	17.77	27.54
Secondary education	751182	482937	268245	842142	530632	311510
	43.93	49.57	36.47	50.91	54.08	46.28
Tertiary education	162081	129728	32353	232874	187714	45160
	9.48	13.32	4.40	14.08	19.13	6.71
Unknown	15185	8198	6987	4349	2824	1525
	0.89	0.84	0.95	0.26	0.29	0.23

Source: Authors' calculation based on Census data

4. Conclusions

The analysis of the basic demographic characteristics of the rural population in Vojvodina has showed that the number of rural inhabitants in the province in the last twenty year has decreased. Since the decline of the rural population is faster than the decline of the urban population, the share of the rural in total population has declined from 44.3% in 1991 to 40.6% in 2011. Depopulation and deruralization phenomena are immanent in economic development, and we are not the only one faced with these processes. The fact is, however, that in developed countries far more attention has been paid to these processes and these countries constantly look for solutions to stop them. Nevertheless, in our country the problem is largely ignored.

The conducted analysis points to the unfavourable demographic trends and the consequently unfavourable demographic situation in Vojvodina in general, especially when it comes to its rural population. This should not be surprising given that in our country the rural population was for decades either the source of labour (for ever growing secondary and/or tertiary sector) or a kind of redundancies absorber and buffer against the effects of the crisis.

The reduction of the rural population and its unfavourable age and educational structures indicate reduced demographic stocks for new labour force creation, while the sex structure of the rural population warns of possible problems in the reproduction in future. Such negative demographic changes certainly make modernization of agriculture and diversification of the rural economy (which is undoubtedly necessary)

difficult, due to the well-known fact that older and less educated populations accept changes and adopt innovations more slowly and with more difficulties. Therefore, one can say that the current demographic characteristics of the rural population in Vojvodina have numerous, not only economic, but also social cultural and other negative consequences. They also represent serious obstacles to the revitalization of rural areas and rural development of the province, and its overall social and economic development.

Policy makers have to be aware of the above mentioned facts when designing development policies and have to adjust them to the specific conditions. The relatively preserved working contingent leaves some room for action, which should be (must be) utilised. Urgent actions are needed, ones which will enable efficient use of this potential, not only for agricultural production, but for other activities with available needed resources.

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EDUCATION IN TRANSITION IN TERMS OF THE DEVELOPMENT OF AGRICULTURE AND RURAL DEVELOPMENT[1]

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Abstract

The key to success and competitive agriculture are the ability of adaptation, dissemination and application of new technologies for faster modernization which requires general education. The application of knowledge must be accompanied by improvement of the educational structure of the population that also has an impact on the modernization of agriculture and intensive rural development (Marinkovic, 2009., Mojic, 2011.). In the process of transition, education has a significant role in the modernization, of agriculture and rural development (Miladinovic, 2011.).

The process of rural development and modernization of agriculture in Serbia requires the introduction of modern technologies and skilled labor force. Thus, we need human resources to acquire new knowledge and skills and use them for faster modernization. Based on the Census data and relevant literature we are looking into the education and educational structure of the population of Serbia (by regions, areas and settlements).

The results indicate that in the period of transition education structure have been improved. However, there continue to be differences in the educational structure of the population (by gender, age, regions, areas and settlements).

The educational structure of the rural population is less favorable compared to urban. The share of the population in rural areas, without any education, through incomplete primary education to primary education, by gender ranges for males from 17.66 to 50.24% and for females from 82.34 to 49.76%.

Key words*: education, education structure, agriculture, rural development, transition.*

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1. Introduction

In Serbia in the period 1990-2000 we have witnessed major social changes. The state of society had an impact on the changes in education. In the first decade of this century, there have been significant changes in the sphere of education and education policy (years 2001, 2004 and 2008). With the social changes in Serbia reforms in education also taking place. The process of modernization in Serbia takes place following the example of other European societies. The process of transition has slowed down a series of reforms. However, without an effective system of education cannot be imagined the development of modern society. Our society is faced with a number of consequences which is reflected in the education. Education is in transition from a traditional to a modern society.[4]

Reforms in education and educational process aimed at changes to the structural determinants of educational system, acceptance of the values of the educational system of Western countries, educational content adaptation to modern needs, etc.

Education is an organized, systematic process of transferring scientific knowledge to the young generation. To the educational system of any society belongs one of the most important roles in the cultural and social reproduction of the population. Education should be designed so as to become a significant factor in the development of society and economy, new challenges and adjustments.[5] Therefore, the main task of education is adapting of man to dynamics of time and encourage the development of skills and abilities that should facilitate its ability to adapt to social changes.[6]

Transition in Serbia is through the process of harmonization of obsolete standards in all areas of social life as well as in education with the standards of the European Union. One of the most important jobs is at the level of of educational system, which should meet the requirements of reform and modernization. "In that sense, the Serbian Ministry of Education issued a study of the strategic development of education 2004th. The study is the proposal of the new education policy of pre-

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[4] Avramovic Zoran (2011). Transition and modernization challenges in Serbian education, in: Mitrovic, LJ. (eds.) Tradition, modernization, identity, Faculty of Philosophy, Nis, p. 355-367

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university education in Serbia, in the context of the reforms after the 2000th, in accordance with the educational policy of the developed European countries."[7]

In general, most analysts agree that opportunities for Serbia, after the political, economic and social reforms, continuing for more than a decade of violently delayed transition, are characterized by dominant negative characteristics, especially:

- Slow economic growth, which limits the scope of employment of all categories who have lost their jobs, including those working in the „gray zone";
- Unsatisfactory overall employment in relation to the total population and active population;
- Unfavorable structure of employees in all sectors (primary, secondary, tertiary);
- A very high rate of open (registered) unemployment;
- Unfavorable age and education structure of the unemployed;
- Long waiting for employment;
- High hidden unemployment (a surplus of employees);
- Relatively low labor mobility (the inflexibility of the labor market);
- High employment in the gray economy.[8]

It is obvious that the education sector has a number of key issues including social inequality in education, dropout rate of high school pupils and students during education and non-compliance of the need for manpower and educational and professional backgrounds who are educated, poorly developed mechanisms for improving the internal and external quality of education, poor outcomes of efforts to decentralize education management, etc.[9]

The educational structure of the population is connected to the other structure and the socio-economic, cultural and other conditions, influences and changes. The basic characteristics that are considered in the analysis of the educational structure of the population is literacy and educational background.

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[7] Jovanovic Natalija (2011). *Education in Transition*, Journal Culture of Polis, vol. VIII, no. 15, p. 335-340.

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2. The objective and method

The paper presents the educational structure of the population according to some determinants (literacy, educational attainment, territory, region, age, gender, settlement), based on the statistics that have been published in the editions of the Statistical Office of Serbia, the analysis of documents and relevant literature.

Agricultural production is the main activity of a significant part of the population in rural areas, primarily farms. Development of agriculture and other sectors can be an important factor in the development of rural areas and rural development at all. A special role in the rapid development of agriculture can have improvement of the educational structure of the population in rural areas and farms

3. The research results

3.1. Educational structure by regions

Results of the Census in 2011th show continued downward trend in the number and share of the illiterate population in the total population. Serbia illiterate population (aged 10+) covers 127 463 persons, or 1.96%. Compared with the data from the census in 1991st, the proportion of illiterates decreased by 3.29 times in the 2011th (Figure 1).

Significant differences in the shares of illiterate reported in previous censuses, which exist between regions, are conditioned by the level of socio-economic and cultural development, still exists, even though the apparent tendency of their improvements. Share and number of illiterate people in the regions is uneven (Table 1).

Table 1: Illiterate Population aged 10 and over in the regions of Serbia in 2011th

Territory	Total	%
The Republic of Serbia	127,463	1.96
Belgrade region	12,429	0.83
Vojvodina region	27,823	1.59
Šumadija and Western Serbia region	43,722	2.38
Southern and Eastern Serbia region	43,489	3.05

Source: Census of Population, Households and Dwellings in the 2011th in Serbia, Population, education, literacy and computer literacy, Data by municipalities and towns, National Statistical Office, Belgrade, 2013, p. 103.

The structure of the illiterate population by age shows that over 80% were illiterate persons with 50 or more years of age, of which 70.52% with 65 years or more, while only 3.54% of illiterate population is up to 19 years of age (Table 2).

Table 2: Illiterate Population in Serbia aged 10 and over in 2011.

Year	%
Total	100
Up to 14 years	1.50
15-19	2.04
20-34	7.70
35-49	7.01
50-64	11.23
65 and more	70.52

Source: Census of Population, Households and Dwellings in the 2011th in Serbia, Population, education level, literacy and computer literacy, Data by municipalities and towns, National Statistical Office, Belgrade, 2013, p. 103.

The largest share of illiterate people is in the municipalities of Bojnik (9,09%), Crna Trava (7.58%), Gadzin Han (7.28), Merosina (6.77%) and Medvedja (6,29). The least part of illiterate people is in the municipality of Stari Grad 0.14%, Vracar 0.18%, Savski venac 0.24%, Rakovica 0.43% and Medijana (Nis) 0.44%.[10]

Based on the analysis of recent census data is observed uneven distribution of educational structure of the population in regions and areas. In addition, there are also inequalities in education. Serbia's education system is a powerful mechanism for social selection and reproduction of the social structure, especially in terms of higher levels of education.[11] It is necessary to create the environment and conditions for all levels of members of different social classes as a basis against social exclusion. The Law on University Education (Official Gazette of RS 76/05) is aimed at providing everyone equal access to higher education and training opportunities throughout their lives. The Law on Student Standards (Official Gazette of RS 18/2010) obliges a country to identify disadvantaged social classes in higher education and provides for measures to support access to and completion of this level of education.

3.2. Educational structure by gender

Between the urban population and the rest of the population there are some differences in the structure of illiterates by gender. Differences in the level and structure of education of the population according to gender structure as part of socio-demographic structure of gender inequality is still present. So 2002nd in urban areas,

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[10] Press Release January 31, 2013, Census of Population, Households and Dwellings in the 2011th in Serbia, Book 3: Education level, literacy and computer literacy.

[11] Ibid, p. 123

illiterate women was 2.5%, or 5 times more than men. For example, in urban areas, the illiteracy rate ranged from 0.3% in the municipality Vracar to 12.0% in the municipality of Bujanovac. Among the male population, the illiteracy rate ranged from 0.1% in the municipality of Stari Grad, and 5.8% in the municipality of Bujanovac, while the highest 18% of illiterate women was in Bujanovac.

In other areas (i.e. rural), there were 9.92% of illiterate women, which is 6 times more than men. The range between the highest and lowest illiteracy rates ranged from 1.5% in the municipality Kanjiza to 18% in the municipality of Kursumlija. Among the male population, the lowest rate in Lapovo (0.3%) and highest in Kursumlija (6.3%). Among the female population, the illiteracy rate ranges from 1.9% in Kanjiza to 30.3% in Kursumlija. According to the census 2011th there was a reduction in the number and share of illiterate people. However, there are substantial differences in the proportion of illiterate population between urban and rural settlements. Among the residents of other settlements is about three and a half times more illiterate than among the population of urban settlements. The differences were more pronounced among women, the proportion of illiterate women in other settlements is four times higher than in urban settlements (Table 3).

Table 3: Illiterate population aged 10 and over by gender and type of settlements in Serbia 2002-2011.

Type of settlement	2002.			2011.		
Urban	**Total**	**M**	**F**	**Total**	**M**	**F**
Illiterate	59,076	9,096	49,980	39,701	7,856	31,845
Rate of illiteracy.	1.55	0.50	2.49	1.03	0.43	1.57
Other	**Total**	**M**	**F**	**Total**	**M**	**F**
Illiterate	173,849	26,175	147,674	87,762	14,975	72,787
Rate of illiteracy.	5.90	1.79	9.92	3.31	1.13	5.48
Total	**Total**	**M**	**F**	**Total**	**M**	**F**
Illiterate	232,925	35,271	197,645	127,463	22,831	104,632
Rate of illiteracy.	3.45	1.08	5.66	1.96	0.72	3.12

Source: Population, Census of Population, Households and Dwellings in th 2002nd 4, education and literacy, 2003, p. 16-17 and Population Census, Households and Dwellings in the 2011th in Serbia, Population, education, literacy and computer literacy, Data by municipalities and towns, National Statistical Office, Belgrade, 2013, p. 104 and authors calculations.

Education plays an important role in improving the position of women in society. It has long ceased to be a privilege available men, and reduced the difference

between the sexes. However, the elimination of differences in education between the sexes is not a sufficient reason for the elimination of social differences between the sexes.

3.3. *Population structure by educational attainment*

The educational structure of the population by educational attainment between the sexes showed significant differences. Differences in the number of men and women are higher in lower educational levels (no primary education and incomplete primary education). Participation of women at the level without primary school a nearly 4.4 times bigger, while on the level of incomplete primary education is almost twice that of men. The number of women with primary education level is higher by 15.5% than men. At the level of secondary school education are more common in men by 15% of the female population. However, at the level of higher education there is a more women in relation to men (Table 4).

<p align="center">Table 4: Population 15 years and over by educational attainment, gender and type of settlement according to the Census 2011th</p>

The Republic of Serbia	Total in %			Urban settlements			Other settlements		
Level of Education	T	M	F	T	M	F	T	M	F
No school	100	18.57	81.43	100	20.44	79.56	100	17.66	82.34
Incomplete primary education	100	35.60	64.40	100	26.64	73.36	100	39.36	60.64
Primary education	100	46.40	53.60	100	41.83	58.17	100	50.24	49.76
Secondary education	100	53.51	46.49	100	51.28	48.72	100	57.69	42.40
Higher education	100	49.70	50.30	100	48.83	51.17	100	52.94	47.06
High education	100	47.35	52.65	100	47.13	52.87	100	48.95	51.05
Total	100	48.26	51.74	100	47.10	52.90	100	49.87	50.13

Source: Ibid. p. 34/35 and authors calculations.

Regarding the structure of the population by educational attainment between the two censuses in 2002 and 2011. the largest share belongs to the secondary education 41.07% and 48.93% and primary education with 23.88% and 20.76%. Thus, compared to Census in 2002. educational structure of the population improved and we can observe increase participation of the population with

secondary education to 7.86% while incomplete primary school qualifications has reduced participation from 16.18% to 11.00%. Also, with higher education has increased the percentage of 4.07%.

The largest share of people without any education and with incomplete primary education were recorded in the municipalities Ražanj 37.92%, Osecina 36.98%, Gadzin Han 35.85%, Rekovac 35.14% and Crna Trava 34.84%. The largest share of people with higher education were recorded in the municipalities Vračar 52.34%, Stari grad 50.20%, Savski venac 46.62%, Novi Beograd 40.61% and Medijana (Nis) 34.73%.[12]

Table 5: Population 15 years and over by educational attainment, per census 2002. and 2011.

	Census 2002		Census 2011	
	Total	**%**	**Total**	**%**
The Republic of Serbia	6,321,231	100	6,161,584	100
No school	357,552	5.66	164,884	2.68
Incomplete primary education	1,022,974	16.18	677,499	11.00
Primary education	1,509,462	23.88	1,279,116	20.76
Secondary education	2,596,348	41.07	3,015,092	48.93
Higher education	285,056	4.51	348,335	5.65
High education	411,944	6.52	652,234	10.59
Unknown	137,895	2.18	24,424	0.41

Source: Census of Population, Households and Dwellings in the 2011th in Serbia, Population, education level, literacy and computer literacy, Data by municipalities and towns, National Statistical Office, Belgrade, 2013, p. 34/35 and authors calculations

"However, the educational structure of the population in Serbia is still very unfavorable (including young people under 35 years). Nearly a third of citizens of Serbia have not completed or only completed primary school, and nearly 30% of young people "turns out" of the education system (in comparison, the share in EU countries is 15%). In Serbia only every fifth person aged 31 to 35 have a university degree (compared to one-third of the EU)[13]

Population structure according to education in urban and other areas indicates differences that are especially significant in persons without any education and incomplete primary education. Education of the population of other settlements has

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[12] Ibid

[13] Mojic Dusan (2012). *Educational resources, orientation and action of youth*: Youth - our present, exploring the social biography of Serbian youth, Smiljka Tomanovic (et, al), Cigoja press: Institute for Social Researches, Faculty of Philosophy, Belgrade, p. 98/99

been neglected and the level of education unfavorable. No school and primary school education has 51% of the population of other settlements. Particularly is inadequate structure of agricultural holdings members by educational attainment. So in the farm not completed primary school has 51.23% of the total number of households members and primary school 32.87%. Thus, in the farms by educational attainment prevailing members who have not completed primary school or with primary education, about 84% and 16% of the members of households have secondary, or higher education.[14]

On the basis of differences in the age structure between the sexes, we can assume that the differences in education are determined by higher share of elderly women than men.

The educational structure of the population in urban and other areas indicates differences primarily between regions and areas. The differences are particularly striking in comparison to the national average. These trends point to the (non) availability of educational institutions to the residents of certain areas and regions.

Table 6: Population 15 years and over by educational attainment by region in 2011th

Region	Total	No school	Incomplete primary education	Primary education	Secondary education	Higher education	High education	Unknown education
Serbia	100	2.68	10.99	20.76	48.93	5.65	10.58	0.42
Belgrade	100	1.17	4.08	13.59	52.50	8.21	19.60	0.49
Vojvodina	100	2.32	10.68	21.76	50.90	4.90	9.18	0.26
Šumadija and Western Serbia	100	3.39	13.90	23.42	47.21	4.71	7.00	0.37
Southern and Eastern Serbia	100	3.77	14.98	23.34	44.95	5.08	7.38	0.50

Source: Census of Population, Households and Dwellings in the 2011th in Serbia, Population, education level, literacy and computer literacy, Data by municipalities and towns, National Statistical Office, Belgrade, 2013, p. 32 and authors calculations

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[14] Jelic Sreten., Tatjana Jovanovic (2006). *The demographic structure of agricultural holdings Serbia*, Monography of Agriculture and Rural Development of Serbia during the transition period, International experience in the transition of the agricultural sector and rural areas, Serbian Association of Agricultural Economists and Institute of agroeconomy, Faculty of Agriculture, University of Belgrade, p. 71-89.

Having in mind educational structure of the population and changes occurring in the transition process, and still negative tendencies by undeveloped agricultural resources, machinery backward and underdeveloped infrastructure, availability of schools, etc.. that inhibit not only the modernization and development of agriculture, but also other activities and rural development and development of the regions and areas.

4. Conclusion

Education is an important factor in the development of agriculture and rural development. In rural areas the educational structure of the rural population is alarming, especially in certain regions, areas and communities, which affects the development of rural areas and rural development. Due to the unfavorable educational structure the process of modernization of agriculture and other activities in rural areas is slowed. Analyzing the educational structure in the transition process data show that it is less favorable in other settlements than in the cities, and above all, with farmers and members of agricultural households. Also, there is a reciprocal relationship between education structure and the development of agriculture and rural development and development of the regions and areas. Improving the educational structure of the population can affect the improvement of agriculture and rural development in regions and areas.

Education in transition process in the context of the development of agriculture and rural development is in the process of changes. The main determinants of these changes are as follows:

- In Serbia in the period from 1991 to 2011 is reduced the number of illiterate persons, from 418,942 to 127,463, or 30.42%;
- The lowest share of illiterate people is in the Belgrade region, and the largest is in the Southern and Eastern Serbia, 3.05% of the total number of illiterates;
- The rate of illiteracy in cities is 1.03%, and in other settlements 3.31%, which indicates a significant difference. The rate of illiterate male population in cities was 0.43 and 1.57% of the female population, in other settlements the share of illiterate men is 1.13% and 5.48% of women;
- Over 70% of illiterate people are older than 65 years, and about 3.5% of illiterate people is under 19 years old;
- The percentage of people with no education and with incomplete education is reduced at 2.68% and 11.00% of the total population aged 15 and over. Share of educated people who have completed secondary education increased from 32.13% to 48.93%, higher education from 3.84% to 5.65%, and high education has increased from 5.13% to 10.59%;

- Differences in educational levels still exist among the population of urban and rural settlements in Serbia. While the largest share of the population of urban settlements is with secondary education, in other settlements population with basic education is prevalent. Large differences in the population of these two types of settlement are in the proportion of people without primary schools, which are more than three times higher in other than urban settlements.

It is particularly unfavorable educational structure of the agricultural population and members of the farm, which influences the development of agriculture and rural development.

What can be done about improving the parameters of the educational structure of the population, especially in other settlements, and also to prevent further extinction of villages and development of rural areas, as a prerequisite for a better life for all citizens?

Among some of the measures that may deliver the results we noted the following:

- Improvement of education, health and improvement in gender equality;
- Making plans for adult education (additional training, retraining, special schools);
- Increase funding of agricultural support and investment in rural infrastructure, and rural non-farm activities;
- Increase the social funds for rural population, thereby improving the current situation that shows the poorer rural population;
- To support individual farmers with medium and large farms, primarily through the provision of soft loans;
- To establish a rural development policy, which would cover most of the rural population, who owns mostly small holdings;
- Create better economic conditions for employment and hence population stay in rural areas, primarily through the development of small and medium enterprises, to open a facility for the processing of agricultural products and the development of communal infrastructure;
- Providing funding for the development of rural and hunting tourism;
- Equal distribution of budgetary resources, and better control of distribution;
- Improvement of mechanisms to ensure gender equality;

Urban development in other settlements includes not only roads and telephones, but it's a way of life, why young people go to the cities.

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AGRICULTURAL COOPERATIVES – EXAMPLES OF GOOD PRACTISE IN THE WORLD AND SERBIA

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Abstract

Agricultural cooperatives play an important role in the development of the agriculture and rural areas, especially in developing countries and in the time of economic crises – like the current started in 2008. In order to raise global awareness of the importance of agricultural cooperatives, the United Nations declared 2012 as cooperative year, pointing to the importance of cooperatives in reducing poverty, improving food security and employment opportunities in rural areas.

The paper is divided into three parts. After the introduction, in the first part of the paper is analyzed the most important characteristics of agricultural cooperatives in the country and abroad, with considerable attention to the activities in which agricultural cooperatives may have a special importance in the development of agriculture and poverty reduction in rural areas. In the second part are analyzed changes in the number of family farms based on data from the Census of Agriculture 2012, in order to identify trends in the agrarian structure of our country and highlight the interdependence between number of family farms and agricultural cooperatives. In addition, examples of good cooperative practice from the world and our country are highlighted. In the third part of the paper is pointed out to the importance of keeping complete and accurate cooperative statistics in order to properly argue their contribution to the development of rural areas.

Key words: agricultural cooperatives, good practise, family farms.

JEL classification: Q13

1. Introduction

Cooperatives all around the world contribute to survival of more than a half of world's population, according to the UN estimate, and gather over a billion members. They also represent a significant employer because they provide over 100 million jobs. Cooperatives exist in both developed and developing countries: in

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Denmark they account for 36.4 percent of consumer retail market, in France 21 thousand cooperatives provide over a million jobs, or employ 3.5 percent of economic active population, while in New Zealand co-operative sector accounts for 3 percent in gross domestic product and 95 percent of dairy market[3].

Relevant state institutions can create favourable environment for development of agricultural cooperatives. There are different instruments that government can use to create a good climate for the development of cooperatives, starting from adequate law allowing variations and freedom of association in cooperatives and unions; reducing administrative procedures and facilitating the process of forming cooperatives; and providing equal or even privileged position for cooperatives comparing to other forms of organizations, for example through tax incentives, which is especially important in the initial stages of development of cooperative sector. However, even in the complete absence of any incentives from the state authorities, or openly neglect, agricultural cooperatives survive and contribute, although to a limited extent, to the development of rural areas. In this situation, the willingness of individual farmers to organize themselves into cooperatives is evident, especially in countries with unfavourable ownership structure of family farms, dominated by small farms, like in the Republic of Serbia (Ševarlić, 2013).

2. The role of agricultural cooperatives in development of rural areas

The main source of income for rural population, especially in developing countries, is agricultural production. Therefore, agricultural cooperatives are one of the main generators of local development, because they allow farmers to purchase inputs under favourable conditions and to sell their products on the market, or (more rarely) to increase the value of the final products. According to ILO Report *COOP Fact Sheet No. 1* from 2007, contribution of cooperatives to solving the problem of rural (un)employment and poverty reduction is three-fold, as agricultural cooperatives enable direct employment and seasonal work; allow farmers to continue with production and contribute to rural community development; and provide income to rural population creating additional employment.

Ortmann and King (2007) suggest that cooperatives have a role in the overall economic and social development by creating jobs, generating income to members and reducing poverty. Kolin (2010) states that agricultural cooperatives – as a form of social enterprise, have the potential to mitigate the social consequences of transition by employment of rural population, particularly its marginalized groups. However, Serbian cooperative practice is characterized by a relatively small number of agricultural cooperatives that can generate the conditions for sustainable employment of greater number of new workers (Ševarlić and Nikolić, 2012-a).

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[3] http://ica.coop/en/whats-co-op/co-operative-facts-figures

Although we tend to judge the contribution of cooperatives to development of rural areas based solely on our own experience, it is necessary to take into account the experience of other countries in which cooperatives are organized in activities which are not represented in Serbia, either because of legal obstacles and difficulties (savings and credit cooperatives, cooperative production of electricity) or the lack of tradition (cooperative for assistance to vulnerable groups, for child care, etc). Unlike profit-oriented organizations, cooperatives often provide specific services in rural areas where there are small number of users, even when these activities are on the edge of profitability. In the Report of the International Labour Organization (ILO) from 2007 is stated that 58% of electricity consumed in rural areas in Argentina is produced in cooperatives and that they create 6 percent of the national GDP; in the Philippines dominant part of 30,000 cooperatives are located in rural areas where they provide 65,215 jobs through employment in cooperatives. In India, 67 percent of rural households needs are being met through cooperatives.

Serbia is not an exception in terms of contribution of agricultural cooperatives to the development of rural areas and reducing rural poverty, although the potentials of this sector are limited by economic conditions in which they operate. Agricultural cooperatives in Serbia are a dominant form of cooperative organizations: they represent 66.6 percent of the total number of cooperatives – which were 2,381 in April 2011 by the data from Serbian Business Registers Agency (SBRA); they also employed approximately 80 percent of the 6,292 employees in all types of cooperatives and gather some 30,000 cooperative members and much more associated members (Ševarlić and Zakić, 2012).

The effects of our cooperatives sector can be expressed through the following: cooperatives employ 6,292 people, and keeping in mind that the average family in Serbia has three members (Statistical Yearbook 2012, p. 32, SORS), cooperatives contribute to the existence of 18,876 inhabitants. Engagement not only of its members, but also a large number of farmers – associated members enables productive networking of small farmers and increases their competitiveness. As the agricultural co-operatives in our country have been neglected for a long time, it needs initial support for the implementation of the so-called "frog jumps". If the agricultural cooperatives would receive financially assisted to build some 30 centers for gathering, finishing, processing and marketing of agricultural products, of which everyone could employ about 100 people, 3,000 workers would be to providing social security for an additional 9,000 residents in Serbia. At the same time 20-50% of the third class of fruits and vegetables would be collected in the system for processing and thereby increase the value of agri-food products in Serbia.

Despite the poor conditions of the entire cooperative sector, agricultural cooperatives are the only ones that show some tendency to merger. According to national legislation, cooperatives can be divided into small, medium and large. Of

the total number of cooperatives, every cooperative marked as major and 97.2 percent of small cooperatives are agricultural cooperatives. They also have the largest share in the GDP of the cooperative sector – 81.5 percent (SORS, 2011).

Although cooperatives may be organized in all lawful activities, and exist in all five continents, for the representative of cooperative practice and sector, and researches in our country, the most important examples comes from Europe. In period 2002-2007 was recorded increase of the number of agricultural cooperatives in the European countries (about 30% in Finland, 12% in Moldova and 10% in Lithuania), while in Denmark and the UK new cooperatives for exploitation of wind energy have been established. In France there are over 3,200 agricultural cooperatives that provide over 150,000 jobs and have about 650,000 members (ILO Coop, 2007).

By pointing out the good examples of cooperative practice we can influence the change in consciousness in general and the scientific community in favour of agricultural cooperatives, or against the adopted opinion that cooperatives are obsolete and that they have no role in the revival of rural areas, but also on the attitudes of farmers – potential cooperative members regarding possible success of agricultural cooperatives which all can motivate them to join the cooperative movement and to tackle with fatalistic attitude that the situation cannot be changed (Birchall and Simmons, 2009).

In the Serbian cooperative practices today there are no examples of co-operatives that could be compared with cooperative systems, at least at the national level (MIGROS). Therefore it is important to point out examples of good regional (apple production) and local cooperatives (vineyard) in other countries, particularly in Italy, whose ownership structure of family farms is similar to the one in Serbia.

In the World Bank report from 2008 on the development of agriculture, the role of cooperatives in agricultural development is for the first time explicitly highlighted and presented positive experiences of dozens of examples of agricultural and other types of cooperatives. It is particularly important to point out certain characteristics of agricultural cooperatives to potential members so that they become familiar with the new developments in cooperative practice, which is present both in foreign (Cook and Iliopoulos, 1999; Copa-Cogeca, 2010) and in domestic practice (Ševarlić and Nikolić, 2012-b).

3. Changes in number of family farms and agricultural cooperatives in Serbia

Agricultural cooperatives are associations of agricultural producers in which they are integrated to meet diverse needs, although the most common motive for membership is economic. In the survey conducted on a sample of 79 agricultural cooperatives in Serbia, cooperative members stated that the most common motive for joining the

cooperative was assistance in selling agricultural products (88.6%) and the purchase of inputs for agricultural production under favourable conditions (87.3%), but high frequency of response had also access to credit (57.0%) (Ševarlić and Nikolić, 2012-a: 21).

In the Census of Population, Households and Dwellings (2002) conducted in Serbia; farms were defined as any household that at the time of the census used a minimum of 10 acres of arable land, or less than 10 acres of arable land, if it has a certain number of cattle.

Table 1: Number of FF in Serbia* and the total size of used land

Size of land	Census 1991		Census 2002		Census 2012**		Difference (2012-1991)	Difference (2012-2002)
	Number of FF	%	Number of FF	%	Number of FF	%		
No land	1,145	0.1	6,288	0.8	9,486	1.5	8,341	3,198
Up to 2 ha	451,873	45.3	354,029	45.5	293,667	46.7	-158,206	-60,362
2 - 5 ha	319,066	32.0	244,064	31.3	184,637	29.4	-134,429	-59,427
5 - 10 ha	179,654	18.0	131,438	16.9	89,749	14.3	-89,905	-41,689
10 - 20 ha	40,960	4.1	36,772	4.7	32,486	5.2	-8,474	-4,286
Over 20 ha	4,537	0.5	6,300	0.8	18,530	2.9	13,993	12,230
Total	997,235	100.0	778,891	100.0	628,555	100.0	-368,680	-150,336

Source: Census of Agriculture from 1991 and 2002, SORS, Belgrade
* Without data for Kosovo and Metohija, ** Data for year 2012 taken from the publication: Statistical Office of Republic of Serbia (2012): Census of Agriculture 2012 in the Republic of Serbia – the first results, SORS, Belgrade.

In The Census of Agriculture 2012 the methodological approach was changed and instead of "individual farm" (IF) was uses the term "family farm" (FF) which was defined as the holding of at least 0.5 hectares of agricultural land or less than 0.5 ha of agricultural land if it is in the field crop, livestock, fruit growing, viticulture, vegetable production, producing flowers (greenhouses) or when engaged in other forms of agricultural production intended for the market, as well as fish farming, growing mushrooms, snails, bees, etc, or in other words if it is a commercial farm[4].

Ignoring these differences in definitions of agricultural and family farms, it can be noted that the number of individual family farms in the period between two censuses has been significantly reduced (for 150,336 units or 19.3%). This reduction builds on the previous negative trend in the number of FF, and in the last two decades one in four FF disappeared. It can also be noted that the share of

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[4] Statistical Office of Republic of Serbia (2012): Census of Agriculture 2012 – Methodological instruction, SORS, Belgrade.

smaller farms is decreased and the share of farms with more land area is slightly increased by the Census 2012. The most significant reduction was noted in the category of farms with up to 2ha of land (by 35%, or 17% compared to in 1991 and 2002 respectively).

Case 1 – Agricultural Cooperative *Zelena bašta*, Saraorci

Agricultural Cooperative *Zelena bašta* *(Green Garden)* was founded by members of the five families in 2007 aiming at organizing vegetable production, predominantly in greenhouses. Only two years after the establishment of cooperative, they produce tomato, pepper and cucumber on 7ha indoor and production of cauliflower, broccoli and lettuce at about 20ha in the open. Production assortment is adjusted to meet the requirements of markets and customers.

Contemporary agricultural practice and the latest innovations in the field of vegetable production are used in production, in order to increase the yield and obtain more quality products. Cooperative also works with the agricultural advisory service.

Since the establishment, cooperative retains the number of members on the legal minimum, and doesn't cooperate with associated members. In accordance with statutory requirements, investments in cooperative are equal for all farmer-members, but in order to collect significant capital for investment in the expansion of production members fee are higher than usual in agricultural cooperatives. These characteristics indicate that it is new generation cooperative, which among other features is characterised by closed membership and a great investment.

Increasing the number of family farms was recorded in two antipodal groups – landless and with more than 20 hectares, while larger increase was recorded in the category of farms over 20 ha (compared to 13,993 in 1991, i.e. 12,230 or almost three times more than in 2002), while the number of landless households increased 1.5 times compared to 2002, which is mainly due to changes in statistical methodology. Reducing the number of family farms was observed predominantly in the category of smaller ones, owned mainly by elderly population which resulted in the devastation of rural areas.

Along with reducing the number of FF, the number of agricultural cooperatives changed. According to the Statistical Office of the Republic of Serbia, the number of agricultural cooperatives has been continuously decreasing over the past few decades.

In 1991 there was a farmers' cooperative on 1,274 FFs, with almost half (45.3%) of FFs disposed of less than 2 hectares of land, so these holdings in order to survive

were practically focused on some form of association. In 2002 the situation was almost identical in terms of distribution of households by interval groups. The ratio of FF and agricultural cooperatives was changed, and 1,527 IFs were oriented on one agricultural cooperative. Finally, in the 2012 this ratio was the highest – 2,883 FFs is focused on one agricultural cooperative, which is over two times more than in 1991. Focusing more FFs on one agricultural cooperative does not necessarily mean a deterioration of business conditions, if cooperatives are increasing and can meet the needs of a larger number of farmers. However, 66.5% of the agricultural cooperatives in Serbia are small cooperatives (SORS, 2011: 27), which actually indicates that they do not have the economic and human resources to be a good service to all farmers.

The work of agricultural cooperatives in Serbia is further burdened by unfavourable legal environment. According to the provisions of Article 13, paragraph 3 and Articles 150 to 154 of the Bankruptcy Law (2009), which were subsequently declared unconstitutional by the Decision of the Constitutional Court of the Republic of Serbia (2012) in 736 agricultural cooperatives was conducted accelerated bankruptcy. In this way, more than a third (38.1%) of the total number of agricultural cooperatives was liquidated. The majority of these cooperatives were from the territory of central Serbia (494 or 67.1%) and smaller number is from Vojvodina (242 or 32.9%). This can be described as the "largest and fastest administrative 'euthanasia' of agricultural cooperatives in Serbia – from the establishment of the first cooperatives in mid-nineteenth Century until today!" (Ševarlić, 2013).

Agricultural cooperative movement is unfortunately burdened with a number of other problems, among which stand out ownership issues that have not been regulated, and the impossibility of implementing the provisions of the Law on Cooperatives (1996) that regulate the return of the social ownership into cooperative property. If the refund of cooperative property is not resolved "consistently and efficiently", and not just "in general and vague" and so prolong the agony of not addressing this issue, the cooperatives will be forced to "begin again from the scratch" (Maričić, 2006).

Case 2 – Agricultural Cooperative *Agrodunav*, Karavukovo, Serbia

Village Karavukovo is located in the Zapadnobački District and has a population of about 5,000 inhabitants, which are mainly engaged in agriculture. Shortly after the Second World War, the village was colonized and there were established four peasant cooperatives that mergend into one called Agricultural Cooperative *Agrodunav, Karavukovo* in 1956. This cooperative operates until today under the same name.

Analysis of the development path of cooperative *Agrodunav* is extremely important, as it indicates the different phases of the development of agricultural sector in Serbia. It also represents one of the better examples how agricultural cooperatives can be recovered. From the establishment of cooperatrive until the pre-transition period cooperatives operated relatively successfully, mainly by organizing crop production in their own economy, investing in the purchase of land and agricultural machinery. At the beginning of the 1990s, however, the cooperative enters into a recession which lasts for almost a decade and culminated in 1999 when the pricess of bankruptcy started. At this point, the cooperative was in extremely poor condition: the production of its own economy was almost non-existent, since 1,400 ha (77%) of the total 1,816 ha of cooperative land was neglected; cooperation with farmers wasn't organized, machinery was faulty or damaged, the debt to the creditors could not be settled, and the workers did not receive a salary in the last four years.

After two years in bankruptcy, active engagement of management and farmers, cooperatives have overcome the crisis: obligations to workers have been paid, the production started on the entire land with the planting structure significantly altered in favor of highly intensive production lines, and three years after getting out of the bankruptcy, cooperative settled all obligations to creditors and began restoring agricultural machinery and construction of dairy farm.

ZZ Agrodunav today is a leader in the organization of agricultural production in the local community. It employs 73 full-time employees and hires up to several hundred seasonal workers, mostly during the summer months. At over 1,000 hectares of its own land organize seed production, of which 400 ha under irrigation, with the active cooperation of agricultural extension services.

Experiences from cooperative sector from Europe and the world, as well as examples of good practice of "old" cooperatives (Agricultural cooperative "Beška", Agricultural cooperative "Tisa", ...) and the "new" cooperatives (Agricultural cooperative "Voćko" – Tavankut, Agricultural cooperative "Zelena bašta" – Saraorci, ...) from Serbia indicate that agricultural cooperatives can be organizations for poverty reduction in rural areas and faster and better addressing

economic, social and other problems of its members and residents of local communities. In order to agricultural cooperatives become more significant factor in the development of agriculture and villages in Serbia, it is necessary to do following: make restitution of cooperative property and enact a new law on cooperatives; enable cooperative members for the democratic participation in their organisation; train personnel for the cooperative management; reorganize and consolidate agricultural cooperative unions with other sectoral cooperative unions in one general union that would represent sector towards government organisations and Coops Europe and ICA; give priority to projects and programs that meet the needs and ensure the viability of a number of farms united into some forms of organisations, and not individual family farms in the agrarian policy, especially in the current economic situation.

4. Argumentation of the importance of cooperative statistics for the cooperative sector

Accurate and reliable data on the co-operative sector are a necessary precondition to assess the situation and make decisions about the development and new business activities. The need for adequate management of cooperative statistics is stressed in foreign literature (publications of the International Cooperative Alliance – ICA and Copa-Cogeca; UN Resolution 62/128 of 2008; ILO Recommendation 193 on the promotion of cooperatives adopted in June 2002) and domestic literature (Journal Agricultural Cooperative No. 15 of April 12 in 1936; Zakić 2000).

As an international umbrella association, the ICA has launched a campaign *Global 300 list* – the ranking of 300 economic most successful cooperatives in the world. Liebrand and Chesnick (2007) argue that cooperatives tend to last longer than profit-oriented enterprises since their business goals are realistically achievable only in the long run. They state that nearly half of the cooperatives in the Global 300 list were established before the Second World War, and that one in ten exists for more than a century, indicating their stability and reliability. The dominance of agricultural cooperatives in the overall cooperative sector is not confirmed only in our country, but also applies globally: more than one third of the cooperatives on the Global 300 list are operating in the field of agriculture, and almost every country that is present in the Global 300 list has at least one agriculture cooperative.

The importance of agricultural cooperatives in Europe is illustrated by the publications periodically issued by cooperative and other international institutions, such as the Copa-Cogeca, the ICA and the ILO, which highlight the need to conduct cooperative updated statistics. The ILO and the ICA collaborated since the establishment of the ILO in 1919, and ICA has the status of observer member of the ILO. ILO's ccommitment to the cooperative sector has manifested through the development of Recommendation No. 193 on the promotion of cooperatives

adopted in June 2002, and in signing and implementation of the Common Cooperative Agenda between the two organizations in February 2004 on creation of jobs and poverty reduction, especially in rural areas.

Case 3 – Danish Crown, Denmark

Danish Crown was created out of the first co-operative slaughterhouse, which was founded in 1887 in the town of Horsens in Denmark. Danish Crown is now Europe's largest and second largest in the world cooperative company that processes pork, and the largest processor and exporter of beef in Denmark. It accounts for 54.4% of the Danish agricultural exports and is the largest exporter of pork. It is among the top three exporters of meat in the world.

Danish Crown owns 15 pork and seven beef slaughterhouses (including one in Germany), has offices around the world, and especially extended network in Europe. Each year in their abattoirs is slaughter 21.8 million pigs – of which 6.3 million in the UK, Poland and Sweden, and about 600,000 head of cattle – half of which in Denmark. It employs approximately 23,500 workers and 10,500 employees in daughter companies – engaged in manufacturing of various processed meat products.

Danish Crown is organized as a cooperative owned limited liability company and operated by the elected representatives of members and employees of cooperatives, which unites about 11,000 farmers. It is regularly ranked high on the Global 300 list of the largest cooperatives in the world – in 2010 was the 12th place among agricultural and on the 38th place between all cooperatives (regardless of activity).

Not surprisingly, the ILO also stressed the importance of co-operative statistics. This organization values highly cooperatives as one of the more significant employers and importan contributor in terms of jobs creation. It also steressed that official statistics is often not monitoring sufficiently cooperative, or monitor only a part – whether it relates to certain types of cooperatives or to certain information on cooperatives. In fact, according to the ILO, cooperative statistics should include not only the number of cooperatives in total and by sectors, but the volume of business, members, employees, and a set of financial indicators, as well as reserve funds. This is why on the ILO International Conference of Statisticians, which is held in October 2013 in Geneva (Switzerland), for the first time will be considered the establishment of a database on cooperatives that would be comparable to the international level.

Obviously, the cooperative sector is an essential element in the agriculture of Europe and the world. The data presented in documents and on the websites of the relevant international organizations are an argument in the hands of the cooperative sector, which can be used to eliminate the ambiguity of the potential of agricultural and other types of cooperatives and their importance in solving some of the pressing problems of today.

5. Conclusion

While agricultural cooperatives all around the world experience the renaissance initiated by the global economic crisis, rising food prices and the identification of cooperatives as one of the most desirable models of social economy, agricultural cooperatives in Serbia are faced with one of the most difficult periods in its development since the end of the Second World War. Long term neglecting of cooperatives, lack of an adequate legal framework and consequently weak business effects of a dwindling number of agricultural cooperatives in Serbia, have contributed that not only farmers, but also representatives of the cooperative sector lose their trust in this type of organisation.

Unfavourable institutional and legal environment contributed to the drastic reduction of the number of agricultural cooperatives, since on the basis of the Law on Bankruptcy (2009) were executed more than a third of the total number of agricultural cooperatives (Ševarlić, 2013). The unresolved issue of transformation of social ownership in agricultural cooperatives, lack of access to favourable source of finance, unequal relationship with other stakeholders in agribusiness and other problems caused a reduction in their number in Serbia, and agricultural cooperatives that survived are mostly small (66.5% of the total number of agricultural cooperatives). Nonetheless, they gathered more than 30,000 cooperative members and employ about 5,000 workers. The importance of agricultural cooperatives is reflected not only in their business in Serbia, but also in developed countries, which is supported by the fact that the number of agricultural cooperatives in Europe is increasing.

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ECONOMIC EFFICIENCY AND PERFORMANCE OF DIFFERENT TYPES OF FARMS AND AGRIBUSINESS SUBSECTORS

A RANKING OF SERBIAN DISTRICTS BASED ON THE EFFICIENCY OF SMEs IN AGRIBUSINESS[1]

Radojka Maletic[2], Blazenka Popovic[3]

Summary

Due to the different geo-morphological, climatic, economic and social factors, Serbia represents a very heterogeneous area with specific historical legacies that are hard to overcome. Therefore, the regional specificities represent a starting point for planning the development of the economy as a whole, and of the agribusiness in particular. It is important to properly identify the regional peculiarities of agriculture in order to contribute to the agricultural development of Serbia as a whole. First of all, the attention should be placed to overcome the problems of underdeveloped areas that would contribute to a more stable and harmonious development of agriculture in Serbia. Balanced regional development policies should encourage better use of natural resources, especially in lagging behind areas. Spatial planning is a tool to create quality changes, especially in rural areas, linking different sectors (agriculture, food processing, tourism, environmental protection, etc.). The achievement of set objectives is highly dependent on the level of development of small and medium enterprises (SMEs) in agribusiness. Agribusiness is particularly interesting field for the development of SMEs as it is a complex area that involves the production and processing of agricultural and food products. Therefore, by using the appropriate mathematical and statistical methods, evaluation of the operational efficiency of SMEs in agribusiness in districts of Serbia was performed, in order to address the deficiencies and improvement opportunities in business in some areas.

Key words: *Ranking of district, SME, DEA analysis, operational efficiency.*

JEL classification: *C38; L26; O13; R11;*

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1. Regional development of Serbia and role of SMEs in this process

Regional disparity is not a „new thing", this problem reaches back to the past. It has become popular in recent years in Serbia because of the growing problems faced by underdeveloped regions. Given that the transition process has already started, the problems of certain regions are more pronounced. It is now clear that the economy in these regions was based on ill foundations. However, the problem of uneven regional development is not only present in Serbia, it is the problem of global nature. Also, the experience of other countries shows that the problems of uneven regional development are complex and that there are no universal and predefined solutions. Modern technology, mass production, and to some extent changed way and style of living of the world's population create a picture of uneven regional development. Therefore, it is clear that one of the most important issues of macroeconomic policy of each country, including Serbia, is the balanced economic development throughout its territory. However, until the present day, socio-political action in Serbia relevant to this social process have always been determined as the partial issue or as a matter of party affiliation program, rather than serious and general social-state project that can not be realized without fundamental reconstruction of the political system.

The complexity and importance of regional development is shown by the fact that these issues are in the constitutions of many countries. Therefore, the Republic of Serbia adopted in year 2009 „*The Law on Regional Development*" outlining the new regionalization and specifying the regional development objectives. The Parliament of RS also passed „Regional Development Strategy of the Republic of Serbia "for the period from 2007 to 2012. Its adoption and implementation is necessary because of the pro-European orientation of Serbia.

The differences in the level of development within Serbia are much discussed, but there is relatively little analytical materials that deal with these issues. The website www.makroekonomija.org presents the research by Zdravkovic M. That, based on the population and national income, calculates national income per capita and the deviation of this data in the cities and districts in relation to the average value (Table 1). The main conclusion of this study is that after year 2000, there has been a sudden increase in the difference in the development level as measured by per capita national income, and that the current differences in the level of development are comparable to the period of 40 years ago. The increase of industrial production in the seventies, and reduction of external trade imbalances, in the eighties of the last century, have resulted in reduction of differences in level of development between districts and between Belgrade and Novi Sad, on the one hand, and other parts of Serbia, on the other hand.

Serbia is a country with one of the largest regional disparty in Europe – the difference between the most developed and the least developed district is closer to

double digit figures, and it is even higher at the municipal level. The current system leads to polarization, i.e., rich municipalities become richer and the poor municipalities poorer, while the deepening of regional differences affects the very unfavourable demographic indicators in some areas. In general, we see that the northern part of the Republic of Serbia is considerably more developed in comparison to the southern territories.

Table 1: Deviations from the average in the development of districts

Districts	YEARS				
	1970	1980	1989	2000	2005
Serbia	100.0	100.0	100.0	100.0	100.0
Vojvodina	107.1	119.6	124.2	118.1	117.8
Central Serbia excl. Belgrade	76.7	76.4	79.9	79.1	68.0
Novi Sad	184.8	181.0	133.8	132.1	188.6
Belgrade	166.4	140.8	121.7	128.3	151.5
Nis – city	123.8	106.1	106.7	100.6	118.4
South Backa district, excl. Novi Sad	114.0	135.0	130.8	120.9	116.5
North Banat	106.1	127.9	127.7	136.4	115.5
North Backa	121.4	127.0	112.2	119.6	109.3
West Backa	105.4	113.5	132.7	114.6	108.2
South Banat	82.9	101.2	131.7	112.3	107.7
Central Banat	101.2	114.1	118.8	87.6	103.2
Morava	84.6	102.1	101.9	98.9	95.6
Macva	64.4	65.7	66.7	72.3	87.4
Branicevo	54.3	55.0	77.3	69.4	78.6
Srem	86.5	95.0	106.0	90.4	77.8
Pomoravlje	82.1	79.8	68.9	85.6	77.4
Pirot	68.2	67.2	82.4	72.0	70.5
Kolubara	48.2	73.7	78.5	86.7	68.8
Sumadija	91.6	92.0	74.6	67.5	67.1
Zlatibor	76.2	93.0	84.0	84.5	67.0
Rasina	77.3	87.5	104.6	90.5	65.3
Zajecar	72.7	78.5	79.3	92.1	58.4
Raska	65.2	62.8	57.9	61.5	51.5
Toplice	52.8	63.8	61.8	72.4	49.5
Pčinje	44.8	50.1	59.7	81.1	49.1
Nisava – excl. Nis	50.6	54.9	50.6	64.2	47.5
Podunavlje	75.9	73.4	84.7	84.7	45.7
Bor	109.5	107.3	142.6	77.5	44.1
Jablanica	53.9	57.5	64.0	60.1	42.9

Table taken from the site www.makroekonomija.org and necessary calculations are performed by Zdravkovic M. based on data from Statistical Yearbook of Yugoslavia and Serbia

The most developed city is city of Belgrade. Somewhat more developed is the district of South Bačka with the city of Novi Sad as its centre. There are four medium developed districts of which three are in Vojvodina (North Bačka, Sout Bačka and West Bačka districts) and one in eastern Serbia, Niš, including the surrounding areas (Nišava district). Undeveloped districts are as follows: Mačva, Kolubara, Zlatibor, Raška, Rasina, Bor, Zaječar, Toplice, Pirot, Pčinje districts. Jablanica is the least developed district (Table 1).

In addition to the many economic reasons for regional disparities, social and political factors are also significant: the war in the 90's, followed by economic sanctions, bombardment of Serbia in the year 1999, etc.

Bogdanov (2007) states that "the reform of the agricultural sector, in addition to changes in the ownership structure and privatization of processing capacities, market liberalization, also includes forming of a general environment for the establishment of new, completely different economic and business structures". It can be said that the objective of rural development is the creation of equally valuable and good quality conditions for living (work and rest) in all areas. The realization of defined goals largely depends on the level of development of small and medium enterprises in agribusiness. According to Beck and Demirguc-Kunt (2006) it is of major importance to determine the factors affecting the performance and business of the companies, since they are mainly funded from their own revenues with only an insignificant help from the state. The small and medium enterprises in Serbia should be the main backbone of economic development and the future (as is the case in developed countries), especially in the rural areas of Serbia (*Ceranic and Maletic, 2010; Popovic, 2011*). However, the level of development of small and medium-sized enterprises in the agribusiness of Republic of Serbia is far below potential and satisfactory. A great opportunity for small and medium businesses, and therefore for the development of agribusiness is underutilized economic potential of agriculture (*Ceranic et al., 2006*). SMEs are extremely flexible which contributes to a higher degree of efficiency in utilization of inputs. Therefore, optimal use of agricultural resources, increase of production volume, creating a stable market, the increase in exports of agricultural and food products and the realization of an integrated agricultural, rural and regional development are the strategic goals for the development of agriculture of the Republic of Serbia (*Ceranic and Maletic, 2009; Maletic et al. 2011*)

The development strategies, among other things, of the government that aims to promote and provide guidelines on how things should take place over a longer or shorter period, show how important is the development of small and medium enterprises in transition countries. One example is the Serbian government documents: *The Strategy for Development of Small and Medium Enterprises in the Republic of Serbia in 2003 - 2008, the Action Plan to Stimulate the Development of Small and Medium Enterprises, 2005-2007*, and the latest *Strategy and*

Development of Competitive and Innovative SMEs for the Period of 2009-2013. Their goal is to promote entrepreneurship and create a framework for opening of a sustainable, internationally competitive and export-oriented sector of small and medium sized enterprises in the future and thus ensure the economic and social well-being of the Republic of Serbia.

Starting from this position, the aim of this study is (i) to evaluate the efficiency of SMEs in agribusiness and (ii) make a ranking of districts in Serbia according to the results obtained. The results of these studies can be useful to determine the optimal production orientation of certain areas and to further develop agricultural zoning. Numerous authors considered it of major importance to estimate the efficiency of the agricultural sector (*Shenngen and Xiaobo, 2002 Jirong et al., 1996*). It is therefore necessary to apply appropriate mathematical and statistical methods in order to fully study the problem of multi-dimensional development concept. A number of methodologies can be used for this purpose. Thus, in the research by Popovic et al. (2011) a method of cluster analysis was used and homogeneous groups of municipalities of Serbia were defined based on indicators of the development of SMEs in the agribusiness, and for the assessment of the efficiency of SMEs in agribusiness in the municipalities belonging to the DRB (Danube river basin), Maletic and Popovic (2011) have used the I-squared distance for ranking municipalities and the DEA methodology, as a special technique for determining the effectiveness of numerous entities of the same in the same field.

2. Concept of DEA method

In regard to above mentioned, to measure the efficiency of SMEs engaged in agribusiness by districts, the DEA (*Data Development Analysis*) technique will be used in this study as an effective instrument in the process of measuring of the business efficiency. DEA method has proven to be an excellent technique for determining the efficiency of multiple entities of the same area. Besides the evaluation of the efficiency and determination of their causers, as well as of the reasons of inefficiency and ways for their elimination, the DEA has a model that provides the decision maker with the ability to make observations and rank entities. This model will be used in this study to rank the districts of Serbia on the basis of business success of their agricultural enterprises.

Suppose that DMUj (j=1, ..., n) uses inputs x_{ij} (i=1, ..., m) to produce outputs y_{rj} (r=1, ..., s). The input-oriented weighted version of Andersen-Petersen′s super-efficiency DEA model is as follows (*Andersen and Petersen, 1993*):

$$(Max)h_k = \sum_{r=1}^{s} \mu_r y_{rk} \tag{1}$$

Subject to:

$$\sum_{i=1}^{m} v_i x_{ik} = 1 \tag{2}$$

$$\sum_{r=1}^{s} \mu_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \leq 0, \quad j = 1, 2, ..., n \quad j \neq k \tag{3}$$

$$\mu_r \geq \varepsilon, \quad r = 1, 2, ..., s \quad \text{and} \quad v_i \geq \varepsilon, \quad i = 1, 2, ..., m \tag{4}$$

where:

h_k – the relative efficiency of k DMU
n – the number of DMU to be determined
m – number of inputs
s – number of outputs
μ_r – coefficient of significance for output r
v_i – coefficient of significance for input i.

The optimal values of efficiency scores h_k are obtained by solving the linear model (1)-(4) k-times (once for each DMU in order to compare it with other DMUs). Efficiency score h_k is greater or equal to 1 for all efficient units and smaller than 1 for inefficient units. In this way, ranking of units, according to their efficiency, is enabled. The smaller value of efficiency score h_k the less efficient is the unit. The resulting rankings were used to analyse the sensitivity of DEA techniques. The result of this model shows how much individual units could be worse and still be effective (they are all over 100%), and the one with the highest score is the highest-ranked, while the one with the worst score is ranked last. In this regard, super-efficient units, i.e. those units with a score over 100%, represent so called *exemplary units* (benchmark) for inefficient units. Based on selected indicators to monitor development of districts in Serbia, their ranking was carried out on the basis of the efficiency indicators using EMS software (*Efficiency Measurement System*) (http://www.wiwi.uni-jena.de/Mikro/pdf/ems.pdf).

The following SME indicators will be monitored: the total income, profit, long term assets, non-current/long-term assets, the number of firms, number of employees, and the losses. Home database was obtained from the Bureau of Statistics on the basis of SMEs' annual final accounts for a four year period 2008-2011.

The application of DEA for ranking and estimating the efficiency in agriculture has already been discussed by a number of authors. Some of them used DEA in order to determine the influence of manpower, fertilizers, irrigation, capital and seed on yield of different crops (*Lilienfeld and Asmild, 2007*). Other authors focused their interest on the efficiency in the production of meat and cereals based on inputs such as agricultural machinery, labour, fertilizer, sown area (*Monchuk et al, 2010*). Vennesland (2005) used the same methodology in determining the development efficiency of the rural regions of Norway. Based on four input and four output indicators, Martic and Savic (2001) focused on ranking 30 regions of Serbia, of which 17 proved efficient.

3. Ranking of districts in Serbia using DEA technique

As stated above, the objective of this research is ranking of districts in Serbia by observing the level of development of SMEs in the agriculture and comparison of ranks obtained for districts by applying the DEA method. Data analysis in this study assumes that revenue and profit are the most important for the ranking (which are considered as DEA outputs), and working capital, fixed assets, number of employees, number of firms and loss are viewed as inputs. Each DMU (*Decision Making Unit*), in this case the district, will assign different weights to each factor in order to approach the efficiency limit. Therefore, if you need to make an objective ranking, where the DMUs are compared to the limits of efficiency and model units, it is recommended to apply the DEA method.

Based on the results of the model, scores of super-efficiency of SME business are obtained, by districts in Serbia, as shown in Table 2, and on the basis of these scores the results were ranked and illustrated in Table 3.

Based on the obtained results, it is obvious that among the evaluated DMUs (in our study districts) there are *outlayers* or units whose value is so large that it cannot be considered a relevant result. This unit is Sumadija district, because its *score* is 234.43%, which means that the unit can „*spoil*" its business to 134.43% and still be effective. The reason for this unit to be ranked first is considerably low inputs, and slightly lower outputs compared to the other DMUs. The greatest significance is given to its third input (long-term assets), whose value is slightly higher than the minimum values of the same inputs of other DMU (Toplice district). As for the outputs of Sumadija district, the only significance is given to the last output (profit). This unit is a *benchmark* or exemplary unit for 5 other DMUs (district). However, as its *score* exceeds 200%, it will be exempted from further analysis.

The second highest ranking is the Kolubara District, with a *score* of 146.03 %. This super-efficient unit has low inputs and outputs, with the greatest significance attached to the second input (long-term assets - 59%) and slightly lower significance to the third input (working capital - 41%). The first output (revenue) has significance of 1.46. Kolubara is *benchmark* for two units.

Pomoravlje district found itself ranked third, with super-efficiency of 142.38%. For the analysis the following inputs are essential: number of firms (25% significance), working capital (12% significance), loss (34% significance), and number of employees (28% significance). Number of firms operating in the district is 52, with a total of 630 employees. Obviously, these figures position this district among the best ranked units, because the inputs are low. However, the loss is of utmost importance, and with the value of 94.814 dinars this DMU is among the more successful districts. Both outputs are important for this analysis, namely: income (significance 0.82) and profit (significance 0.6). This unit is the benchmark for 16 DMUs (Table 2).

Table 2: Results of the DEA analysis

DMU	Score (%)	No. of firms {I}{V}	Long term assets {I}{V}	Working capital {I}{V}	Loss {I}{V}	No. of employees {I}{V}	Revenue {O}{V}	profit {O}{V}	Benchmarks
City of Belgrade	68.5	0.48	0	0.52	0	0	0	0.68	2 (1.08) 13 (1.94)
North Bačka	141.79	0.99	0	0	0.01	0	1.42	0	7
Central Banat	82.07	0.1	0	0	0	0.9	0.82	0	2 (0.53) 14 (0.59)
North Banat	67.55	0.21	0	0.79	0	0	0.68	0	2 (0.21) 14 (0.71)
South Banat	91.73	0.1	0	0	0.16	0.74	0.92	0	2 (1.01) 7 (0.13) 14 (0.59)
West Backa	89.58	0.25	0	0.13	0	0.62	0.04	0.85	2 (0.73) 7 (0.09) 13 (0.01) 14 (0.18)
South Backa	113.65	0.4	0	0	0.6	0	0	1.14	2
Srem	87.92	0.14	0	0	0	0.86	0.88	0	2 (0.39) 14 (1.22)
Macva	79.2	0.36	0	0	0	0.64	0.79	0	14 (0.20) 15 (1.32)
Kolubaa	146.03	0	0.59	0.41	0	0	1.46	0	2
Podunavlje	96.59	0.05	0	0	0.95	0	0.97	0	14 (0.34) 26 (0.10)
Branicevo	60.22	0.03	0	0.97	0	0	0.6	0	14 (0.19) 26 (0.57)
Sumadija	234.43	0	0	1	0	0	0	2.34	5
Pomoravlje	142.38	0.25	0	0.12	0.34	0.28	0.82	0.6	16
Bor	137.6	0	0	0	0	1	1.38	0	2
Zajecar	39.4	0.03	0	0.97	0	0	0.39	0	14 (0.09) 26 (0.21)
Zlatibor	54.89	0	0	0	0	1	0.17	0.38	13 (0.11) 14 (0.57)
Moravica	92.63	0.17	0	0	0	0.83	0.93	0	2 (0.10) 14 (0.54)
Raska	74.12	0	0.24	0.76	0	0	0.62	0.12	10 (0.21) 13 (0.01) 14 (0.11)
Rasina	108.56	0	0.53	0	0	0.47	0.52	0.57	0
Nisava	67.87	0.01	0.11	0.89	0	0	0.68	0	10 (0.32) 14 (0.15) 26 (0.59)
Toplice	113.49	0	0.61	0	0.39	0	0.4	0.73	0
Pirot	45.2	0.03	0	0.97	0	0	0.39	0.06	13 (0.04) 14 (0.02) 26 (0.16)
Jablanica	33.39	0	0	0.38	0	0.62	0.33	0	14 (0.20) 15 (0.00)
Pcinje	17.48	0.03	0	0.97	0	0	0.17	0	14 (0.05) 26 (0.11)

The continue Table 2.

DMU	No. of firms {I}	long-term assets {I}	Working capital {I}	Loss {I}	No. of employees {I}	Revenue {O}	Profit {O}
City of Belgrade	0	8159500.2	0	522064.5	822.06	1644850	0
North Bačka							
Central Banat	0	5737054.1	2.00E+06	331571.4	0	0	168085
North Banat	0	1041364	0	235124.4	96.01	0	174365
South Banat	0	10897273	1.00E+07	0	0	0.01	69143.4
West Backa	0	1281383.3	0	327310.7	0	2.6	0
South Backa							
Srem	0	6800403.9	730343	141512	0	0	77780.2
Macva	0	1529877	2.00E+06	60339.29	0	0	17270.2
Kolubaa							
Podunavlje	0	141006.54	351078	0	137.33	0	16244.1
Branicevo	0	13780.95	0	32797.45	131.32	0	27340.2
Sumadija							
Pomoravlje							
Bor							
Zajecar	0	478572.51	0	44450.87	35.38	0	22702
Zlatibor	6.7	116123.78	136948	23402.42	0	0	0
Moravica	0	189319.48	571849	325181.8	0	0.01	102594
Raska	8.95	0	0	5042.08	77.87	0	0
Rasina							
Nisava	0	0	0	14762.83	279.41	0	37467.9
Toplice							
Pirot	0	175150.59	0	10084.31	11.62	0	0
Jablanica							54700
Pcinje	0	20630.77	0	5420.73	8.56	0	14441

Table 3: Results of ranking districts by efficiency of small and medium enterprises in agribusines (measuring of super-efficiency)

Districts	Score (%)	Rank	Districts	Score (%)	Rank	Districts	Score (%)	Rank
Šumadija	234.43	1	Moravica	92.63	10	North Banat	67.55	19
Kolubara	146.03	2	South Banat	91.73	11	Branicevo	60.22	20
Pomoravlje	142.38	3	West Backa	89.58	12	Zlatiboro	54.89	21
North Backa	141.79	4	Srem	87.92	13	Piroto	45.20	22
Bor	137.60	5	Central Banat	82.07	14	Zajecaro	39.40	23
South Backa	113.65	6	Macva	79.20	15	Jablanica	33.39	24
Toplice	113.49	7	Raska	74.12	16	Pcinje	17.48	25
Rasina	108.56	8	City of Belgrade	68.50	17			
Podunavlje	96.59	9	Nisava	67.87	18			

Another super-efficient unit is North Backa district. The value of its *score* of 141.79% placed this district in the fourth rank. It is the benchmark against 7 units. The greatest importance is given to the first input (the number of firms - 99% significance), and the remaining 1% being the fourth input (loss). Number of firms in this district is very low, 42 companies. The loss is quite low, but as already pointed out, this input is not taken into account in particular. From the outputs, the only importance is given to the first output (revenue), which amounts to RSD 17.541.635, as compared with the remaining DMU is a very desirable value.

The next in the rank is the Bor district, whose *score* was 137.60%. This super-efficient unit of the fifth rank is exemplary unit to the two DMUs. The reason for this is the fifth input (number of employees - the importance of 100%) which is extremely low, in fact it is evident that they have only 122 employees. As the most important output of this unit - revenue is 1.294.817 dinars.

South Backa district is ranked sixth, with super-efficiency of 113.65%. As a exemplary unit to two other DMUs, this unit includes as significant inputs the number of firms (significance 40%) and loss (60% significance). Although the number of firms in the district is the second highest (146, and the most companies are in Belgrade - 180), and the loss shows not so low value, what this unit placed in such a good position is considerable profit amounting to 2.065.921 dinars.

Out of 8 super-efficient units Toplice district is ranked seventh, with the *score* of 113.49%. This unit is not relevant to the analysis because its improvement or deterioration would not affect any one unit, given that it is not the benchmark against any unit. However, the significant inputs considered such as long-term assets (significance 61%) and loss (39% significance), with long-term assets representing a very low value, as well as loss which is why the unit has good positioning. In regard to the outputs, greatest importance is given to the output

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profit, although with not so enviable value. Also, the first output (revenue) has a certain significance, although smaller than the other outputs.

The last on the list of super-efficient units is Rasina district, with a value of 108.56%, which immediately places this unit on the eighth rank. This unit, like the previous one, is not a exemplary unit. The greatest importance is given to the second input (long-term assets - 53% significance) and fifth input (number of employees - significance of 47%). In regard to the outputs, revenue has significance of 0.52, and the gain/profit 0.57.

The unit that was ranked the last is Pcinje district, with a value of 17.48%. An obvious reason for the inefficiency of this unit is that the greatest importance is attached to the working capital which is quite small input and in regard to outputs the revenue has low significance of significance 0.17. This unit looks up to Pomoravlje district, which, as already mentioned, is a super-efficient unit.

4. Conclusion

Balanced regional development should encourage better use of natural resources in all and especially in underdeveloped regions, and this primarily is related to the development of agriculture and tourism. The main task of policy and strategy for the rapid development of underdeveloped regions should be based on differential benefits of a specific territory.

In the process of raising and development of certain regions, SMEs have a significant role. Due to their exceptional flexibility they need to be the backbone of economic development and the future, especially in rural areas of Serbia.

The study shows that the level of development of small and medium enterprises is significantly different by districts. Out of the total 25 districts, eight have been observed as super-efficient in terms of operations of their SME agribusiness. The reason for this result is that applied DEA methodology aims to achieve with the smaller investment as high output as possible, and perform weighting or assigns significance to certain inputs and outputs in order for specific unit (district) to be ranked as high as possible. In addition, DEA provides information on how much improvement or worsening of super-efficient unit may affect certain DMUs that look up to (i.e. are benchmarked against) the aforementioned super-efficient unit (district). Analysis of the results presented in Table 2 clearly shows which districts – in regard to the level of development of small and medium enterprises, should look up to (i.e. be benchmarked against) that region, and what is necessary to increase or decrease in terms of input indicators in order for outputs to be as high as possible. So, the clear guidance of what direction we should work to improve performance and increase efficiency of SMEs in each district is given. It can serve

as an important instrument for the promotion and development of entrepreneurship observed in a given environment.

Therefore, the role of the government in the new regional policy amounts to the removal and mitigation of constraints that the affected areas are faced with, and their ability to have rapid growth. This applies particularly to help provided to those regions with special development problems, through investments and encouragement of the inflow of capital, so that these areas could compensate for their structural weaknesses. In order for the support of the state to be efficient, it is necessary to ensure its continuity and keep the intensity of support for a longer period.

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SMEs IN FUNCTION OF DEVELOPMENT OF ORGANIC AGRICULTURE IN SERBIA[1]

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Abstract

Agricultural production is very diverse and gives the great opportunities for various activities of small and medium enterprises. There is a great competition for placement of agricultural and food products, on both, domestic and international food markets. In a situation where there is a hyper production of agricultural products in the European market, the export of agricultural and food products is possible only if it offers organic products, for which there is a great demand. Organic production in Serbia is more popular and economically more important. Thanks to potentials that are reflected primarily in the fragmented property and land that is not contaminated with harmful substances, this type of agriculture can contribute significantly to development of rural areas and agriculture in general. Therefore, organic farming is set as one of the priorities for development of agriculture, and an integral part of the strategy for rural and agricultural development in the Republic of Serbia. Development level of organic production in Serbia is low, and the reasons are as follows: a low level of environmental awareness, lack of state support to the agricultural sector, the decline in living standards of the population, and therefore the reduced purchasing power. Organic products are becoming increasingly important goods in world terms, and there is a growing participation of these products in global trade flows. It is evident that the presence of organic food in the growing number of consumers around the world is not just a fashion fad, but the constant striving to eat better quality products, and

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thus contribute to the preservation of the environment and our health. These products represent a great opportunity for the promotion of small and medium enterprises in domestic and especially in foreign markets.

Keywords: Organic farming, SMEs, SWOT analysis.

JEL classification: C10, Q13.

1. Introduction

The previous practice of giving priority to the economic aspects of agricultural production compared to other aspects, has led to the fact that today most of the food products that are used in animal and human nutrition, contains materials harmful to health. Excessive, uncontrollable and often unprofessional use of fertilizers and pesticides in order to achieve higher yields and profits cause a decrease in quality and soil fertility, as well as the neglect of quality and food safety on human and animal health (Popovic and Paunovic, 2008). In many market-developed countries, where the negative effects of such a development of agricultural production are the most evident, the demand for organic agricultural products is constantly increasing. Turnover on this kind of products on the global level is about $ 40 billion, whereas the rate of demand and consumption is constantly increasing (eg. in the USA for the last 6 years, the rate is at about 15% per year) while common food products are not growing. Most countries of the European Union, in the field of agricultural policy aim to increase land area for organic agricultural production over the next 5-10 years.

Modern organic farming is being developed on ecological principles, which also means more efficient production while preserving ecosystems and agro ecosystems. It means production of high-quality, health-safe, controlled and certified food that meets the needs of modern consumers, contributing to the rational use of resources and environmental conservation. Today, organic agriculture is developing very fast worldwide, as a response to the environment, which is clearly disturbed, and especially as a response to consumer needs for quality and safe food. Serbia fulfills all conditions for organized development of organic, high quality, healthy and safe, certified food for consumers, and all the conditions to increase exports, to achieve ecological and economic profit, while preserving the environment. That is why organic farming is a controlled way of production from "farm to fork", as prevention of a possible disruption of ecosystems but also a human health (Lazic, Babovic, 2008).

There are many definitions of organic agriculture, and one of them is the FAO definition (http://www.fao.org/organicag/oa) which states that "Organic agriculture is an integrated system of high-quality food production based on best environmental practices, which is socially acceptable and economically profitable". Production conditions are based on the IFOAM regulations, (The International

Federation of Organic Agriculture Movements*)* but they must be legally regulated and adapted to the specific conditions of each country in which production takes place. In order to establish organic farming in an area, precisely defined conditions have to be fulfilled: the isolation of land parcels, livestock farms and processing capacities from possible sources of pollution, the appropriate water quality for irrigation, the coordinated development of crop and livestock production, and the ability of experts and manufacturers of organic agriculture with the obligation of continuous knowledge innovation (www.ef.uns.ac.rs). Organic food is free of any artificial substances, including pesticides, and furthermore, has more nutritional value than food from conventional production.

Organic agriculture should be based on the principles of organic production, but also on the goals to sufficiently reduce the human impact on the environment. At the same time, it should be ensured that agricultural production is functioning properly.

What are the goals of organic farming?

− Organic agriculture should sustain and enhance the health of soil, plant, animal and human as one and indivisible, to maintain a balance among them, to establish a healthy and stable system;

− It should contribute to a high level of biological diversity;

− It should provide a high awareness of energy use and natural resources, such as water, soil, organic matter and air;

− It should produce high quality products;

− It should satisfy the needs of consumers for products that are produced by processes that do not harm the environment, human health, plant health or animal health.

From these objectives, it can clearly be concluded that organic agriculture is a kind of life philosophy.

What are the main characteristics of organic farming?

− Compliance with the requirements of crop rotation as a prerequisite for the best use of natural conditions;

− Controlled and restricted use of pesticides and mineral fertilizers;

− A complete ban on the use of genetically modified organisms;

− The use of manure as fertilizer;

− Selection of plant species those are resistant to diseases and adapted to local conditions.

However, organic farming is not only the production without mineral fertilizers and pesticides! It actually takes a comprehensive approach in an attempt to establish a production system that includes plants, animals, microorganisms, insects, natural resources, land. This is so called a holistic approach (www.polj.savetodavstvo.vojvodina.gov.rs).

Moreover, this type of farming involves a series of measures and process control, storage, packaging, transport, processing, certification and labeling of the products, where small and medium-sized enterprises, because of their flexibility and rapid adjustment to the market conditions, have a great opportunity for their affirmation.

Due to high demand and inability to produce because of the high soil and air pollution, but also because of broken relationships in nature, there is a lack of organic products on the market of developed countries. Therefore, the less developed countries where the agro-ecosystem is still intact (due to poverty, expensive agrochemicals are not being used), have a chance to increase their export through organic products.

Organic production is fully controlled production. Legislation is a basis for sustainable development of organic production. Application of standards in organic production guarantees a fair competition, and it aims to protect the consumer interests. Compliance with standards and legally prescribed conditions of: production, processing, storage, transport, labeling of organic products etc. is under the supervision of the state authorities.

Control system on organic products in Serbia was established in accordance with EU regulations - Council Regulation (EC) no. 834/2007 and Commission Regulation (EC) no. 889/2008.

Organic production in Republic of Serbia is regulated by:

− Law on Organic Production ("Official Gazette of the Republic of Serbia", No 30/10, 7.5.2010.), which came into force on 1 January 2011.

− Rulebook on control and certification of organic production and methods of organic production (published in the Official Gazette of the Republic of Serbia no. 48/11)

− Regulations Amendments on control and certification of organic production and methods of organic production (published in the Official Gazette of the Republic of Serbia no. 40/12)

This law, as well as the by-laws, regulates all issues related to methods of organic production, control and certification, processing, storage, transport, marketing and labeling of organic products.

2. Organic farming in the world and in Serbia

Organic agriculture is now practiced in more than 120 countries around the world, nearly 31 million hectares of agricultural land are managed organically (representing about 1% of agricultural land on the planet), by at least 634 000 farms. Currently, the countries with the greatest organic areas are Australia (12.1 million hectares), followed by Europe (7.8 million hectares), South America (with 6.4 million hectares), while much smaller areas in Asia (2.9 million hectares), North America (2.2 million hectares) and Africa, with only 0.9 million hectares.

In recent years, organic farming in Europe has achieved significant growth of 5 - 10% per year (http://siepa.gov.rs), as confirmed by Eurostat data on the participation of organic products in total food trade in the amount of 1.5 - 2.7%, primarily thanks to a stable market for their products, and growing consumption of organic products in the last 20 years. In the last ten years, the share of area under organic farming (Table 1) in the European Union is constantly growing. The highest share is registered in Austria (18.9%), while Malta is a country where only 0.2% of the agricultural area is under organic agriculture. According to available Eurostat data (Table 2), largest areas used for organic farming in year 2011 were recorded in Spain (1 221 890 ha) and Italy (837 107 ha), while Malta had only 16 hectares of organic land in 2010.

Table 1: Land under organic farming in percent in the EU countries

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU (27 countries)	:	:	:	3.6	3.7	4	4.4	4.7	5.1	:
Belgium	2.1	1.7	1.7	1.7	2.1	2.4	2.6	3	3.6	:
Bulgaria	:	:	:	0.2	0.1	0.3	0.3	0.2	0.5	0.5
Czech Republic	:	7	7.2	7.1	7.2	8.2	9	10.6	12.4	13.1
Denmark	6.5	6.3	5.8	4.9	5.1	5	5.6	5.9	6.1	6.1
Germany	4.1	4.3	4.5	4.7	4.9	5.1	5.4	5.6	5.9	6.1
Estonia	:	:	7.2	7.2	9.6	8.7	9.6	11	12.8	14.1
Ireland	0.7	0.7	0.7	0.8	0.9	1	1	1.1	1.1	:
Greece	2	6.4	6.5	7.6	7.6	7	7.8	8.5	8.4	:
Spain	2.6	2.9	2.9	3.1	3.7	4	5.3	6.6	6.7	7.5
France	1.7	1.9	1.8	1.9	1.7	1.9	2	1.9	2.9	:
Italy	7.6	7	6.4	7.3	7.9	7.9	7.5	8.1	8.6	8.5
Cyprus	:	:	0.6	1	1.2	1.5	1.6	2.6	2.8	:
Latvia	:	:	1.6	6.8	9.4	8.1	8.9	8.7	9.2	10.1
Lithuania	:	:	1.4	2.3	3.5	4.5	4.6	4.8	5.2	5.4
Luxembourg	2.2	2.3	2.5	2.4	2.4	2.6	2.7	2.7	2.8	:
Hungary	1.6	2	2.3	2.2	2.1	1.8	2.1	2.4	2.4	2.3
Malta	:	:	0	0.1	0.2	0.3	0.4	0.5	0.2	0.2
Netherlands	2.2	2.2	2.5	2.5	2.5	2.5	2.6	2.6	2.5	2.5
Austria	14.5	15.5	16	16.7	16.7	17.1	17.5	18.5	17.2	18.9
Poland	:	0.2	0.5	1	1	1.8	2	2.3	3.3	4.1
Portugal	2.1	3.2	5.6	6.2	7.2	6.3	5.7	4.3	5.8	:
Romania	:	:	:	0.7	0.8	1	1	1.2	1.3	1.6
Slovenia	:	:	4.6	4.6	5.5	5.9	6.1	6.3	6.4	7
Slovakia	:	2.2	2.6	4.6	6.2	6.1	7.3	7.5	9.1	8.6
Finland	7.6	7.1	7.2	6.5	6.3	6.6	6.5	7.2	7.4	8.2
Sweden	6.8	7.2	7	7	7.2	9.9	10.9	12.8	14.3	15.7
United Kingdom	4.2	3.9	3.9	3.5	3.4	3.7	4.1	4.2	4.1	3.7

Source: Eurostat   : - Not available

Table 2: Areas under organic farming in the EU countries (ha)

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU (27)	:	:	:	:	:	3997440 (s)	4487798(s)	3761884(s)	:	:
Belgium	24820	16176	19853	19764	21754	23842	27376	29778	30410	:
Bulgaria	:	:	:	:	2728	8387	4236	4955	12691	8902
Czech Republic	:	195216	208000	226209	216319	224373	232939	267483	296379	354649
Denmark	148279 (p)	149106 (p)	149219	132283	133048	:	139021	139539	145638	151362
Germany	:	:	:	:	:	:	:	:	:	:
Estonia	:	:	:	36487	44878	55445	71848	76200	82391	101906
Ireland	:	:	24568	23533	:	:	:	37662	:	:
Greece	65555	192190	202799	206205	182848	174724	266745	293644	292584	:
Spain	314640	374001	430900	470832	605296	640536	691196 (p)	605366	1084589	1221890
France	342406	406338	468476	:	499589	497314	502234	525638	571815	:
Italy	746511	751860	708043	731537	801350	903254	812139	735327	821921 (p)	837107
Cyprus	:	:	111	230	665	1398	:	1890 (s)	:	:
Latvia	:	:	12142	20691	51213	62321	141524	141070	140946	130059
Lithuania	:	:	18395	13905	30498	56542	89890	106060	103225	99410
Luxembourg	1019	2130	2741	:	:	2721	:	3245	:	:
Hungary	54264	70514	75834	84765	92167	98243	108578	110916	97584	101801
Malta	:	:	0	0	0	:	:	16 (s)	16	:
Netherlands	38340	40681	46137	46877	47045	45463	46895	47450	43659	:
Austria	:	:	:	:	:	:	:	:	:	:
Poland	:	:	37724	38609(s)	47570(s)	135815(s)	178670	222022	309219	375086
Portugal	35364	54480	75143	110370	:	:	:	:	:	:
Romania	:	:	:	:	65111	84590	71597	83862	82981	96606
Slovenia	:	:	14354	15985	20151	23560	26125	25816	25056	27448
Slovakia	:	35302(s)	25590(s)	27247(s)	40085(s)	80268 (s)	113132(s)	111466	112314(p)	123272
Finland	135434	142054	148183	135223	130940	133543	134820	143033	142012	161162
Sweden	186695	207328	206631	200638	201298	234429	246628	303298	329319	385243
United Kingd.	536866	629482	635495	527836	489108	510673	582205	607940	651930	605582

Source: Eurostat   Not available; s - estimate of Eurostat; p - temporary

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In the European Union the overall development of organic market is estimated at about 10% per year, and 50 million people (or 10%) said that they want to consume food that is organic and contains no GMO ingredients. Germans, Italians and French are the biggest consumers of organic food, while in Switzerland consumption per capita and the market share of organic products compared to overall market is the largest. Thanks to the government's stimulus measures, which allocate 30% of its budget for development of organic agriculture, Hungary exports about 80% of its products from organic agriculture, making it the most successful country in terms of exports to Europe.

The area of the Republic of Serbia is characterized by favorable conditions for development of organic agriculture. Traditional relationship of population and agriculture, small farm size, favorable agro-ecological conditions, the ban on growing genetically modified organisms, established institutions in the field of organic farming as well as access to large markets (Germany and Russia) are very good preconditions for development of organic agriculture in Serbia.

The offer of organic agricultural products in Serbia is characterized by a relatively small total area in relation to total agricultural land, as well as a small number of agricultural crops, ie. crops that are produced. The current state of organic agriculture in Serbia is characterized by the production on approximately 11 000 ha, of which 65.07% of the land in the organic status, and 34.93% in conversion. In addition, there are 250 000 ha of certified production area for collecting herbs, berry fruit and mushrooms. In Serbia, there are 4000 registered producers dealing with organic agriculture.

In organic plant production, fruit production is the most common, followed by crop and vegetable production, while meadows and pastures are the least represented (Figure 1).
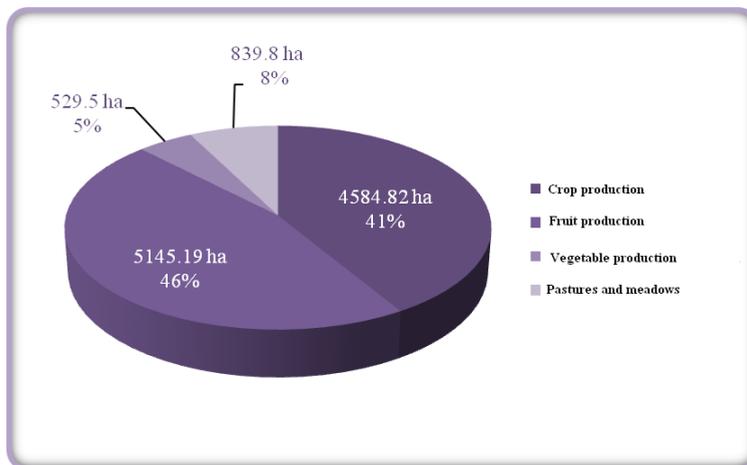
Source: Organic Agriculture in Serbia 2013
Figure 1 Land area under organic plant production in Serbia in 2012

Regarding the structure of the organic plant production, perennial plant species of plum, apple and raspberry are dominant (Figure 2).
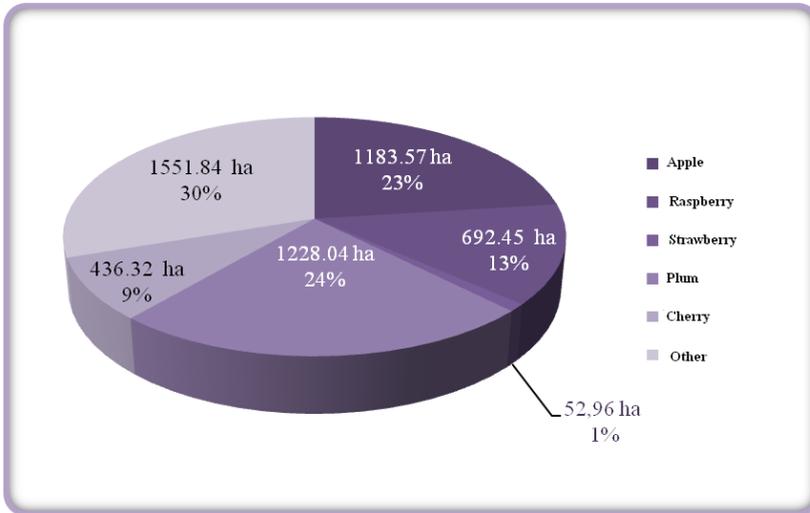
Figure 2 Land area under organic fruit production in Serbia in 2012

The most represented annual plant species are corn, wheat, soybeans, and various vegetables (Figure 3).
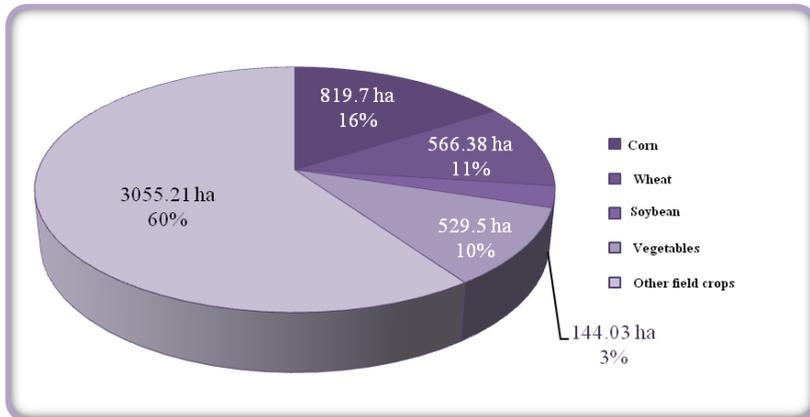
Figure 3 Land area under organic crop production in Serbia in 2012

Organic farming is at the very beginning, because it was faced with a lack of certified feed, with the specific growing conditions and the low profitability of

production. A large number of animals, both large and small livestock, which are in conversion period, represent a step forward in this sector of organic production (Figure 4).
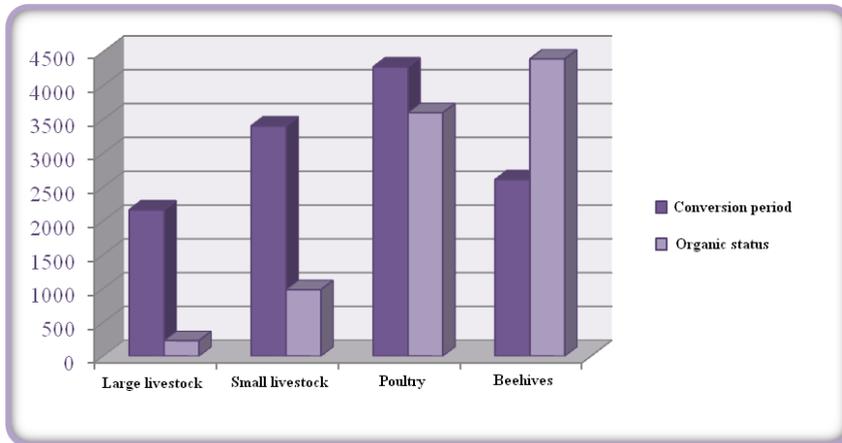
Source: Organic Agriculture in Serbia 2013
Figure 4 Organic livestock production in Serbia in 2012

For the time being, it is possible to find only a small amount of eggs and honey on the market of certified animal products. However, with the inclusion of large companies in the sector of animal production in early 2013, a certified cow's milk and cow's milk products have appeared on the market.

In order to determine the ability to achieve strategic goals important for development of organic agriculture in Serbia, strengths, weaknesses, opportunities and threats were analyzed using a SWOT analysis. It should be pointed out that this analysis is the most commonly used technique in strategic planning and strategic management nowadays. A SWOT analysis encompasses and integrates segments necessary in any strategic research such as: environmental analysis and strategic opportunity or opportunities and threats for the organization, then the organization's competitive position and organizational skills analysis, strategic strengths and weaknesses of the organization, ie. its competitive ability. The possibility of using a SWOT analysis is at the level of the organization, department or product. However, it is possible to use the analysis at the level of geographic areas, where special interest is to estimate the opportunities and threats (Ceranić, 2007). A SWOT analysis of organic production that is presented in this paper is an attempt to identify the critical resources and needs, as well as options, opportunities and advantages on the one hand, and the possible challenges and temptations on the other, in the future development of organic agriculture in Serbia.

Small and medium enterprises are the backbone of economic development in Europe, but also in the Balkans. In Serbia, 99.8% of all enterprises are SMEs, and thereby include two-thirds of employees, 68% of turnover, 58% of gross value added, 50% of export and 51% of investments. These data clearly indicate the importance and the role of SMEs in Serbian economy. Small businesses with a variety of business programs, in rural areas would enable the use of cheaper resources, youth employment, as well as keeping young people in rural areas, which contributes to improved life quality and development of the entire rural area. The advantage of these family and small business is the use of existing natural and human resources. Initiatives to support rehabilitation of rural economy, creating jobs and improving the quality of life, certainly must have a social support (Maletic et al., 2011.).

In countries with a market economy and countries in transition such as Serbia, SMEs are the engine of development, resulting in:

− Increasing the number of business entities

− Reducing the unemployment (job creation)

− Balanced regional development

− The growth of GDP

− Higher export competitiveness of the national economy.

− Since the presence of SMEs in the field of organic farming in Serbia is relatively low, and export potential of organic food is practically unlimited, organic farming represents a great opportunity for development of SMEs in the agricultural sector.

Compared with developed countries, agricultural production in the Republic of Serbia is realized with relatively low inputs, and therefore the soil pollution, water pollution and air pollution is lower. This is particularly characteristic of hilly and mountainous areas, which are economically underdeveloped and where agriculture is the only activity. Prospects of organic agriculture development in such areas are exceptional because of the very favorable natural conditions and a clean environment on the one hand, and the involvement of a large number of unemployed on the other, since this is a labor-intensive production. In addition to the benefits and opportunities for SMEs in the field of organic production there are also problems that slow down development of this agribusiness sector, such as: low consumer awareness, underdeveloped domestic market and a low living standard, high rates of control and certification, high production costs and high accreditation costs.

Strengths

* Large areas of farmland are not polluted or intensively cultivated, which facilitates and accelerates the conversion period.

* Working age population, which is currently unemployed (high unemployment).

* A positive attitude about organic farming.

* High consumer awareness for high quality food.

* The interest of foreign investors.

* Improvement of the legal framework.

* Systemic Education and Training.

* Trained assessors in the field of organic agriculture.

Weaknesses

* Underdeveloped market of organic products.

* Low purchasing power of consumers in domestic market.

* Participation in international market is very low.

* Insufficient education of farmers regarding organic production.

* Minimum subsidies from the government.

* Small producers are the majority, but the cooperation between them is very weak.

* The low level of processing of organic products.

* Marketing of organic products is insufficient.

* Interest at the institutional level is also insufficient.

SWOT ANALYSIS

Opportunities

* Export of organically produced fruits with special focus on berries.

* Placement of organically produced meat and milk to the market of European Union.

* The high prevalence of organic vegetable production on the international market.

* Placement of organic soy products and other field crops to foreign markets.

* Exports of organic components for the food industry.

* Development of this agricultural sector would increase manpower needs, which would reduce the unemployment rate in Serbia.

* The foreign trade deficit would be reduced

* Agriculture sector would have a significant contribution to the growth of GDP.

Threats

* Relevant institutions will not recognize the potential of organic farming during the reconstruction of the agrarian sector in the EU accession process.

* Lack of both, domestic and foreign investments.

* Domestic producers will not be competitive in the international market.

* Cooperation and association of small producers is not developed enough.

* The lack of coordination in the system, from production all the way to product sales.

Organic farming - a chance for SMEs development

Our country, with its agricultural and food products, is a market-oriented mainly to European countries. A large number of countries subsidize these forms of production, and thereby stimulate agricultural producers to accept it. According to the Regulation of the Council of Europe, the European Union subsidizes the transition from conventional to organic production in the amount of EUR 600 per hectare for annual crops, to 900 euros per hectare for perennial agricultural crops over the next five years, as it takes to clear a land of harmful substances.

In Serbia, decree on the use of incentives funds for support to development of organic production in 2011, was adopted. The applicants with a plant production that is in the conversion period, are eligible for incentives for support to development of organic production of approximately 36 000 dinars per hectare for crop production (cereals, industrial crops, medicinal and aromatic plants). Subsidies for organic vegetable production amounted to 50 400 dinars per hectare, and for fruit and viticulture production to 64 800 dinars per hectare. Subsidies for organic vegetable production are 50 400 dinars per hectare, and for fruit and viticulture production are up to 64 800 dinars per hectare. The total amount of incentives per applicant cannot be more than 1.2 million dinars. The applicants who are certified for organic plant products, or those with plant production where the conversion period has been completed and are in the process of certification, are eligible for incentives for support to development of organic farming in the amount of 30 000 dinars per hectare for crop production (cereals, industrial crops, medicinal and aromatic plants). These applicants can receive 42 000 dinars per hectare for vegetable production and 54 000 dinars per hectare for fruit and viticulture production, and the total amount of incentives cannot be greater than a million dinars. The applicants with livestock production which is in conversion, are eligible for incentives for support to development of organic farming in the amount of 21 600 dinars per head of cattle (for a minimum of four animals), 7 200 dinars per head of sheep (for at least 10 animals), 720 dinars per head of poultry (at least 100 individuals) and 2 800 dinars per hive (for at least 30 hives). The total amount of incentives per applicant cannot be more than 1.2 million dinars. The applicants who are certified for organic livestock products, or those with livestock production where the conversion period has been completed and are in the process of certification, are eligible for incentives for support to development of organic farming in the amount of 18 000 dinars per head of cattle (for at least four heads). Subsidies are 6,000 dinars per head of small livestock (for a minimum of 10 animals), 600 dinars per head of poultry (at least 100 individuals) and 2 400 dinars per hive (for at least 30 hives). The total amount of incentives per applicant cannot be more than a million dinars.

The incentives should lead to an increase in the volume of organic production in Serbia. If the production of organic products would increase from the current 0.3% of land area to 3%, then it could be exported all that is produced. The entire

production could be exported to the European market, as well as to other markets such as Japan and China, which have become major consumers of organic food in order to improve the living standards of the population.

Ceranić and Paunović (2010) describe the advantages of the SMEs involved in organic production, ie.:

− The state support in the form of grants for the establishment of SMEs,

− New job positions in order to create a competitive SMEs sector,

− Simplified procedures for taxation, financing and lending for SMEs

− SMEs have an outstanding competitive advantages in export markets,

− In Serbia, there is a good business, legal and institutional environment for SMEs.

Education is an essential factor for further development in this area - the SME sector would be introduced to the basic postulates of modern food processing that enables higher quality of products, export, and thus the competitiveness of products on foreign markets. Individual farmers, the management and employees of small and medium enterprises should be trained, through different projects, in food production under the guidance of ISO standards and HACCP system, which will facilitate the next step - obtaining the HACCP certification and certification in the field of organic farming.

Despite the high prices, the demand for organic products in the world is great, and the area under organic agriculture in Serbia is measured per thousand (‰).

That's why healthy food production is our great, but untapped potential, and important role in achieving a higher level of development in this sector should be given to SMEs.

3. Conclusion

The consumption of organic food in developed countries is growing, while supply cannot meet the growing demand. Accordingly, there is a possibility for under-developed countries, where there are optimal environmental conditions in rural areas, to increase the production of organic food, and then to focus on the international market, where it will achieve much greater profits compared to export of conventionally produced food.

It is wrong to expect that organic farming will suppress the conventional form of agriculture, and that there is competition between them. It should be noted that organic agriculture in most countries occupies less than 10% of the area.

According to the National Strategy for Development of Organic Agriculture in Serbia by 2017, it is expected to be a land area of approximately 50 000 ha, which greatly opens up the perspective of small and medium enterprises for the production and processing of organic products.

Development of mini, small and medium enterprises in agribusiness should be the main factor of production restructuring and intensification of agricultural and rural development for a country like Serbia, which should come out of serious economic and social crisis. The establishment and development of such enterprises should be based on the raw materials, on the comparative advantages, on the market opportunities and the possibilities of food industry, with an orientation on production programs that will be economically efficient and profitable; which will enable import substitution and increase in export of high value products at higher processing stages, as well as organic and healthy food for which there is demand in the national and international market (Ilić et al, 2006).

Considering the available natural resources, knowledge and global demand of organic products, organic production should be organized and promote in Serbia. Using the strategy and all the necessary measures for the promotion and encouragement of organic farming, government institutions should contribute to large-scale development of this agribusiness sector.

Significant involvement of SMEs would lead to lower unemployment, better use of natural resources, quantitative and qualitative increase in assortment of organic products, GDP growth and an increase in export of organic products.

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DYNAMICS OF LABOUR COSTS OF SERBIAN DAIRY PROCESSING INDUSTRY[1]

Saša Muminović[2], Vladan Pavlović[3], Ljubiša Milačić[4]

Summary

Previous research has shown that the dairy industry in Serbia is more profitable than the market average measured by indices of the Belgrade Stock Exchange BELEX15 and BELEXLINE. The labour costs are, after raw milk costs, the second most important group of costs in dairy processing industry. The aim of this paper is to identify changes and adaptations of modern industry market conditions through analysis of labour cost of dairy processing industry in Serbia, by analysis of the trends in the number of employees, average labour cost, and productivity and cost efficiency and through the prism of these changes. In this paper, on qualified sample is proved that there is a strong positive correlation between firm size and productivity and a weaker one between firm size and labour costs. On the other hand, contrary to previous research, relation between the size of companies in the sample and the economic efficiency of labour costs was not confirmed.

Key words*: dairy processing industry, labour cost, productivity, cost efficiency*

JEL classification: *G31, G32, Q14*

1. Introduction

Looking at the production capacity data, published in National Agricultural Programme (*Nacionalni program za poljoprivredu*), there are 201 companies in dairy processing industry in Serbia. From total of 201, 29 companies have average daily capacity more than 20.000 litres. 97 companies have daily capacity in range between 20,000 and 3,000 litres and 75 small dairy processing companies have average daily capacity less than 3.000 litres. Of the total raw milk production, up to

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60% (Vlada Republike Srbije, 2010) ends in buy-out on formal market, while the rest of the milk production *is used by farmers and their families and some of it is sold direct to the customers* (Popović, 2009).

According to the *AgriPolicy Report* data (Van Berkun, 2009) the biggest five dairy processing companies in Serbia buy-out 67% of raw milk of the total buy-out (on formal market), therefore the market is characterised as concentrated. That was also confirmed by value of Herfindahl-Hirshman index, which is more than 2.200 (Petković, 2008).

Previous research Muminović, et.al, 2012 and Muminović and Pavlović 2012 have shown that the dairy processing industry in Serbia is more profitable than the market average, measured by indices of the Belgrade Stock Exchange BELEX15 and BELEXLINE.

Another previous research, Aljinović Barać and Muminović 2013, has shown that capital investments per employee significantly increase productivity measured by EBITDA and personnel costs. Also, statistically significant association of capital investments and foreign ownership was identified. The research proved that capital investments per employee do not significantly affect the profitability of dairy processing companies in Serbia, Croatia and Slovenia, unless they are accompanied by changes in owners' structure and know-how that foreign owners bring. This applied to every country investigated.
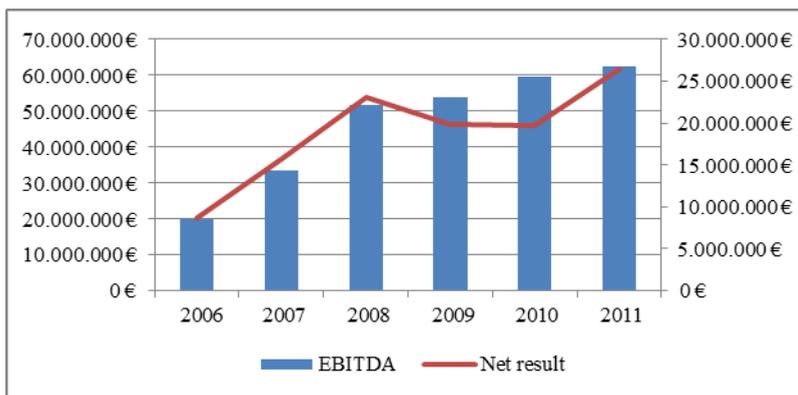
Source: authors' calculations

Figure 1 EBITDA and net result of Serbian dairy processing industry 2006-2011

On Figure 1, could be seen that EBITDA (Earnings before Interest, Taxes, Depreciation, and Amortization) has constantly increased in observed period, while net result stagnated only in the years of crises: 2009 and 2010.

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The basic raw material in dairy processing industry is the raw milk, and raw milk prices have significant impact on total production cost. However, raw milk prices are subject of (some) regulation and dairy processing companies and there is left little room for some manoeuvres.

On the other hand, labour cost is second the most important cost in dairy processing industry. Their share in total costs in Serbian dairy processing industry in 2009 was in range from 10.7 to 19.5% (Popović and Knežević, 2010), while in Germany that share was from 4 to 10% (Thiele H. 2008). Through various activities labour cost could be managed: through salaries, number of employees or labour productivity.

The aim of this paper was to identify changes and adaptations to modern industry market conditions through analysis of labour cost dynamics of dairy processing industry in Serbia, by analysis of the trends in the number of employees, average labour cost, productivity and cost efficiency through the prism of these changes.

2. Research design

This research is conducted on the sample of financial data of 39 dairy processing companies in period 2006-2011, published on the web pages of Serbian Business Registers Agency (available on: www.apr.gov.rs). The sample is divided in three groups according to the total asset value in 2010: more than 1 billion RSD (5 big companies), total asset value in range from 100 million RSD to 1 billion RSD (19 medium size companies) and less than 100 million RSD (15 small size companies). The sample is representative because total asset of selected companies in years 2010 and 2011 represents 87.81% and 88.65% of total asset of all companies under: C10.5 – *Manufacture of dairy products* of National Classification of Economic Activities. Companies that are in the bankruptcy or liquidation process were excluded from the sample.

According to the methodology found in literature (Popović and Knežević, 2010, pp.11), for labour cost efficiency, the share of labour cost in total operating income was chosen as indicator. While productivity of labour cost was measured by EBITDA divided by average number of employees, which is also widely accepted and used proxy variables for company's productivity (Engelhardt, 2006) (Kale, et.al, 2007).

For this research the following statistical hypotheses have been developed:

H1: … *The tendency of changes in the number of employees in the dairy processing industry in Serbia is in line with the tendencies of dairy industry in South-Eastern Europe.*

H2: …*There has been significant increase in productivity and economic efficiency of the labour force costs in dairy processing industry in Serbia*

3. Research results and discussion

3.1. Dynamics of number of employees and average labour cost

The privatisation process of big dairy processing companies in Serbia was finished before the period under observation: 2006-2011. Except one big dairy processing company all big dairy processing companies are in foreign ownership. In the years following the privatisation, some structural changes took place, which could be observed *through changes in competition position and production structure of dairy processing companies* (Popović, 2009, pp.11). The consequence of changes in ownership structure was reorganisation of production which has its effect on decrease of number of employees. That decrease of number of employees was also characteristic for some other East-European transitional countries, i.e. Hungary (Gorton and Guba, 2002) and Slovakia (Mura, et.al, 2012).

The companies in observed sample employ more than 4.000 employees – Figure 2. The highest number was in year 2009 - 4.568 and lowest number was in year 2006 - 4.095 employees. More than 50% of the total number of employees was in big dairy processing companies, where in the observed period the number of employees decreased for 15.47%. Medium size companies increased the total number of employees for 32.22% (mostly as a consequence of entrance of the new companies in the industry). The biggest increase of number of employees was in small companies i.e. 104% (the consequence of entrance of the new companies in the industry and the internal (organic) growth).
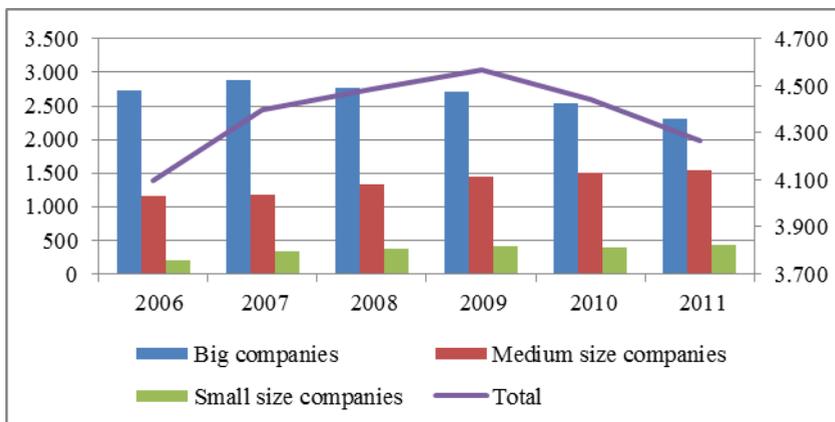
Source: authors' calculations

Figure 2 Dynamics of number of employees

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Looking at the average labour cost in local currency (per month per employee) in the Table 1, it could be concluded that they have increased. Meanwhile, looking at data in EUR currency we could see that the increase of labour cost was in medium and small size companies, while the labour cost in big dairy processing companies follows local currency (RSD) depreciation.

Table 1: Average labour cost

RSD	2006	2007	2008	2009	2010	2011	Index 2006/2011
Big DPC*	83,423	83,466	97,361	97,655	103,933	108,677	30.27%
Medium DPC	31,719	34,486	39,881	40,189	42,188	47,290	49.09%
Small DPC	19,528	32,294	27,993	31,422	33,325	35,660	82.61%
Average	**65,474**	**66,523**	**74,477**	**73,525**	**76,778**	**79,261**	**21.06%**
€							
Big DPC	1,059 €	1,044 €	1,195 €	1,039 €	1,009 €	1,066 €	0.68%
Medium DPC	403 €	431 €	490 €	428 €	409 €	464 €	15.22%
Small DPC	248 €	404 €	344 €	334 €	323 €	350 €	41.13%
Average	**831 €**	**832 €**	**915 €**	**783 €**	**745 €**	**777 €**	**-6.44%**

*DPC - dairy processing companies
Source: authors' calculations

Regression analysis, in table 2, has confirmed medium positive correlation between company size, measured by total assets, and labour cost per employee. It was expected because big companies have more complex organisational structure which includes employees in R&D, marketing and other positions which employ highly educated and consequently better paid labour force.

3.2. Dynamics of productivity

Productivity on industry level, measured by EBITDA / average number of employees, except in 2009, has stable growth – Figure 3 in 2011, compared to the initial year 2006. The increase was 200%. However, if the size of the company is taken into account, this is very much different. The highest increase in productivity was in big companies (307%), far smaller in medium size companies (34.2%), while small dairy processing companies have decreased in productivity (-43%).

The small companies have increased the number of employees more intensively than they have increased their EBITDA.

Although the sample is not the same, the result are similar to data of capacity usage presented in document of Serbian Commission for Protection of Competition (*Komisija za zaštitu konkurencije RS, 2012*). Big companies use 90% of their production capacity, middle size 6% and small only 4%. The lack of capacity usage could be the reason for the differences in productivity on observed sample.
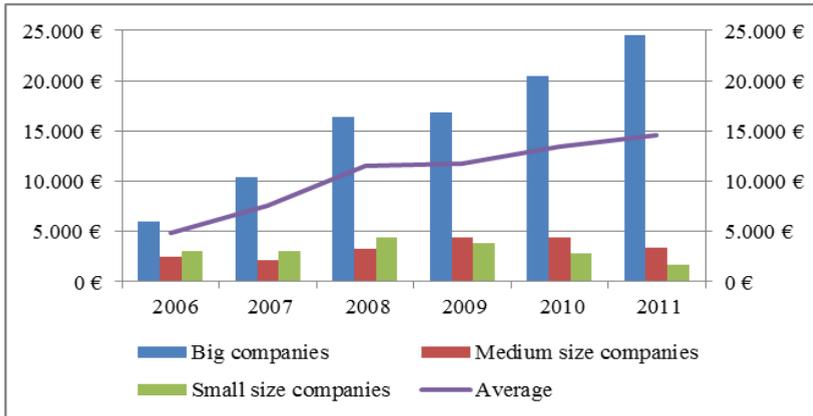
Source: authors' calculations

Figure 3 Dynamics of labour productivity

Regression analysis, Table 2, has confirmed positive correlation between company size, measured by total asset, and EBITDA per employees. This is an expected finding, taking into consideration data of capacity usage and company size.

Table 2: Dependency of EBITDA per employee, labour cost and efficiency of the labour cost and the company size

Company size and	EBITDA / employee	Labour cost	Labour cost efficiency
Multiple R	92.06%	63.31%	2.87%
R Square	84.76%	40.09%	0.08%
Adjusted R Square	84.68%	39.81%	-0.39%
Standard Error	1754.713	218.7046	4.562671
Observations*	215	215	215
Significance F	0.0000	0.0000	0.6755
t Stat	34.4136	11.9379	-0.4192
P-value	0.0000	0.0000	0.6755

* Companies for which all data was not available were excluded from the calculations.
Source: authors' calculations

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3.3. Cost efficiency of labour cost

Cost efficiency means the share of some costs (or some inputs) or total costs in operating income (Popović and Knežević, 2010). Its decrease, in absolute number, means increase in cost efficiency in observed company.

Figure 4 presents the increase in efficiency of labour cost in Serbian dairy processing industry in period 2006-2011. Increase ranged from 13.8% to 8.12% for the whole industry. Also in this case, the big companies have the highest positive change from 14.7% to 8.22%. The labour cost efficiency in medium sized companies increased from 10.47% to 7.78%, while in small companies decreased from 7.74% in 2006 to 8.26% in 2011.
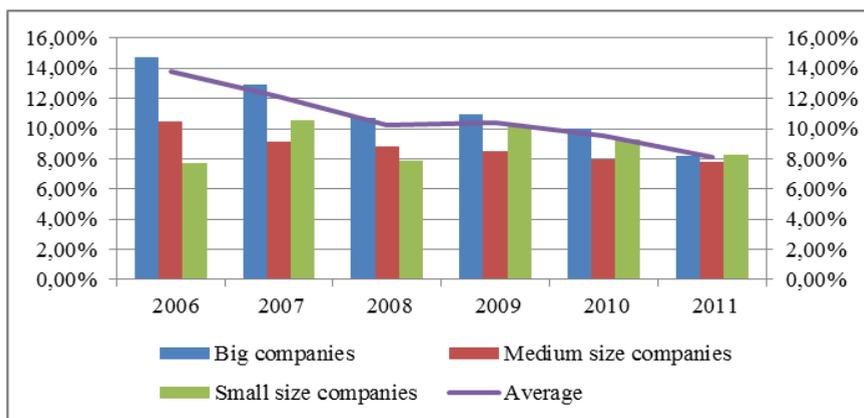
Source: authors' calculations

Figure 4 The labour cost share in operating income

It could be seen that in 2011 cost efficiency of labour cost for large, medium and small companies was very close to the industry average.

Regression analysis, Table 2, has shown very low correlation between company size, measured by total assets, and labour cost efficiency, measured by labour cost share in operating income. That means that also smaller companies achieve good efficiency of labour cost, and that in this cost segment they are not left behind the large companies.

This finding is contrary to the previous research (Popović and Knežević, 2010, p.11) where was concluded that *with increase of capacity exists the decrease of coefficient of labour cost efficiency, or that small companies have weaker labour cost control and consequently lower labour cost efficiency.* The differences in results could be justified with smaller sample (5) and shorter period of time in previous research.
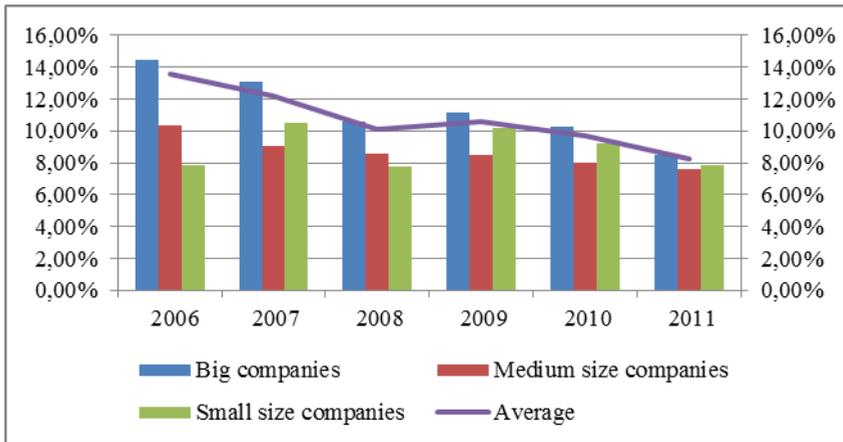
Figure 5 Share of labour costs in the total cost

It is similar if we look at the share of labour cost in total cost – Figure 5. In 2011 that share decreased for large and medium size companies, while for small companies coefficient returned to the 2006 level. As was already mentioned, according to the research in 2010, the share of labour cost in total cost in Serbian dairy processing industry share in 2009 was in range from 10.7 to 19.5% (Popović and Knežević, 2010). And again, the differences in results could be justified with smaller sample and shorter period of time in previous research.

4. Conclusion

The starting hypothesis regarding the tendency of changes in number of employees was proven partly because it was proven only for big companies. Only in big dairy processing companies' number of employees decreased. This is in accordance with world trend. In medium and small companies number of employees increased. This could be explained by profitability and attractiveness of that industry and new companies which entered the market.

The second hypothesis about the increase of productivity and economic efficiency of labour cost of dairy processing industry in Serbia is confirmed. However, only for the industry as a whole. There was an increase in productivity and economic efficiency and labour costs. However, if we look at companies the size of the hypothesis is only partially confirmed in a sample of large and medium-sized enterprises.

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However, if we consider the market share, the market concentration of dominant and position of big companies especially the market leader, we can conclude that both the hypothesis were proved.

The average labour cost tends to grow slowly if observed in the local currency. However, observed in euros only large dairies have kept the costs at the level of 2006. In the others, there was an increase as expected when taking into account large differences in labour cost.

A possible direction for further research is the analysis of the dynamics imposed by labour costs in the region of South-eastern Europe or the wider area covered by the Eastern European transition countries and the comparison with the trends of large multinational corporations engaged in the processing of milk.

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THE IMPACT OF SOWING STRUCTURE ON EMPLOYMENT OF LABOUR FORCE ON FAMILY FARMS DIRECTED AT FATTENING OF BEEF CATTLE[1]

Saša Todorović[2]

Summary

This paper is aimed at examining the impact of change of sowing structure on the employment of labour force and on the economic effects of business operations of farms directed at final production of fattened beef cattle in the conditions of unchanged estate size. Thereby, appropriate models of family farms directed at fattening of beef cattle are formed and they serve for considering organisational and economic effects of changes in sowing structure. Applying partial budget analysis, it was examined whether the decision on changing the sowing structure was economically justified and under what conditions by using an additional procedure of analysis. Applying this approach, it was determined to what extent that decision contributed to economic effects of the family farm business.

A detailed analysis of natural, organisational and economic conditions in which these farms operate was previously carried out so as to successfully accomplish the given aim, and then the analysis of all available resources was conducted as well as the analysis of production results. The data for this survey were collected during the year of 2012 by interviewing holders of the chosen family farms directed at the final production of fattened beef cattle. For the purpose of considering the effects of change in sowing structure, the results of previous research related to employment of labour force in crop and livestock production were used.

In this regard, the results of the conducted research show that more rational way of organization (change in sowing structure) provides an opportunity for family farms directed at the final production of fattened beef cattle to use available resources (especially labour force) in a better way, and thus to improve economic effects of the family farm business.

Key words: *sowing structure, labour force, fattening beef cattle, family farms.*

JEL classification: *Q12, J21, J22*

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1. Introduction

Livestock production takes place during the whole year and therefore the level of employment of labour force at livestock farms is almost balanced per month. However, this statement is valid only in the case of farms that are highly specialized and deal exclusively with livestock production, not with the production of animal feed. This type of farms can include highly intensive production, such as fattening of broilers, production of eggs and etc. Thus, it should be taken into account that such farms are less common in our practice, and that the majority of livestock farms are engaged in the production of fodder for their own needs. As regards this type of livestock farms, a greater variation occurs in the employment of labour force during certain months, and these variations mainly come from crop production. Traditionally, crop production requires a considerable employment of labour force in the season, especially in the sowing and harvesting period. Therefore, the farms directed at crop production in certain parts of the year have unused reserves of available labour force. In this matter, the time available for engaging in other activities at small farms directed at crop production is very considerable. The issue of the amount of the available working time which is given to the family farms aimed at crop production for performing additional activities is related to the size and nature of the existing production (Todorović i Ivanović, 2011a; Todorović i Ivanović, 2011b).This means that there is a problem of hidden unemployment at such small farms. Such situation could cause the formation and growth of rural poverty.

Small and inadequately used estates limit capacities of livestock production because of reduced forage production, which represents the basis of economic sustainability of the farm. An insufficient and inadequate use of land resources leads to the decrease of their economic efficiency and rationality of business operations, which makes them less competitive. All that refers to the need for finding modern and more rational ways of their organisation so that available resources can be additionally used. More rational way of organization (change of production direction – introduction of beef production) provides an opportunity for family farms directed at crop production to use available resources (especially labour) better, and thus to improve business results (Todorović et al., 2012). In addition to this, it is necessary to coordinate production structure with available possibilities in order to achieve good economic results (Bastajić and Živković, 2002). In the time of increasingly profitable production, the special attention should be called to the choice of optimal sowing structure, regarding the great impact it has on functioning and success of family farms business operations (Todorović and Munćan, 2009; Todorović et al., 2010a; Todorović et al., 2010b). Bearing that in mind, this paper is aimed at examining the impact of change of sowing structure on the employment of labour force and on the economic effects of

business operations of farms directed at final production of fattened beef cattle in the conditions of unchanged estate size.

2.   Material and method

A detailed analysis of natural, organisational and economic conditions in which these farms operate was previously carried out so as to successfully accomplish the given aim, and then the analysis of all available resources was conducted as well as the analysis of production results. The data for this survey were collected during the year of 2012 by interviewing holders of the chosen family farms directed at the final production of fattened beef cattle. For the purpose of considering the effects of change in sowing structure, the results of previous research related to employment of labour force in crop and livestock production were used.

In accordance with the aim of the research, the model of family farm directed at the final production of fattened beef cattle is constructed, having the following characteristics:

− family farm is placed in lowlands and has 17.72 ha of arable land,

− it is directed at the final production of fattened beef cattle of Simmental breed (intensive fattening of calves weighing 150 kg at the beginning, achieving total mass of 550 kg, 35 head in fattening),

− thereby the average daily weight gain (average weight gain per feeding day) is 1.25 kg, the duration of fattening is 320 days, and one cycle per year is averagely realised on the farm (the rest of time is spent on cleaning the facilities which are used for fattening beef cattle and their preparation for inclusion of new head for fattening),

− the structure of plant production is coordinated with the needs of animal husbandry and agrotechnical limitations of crop rotation,

− the technology of crop production is typical for the area where the family farm is located and

− the required area for the production of animal feed, aimed at providing stable supply, was increased by 3% to 7%, which is in accordance with practical recommendations (Krstić et al., 2000).

The designed model served for considering organisational and economic effects of the change in the structure of sowing.

For the purpose of finding modern and more rational ways of their organising as well as for the purpose of additional using of available resources, the decision on buying mercantile maize on the market instead of producing it on the farm is taken

into consideration. In addition, the fact that should be taken into account is that buying mercantile maize on the market instead of its producing on the farm makes the area free for potential production of additional amounts of alfalfa hay and silage maize for fattening additional head. In that sense, the decision on buying of mercantile maize on the market instead of producing it on the farm influences the change of sowing structure.

The initial assumption concerning the increase in the number of head for fattening is the fact that most family farms of this type have already had necessary basic means for fattening beef cattle (which corresponds to s real situation in our practice), therefore the additional investments will not be required, but there will be only change in the levels of production value and variable costs on the farm. Increasing the number of head for fattening on the farm will not result in the change in the level of fixed costs. According to Gogić (2005), the fixed costs are not changed when changing the degree of using capacities, that is, their total amount remains the same regardless of the amount of products produced or services rendered. Avoiding additional investments in facilities and equipment, that is better use of existing capacities, the risk of increasing the number of head for fattening is largely reduced.

Applying partial budget analysis, it was examined whether the decision on changing the sowing structure was economically justified and under what conditions by using an additional procedure of analysis. Applying this approach, it was determined to what extent that decision contributed to economic effects of the family farm business.

3. Results and discussion

Buying mercantile maize on the market instead of producing it on the farm makes changes in sowing structure which result in the increasing the areas occupied by alfalfa and silage maize (Table 1).

Table 1: The area of crops and sowing structure before and after taking a decision on buying mercantile maize on the market instead of producing it on the farm

CROP	AREA (ha)		CHANGE (ha)	CHANGE (%)	STRUCTURE (%)	
	Before	After			Before	After
Winter wheat	7.84	7.84	0.00	0.00	44.25	44.25
Maize (silage)	3.36	6.07	2.71	80.67	18.96	34.26
Maize (mercantile)	4.41	0.00	-4.41	-100.00	24.89	0.00
Alfalfa (using)	1.32	2.39	1.07	80.67	7.47	13.49
Alfalfa (establishing)	0.78	1.42	0.63	80.67	4.43	7.99
TOTAL	17.72	17.72			100.00	100.00

Source: Author's calculation

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Thus, the crop production of the modelised farm is aligned with the needs of animal feed for fattening beef cattle and the requirements of crop rotation with regard to the restrictions related to the use of its own labour force. Increasing the participation of silage maize and alfalfa (which require a greater engagement of labour force compared to mercantile maize which was previously present in crop production) in sowing structure contributes to the increase in employment of labour force on the farm (Graph 1).
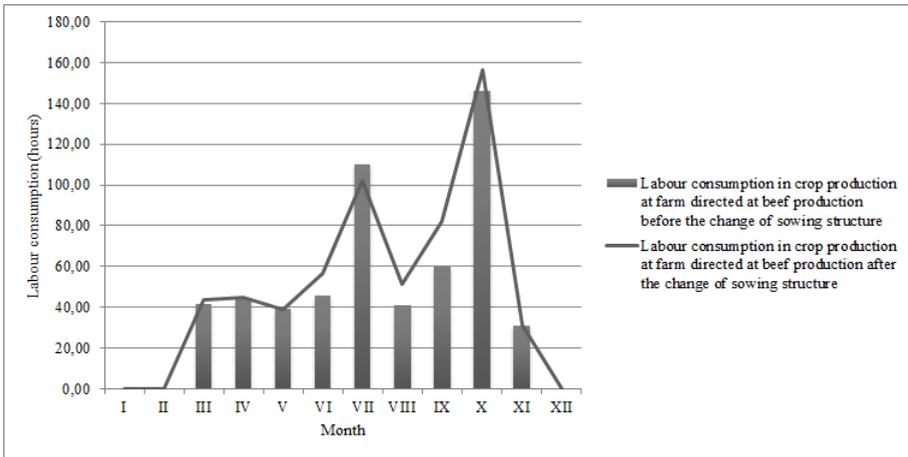
Source: Author's calculation

Graph 1 Labour consumption in crop production at farm directed at beef production (by months)

This Graph shows that the working time spent in crop production on the farms directed at beef cattle production is longer after the decision to buy mercantile maize on the market (as a consequence of this decision a change in sowing structure occurred), primarily during some months (June, August, September and October). This is, as it was previously mentioned, a consequence of the increase in the participation in sowing structure of silage maize and alfalfa.

While the working time spent in crop production before the change in sowing structure was 559.09 hours, after the change it amounted to 607.34 hours, the change in spent working hours, as a result of the change in sowing structure caused by the decision on buying mercantile maize on the market, only on this basis amounts to 48.25 hours, that is 8.63% at an annual level.

However, estimated annual change which amounts to -278,418.54 dinars shows that, according to previously mentioned assumptions, buying mercantile maize is

not economically justified, for it unfavourably influences the business operations of family farms (Table 2).

Table 2: Partial budget analysis of buying mercantile maize instead of producing mercantile maize

ELEMENTS	Number of added calf's	
	0	28
Increased revenue (RSD)	**0**	**3,542,000**
Adding calf's to herd	0	3,542,000
Reduced expense (RSD)	**456,111.06**	**456,111.06**
Stop harvesting mercantile maize	456,111.06	456,111.06
Total increased revenue and reduced expenses (RSD)	**456,111.06**	**3,998,111.06**
Reduced revenue (RSD)	**0**	0.00
None	0	0.00
Increased expense (RSD)	**734,529.6**	**3,346,878.2**
Adding calf's to herd	0	2,024,724.9
Purchasing mercantile maize	734,529.6	1,322,153.3
Total reduced revenue and increased expense (RSD)	**734,529.6**	**3,346,878.23**
Estimated annual change (RSD)	**-278,418.54**	**651,232.83**

Source: Author's calculation

However, if we take into account the fact that buying mercantile maize in the actual example will make the area free, which according to some conservative estimations, can be used for production of sufficient amount of alfalfa and silage maize for fattening of additional 28 head then the situation seems quite different (Table 2). In that case the average annual change of the results of family farms amounts to 651,232.83 dinars, as well as higher employment of labour force on the family farm can be expected (Graph 2).

This Graph demonstrates that the working time spent on the farms directed at beef cattle production is considerably longer after the decision to buy mercantile maize on the market, and use the free area for the production of alfalfa hay and silage maize for fattening of additional 28 head during all months.

While the working time spent on the farm before the change in sowing structure amounted to 1,317.61 hours, after the change it amounted to 1,972.67 hours, so the change of the spent working hours, as a consequence of the change in sowing structure caused by the decision on buying mercantile maize on the market and using the free area for the production of alfalfa hay and silage maize for fattening of additional 28 head annually amounts to 655.06 hours that is 49.72%.
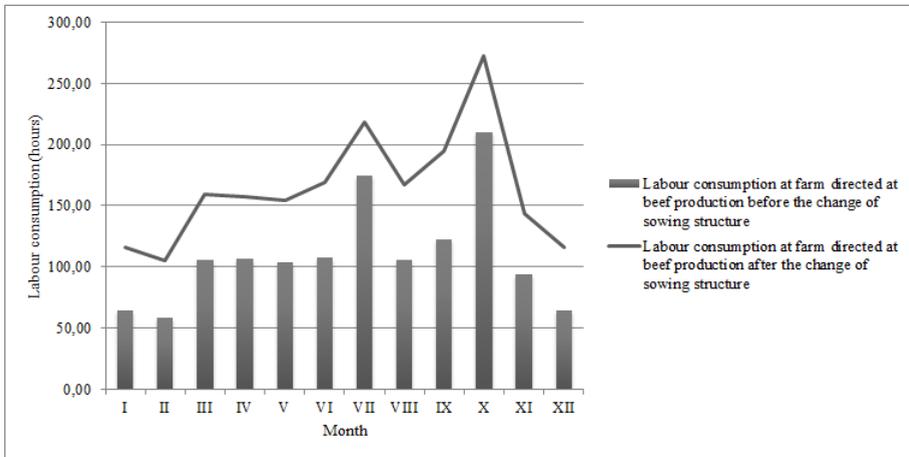
Graph 2 Labour consumption at farm directed at beef production (by months)

Although it is determined under what conditions that decision is economically justified, the final conclusion cannot be reached without an additional analysis. Apart from previously described factors, there is a range of others, which producers should consider when making decisions on shifting to buying mercantile maize.

Are sufficient amounts available on the market every year? What is the quality? Are there possibilities for storing mercantile grain maize which will be purchased on the market? Is soil used for production of mercantile maize suitable for growing of other crops? Is it possible to use the labour employed for production of mercantile maize in other way?

There are other questions concerning investments which should be considered. What is the degree of using available capacities for fattening and whether adding of envisaged number of head requires new investments? Is there any available capital for buying additional head? Will the equipment which is used only in the production of mercantile maize be sold? The question whether the equipment will be sold or not greatly influences economic justification of previously analysed decisions, because in case the equipment is not sold, its fixed costs remain, which encumbers the business operations of family farm. However, it is not true in the case when the same equipment is used for doing a service to others (Todorović i Ivanović, 2012).

4. Conclusion

The results of the conducted research show that more rational way of organization (change in sowing structure) provides an opportunity for family farms directed at the final production of fattened beef cattle to increase production and use available resources (especially labour force) in a better way, and thus to improve economic effects of the family farm business.

A significant employment of labour force in crop and livestock production on the farms directed at fattening beef cattle ensures higher employment of members of the family farm, who are engaged only on the farm (which increases incomes of the family farm and allows reducing rural poverty). Thus, it reduces the need for engaging most of working-age members of the family farm to work off the farm.

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POSSIBILITIES OF IMPROVEMENT OF ECONOMIC RESULTS BY CHANGING THE TYPE OF PRODUCTION IN AGRICULTURAL ENTERPRISES[1]

Mihajlo Munćan[2], Jelena Đoković[3]

Summary

Serbia is characterized by a very low consumption of meat and meat products, and constantly depends on import of agricultural and food products. One of the reasons for low consumption of meat in Serbia, in addition to a low standard of living, are the lack of production and supply of meat, resulting in occasional shortages and considerable fluctuation in prices of meat during the year.

The goal of this paper is to explore the possibilities for improvement of economic results by changing the type of production in agricultural enterprises. Observed agricultural enterprise is focused solely on intensive crop production, with all the necessary machinery for its organization, and includes large functional objects for fattening pigs.

The method of linear programming is used to optimize the production of this agricultural enterprise in function of maximizing gross margin. Obtained solution and post-optimal analysis showed that the change of the type of production is cost-effective in economic terms, as in the terms of rational use of available capacity. This model represents one of the specified ways to improve and increase livestock production in Serbia, as well as the possibility to increase employment and income of labor in rural areas.

Key words: *crop production, fattening, optimization, economic results*

JEL classification: *Q12, C61*

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1. Introduction

Favourable natural conditions, good geographical location, large acreage available, the capacity of the agricultural production not only meet domestic needs, but also enable the export are the most important preconditions (characteristics) of agriculture of the Republic of Serbia. However, in addition to the above features, Serbia is characterized by a very low consumption of meat and meat products, and constant dependence on import of agricultural and food products.

The development of agriculture of a country can be measured by participation of livestock production in the structure of agriculture. The share of livestock in Serbia is about 41.3%, with a tendency of decrease by about 2% per year. Observed period (years 2006-2011) is characterized by the total reduction of livestock as follows: 165 thousand cattle, 491 thousand pigs and 74 thousand sheep. During the six-year period, only the number of poultry increased by about 2.5 million individuals.

The diet of the population in Serbia is traditionally dominated by pork. The amount of pork in Serbia used as food amounts to 24.8 kg per capita, while other less common types of meat (beef 9.7 kg, 8.2 kg of poultry meat, sheep meat and goat 2.5 kg per capita annually).

On the basis of the consumption of about 45 kg of meat per capita annually, Serbia is at the bottom of the list of European countries, with an average of about 71kg, while in the EU the average consumption of meat per capita per year is about 80kg.

One reason for this low consumption of meat in Serbia, in addition to low standards, is the lack of production and supply of meat, resulting in occasional shortages and large fluctuation in prices of meat in a year.

The consequences of poorly managed privatization and destruction of livestock production in most privatized agricultural enterprises, and lack of long-term agricultural policy directly have caused the reduction of the production volume of animal products, especially meat. According to some sources, Serbia now has 30.000 - 40.000 buildings that are empty, and are suitable for fattening of pigs and cattle (*Nataša Kljajić et al., 2009*)

In the period from year 2006 to 2011, the average production of fattening pigs was about 934,000 animals a year, ranging from 1.132 million head in the 2006 to 864,000 animals in the 2011. Within six years, the annual production of pigs in Serbia decreased by 268,000 head, or almost 24%. For Vojvodina, even greater reduction in the number of pigs is noticeable, by almost 28% (from 592,000 heads in 2006 to 430,000 heads in 2011). Extremely unfavourable tendencies are characterized by an average annual rate of decline of –4.15% per year (*Novković et al., 2011*).

2. Research subject and objective

The research subject presented in this paper is the agricultural enterprise of plant crop orientation that is characterized as follows:

- located in the plains;
- natural conditions allow the organization of intensive crop production;
- disposes with 1002 hectares of arable land of uniform quality and optimal lot sizes;
- engaged in intensive crop production;
- is well equipped with the necessary means of mechanization;
- there is an opportunity to engage the required number of seasonal workers;
- arable land exclusively used for the production of grain and industrial crops;
- the whole arable land has been engaged in market-oriented agricultural production;
- there are constructed and unused capacities for pig fattening and all the necessary resources for the organization of intensive livestock production.

The aim is finding the opportunities to increase economic performance through better use of available resources and by introducing new production lines. Using modern optimization methods, patterns of production have been established in observed agricultural enterprise, such as: optimization of the existing structure of crop production and the optimization of the production structure by introducing of new crop lines for the production of concentrated animal feed in the function of change of the production direction, that is introduction of pig fattening enterprise. Pig fattening, as a new line of livestock production, is introduced in order to utilize existing available capacities of the enterprise intended for fattening of pigs, spare capacity in form of existing mechanization and available capacity of full-time employees.

3. Method

For the realization of the set goal, i.e. to optimize the production structure of the observed agricultural enterprise, the method of linear programming was used in this study.

Linear programming models are designed for the determination of the optimal solution, which provides an extreme (maximum or minimum) value of the defined criteria (objective). Programming model is formulated on the basis of quantitatively expressed limiting conditions (extent of available resources), technical coefficients (resource use per unit of production), and aims, while there are several possible solutions (different technologies, different possible structures of production) to choose between.

In mathematical terms, the general linear programming problem consists in finding the optimum (minimum or maximum) linear functions, with "n" independent variables Xi (i = 1,2,3, ..., n) connected by linear relations (equations or inequality), and limiting conditions.

a) the objective function

$$Z=C_1X_1 + C_2X_2 +......+ C_nX_n \rightarrow max \qquad (1)$$

or

$$V=C_1X_1 + C_2X_2 +......+ C_nX_n \rightarrow min \qquad (2)$$

Where:

X_i – unknown independent variable value, i=1..n

C_i – coefficient of the objective function,

Z – maximum of the objective function

V – minimum of the objective function

n – number of unknown values in the model

i=1..n

b) matrix of the limiting conditions

$$a_{11}x_1 + a_{12}x_2 +......+ a_{1n} x_n \leq b_1 \qquad (3)$$
$$a_{21}x_1 + a_{22}x_2 +......+ a_{2n} x_n \leq b_2 \qquad (4)$$
$$a_{m1}x_1 + a_{m2}x_2 +....+ a_{mn} x_n \leq b_m \qquad (5)$$
$$x_1, x_2, ..., x_m \geq 0; \quad bj \geq 0 \qquad (6)$$

Where:

b_j – available resource,

a_{ij} – technical coefficient of the independent variable,

m – number of limitations in the model,

j=1..m

c) non negativity condition $Xi \geq 0$

By specifying the values of unknown variables Xi which satisfy the mathematical constraints in the matrix of limiting conditions, realization of extreme values of the objective function is achieved.

In economic terms, linear programming is a mathematical technique for the deployment and use of limited funds and resources in order to define the best plan for their use as defined in the predetermined objective, such as the maximum income and minimum cost.

When compiling simplex table used as starting point in solving a given problem of optimization as the criterion of the objective function, the gross margin for all present production lines is used. The calculation of gross margin was made on the basis of average yields and actual consumption of direct and auxiliary materials for the period 2008-2012. All indicative values were calculated using constant prices from year 2012.

Limiting conditions in the proposed model are determined based on crop rotation and budget of manpower and machinery using the method developed in the research by Nikolić (*Nikolić 1984*). Technical coefficients are expressed through hours of labour and mechanization per month during the vegetation period for individual production lines, in accordance with the applied technology and agrotechnics in production of field crops in the company.

4. Results and Discussion

For the study, based on the methodology proposed in this paper, two research models were constructed.

The resulting optimal solutions were compared with the average of the results achieved in the previous five-year period (from 2008 to 2012) calculated using the fixed price of the year 2012.

The first model was constructed in order to determine the optimum seeding structure for already existing crop production lines represented in the 2008-2012 period.

The second model introduces as an additional activity the pig fattening line and soybean production line as the main protein feed for the preparation of concentrated mixtures for nutrition of pigs. In this model, the structure of crop production management is determined by the pig fattening line. The starting point was the assumption to provide from their own production the necessary components for preparation of animal feed intended for feeding of pigs, which are then sold on the market.

The calculation of gross margin in the production of pigs was made based on composed pig diet, average market prices of piglets and fattening pigs and performance of employees. Concentrated mixtures used in the feeding of pigs were based on their own production of maize, winter barley and soybean. Soybean produced on the company's own areas was delivered to the processing facilities in

a parity exchange for soybean meal. As the essential ingredients of feed mixtures only pre-mixes were purchased on the market.

Average actual structure of agricultural production in the period 2006-2012, as well as obtained optimal structures of crop production, by solving the first and second model, presented graphically (Graph 1)
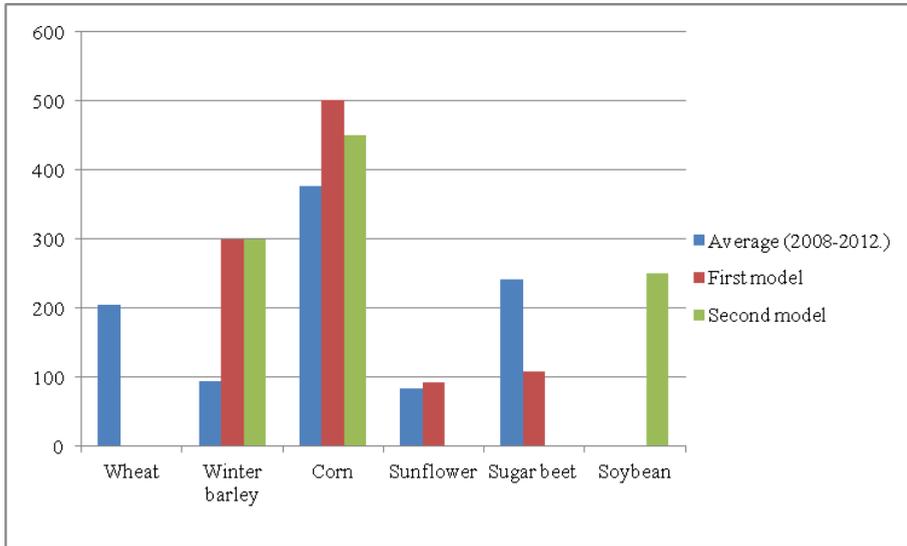
Graph 1 Average and optimized structure of sowing

Optimal seeding structure of the first and second model differs significantly from the average actual structure of crop production in observed agricultural company. In the first model, the wheat was not included in the optimal structure of sowing, but instead the winter barley was included, primarily due to the gross margin realized in this production. At the same time, in the first model, the share of maize (32%) and sunflower (11%) increased, while the share of sugar beet in the sowing structure was reduced (by 45%). Thus these crops fully satisfied the restrictions related to crop rotation. In the first model, the limitation of labour and of operation of medium size tractors were completely fulfilled only in October, as a month with the highest work peak in the company. The received gross margin in the first model was by 3.7% higher than the gross margin of agricultural enterprise that was obtained based on the average sowing structure generated in the observed period.

Optimal seeding structure of the second model fully satisfied the set limitations in regard to the crop rotation of soybean and winter barley. This is because these two lines, in addition to maize, are intended exclusively for preparation of concentrated meals for feeding of fattening pigs. For other crops limitations relating to crop

rotation were satisfied with 90% in maize, while in this model, wheat, sunflower and sugar beet were not entered in the optimal structure of sowing because they are not related to the preparation of animal feed, through which far greater gross margin is achieved, but were intended for sale in the market. The resulting solution allows fattening of pigs on 4303 places in one production cycle, and the total annual fattening of 14.632 pigs. Achieved total gross margin in the second model, is by about 83% higher than the gross margin in the first model.

In addition, for evaluation of economic efficiency of the tested models other indicators were used, such as: realized gross margin per hectare, realized gross margin per employee and labour productivity expressed in gross margin per hour of work of employees.
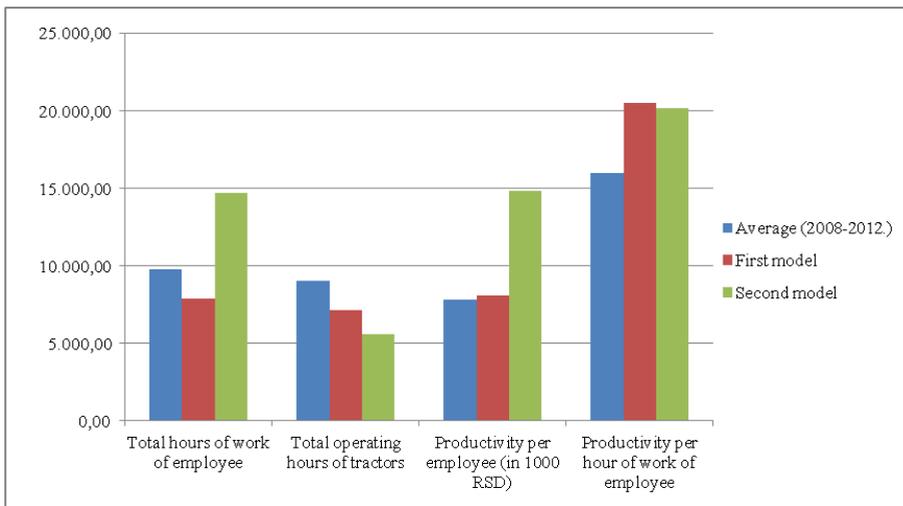
Graph 2 Realized economic indicators

Bearing in mind that in the first model the structure optimization of existing production lines was performed, it can be concluded that with the increase in total gross margin of the company, a reduction in total hours of workers and tractors by about 20% occurs, compared to the average work hours that company had in the period 2000-2012.

Due to the introduction of labour-intensive production of pig fattening, in the second model, the total increase in gross margin was accompanied by the increase of the total operating time of workers by about 51%. In addition, because sugar beet, as the most labour intensive crop, was not included in the optimal structure of sowing, engagement of tractors was reduced by about 39%, compared to the

average hours of tractor operation that was recorded in the company in the period 2000-2012.

The level of actual labour productivity expressed as gross margin per hour of work of employees in the first model increased by 28.3%, and in the second model by about 26.4% compared to the average productivity achieved in the company in the reporting period of 2008-2012.

5. Conclusion

Based on the research results obtained, it can be concluded as follows:

- Optimization of existing production structure in the observed agricultural company, total gross margin can be increased by 3.7% compared to the average achieved in the five-year period;

- Changing the direction of production and by the introducing the pig fattening and production of basic nutrients for preparation of animal feed on their own land, instead of production of crops for the market, resulted in the increase of the total company gross margin by approximately 83% compared to the average achieved in the observed period;

- The efficient utilization of existing capacities (now empty and deserted) for fattening pigs in agricultural enterprises can significantly improve the economic results of business operations, increase the employment of workers and thereby significantly stabilize the domestic swine and pork market.

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ECONOMIC EFFICIENCY OF DAIRY FARMS WITH INTENSIVE AND GRAZING PRODUCTION SYSTEMS[1]

Rade Popovic[2]

Summary

The objective of this research was to examine efficiency of the most common milk production systems in central Serbia. Sample with 8 farms is not statistically representative, but allows use of Data envelopment analysis (DEA). Such technique allows measurement of whole farm efficiency and gives benchmarks for further farm analysis. DEA compare levels of input and outputs for a given dairy farm with all other analysed dairy farms, determining levels of efficiency for all farms with collected consistent data set. A DEA model to measure economic efficiency was developed. It measure efficiency of producing physical (milk) and economic outputs (income) by use of physical (labour and cows) and economic inputs (feed cost).

Results revealed that economic efficiency was achieved by three from eight farms. In total, milk production system with grazing period had higher level of efficiency 0,796 comparing with intensive production system with 0,579. But, in intensive milk production system one farm showed efficiency. This indicates that some other input variables like farmer's management capabilities influenced on efficiency.

Key words: *Economical efficiency, milk, Serbia, production system, dairy farm.*

JEL classification: *Q12*

1. Introduction

Dairy enterprise is the most complex between all farm enterprises. Inputs like: feed, labour, land, cows, equipment, mechanisation, buildings and managerial skills are combined to produce outputs: milk, calves and manure. Which

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combination of inputs farmers use to produce output depends of chosen production system. Generally, dairy production systems worldwide variate in range from low input – low output to high input – high output. In last decade dairy farmers all over the world faced high volatile of milk prices and increasing feed prices. Such trends strongly influenced especially on economics of intensive dairy production systems.

Milk production in Serbia is still dominantly based on family farms with herd size 1 to 5 cows. Although farm structure is slowly changing in recent decades, in 2010 those farms owned 77% of all cows in Republic of Serbia and produced 68% of total milk production. Small dairy farms usually utilize two production systems: tie stall barn throughout whole year, and tie stall barn with grazing period from May to October. Significance of this milk production segment raised several questions about future sustainability of such production systems, their efficiency, competitiveness etc.

Efficiency of some enterprise can be measured as partial and total. Examples of partial measures are: kg milk per cow, kg feed used to produce 1 kg of milk, milk sold per labour unit, etc. This measures of partial efficiency can cause a misleading indication of overall efficiency when consider isolated. Yet, if farmer decide to improve efficiency in use of one input it will influence use of other inputs.

Measure efficiency of the farming system as a whole is better alternative. Use of such approach asks for appropriate methods. The most applied methods in analysis of non-aggregated data are Data envelopment analysis (DEA) and Stohastic frontier analysis (SFA) (Coelly, Rao, O'Donnell, Battese, 2006). They are representatives of non-parametric and parametric methods, respectively. DEA is one of newest methods which can be applied in measurement efficiency of one decision-making unit (DMU) compared to other DMU in sample. Term DMU, cover in flexible manner any entity as a part of collection that utilizes similar inputs to produce similar outputs (Cooper, Seiford, Tone, 2006). It is very flexible model able to use from several to vast number of DMU. DEA is nonparametric method of calculating the efficiency of individual DMU such as dairy farm for performance measurement, analysis and benchmarking (Weersing et. al., cited in Stokes, Tozer, Hyde 2007).

The main advantage of DEA over SFA is that DEA does not require the specification of a functional form for the formation of production frontier (Kelly, et. al. 2013). Beside that DEA can be applied on smaller samples to measure relative efficiency. From farmer point of view, DEA information about specific sources of input or output inefficiency can be used to compare with identified benchmarks. Availability of data and mentioned advantages of DEA makes it preferred method in this research.

2. Material and methodology

Focus in this paper is on group of small dairy farms. Research was conducted in central Serbia, on two the most represented production systems: small dairy farms with tie stall barn and small dairy farms with grazing period. Data are collected on beginning of 2012 from 8 dairy farms in Kolubara Region. Each production system is represented by 4 farms. Period of analysis is 2011 production year for several reasons. It is year with average production conditions, milk prices were relatively stable on higher level and at national milk market were no extreme conditions (like in 2013 with afla-toxin affair).

Main characteristic of analysed production systems are presented in Figure 1. The difference between those two production systems is in chosen feeding, milking and marketing subsystems. Other subsystems are similar as breeding, calves rearing, milk collecting and housing. Looking on output side significant difference exist in milk yield of those two production systems. Beside those differences it can be concluded that both analysed production systems are on same technology level.

Inputs, from farm managers point of view can be grouped in controllable and non-controllable (Stokes, Tozer, Hyde, 2007). Controllable inputs are those over which manager has control, such as: production system, farm land area, barn type, breed type, labour use, number of cows, milking system, etc. Non-controllable inputs are those where manager has no control, as it is weather, prices of inputs and outputs, etc. Also, inputs can be separated according economic significance in cost structure on: important and side inputs. Inputs with highest shares in total cost of production are those on which manager has to look more carefully. In milk production feed costs are usually representing 50%, and labour cost can reach over 15% on small farms (Popovic, 2006; Popovic, Knezevic, 2012), so those two inputs are the most important here.

Chosen DEA model implemented to examine efficiency of dairy farms system in central Serbia is Charnes, Cooper, Rhodes model with input orientation (cited in Stokes, Tozer, Hyde 2007). Model estimates inefficiency with respect to inputs as opposed to the outputs. It is implemented as a linear program expressed for each DMU j as:

$$\min \theta_j \tag{1}$$

$$\theta_j x_{jm} \geq \sum_{k=1}^{K} x_{km} \lambda_{jk} \quad \text{for all m} \tag{2}$$

$$\sum_{k=1}^{K} y_{ki} \lambda_{jk} \geq y_{ji} \text{ for all i} \tag{3}$$

$$\lambda_{jk}, \theta_j \geq 0 \tag{4}$$

Factor	Small farms with tie stall barns	Small farms with grazing period
Milk yield	From 3,400 to 5,200 l	From 2,700 to 4,500 l
Breed	Dominantly Simmental	Dominantly Simmental
Breeding	Artificial insemination	Artificial insemination
Calving	Through all year	Winter or early spring
Calves	0.93 calves per cow, sold on market after 10 days or 2-3 months depends of market situation, female reared for replacement as needed	0.92 calves per cow, sold on market after 10 days or 2-3 months depends of market situation, female reared for replacement as needed
Culling rate	14 – 17%	17%
Labour	330 hours/cow/year	300 hours/cow/year
Bulk feed	Whole year fed in barn with mainly corn silage or corn stover, red clove hay, seldom meadow hay and feed by-products.	Grazing from May to end of October; in rest period use mostly meadow hay, red clove hay and seldom corn silage
Concentrate	From 4 to 5.5 kg concentrate mainly mixed on the farm from own cereals, roasted soybean and bought: soybean meal, wheat bran, sunflower shell, mineral supplements	From 3.5 to 4.5 kg concentrate mixed on the farm from own cereals and bought: soybean meal, wheat bran, sunflower shell, mineral supplements
Housing	Cows tied all year round in stalls barn	Cows tied in barn during winter and raining days
Milking	Cows are milked two times in the barn by portable machines without pulsators	Cow are milked two times in the barn by hand or portable machines without pulsators
Milk collecting	Several close living farmers collect milk on one farm in cooling tank provided by dairy plant	Several close living farmers collect milk on one farm in cooling tank provided by dairy plant
Milk marketing	Dairy plant	Dairy plant and local market

Source: Popovic, Knezevic, 2012 and Goss et. al. 2010

Figure 1 Characteristics of dairy production systems practiced on small farms, based on two samples with 4 farms each

where, θ is scalar and represent efficiency score for each DMUj. Inputs are indexes with m so that x_{jm} is the amount of input m used by DMU j, and x_{km} is the amount of input m used by each of the other K DMU. Outputs are indexes with i, so that y_{ji} represents the amount of output i produced by each of the other K DMU. Linear

program must be solved K times, once for each farm in the sample. A value θ is than obtained for each farm.

The objective of linear program is to find an optimal set of weights denoted by λ_{jk} that satisfy the $m \times i$ constrains and give an efficiency score denoted by $0 \leq \theta_j \leq 1$.

DEA model were calculated using MS Excel Solver, with assumption of constant return to scale. Such assumption requires that every increase of input will result in a proportional output increase. Model was solved for each DMU, comparing its inputs and outputs against all other DMU in data set.

There are several important issues that have to be satisfied before using DEA. First is definition of DMU, which is in this case dairy farm from same herd size group and technology level. Second, all DMUs should use same input set to produce same set of outputs. In other words it means use of same or similar production system. According Sale and Sale (2009), ideally all important inputs are used and outputs are produced by all DMUs. Third, data should avoid double-counting approach, so each input and output should measure unique elements of production system. Fourth, region of production can affect efficiency, so DMUs in sample should be from same region. And last, but not list like in application of any other model the core issue is in quality and reliability of data.

3. Results

Collected data were stratified to production systems. Farms numbered from 1 to 4 represent small farms with tie stall barn, and from 5 to 8 small farms with grazing period. Both production systems have a same production technology level. All examined farms are from same region, what maintaining homogeneity of data set.

Selected physical as well as economic inputs and outputs data are shown in Table 1. Labour full time employed (FTE) represent unit of labour with 2,400 working hours per year. In literature FTE varied from 2,400 to 3,000 working hours per year (Jeffrey, Grant 2001, Hyde, Dunn 2002, Colman, Farrar, Zhuang 2004). It counts only labour for activities in dairy enterprise: milking, feeding, cleaning, herd management, manure disposal and building and equipment maintenance. Labour included indirectly in producing crops and forage for feed is not calculated to avoid double counting in costs since local market feed prices were applied. Land as input is not included here separately because cost of land is included in feed cost. Number of cows represents average number throughout year. Feed cost includes costs of concentrate and forage. Physical output is represented by average milk yield in kg, and economical with net income from dairy enterprise.

If data are available, DEA could use many other physical inputs like: ha of land, kg or dry matter of concentrate and forage, kg of fertilizer for pasture etc., and

economic inputs: values of physical inputs, other direct cost, overhead cost, etc. On output side additional physical outputs can be: number of sold calves, tonnes of manure, kg of live weight excluded cows, etc., and as economic outputs can be used values of: milk sold, milk solids, livestock sold, etc.

Table 1: Inputs and outputs used in Data envelopment analysis models

DMU	Input 1 Labour (FTE)	Input 2 Cows	Input 3 Feed cost (RSD)	Output 1 Milk production (kg/cow/year)	Output 2 Net income (RSD)
1	0,277	2	112.515	3.389	29.467
2	0,456	4	283.363	3.378	66.061
3	0,570	3	269.048	5.195	269.914
4	0,624	5	386.279	3.439	70.735
5	0,592	5	326.709	4.506	393.913
6	0,364	3	166.848	3.564	116.143
7	0,524	4	230.190	2.670	71.923
8	0,144	1	66.932	3.525	31.270

A DEA model is developed to measure economic efficiency of producing physical (milk) and economic outputs (income) by use of physical (labour and cows) and economic inputs (feed cost). All efficiency score in DEA are in range from 0 to 1. Where, score 1 shows efficient farm, and result closed to 0 shows inefficient farm. Result of economic DEA model reviled that 3 out of 8 dairy farms were identified as DEA efficient. Those farms do not have input or output inefficiency and their DEA efficiency scores are equal to 1. Dairy farms 5 and 8 are from production system with grazing period. Farm 3 is from intensive production system, and has highest milk yield in the group. In average, efficient farms produce 4.541 kg milk/cow, and 77,233 RSD/cow of net income, using 0.435 FTE, 3 cows and 73,632 RSD/cow feed value. Inefficient farms use 0.449 FTE, 4 cows and 65,511 RSD/cow feed value to produce 3,387 kg milk/cow and 19,685 RSD/cow of net income. Milk yield is 1,154 kg higher in case of efficient farms, as well as feed costs and net income per cow.

Looking over calculated efficiency data farms from production system with grazing period (5 to 8) have in average higher efficiency score 0.796, than farms with intensive production system (1 to 4), which scored 0.579. Dairy farms with tie stall barn use: 75,086 RSD feed value/cow and 0.138 FTE/cow to produce 3,966 kg milk and 31,156 RSD of net income/cow. Dairy farms with grazing period use: 60,821 RSD feed value/cow, 0.125 FTE/cow to produce 3,673 kg milk and 47,173 RSD of net income/cow. It infer that reason of higher efficiency lies in relation

lower use of inputs (labour and feed) with moderate output (milk yield), that results in higher net income. Good management practice is observed on few farms, but in both production systems, so it is source of efficiency for farms 3 and 5.

Table 2: Result of economic Data envelopment analysis model

DMU	Efficiency	Slack labour (FTE)	Slack feed (RSD)	Actual milk production (kg)	Target milk production (kg)	Target net income (RSD)
5	1,0000	0	0	4.642	4.642	0
8	1,0000	0	0	3.631	3.631	0
3	1,0000	0	0	5.351	5.351	0
6	0,7656	0,0299	0	3.671	3.867	0
1	0,5949	0,0204	0	3.490	3.631	1.802
7	0,4173	0,0240	0	2.750	3.744	0
2	0,4104	0	24.424	3.479	3.728	0
4	0,3095	0	24.355	3.542	3.741	0

Sources of inefficiency of other farms are slack of labour and slack of feed cost. Slack value of inputs indicates its amount by which a DEA model constraint is not satisfied with equality, and represents amount of input which is overused relative to how efficient farms use the input. Model didn't report any slack of number of cows. Target milk production and net income level shows at which level of output inefficient farms will become efficient, with use less of slack inputs.

Inefficient farms 6, 1 and 7 use some amount of labour more than efficient once, and farms 2 and 4 overuse feed. Farm 7 has biggest difference in milk target, almost 1,000 kg, and it can be due low genetic of herd.

One problem observed in this research is about of appropriate number of inputs and outputs used in DEA with smaller number of DMU. When more inputs and outputs includes in model with smaller number of farms, results of economic efficiency tend to be all very close or equal to 1. So, it was reason to keep focus only on main inputs and outputs for DEA model in this research. It leads to conclusion that use of more inputs and outputs, both physical and financial, are more appropriate for bigger number of farms in sample.

4. Conclusions

The aim of article was to investigate economic efficiency in two most represented dairy production systems in central Serbia. Data envelopment analysis with constant return to scale assumption was applied. Results reviled that efficient farms

exist in both production systems. But, production system with grazing period has higher overall efficiency score. Production strategy low input low output provide more net income for dairy farmers oriented to use grazing period in milk production. Besides that, possibility of use crossbreeds, as genetically improvement gives benefits to pasture grazing system in the way that cows are healthier and more resistant. Further, on cost side there is lower rate of replacement cows and lower production costs.

Looking in wider scope it is well known that on world milk market the highest efficiency is achieved in countries where intensive grazing production systems are dominant, like in New Zealand, Australia and several South America countries. Dairy farmers in mentioned countries practice production system which is based on relation low level of inputs and moderate level of outputs. Grain price trends in previous years gives the stronger position of this production system since it become more economically sustainable. Additionally, grazing milk production system has fewer burdens in ecological and social sustainability aspects.

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EFFECTS OF INTENSIFYING GRAIN PRODUCTION IN FAMILY HOLDINGS[1]

Petar Munćan[2], Dragica Božić[3]

Summary

The starting point of the present study was the assumption that the intensity of grain production (wheat and maize), on family farms/holdings, can be raised to a higher level by increasing the use of mineral fertilizers per unit area as one of the fastest, simplest and economically most rational measures (does not require additional investments). Determination to increase the level of grain production intensity in this way is the result of survey conducted on family farms/holdings on the territory of Vojvodina. Namely, the survey established that family farms/holdings, despite of analyses of soil fertility and received recommendations for the optimal application of mineral fertilizers, by extension services, in most cases (83%) do not respect the recommendations, and apply mineral fertilizers in accordance with their habits and budget.

The results obtained indicated that there were significant opportunities to increase the intensity of grain production by using larger amounts of mineral fertilizers per unit area. Namely, because of the lower use of mineral fertilizers in relation to the recommendations given by the agricultural extension, lower wheat yields were achieved in average by 18.7% and 17.6% for maize than planned, which had the effect of considerably reducing not only the actual value of production of these crops, but also the total profit of family farms/holdings.

Key words: economic effects, production intensity, fertilizers, cereals, family farms

JEL classification: Q12; D10; D13; D24

1. Introduction

Mineral fertilizers are one of the key inputs for the intensification of plant production. In the past, their use per unit area was much higher in developed

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countries than in developing countries. However, in recent years the use of fertilizers increased faster in developing countries than in developed countries and has reached nearly three-quarters of the total global consumption of mineral fertilization (*Sekulić, P. et al. 2009)*. This is associated with the overproduction in the agricultural industry in developed countries and measures aimed at limiting of the production, protection of the environment and production of safe food which are limiting and excluding the use of chemical inputs. A large number of conducted experiments, in particular the results achieved in practice over the last forty years, confirmed that the increase in yield per unit area can be realized in the fastest, easiest and most efficient way through rational use of mineral fertilizers. In conditions of modern (conventional) farming, the amount of realized yield is influenced by the application of appropriate, adequate agricultural practices (fertilization, the creation of new varieties and hybrids, irrigation, use of pesticides, modern mechanization). All these agricultural measures and practices have similar impact on yields. The application of fertilizers is of particular importance, as confirmed by the FAO estimates showing that the application of fertilizers contributes to the increase of yields with 50% (*Mirjana Kresović 2010*). From the above stated it can be concluded that mineral fertilizers represent a powerful tool to increase yields with high impact on the level of intensity of production. At the same time, the fact cannot be overlooked that the costs of mineral fertilizers represent significant part of the total cost of production. So these costs participate in total cost of wheat production with 19.7% and 28.2% in production of maize (*Jovanović, M., Bošnjak Danica 1997*). Also the results of the analysis of the economic efficiency of crop production on family farms/holdings in the period 2005-2009, have shown that the share of the cost of mineral fertilizers in the total variable costs of wheat production averaged 37% and ranged from 31.2 to 45.5%, and in production of commercial maize averaged 39.7% and ranged from 35.8 to 41.5% (*Munćan et al. 2010*).

In the initial stages of agricultural intensification mineral fertilizers are used in large quantities in order to achieve maximum yield. However, experience has shown that the increase in yield is not always proportional to the consumed quantities of fertilizer and that it is necessary to examine the amounts of fertilizer that are optimal for a given level of return (*Pejin, D., Ljesov Dušanka 1973*). Given that in our conditions, production capacities (84% of utilized agricultural land; 98.5% of the total number of tractors)[4] are mainly owned by family farms/holdings, it is questionable how realistic are the expectations of these farms/holdings to find a solution to the economic optimum yield, and hence the economically optimal use of mineral fertilizers necessary for this yield. Under the current conditions, it could be concluded that family farms are not able to do this.

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[4] According to the results of Agricultural census in year 2012, preliminary results, Statistical Office of the Republic of Serbia, Belgrade.

In most developed countries this is done for them by experts of agricultural extension services. Hence, the Agricultural Land Act from 2006 (The (Official Gazette of RS, 62/06) provided that "for the purpose of protection and preservation of chemical and biological properties of agricultural land, from first to fifth cadastral class, and ensuring the correct use of mineral and organic fertilizers and pesticides, the owner or user of arable land is obligated to control the fertility of arable land and keep a records of the quantities of introduced mineral fertilizers and pesticides. Control of fertility of arable land and of quantities of introduced mineral fertilizers and pesticides is done as needed and minimum every five years ". In laboratories of agricultural services, research institutes and universities in the field of agriculture fertility parameters are analysed and recommendations made for rational fertilization with mineral fertilizers. In the period after the adoption of the Law, owners and users of land, as well as experts of regional agricultural services, sampled the land of family farms/holdings. Total of 70,189 samples were collected and analysed (*Sekulić, P. et al. 2009*). For each analysed sample recommendations for cost-effective and proper fertilization with mineral fertilizers was given in order to ensure an adequate yield.

In this paper, The starting point was the assumption that the intensity of grain production (wheat and maize) can be raised to a higher level by increasing the use of mineral fertilizers per unit area as one of the fastest, simplest and economically most rational measures (does not require additional investments). Determination to increase the level of grain production intensity in this way is the result of survey conducted on family farms/holdings on the territory of Vojvodina. Fact that indispensable information was provided by this survey conducted in Vojvodina has influenced the decision to put this area in the focus of the analysis in this study. Namely, the survey established that family farms/holdings, despite of analyses of soil fertility and received recommendations for the optimal application of mineral fertilizers, by extension services, in most cases (83%) do not respect the recommendations, and apply mineral fertilizers in accordance with their habits and budget. The subject of research presented in this paper is intensity of grain production (wheat mercantile and commercial maize) on family farms/holdings in lowland areas. The research included family farms/holdings covering more than 20 hectares of arable land. The commitment of these farms to be surveyed was based on the fact that according to the last census from 2012, mentioned farms/holdings, although they account for only 2.9% of the total number of farms in Serbia, have the 918,103 ha, or about 33% of the total land used by agricultural family holdings.

Based on the study subject, the research objectives were formulated:
- analysis of the trend of consumption of mineral fertilizers on family farms/holdings in Vojvodina;
- analysis of trend in grain production and yields realized on family farms/holdings in Vojvodina;

- assessment of the effects of intensification of grain production using the recommended amounts of mineral fertilizers.

2. Method and data sources

According to the research objectives, several mathematical and statistical methods were applied. The relative indicators of the structure were used in the analysis of the distribution of wheat and maize on arable land of family farms/holdings. Developments in production and realized yields of wheat and maize, as well as the use of mineral fertilizers on family farms/holdings in Vojvodina were perceived through the relative indicators of dynamics (intersecting growth rate), as well as indicators of descriptive statistics (coefficient of variation, the variation interval).

 The effect of application of mineral fertilizers on the yields of wheat and maize in the period 1971-2000 on family farms/holdings in Vojvodina was analysed using the method of correlation-regression analysis. The following types of functions were tested: linear, quadratic, semi-logarithm, double-logarithm and hyperbole. The type of function was finally selected according to the usual indicators of the degree of adjustment to the actual phenomena relation, such as the standard error of regression and correlation coefficient and determination.

Investigated forty year period (1971-2010) was divided into four sub-periods in the following way:

- 1971-1980.
- 1981-1990.
- 1991-2000.
- 2001-2010.

Data on consumption of mineral fertilizers on family farms/holdings in the period 1971-2001 were obtained from statistical newsletters "Crop production, fruit growing and viticulture," published by the Federal Statistical Office until year 2001. Since the Statistical Office of the Republic of Serbia no longer monitors or publishes data on the use and consumption of mineral fertilizers, the data on their consumption for the period 2001-2010 were obtained from FAO databases and related to the total consumption of fertilizers in Republic of Serbia.

The survey conducted on 20 targeted family farms/holdings and 197 cadastre plots of total area of 1,096 ha was used as another important source of data for analysis in this paper. The surveyed farms operated in 6 cadastral municipalities from the territory of the South Banat, as one of the most important agricultural areas in grain production in Serbia. The survey was conducted over four consecutive calendar years (from years 2009 to 2012) and included, among others, the following elements:

- The number and area of cadastral plots;

- Seeding structure, total production and realized yields of wheat and maize;
- Consumed quantities of mineral fertilizers per cadastral plots, and the recommendations of the agricultural extension services for their fertilization;
- The type, amount and cost of mineral fertilizers used in cadastral plots.

In the selection of family farms/holdings in the survey, farms equipped with modern means of mechanization in production and apply the most advanced cropping practices and achieve above average yields in wheat and maize were considered.

When calculating the value of indicators used to determine the economic effectiveness of increasing the intensity of production of wheat, four-year (2009-2012) averages of prices realized on the surveyed family farms/holdings were used. Average prices were used to avoid the influence of extreme environmental conditions on the results achieved in some years (such as drought in year 2012).

3. Results of the research

3.1. Representation of wheat and maize in the sowing structure of family farms/holdings in Vojvodina

Based on the presence of different groups of crops in sowing structure, the direction of crop production and the intensity of use of arable land can be estimated. In addition, analysis of the share of individual crops in planted area indicates to the character of crop rotation and the organizational-economic characteristics of the use of arable land. According to *Molnar (1999)*, crop rotation, in addition to the agro-technical it also has an important organizational - economic and phyto-sanitary meaning in terms of the most rational use of land. On over two-thirds of the arable land of family farms-holdings in Vojvodina, maize and wheat are sown. The average share of wheat and maize in sowing structure in the period 1971-2010 was 69.1% (Table 1). The highest share of these two crops was observed in the second sub-period (1981-1990) when it amounted to maximum of 71.6%. After this period, the share of wheat and maize gradually declined and in the last observed sub-period (2001-2010) it amounted to 64.5%. Maize as the most abundant arable crop on family farms/holdings in Vojvodina is sown on more than 50% of arable land, which determines the crop rotation, the direction and intensity of crop production of family farm/holding. High presence of maize is characterized by constant participation in sowing structure (Cv = 7,76).

Table 1: The share of wheat and maize in sowing structure of family farms/holdings in Vojvodina (%)

Period	Average	Variation coefficient	Variation interval	
			minimum	maximum
Wheat				
1971-2010	16,8	17,48	10,4	22,38
1971-1980	17,1	12,71	13,4	19,25
1981-1990	15,8	17,54	10,4	18,81
1991-2000	18,3	17,57	11,50	22,38
2001-2010	16,3	15,21	13,49	21,22
Maize				
1971-2010	52,3	7,76	43,75	60,66
1971-1980	52,1	6,60	43,75	52,92
1981-1990	55,8	5,14	52,55	60,66
1991-2000	51,4	6,19	45,61	58,89
2001-2010	48,2	2,19	47,07	50,71

Source: authors' calculations based on data from the bulletin "Crop production, fruit growing and viticulture" and documentary material, RSO; Belgrade

3.2. The use of mineral fertilizers and the yields realized on family farms/holdings

Keeping in mind the research objective, the starting point was the analysis of mineral fertilizer consumption on family farms/holdings in Vojvodina in the period 1971-2000. This period was taken into consideration because until 2001 data on the consumption of fertilizers on family farms/holdings in Vojvodina were monitored and published by the statistic services. Because since 2001, there is no statistical monitoring of the consumption of mineral fertilizers in Serbia, the single source of data for the period 2001-2010 was FAO database. But the data from this database are not comparable with data for the period 1971-2000 as they relate to the entire territory of the Republic of Serbia. For this reason, testing of interdependence of consumption of mineral fertilizers and achieved yields of wheat and maize on family farms/holdings in Vojvodina was realized through application of correlation-regression analysis, only for the thirty-year period (from 1971 to 2000). The following types of functions were tested: linear, quadratic, semi-logarithm, double-logarithm and hyperbole. The final selection of linear function was made according to the correlation coefficient which was in the production of wheat 0.57 and production of maize 0.74. The data obtained confirmed the initial hypothesis that mineral fertilizers contribute to increases in yields of about 50%.

The use of mineral fertilizers is shown as average consumption per unit area for the entire period and by individual sub-periods. Data on the average consumption of mineral fertilizers were analysed by variation coefficient, interval of variation and

the rate of change (Table 2). The greatest variation in the consumption of mineral fertilizers was recorded in the third sub-period (Cv 111.49) when their consumption ranged from a maximum of 354 kg/ha (in 1991) to only 33 kg/ha (2000). It was in this period that the highest average rate of decline was recorded (23.2% annually). These trends in the consumption of mineral fertilizers were result of the severe economic crisis in Serbia that marked the nineties of the last century.

Table 2: Consumption of mineral fertilizers
on family farms/holdings in Vojvodina

Period	Average (kg/ha)	Variation coefficient	Variation interval		Average growth rate
			Minimum	Maximum	
1971-2000	275	57,6	33	474	-6,82
1971-1980	314	17,63	256	426	5,82
1981-1990	428	10,08	323	474	-2,16
1991-2000	84	111,49	33	354	-23,2
2001-2010	123	19,89	80	153	5,51

Source: authors' calculations based on data from the bulletin "Crop production, fruit growing and viticulture" and documentary material, RSO; Belgrade

Average realized yields of wheat and maize were also expressed per unit area, both for the individual sub-periods, and for the total period, and were statistically analysed using the coefficient of variation, the interval of variation and the rate of change (Table 3). The degree of yield variability (Cv) can be regarded as an indicator of the degree of intensity of production. In intensified productions coefficient of variation is lower, because more intensive investing practically reduces the impact of objective factors on yield. In addition, the high coefficient of variation of yield indicates also the changes in the degree of production intensity, which is most often caused by changes in the economic conditions of production.

During the forty-year period, the yield of wheat had general tendency of increase (rate of 0.26% per year) and was accompanied by significant variation (Cv = 16.79). At the beginning of the analysed period, wheat yield exhibited a tendency to increase at an average annual rate of 1.07 to 1.93%. The nineties of the last century were marked by the great economic crisis (caused by UN sanctions and war events in the former Yugoslavia) that had exceptional major impact on wheat production. Namely, the trends in wheat yields in this period are characterized by the greatest variation (Cv = 17.05) showing the tendency of decrease at an average annual rate of - 5.33%. Yield decrease was primarily caused by low consumption of mineral fertilizers per unit area as a consequence of the depletion of family farms/holdings due to the economic crisis. Despite this state, the trend in yield of wheat at the end of the analysed period (2001-2010) exhibited a slight tendency of increase (growth rate 1.07%), but the level of realized average yields decreased by

11% compared to the level realized in the first period of analysis (1971-1980) and decreased by 22% compared to the level achieved in the period 1981-1990, characterized by the highest average yields achieved in total analysed period. The above stated results show that the potentials of family farms/holdings in the production of grain are not used sufficiently. This can be ascertained by comparing the actual average yields in the developed European countries. Thus, the average wheat yields achieved in the period 2001-2010 were: in France, 6.96 t/ha, Germany 7.42 t/ha, in the Netherlands, 8.57 t/ha while on family farms/holdings in Vojvodina it was only 3.53 t/ha.

Table 3: The trend in regard to yield of wheat and maize
on family farms/holdings in Vojvodina

Period	Average (t/ha)	Variation coefficient (Cv)	Variation interval		Average growth rate
			Minimum (t/ha)	Maximum (t/ha)	
Wheat					
1971-2010	3,94	16,79	2,69	5,22	0,26
1971-1980	3,69	15,66	2,69	4,75	1,07
1981-1990	4,51	7,59	3,99	5,22	1,93
1991-2000	3,63	17,05	2,77	5,11	-5,33
2001-2010	3,53	15,34	2,09	4,36	1,07
Maize					
1971-2010	4,93	21,81	3,62	6,83	-0,38
1971-1980	5,23	11,64	4,33	6,18	3,38
1981-1990	5,56	18,55	3,62	6,61	-4,99
1991-2000	4,12	25,09	3,88	6,83	-6,09
2001-2010	5,08	16,91	3,34	6,18	1,36

Source: authors' calculations based on data from the bulletin "Crop production, fruit growing and viticulture" and documentary material, RSO; Belgrade

The trend in yield of maize during the whole period was accompanied by a much higher variation (Cv = 21.28), with a tendency of decline at an average annual rate of 0.38%. The highest rate of growth in maize yield was in the second sub-period average of 3.38%, while the most significant decline in yield was characteristic of the nineties (rate - 6,09). The last ten years of the analysed period, were characterized by somewhat smaller variation of maize yield and average annual growth rate of 1.36%. Based on the comparison of average maize yield achieved during this period (5.08 t/ha) with the same in France (8.77 t/ha), Germany (9.03 t /ha) and the Netherlands (11.42 t/ha) it can be concluded that in this production there may well be great opportunities for its intensification.

3.3. The main features and results achieved by surveyed family farms/holdings

The average area of arable land used by surveyed family farms/holdings was 54.8 ha (Table 4) and ranged from 32.5 to 96.8 ha.

Table 4: Properties of the farms investigated

Indices	Average for the farms
Arable land area (ha):	54,8
- Own land	36,7
- Leased land	18,1
Number of plots per holding	9,85
Average plot size (ha)	5,56
Share of wheat and maize in sowing structure (%):	
- wheat	24,3
- maize	53,1
Consumed quantities of mineral fertilizers in	
- NPK	250
- AN	200
Consumed quantities of mineral fertilizers in	
- NPK	300
- UREA	200
The cost of use of mineral fertilizers (RSD/ha):	
- Production of wheat	15.400
- Production of maize	18.500
Realized yields (t/ha):	
- wheat	5,12
- maize	7,58

Source: author's calculation based on Survey data

The average size of the land plot was 5.56 ha, and the average total number of plots per farm was 9.85 and ranged from 6 to 18. Grain (wheat and maize) crops represent a dominant crop group in the studied family farms/holdings with an average share during the study period of 77.4%. Sowing structure which, in addition to wheat and maize, included also sunflower, can be explained by the fact that the farms were very well equipped with modern means of agricultural machinery allowing them rational implementation of modern agricultural measures and practices (techniques) and manufacturing technology and the realization of very high labour productivity.

The average realized yields of wheat and maize on family farms/holdings surveyed in period 2009-2012 were higher than the same in Vojvodina by 33% and 42%. Compared to the average achieved yields in developed European countries (France,

Germany, the Netherlands) it can be concluded that the average yields of wheat achieved by the studied family holdings were lower by about 30% and of maize by 13 to 32%.

3.4. Economic Effects of intensification of grain production

Based on data collected in the survey on elements of technology and agricultural practices and measures (techniques) in grain production present on observed family farms/holdings, analytic calculations were composed on the basis of direct variable costs (Table 5). As the main indicator of economic efficiency of intensification of wheat production, the gross margin was used representing the difference between the realized value of production and total variable costs (seed, mineral fertilizer, pesticides, diesel fuel, the cost of land lease, etc.).

Table 5: Calculation of wheat and maize production

E l e m e n t s	Average	Projected	Difference
1	2	3	4
W h e a t			
Yield t/ha	5,12	6,3	1,18
A) Value of production (RSD)	79.360	97.650	18.290
B) Direct variable costs			
- seed	9.800	9.800	**-**
- mineral fertilizer	15.400	21.210	5.810
- plant protection preparations	3.360	3.360	**-**
- diesel fuel	10.814	10.814	-
- cost of land lease	7.800	7.800	-
Total variable costs (RSD)	47.174	52.984	5.810
C) Gross margin C = (A-B) (RSD)	**32.186**	**44.666**	**12.480**
M a i z e			
Yield t/ha	7,58	9,2	1,62
A) Value of production (RSD)	109.910	133.400	23.490
B) Direct variable costs			
- seed	12.544	12.544	-
- mineral fertilizer	18.500	26.019	7.519
- plant protection preparations	5.170	5.170	-
- diesel fuel	14.860	14.860	-
- cost of land lease	7.800	7.800	-
Total variable costs (RSD)	58.874	66.393	7.519
C) Gross margin C = (A-B) (RSD)	**51.036**	**67.007**	**15.971**

Source: Authors' calculations based on data from the Survey
*Actual direct variable costs of the surveyed holdings for the period 2009-2012.
**Projected direct variable costs based on recommendation of the agricultural extension services, in regard to fertilization using the mineral fertilizers

Respecting of the recommendations given by the agricultural extension services, in regard to rational fertilization with mineral fertilizers, for family farms would mean additional production costs in production of wheat and maize by 37.7% and 40.6%, respectively. The increase of average wheat yield of 18.7% and 17.6% for maize was a result of additional investments in mineral fertilizers, their production value increased by 23% and 21%, and gross margins per unit area by 38.7 and 31.3%, respectively. Based on the presented results it can be concluded that the increased costs of using mineral fertilizers are fully justified because of the increased value of production which fully covers these costs and makes a positive difference in gross margins. Therefore, the obtained results indicated that there were significant opportunities to increase the intensity of grain production on family farms/holdings, using larger quantities of mineral fertilizers per unit area.

4. Conclusion

In the last twenty years, the total consumption of mineral fertilizers on family farms/holdings, both absolutely and per unit area manifested a tendency of decrease. The decrease was particularly characteristic of the nineties of the last century, caused by the economic crisis and the reaction of farmers to disruptions in regard to price parities of fertilizer and grain prices. Decline in use of mineral fertilizers resulted in a decrease in the yield of wheat and maize. Compared to the average achieved yields in developed European countries (France, Germany, the Netherlands) it can be concluded that the average yields of wheat achieved by the studied family holdings were lower by about 30% and of maize by 13 to 32%. The above stated results show that the potentials of family farms/holdings in the production of grain are not used sufficiently and that there is potential to increase the intensity of this production by increased use of mineral fertilizers per unit area as one of the fastest, simplest and economically most rational measures.

If we accept the estimate that in the foreseeable future it will not be possible to significantly improve the level of expertise of family farmers and owners of family holdings, then this unfavourable situation can be alleviated with increased efforts of agricultural extension agents, as well as scientists, researchers and experts in the field of agronomy. In this way, the results of the analysis of soil fertility would be taken seriously and used in the practice of family farms/holdings which would create conditions for increasing not only the intensity of grain production but also its competitiveness.

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MAIZE GROSS MARGINS IN DIFFERENT ENVIRONMENTAL CONDITIONS IN 2011 AND 2012[1]

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Summary

Environmental conditions significantly influence agricultural production, i.e. they are one of the main factors that affect its efficiency. Continuous monitoring of economic results makes it possible to identify the basic elements of revenues and expenditures in production of major agricultural crops, and use these data to plan future production – in other words, to choose the right enterprise for respective environmental conditions.

The gross margin is a quick and efficient indicator used to analyse an enterprise when considering economic indicators of different enterprises and choosing the most efficient one in economic terms. In this paper we used the gross margin to compare the two production years with different production conditions, but on the same farms. Therefore, gross margin was used as an adequate indicator that aims to show the difference which is in function of various agro-ecological conditions, price and yield within the period of two years.

The paper used the questionnaire carried out in 2011 and 2012 on a total of 69 chosen leader farms from the territory of 11 stations of the Agricultural Extension Service of Serbia. The questionnaire collected data on revenues and expenditures based on which gross margins for maize were calculated. The main indicator of this calculation is the gross margin, which is the difference between the value of production (value of the primary and the secondary product) and total variable costs that covers seed costs, fertilizer costs, costs of plant protection products, diesel fuels and contracted services (for sowing, harvest and labour).

In these periods climatic conditions differed significantly. In 2012 there was considerably less precipitation with higher air temperatures, which was one of the main reason for reduced yields per area unit. In 2012, yields decreased by 28%,

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while price per kilogram of maize increased by about 37%, reducing total value of production by about 1%. It was estimated that total variable costs increased by 6%, while the gross margin was reduced by about 8%.

Key words: *gross margin, chosen leader farm, maize, climatic conditions, value of production, variable costs.*

1. Introduction

In the Republic of Serbia about 5096000 ha of land is under agricultural production. About 62% of this area is under cereal crops, most important of which is maize, cultivated on about 1258437 ha throughout Serbia (Statistical Yearbook for 2012).

Maize is an important crop for many reasons. According to the Ministry of Agriculture, Forestry and Water Management, about 70% of total maize consumption is used in livestock diets, where it is a basic component of livestock feed and thus an irreplaceable input in modern livestock husbandry. About 20% of produced maize is exported, while 3-5% is used for processing and making industrial products.

One of important characteristics of agriculture production in Serbia is that it is conducted on family farms. Most of production is conducted at plots of maximum 3 ha of size (60%) (Muncan & Bozic, 2006).

Apart from the specificities of agro-industry, the authors agreed upon several main problems that can result in improvements if addressed properly, also pointed out by Pejanovic & Kosanovic (2010). Those are: adverse owning structure and a lack of farmers' organization, non-regulated market of agricultural products, a lack of competitiveness and a demographic problem of the farming population.

In every area of production, it is the achieved economic effect that comes as the universal indicator of efficiency. It is important for farmers to be introduced to these results since the economic effect of a certain production most often has the predominant role when choosing a certain enterprise. In this regard, gross margin is a quick and efficient indicator for comparing different enterprises and choosing the most economic one. The previous study (Jankovic et al., 2006) shows it is maize production that gives the highest gross margin value per hectare of all field crops.

The objective of this research was to show economic effects in maize enterprises in the Republic of Serbia, based on the analysis of environmental conditions in two consecutive years.

2. Materials and Methods

In this paper, gross margin was used as an indicator of economic effects of maize grain production (Andjelic et al., 2010). Data for gross margin calculations were collected through the questionnaire from the same farms in the both respective years. The sample comprised 69 farms from the territory of the following regional offices of the Agricultural Extension Service of Serbia (PSSS): Valjevo, Smederevo, Pozarevac, Sabac, Prokuplje, Kraljevo, Cacak, Loznica, Leskovac, Nis and Zajecar. The research on economic effects of enterprises from farms in the Republic of Serbia in 2011 and 2012 was conducted by the Institute for Science Application in Agriculture in collaboration with the PSSS.

The following data were used for calculating the basic elements of a maize gross margin: data on yield and price; by-product price; value of seed; quantity and value of fertilizers, pesticides, and fuel; and costs of contracted services. Based on starting data for each farm for the both years, indicators for the value of production, total variable costs and gross margin were calculated. For processing data on farm enterprise calculations and calculating the average gross margin for maize, elements of revenue and expenditures, the *Microsoft Excel* was used. The programme was adjusted to calculate the average value of each element of the calculation.

Important elements that had the predominant effect on maize yields in the both years and especially in 2012, were precipitation amount and mean monthly temperatures in the period April - September on the territories covered by the PSSS. The precipitation amount was compared with the optimal amount of precipitation for the vegetation period and some discrepancies were shown, while the mean monthly temperatures were compared in their absolute values.

Based on the comparative analysis, the effect of the investigated environmental and economic conditions on the final value of gross margin was determined. The final indicator was the share of total variable costs and gross margin in the total value of production in the both years. Moreover, the analysis determined the structure of variable costs, which is the share of seed costs, fertilizer costs, fuel costs and costs of contracted services in the total variable costs.

3. Results and Discussion

Analysing the collected data for maize gross margin calculations it was determined that the yield in 2011 ranged from 3500 kg/ha to 12000 kg/ha, while in 2012 the yield ranged from 2000 kg/ha to 10000 kg/ha. The price of maize grain in 2011 ranged from 14.00 RSD/kg to 25.00 RSD/kg, while a significant rise in price was determined in 2012 - from 22.00 RSD/kg to 30.00 RSD/kg. When compared the obtained maize yields and the prices in the respective years, a slight decrease in the

value of production can be seen in 2012, which came a direct result of a higher price, although the yield was significantly lower. The decrease in the gross margin value was also affected by the variable costs being on average higher by around 3500.00 RSD/ha in 2012 (Table 1).

Table 1: Basic indicators of the maize gross margins (ha)
for the surveyed farms in 2011 and 2012

Indicator	Year				2012/2011 index	
	Value in RSD		Value in EUR			
	2011	2012	2011*	2012**	RSD	EUR
Yield (kg)	6336.00	4572.00	-	-	72	72
Price (1 kg)	19.28	26.46	0.19	0.23	137	124
Value of production (VP)	121558.00	120840.00	1192.33	1068.15	99	90
Total variable costs (TVC)	55086.00	58489.00	54032	51701	106	96
Gros margin (GM)	70241.00	64257.00	688.97	567.99	92	83

Source: Authors' calculation
* 1 EUR= 101.95 RSD
** 1 EUR= 113.13 RSD

When compared to 2011, despite higher variable costs and a significantly lower yield, a higher price per kilogram in 2012 resulted in a slightly lower value of the gross margin – for about 8% or 16% if the figure is expressed in Euro (Graph 1).
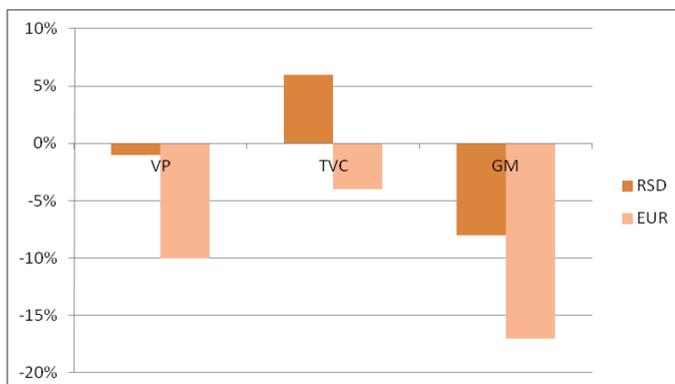
Graph 1 Review of the percentage decrease of the variable costs and the gross margin and increase of the total variable costs in 2012, when compared to 2011 (Indicators calculated in RSD and EUR)

A more detailed analysis of fertilizer costs determined that more-less the same amounts of fertilizers were used in the respective years. However, higher fertilizer costs were affected by a higher price of fertilizer of about five RSD per kg. The analysis of the share of the other elements of variable costs determined that the share of seed in 2012 was slightly higher than in 2011 (0.26%), the share of pesticides and fuel was lower (0.50% and 0.95%, respectively), while the share of the contracted services was twice as lower (10%) (Graphs 2 and 3).

Table 2: Structure of the variable costs in the maize production on the surveyed localities in 2011 and 2012

Categories of variable costs	2011				2012			
	kg (l/ha)	RSD/ kg(l)	RSD/ ha	% of TVC*	kg (l/ha)	RSD/ kg(l)	RSD/ ha	% of TVC*
Seed costs	-	-	6763.00	11.08	-	-	6633.00	11.34
NPK	299.70	41.69	12559.00	-	284.43	48.08	13575.00	-
Urea	139.29	42.07	5879.00	-	178.24	45.24	8018.00	-
KAN	225.51	29.58	6605.00	-	243.72	31.98	7801.00	-
AN	233.33	34.00	7900.00	-	202.31	42.31	8536.00	-
Fertilizer costs – total	-	-	22470.00	36.81	-	-	30036.00	51.35
Pesticide costs	-	-	4936.19	8.09	-	-	4438.03	7.59
Fuel costs	-	-	13225.90	21.67	-	-	11534.84	19.72
Costs of the contacted services	-	-	13643.00	22.35	-	-	5848.00	10.00
TVC	-	-	55086.00	100.00	-	-	58489.00	100.00

Source: Authors' calculation
* TVC – Total variable costs
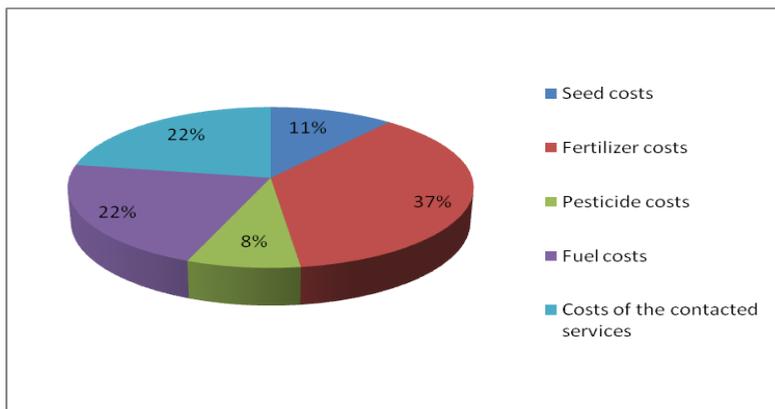
Graph 2 Structure of the TVC in 2011
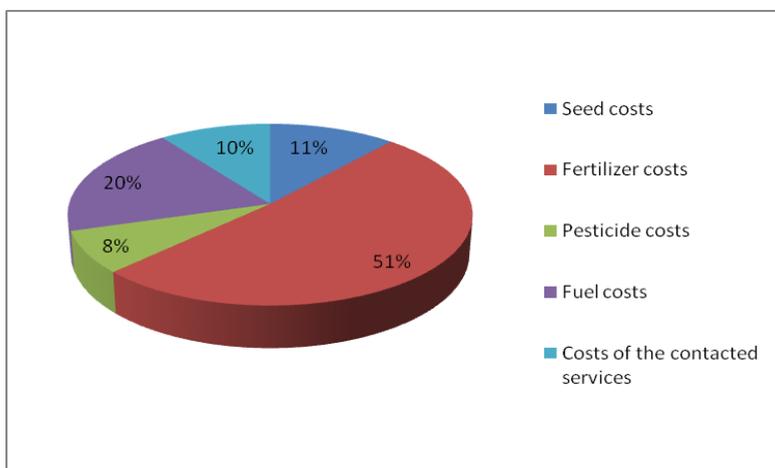
Graph 3 Structure of the TVC in 2012

The beginning of vegetation period in the both respective years was characterised by dry and warm weather, with a higher amount of precipitation in 2012, higher than the optimum amount for that period of year. In 2011, as in 2012, the accumulation of winter moisture in the ground was sufficient for sowing, germination and sprouting, due to a lot of precipitation during January and February.

May was a favourable month for maize growth and development because of the amount of precipitation that was slightly lower than the optimum in 2011 but

significantly higher than the optimum in 2012, and favourable temperatures in the both years with almost equal mean monthly temperatures.

Early June was favourable in the both years, due to a sufficient amount of precipitation in May; yet this situation lasted only until high temperatures occurred after the 20th of June. Year 2012 was characterised by high temperatures and a lower amount of precipitation, significantly lower than the optimum amount needed for the development of maize in this part of year.

A negative trend of high temperatures and lower amounts of precipitation continued in July, and it was more expressed in 2012. High temperatures and the lack of precipitation caused strong/extreme droughts in 2012 at the time when maize was in its most sensitive generative growth phases. The maximum temperatures went up to 40˚C.

Very warm weather with the minimum amounts of precipitation continued through August and September of the both years, although the weather was slightly more favourable in 2011, due to the absence of extremely high temperatures of air, characteristic for 2012.

Due to worsening of environmental conditions in 2012, there was a decrease in the yield for about 1800.00 kg/ha on average on the respective farms, when compared to 2011.

Table 3: Precipitation amounts and mean monthly temperatures in the period April – September on the surveyed localities in 2011 and 2012

Month	Mean precipitation (mm)*		Optimum distribution of precipitation during vegetation (mm)**	Difference in precipitation amounts when compared to the minimum (mm)		Mean monthly temperatures of air (˚C)*	
	2011	2012		2011	2012	2011	2012
April	23.13	80.55	50	-26.87	30.55	12.34	12.73
May	70.08	124.35	75	-4.92	49.35	16.07	16.2
June	48.04	22.37	90	-41.96	-67.63	20.67	22.86
July	70.68	62.9	100	-29.32	-37.1	22.53	25.38
August	6.61	2.18	95	-88.39	-92.82	22.96	23.82
September	29.05	15.14	80	-50.95	-64.86	20.3	19.71

*Source: * Authors' calculation based on the report by the Republic Hydrometeorological Service of Serbia for 2011 and 2012*
**taken from: Menadzment ratarske proizvodnje (Field Crop Management) (Petar Muncan & Dragic Zivkovic), Belgrade, 2006, pp. 127

After analysing the share of total variable costs and gross margin value of production and analysing climatic factors, their effects on maize production were shown for the both years. The share of variable costs was higher than in 2011 and it accounted for 47.65%, while the share of gross margin decreased to 52.34% of the value of production, which implies that both economic and environmental conditions were more favourable in 2011 (Graph 4).
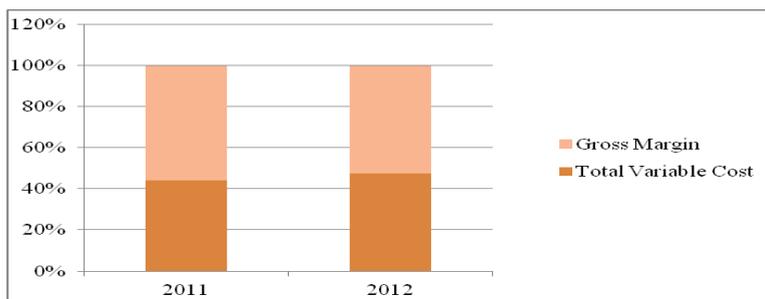
Graph 4 Share of the TVC and the GM in the maize VP in 2011 and 2012

4. Conclusions

Based on the analysis of gross margin indicators for farms in the Republic of Serbia, it was determined that the value of production and the gross margin for maize in 2012 were lower than in 2011, while the total variable costs were higher. Approximately the same value of production in 2012 was entirely due to a higher price, despite a significantly lower yield in 2012, which was a direct result of more adverse environmental conditions of production. The environmental conditions in 2012 were characterised by a severe drought. Prices of inputs were higher in 2012, which led to higher expenditures on inputs. When compared to 2011, the share of variable costs in the total value of production was larger in 2012, that is, the value of gross margin decreased for about eight per cent. In the both production years farmers spent most on purchase of fertilizers and fuel, and for the contracted services.

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PRODUCTION OF SUNFLOWER AND RAPESEED IN METROPOLITAN AREA BELGRADE-NOVI SAD AS SUPPORT TO BEEKEEPING DEVELOPMENT[1]

Bojana Bekić[2], Svetlana Roljević[3]

Summary

In the paper authors analyzed production of sunflower and rapeseed in the metropolitan area Belgrade-Novi Sad, considering the fact that these are economically very important melifferous plants. Authors presented the relation that exists between crops production and beekeeping, from the aspect of ecological and economic benefits. Special emphasis is put on the connection of ecological crop farming and beekeeping.

In Vojvodina, sunflower is third the most important crop, after wheat and maize. Sunflower is one of the most important melliferous plants in our country, whose yield depends on pollination successfulness by bees, which activity depends on amount and quality of nectar related to plant variety, sowing time, applied agro-techniques, soil moisture and rainfall, during flowering. In compare to sunflower, which is entirely cross-pollinating plant, rapeseed is partially cross-pollinating plant, which can be pollinated by bees. In both cases, benefits from this mutual "bee-plant" activity, have both crop farmers and beekeepers. Each year, ecological production is increasing. Ecological crop farming combined with beekeeping practice contributes to biodiversity preservation together with favorable social and economic effects. Successful ecological crop production considers, among other, using of domestic varieties adapted to local environmental conditions and therefore more resistant to pests and diseases. On the other hand, one of the basic demands of ecological honey production is pasture on crops non-treated with artificial chemicals or on areas under natural vegetation. Also, in ecological production it is not allowed to use genetically modified crops and honey, which contains pollen gathered from genetically modified plants, must be properly labeled. Certificate about ecological production is a guarantee of product's safety for people and environment. Considering that demand for ecological products increases each year, which is the result of increased fear of

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consumers regarding non-quality food with possible negative health consequences, possible strategy of agricultural producers could be their reorientation on ecological farming methods.

For the analysis of sunflower and rapeseed production in metropolitan area Belgrade-Novi Sad, authors used official data of Statistical Office of the Republic of Serbia for period 2001-2012. Data are used for obtaining descriptive statistical parameters interpreted in the paper. Metropolitan area Belgrade-Novi Sad includes 11 municipalities: Beočin, City of Belgrade, Inđija, Irig, City of Novi Sad, Pančevo, Pećinci, Ruma, Smederevo, Sremski Karlovci and Stara Pazova. Besides official statistics data, authors used relevant domestic and foreign scientific and professional literature presented by: papers published in scientific journals and proceedings, books and monographs, reports at national and international level.

According to available statistical data, metropolitan area has 537.449 ha of agricultural land, which is 10,5% of agricultural land in the Republic of Serbia. In observed area, industrial crops are produced on 13% of arable land. One third of areas under industrial crops are covered by sunflower, while rapeseed is produced on 2,3% of these areas, in average. By comparing variation coefficients it can be concluded that variability of areas under rapeseed is 5,7 times larger than variability of areas under sunflower. In average, the most significant areas under sunflower are in Belgrade, than Ruma and Pančevo, while the most significant areas under rapeseed are in Pančevo, Belgrade and Inđija. However, in 2012, the largest areas under sunflower were in Pančevo, Pećinci and Belgrade, while rapeseed was presented the most in Belgrade and Ruma. Areas under sunflower have negative average rate of change (-1,52%), while areas under rapeseed have positive rate of change (16,72%). Total sunflower production in metropolitan area varies from 29.618 - 51.456 tons annually, with average rate of change -0,08%, which can be explained by decreasing of areas under this crop during the last years. Variability of total production is 14,56%. However, variability of rapeseed production is about 6 times higher, but with positive average rate of change (18,34%). Average rapeseed production at the territory of metropolitan is 3.500 tons annually. Average sunflower yields in metropolitan area are about 2 t/ha and are lower than the republic average which is 2,2 t/ha. Authors determined positive rate of change of yield per hectare 0,28%, with variation coefficient 8,30%. Rapeseed yield is about 1,3 t/ha, which is also lower than republic average, with high variation coefficient and positive average rate of change (9,9%) in observed period. To improve and support beekeeping development it is important to stimulate production of sunflower and rapeseed and especially, development of ecological methods of crop farming for the purpose of production of products with added value, more attractive for export at foreign markets.

Key words: crops, beekeeping, production of ecological products

JEL classification: Q 10

1. Introduction

The most important oil plants in Serbia are sunflower and soya bean, but in the last few years, more areas are under third oil plant - rapeseed (Marinković et al., 2011).

Sunflower is very profitable crop due to its small demands for moisture and nutrients, which this plant efficiently takes and uses from deeper soil layers. Sunflower is resistant to drought and do not require large agro technical investments, and therefore it is very suitable for our agricultural production conditions. Pollination of sunflower by bees is very important in production of this crop. Free (1964) indicates that sunflower yield can be increased by putting of bee colonies in the sunflower crop and that, on the other hand, sunflower yield is decreased if bee colonies are mowed away from the crop. Similar research results have Nderitu et al. (2005). Importance of sunflower as melliferous plant originates from the time period of flowering, large number of flowers per area unit and from significant potential of flowers to create nectar. This pasture can be significant in honey production where honey characteristics of sunflower hybrid and weather conditions have the key role (Ion et al., 2007).

Production of rapeseed in these areas has long tradition, but areas under this crop are being increased only in recent years. Production of biodiesel in the world caused greater interest for rapeseed because its seed has larger oil content. Some studies suggest that there is a possibility of higher rapeseed yield after being visited by honey bees, although this plant is being considered as self-pollinated plant (Nedić et al., 2013, Sabbahi et al., 2005, Sidddique Munawar et al., 2009;). On the other hand, there are results that showed that using of bees as pollinators did not or slightly influenced at increase of rapeseed yield (Koltowski, 2005). Different results can be explained by using of different crop varieties, by conducting of studies in different ecological conditions as well due to differences in research methodology. Analyzing the honey potential of rapeseed, Nedić et al. (2013) concluded that this crop is reliable but insufficient pasture for bees in Serbia.

2. State of sunflower and rapeseed production at Metropolitan area Belgrade-Novi Sad

For this research, Metropolitan area includes eleven municipalities: Beočin, The City of Belgrade, Inđija, Irig, The City of Novi Sad, Pančevo, Pećinci, Ruma, Smederevo, Sremski Karlovci and Stara Pazova. According to the official statistical data, this area has 537.449 ha of agricultural land, which is 10,5% of total agricultural land of Republic of Serbia. Structure of agricultural land utilization in Metropolitan area is presented by Graph 1.
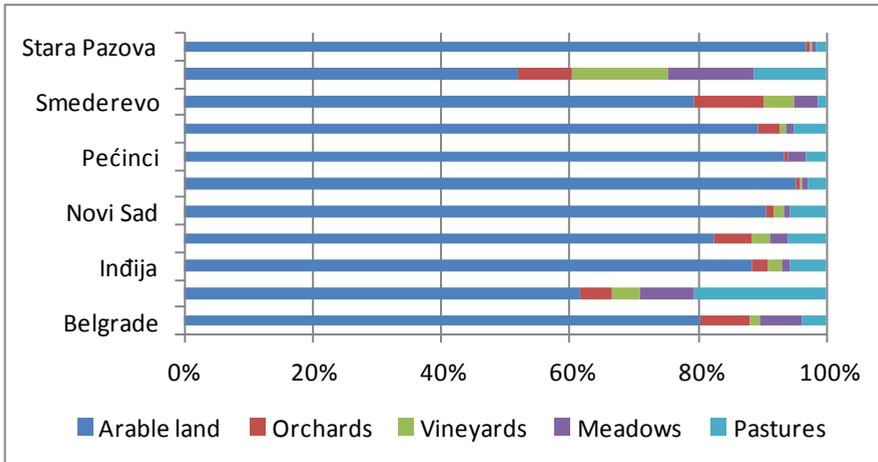
Graph 1 Structure of agricultural land utilization
in municipalities of Metropolitan area

The largest part of agricultural area in Metropolitan is presented by arable land, about 84,7%, and the least areas are under vineyards, about1,4%, which indicates at existence of extensive production. At arable areas dominate production of wheat, industrial and forage crops, and the least areas are under vegetables (Graph 2).
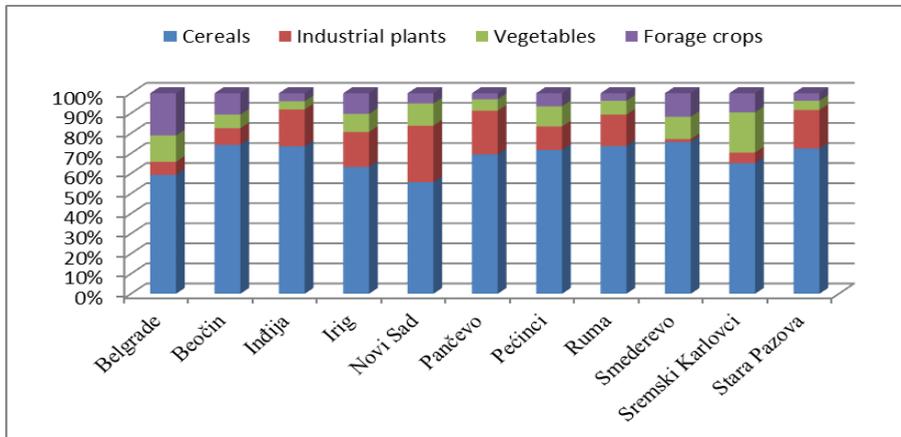
Graph 2 Structure of production at arable land
in Metropolitan area Belgrade-Novi Sad

Industrial plants are produced at 13% of arable land. One third of areas under industrial plants is covered with sunflower, while rapeseed is produced at 2,3%, in average.

The most significant areas under sunflower are in Pančevo, Beočin and Pećinci, which in average have 43%, 13% and 9% of total areas under sunflower in Metropolitan area. Values of variation interval as well as values of variation coefficient indicate the instability of sunflower market, which impacts the presence of areas under this crop. The least areas under sunflower are recorded in 2007, and the largest in 2003 (Table no. 1.). For period 2001-2012, it is determined negative annual rate of change of areas under sunflower, which does not have to seriously impact the production volume.

Unlike sunflower, rapeseed production is increasing, as evidenced by the rate of change of 16.72% annually. Area under rapeseed in Metropolitan area is still quite low and for the analyzed period is averagely 1,600 ha. The most important areas are located in Belgrade, Pančevo and Ruma. High value of the coefficient of variation indicates high degree of dispersion of values in the series.

Table 1: Areas under sunflower and rapeseed
in Metropolitan area Belgrade-Novi Sad, ha

| Crop | Average | Variation interval | | CV (%) | Change rate (%) |
		min	max		
Sunflower	18.192	13.931	22.403	12,46	-1,52
Rapeseed	1.600	162	3.126	71,64	16,72

Source: RSO and authors' calculation

Sunflower yield of 2 t/ha is somewhat lower in compare to perennial republic average. Wide variation interval indicates significant impact of weather but also inadequate agro-techniques application. Average yields in analyzed time series are practically unchanged considering the value of rate of change (Table 2).

In production of rapeseed there are low yields of only 1,3 t/ha where lack of rainfalls or irrigation, as well as losses caused by state of agricultural mechanization are the main reasons. Wide variation interval as well as high values of variation coefficients prove the significant impact of weather conditions on the production of this crop and unadjusted production technology for this crop. So, the least yields are recorded in 2002, while in later period there is an increase of yield considering larger experience of producers.

Table 2: Yield of sunflower and rapeseed at the territory
of Metropolitan area Beograde-Novi Sad, kg/ha

Crop	Average	Variation interval		CV (%)	Change rate (%)
		min	max		
Sunflower	1978,90	1764,23	2259,63	8,30	0,28
Rapeseed	1279,16	571,65	2510,22	50,40	9,9

Source: RSO and authors' calculation

Sunflower production in Metropolitan area at annual level is averagely 33.500 tons (Table 3). Considering mild decrease of areas under this crop and constant average yields, it is expected mild decrease of the total production. Dry year 2012 had negative consequences on field crops production, and therefore on sunflower so, the smallest yields refer to analyzed time series in 2012 and the highest in 2008.

Table 3: Total production of sunflower and rapeseed at the territory
of Metropolitan area Belgrade-Novi Sad, tons

Crop	Average	Variation interval		CV (%)	Change rate (%)
		min	max		
Sunflower	33.520	29.618	51.456	14,56	-0,08
Rapeseed	2.578	277	7.633	98,53	18,34

Source: RSO and authors' calculation

Total rapeseed production in Metropolitan area varies from year to year, which is indicated by very high value of variation coefficient. The smallest production volume is achieved in 2005. For analyzed series there is production growth of 18,34% of average rate.

3. Pollination of crops and ecological production of honey

Bees are the most important pollinator of sunflower, where in our climatic conditions optimal relative air moisture for sunflower pollination is between 40-50% and optimal air temperature is from 20-28°C.The largest impact on nectar quantity and bee visits of this plant species have weather conditions and agro-techniques, as well as type of hybrid, where the impact of external factors is probably more important than genotype (Miklič et al, 2002). The sunflower yield largely depends on genotype and according to the same author, the largest nectar content among sunflower hybrids in our country, has hybrid NS-H-111, which is the most attractive for bees. Sunflower usually blossoms at the end of June, that is

at the beginning of July, and it is intensive pasture because daily honey impact can be to 10kg, and from one hectare of sunflower one can collect to 250 kg of honey (Umeljić, 2010). To guarantee pollination, recommendation is to put 2 bee hives at one hectare of sunflower. This cooperation of crop farming and beekeeping practice gives double benefit - sunflower production is more secure, and considering that sunflower is honey plant, one can get significant honey yield. Rapeseed, for beekeepers more important winter rapeseed which blossoms in April, is a good nectar and pollen plant whose flowering can last to one month. Rapeseed honey has specific light yellow color and crystallizes fast. Bee society develops fast at rapeseed, they build comb regularly and larger amounts of wax can be obtained (Umeljić, 2010). In our country, areas under rapeseed are increased and it can be expected to be planted at area of 50.000-60.000 ha. Rapeseed is grown because of the seed which contains 40-48% of oil and 18-25% of proteins. From one hectare of rapeseed in full flowering, bees can collect to 80 kg of honey, and on plots with good agro-techniques to 195 kg (Marinković, 2009).

Decrease of honey production at sunflower pasture as well as decrease of seed yield, is recorded during the last years in our country, which matches with general decrease of agro-techniques level, mainly with decrease or total lack of fertilization (Miklič et al, 2000). On the one hand, lack of sufficient fertilization negatively impact sunflower yield and thus beekeeping pasture and honey yield, and on the other hand it should be stated that many studies shown that there is negative relation between excessive application of certain agricultural chemicals, bees health and safety of bee products. Agricultural chemicals, in application in conventional crop farming can be accumulated not only in bee products but also in the body of bees. For example, some insecticides as in the case of neonicotinoids, is contributed to be one of the causes of drastic decrease of bees population in the world[4]. Pesticides such as imidacloprid, from the group of neonicotinoids, toxically impact the bees and it is being used in protection of sunflower. Sub lethal doses of this pesticide negatively impact on bees' life length, formation of brood, development of hypopharingeal gland and bee queen activity. Imidacloprid can impact at the immune system of bees and appearance of diseases due to chronic intoxication with small doses. In countries with long tradition of honey production, such as France, known for production of sunflower honey, many pesticides used in conventional agriculture, are banned due to activity of strong beekeeping lobby.[5] According to Bogdanov (2006), sources of contamination of bee products may trough water, air and plants reach bees but also by activity of the beekeeper. Besides pesticides, large part of contaminants is from inadequate beekeeping

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[4]http://www.efsa.europa.eu/en/press/news/130116.htm?utm_source=homepage&utm_medium=infocus&utm_campaign=beehealth
[5] The World of organic Agriculture, Statistics and Emerging Trends 2011

practice and beekeeper can by adjusting its work, decrease concentration of some unwanted substances in the honey.

Large risk for organic beekeeping in the world represents also production of genetically modified organisms, such as genetically modified rapeseed, whose pollen and nectar bees collect and which is in expansion in the world. Bees do not distinguish genetically modified crops from conventional or organic crops and pollen collected from genetically modified crops can be detected in honey. Export of honey from Canada to Europe, due to large areas under genetically modified rapeseed, was drastically decreased. In Europe, upper limit for content of genetically modified components in food is 0,9% and all products with higher content of genetically modified components in the food must be clearly labeled. However, considering that honey has from 0,1 to 0,5% of pollen, its labeling is not required. From this reason, organic food producers in Europe, insist that maximal level of genetically modified components in food be 0,1%[6]. In Serbia, and many countries of European Union, there is no commercial production of genetically modified rapeseed (Gordana Zdjelar, 2011).

In protection of bees and their products, for beekeepers the most important is limitation or exclusion of various contamination sources of bee products. One of ways to achieve this is to start with organic beekeeping methods which require that all wax and swarms used in beekeeping must be organically produced, that is synthetic pesticides are banned, feeding of bees must be only with organic honey or organic sugar and for varroa one must use only organic acids, etheric oils and biotechnical methods. One of the basic conditions that must be achieved in organic beekeeping is quality pasture at natural vegetation or organic crops. Pasture at genetically modified organisms is not allowed. In organic crop farming it should be fully respect crops rotation, which is mean measure against diseases and pests, use of organic fertilizers in optimal amounts, use organic seed and right choice of hybrids. In EU countries, beekeepers understood the significance of organic beekeeping and so beekeepers who are potential entrepreneurs realize that it is profitable to be "green", that is to protect the environmental quality, maintenance of essential ecological processes and life support systems, the preservation of genetic diversity of the bee and the capitalization and protection of pollination (Anca A. POPA et al., 2012). In European Union there is a strong demand for organic honey and beekeepers that can give such honey get better price for their product. Industrialized countries cannot produce enough quantities of organic honey and there is a great demand for import, especially of unifloral honey[7]. Production of organic honey in less developed countries is interesting from

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[6] The World of organic Agriculture, Statistics and Emerging Trends 2011

[7] Apimondia - first world conference on organic beekeeping (2010), *Organic beekeeping, the way to pure natural honey*, p.5

financial point, because beekeepers can get higher price for organic honey in compare to conventionally produced honey. On the other hand, domestic producers in less developed countries are not ready to pay higher price for organic honey. Estimation of organic honey market in Europe in about 6.500t/year that is 2% of total honey market, of which about 2.500t belongs to Germany (POCOL Bianca Cristina and Anca Aurora POPA, 2011). In world there is about 0.9% of agricultural areas under organic agricultural production, where in some countries percent of total areas under organic production is over 10% (Willer H. and Kilcher L, 2011). Organic production of apiary products in Serbia is still small, in compare to total amount of beekeeping products. In 2012, total number of organic hives was 4.394 with 2.610 hives in conversion period[8]. Arable land used for organic production is on area of over 11.000 ha, mainly under orchards while crop farming is on 41% of organic arable areas, which is small in compare to natural resources in our country.

4. Conclusion

Availability of agricultural land and favorable climatic conditions for sunflower and rapeseed production at the territory of Metropolitan area is not used. Having in mind that industrial crops are grown at about 13% of arable land there are certainly potentials for expansion of these areas which would have positive effect on honey production. Considering that organic products have increasing importance at European market, larger support and effort should be given to involve potential producers to plant more areas under organic crops which would positively impact development of organic beekeeping in Serbia.

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FRUIT PRODUCTION IN SERBIA
DURING THE TRANSITION PERIOD[1]

Bojan Dimitrijević[2], Branka Kalanović-Bulatović[3], Slobodan Ceranić[4]

Summary

Difficult and long-term process of transition which the Republic of Serbia went through in the last more than twenty years, globalization, wars and embargo in the nineties of the 20th century and finally, world economic crisis that began in 2008 have contributed to changes in standard of living, unemployment rate and migration.

Under the given circumstances, fruit production represents a potential for mitigating and perhaps even overcoming the unemployment crisis, rural depopulation and increase of income of rural population.

Accordingly, there is a need to consider the condition realistically and to identify existing problems, their causes, some possibilities and further tendencies of resources and activities in the fruit production sector in order to develop a highly profitable agricultural branch in our country.

Data bases of the Statistical Bureau of the Republic of Serbia, Food and Agriculture Organization of the United Nations (FAO), Statistical Office of the European Union (Faostat) as well as scientific and research literature from the

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areas directly or indirectly related to the topic will be used as the sources of data for writing the work.

Several methods will be used in the work: content analysis method, descriptive statistics, comparation method and hypothetical-deductive method.

Key words: *globalisation, transition, crises, fruit, production.*

JEL classification: *Q 10*

1. Introduction

Fruit production, wherever present and developed, is one of important factors behind the development of agriculture and food industry as well as other industries such as cosmetic, pharmaceutical, chemicals industry, etc. Exporting of fresh fruits and fruit products could generate significant foreign exchange revenue. Therefore, fruit production certainly could have significant position in the overall economic development of a country.

That is precisely why the analysis of the current state and change in the scope and dynamics of fruit production in one country, and beyond, is an important prerequisite for the development of not only the primary fruit production, but also the entire food and other industries, and therefore the economy of a country as a whole. This becomes even more important if the economy of a country finds itself in conditions of very rapid and dynamic changes in all crucial aspects of its existence (political, economic, social), as was the case in Serbia in the last 25 years.

In this context, the aim of this research is to investigate the tendencies, regarding the extent, dynamics and structure of fruit production in Serbia for the period from 1988 to 2012 and to assess the present state of this agricultural branch. This analysis opens up the possibility of identifying some opportunities and future directions of resource movement and activities in the production and processing of fruit in Serbia in order to develop fruit growing as a highly profitable branch of agriculture in our country.

2. Materials and methods

National and international statistical databases such as: Statistical Office of the Republic of Serbia, Food and Agriculture Organization of the United Nations (FAO), Eurostat (Statistical Office of the European Union) have been used as data resources for this research paper were. The results of previous research by other authors published as scientific literature in the field directly or indirectly related to the topic have also been analyzed.

Methods used during the development of this paper are content analysis method, method of descriptive statistical analysis, comparative method and hypothetico-deductive method.

The research covers the1988 – 2012 time period, in order to analyse the situation a cuple of years just before transition and all the way long through the whole transition period. For the purpose of analyzing the changes this research focuses on, generally, average values of the parameters observed for a period of three consecutive years have been taken into consideration. This is an attempt to ease noticeable fluctuations due to the changing climate, as well as other short-term factors that appeared in certain observation periods (social, economic, political, etc). Time periods between two average values within three-years during the observation period (1988-2012), coincide with the emergence and actions of distinct and complex political, economic and social changes (globalisation, wars, economic sanctions, global economic crisis, human migrations) that have had and still have far-reaching influence on the production and processing of fruits in the Republic of Serbia.

3. Results and discussion

In total agricultural production value 68.5% comes from plant production (SORS, 2012). The total value of fruit production in 2012 was almost half a billion dollars and accounted for around 15% in the value of total plant production.

In the foreign trade of agricultural and food products, among the top ten products of agricultural origin in the value of export in 2012, out of fruits, in the third place are frozen rolend raspberries, worth 136 million USD, and sour cherries in eighth place, worth 48 million USD. These data suggest that it is necessary to pay special attention to the production of fruits.

Fruit production in the Republic of Serbia has a centuries-old tradition, and for decades represents a significant branch of agriculture and profitable economic activity. The geographical position of Serbia and its climate factors are the key to the successful cultivation of mainly continental fruit crops of all kinds, both with extensive or intensive farming. This certainly contributes to the fact that Serbia is predominantly highland and mountainous, with many areas and locations with different soil types, different quality, but with good enough qualities to successfully organize intensive fruit production.

It should also be noted that in comparison with other branches of agriculture, fruit growing, is characterized by a number of comparative advantages. In the context of the problems observed, only a few of them should be pointed out. For this purpose can be used even soils with poorer physical, chemical and biological properties, as well as areas with greater slope, which gives this production orientation even

greater importance. Fruit production can reach from 10 to 20 times greater value of production per unit area than the production of wheat or corn *(Vlahovic, 2010, p. 265)*.

The existence of large number of factors entails a high sensitivity of the fruit production to the changes in these factors. In other words, this agricultural branch has a very strong dependence on other industries, and therefore is dependent on general trends around the world and in the country. Changes in these areas have been very dynamic in recent decades.

This is why it can reasonably be assumed that it certainly resulted in changes, but also continued to affect changes in fruit production.

Changes of area harvested, i.e. number of productive trees and vines for the period (1988 – 2012) could be seen by analyzing data presented in Graphs 1 and 2.
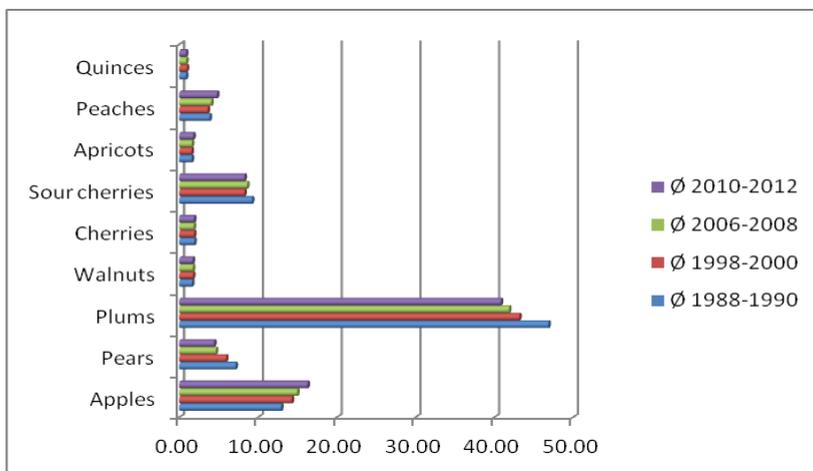
Graph 1 Trends in the number of trees of productive age in Serbia
in the period 1988 – 2012 (000.000)

Average annual growth rate for harvested areas of planted fruits or of a number of harvested fruit tree stubs or grapevines, was at its low for the entire analyzed period (1988-2012). Negative rate of growth was noticed at the harvested areas of grapevine (-2.33%), of pears (-2.12), of plums (-0.65), sour cherries (-0.52) and cherries (-0.13). Positive area rate of growth was noticed with the planted crops of quinces (0.19), walnuts (0.20), apricots (0.64), apples (1.16), peaches (1.27) and raspberries (2.25%).
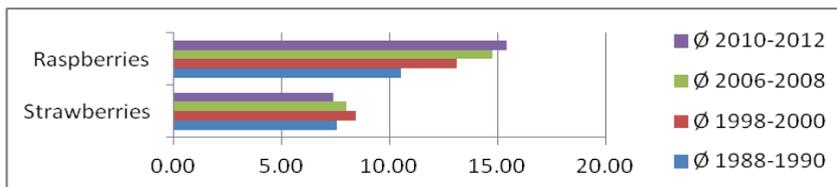
Graph 2 Trends in the number of hectares of Raspberries and Strawberries in Serbia in the period 1988 – 2012 (000)

Tendencies, concerning changes in scope, dynamics and structure of fruit production in Serbia can be detected through data analysis presented in Graph 3.
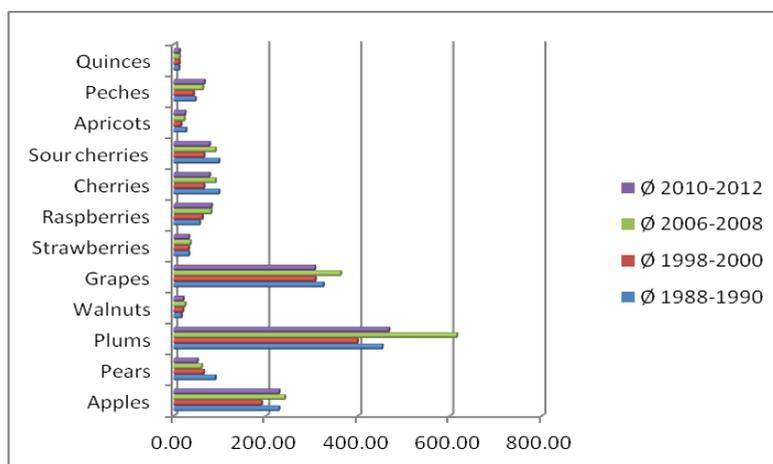
Graph 3 The scope and dynamics of fruit production in Serbia in the period 1988 – 2012 (000 tons)

Fruit production - the total volume in Serbia over the last three years (2010-2012), was, with the notable fluctuation, in average about 1,400,000 tonnes. The average annual growth rate of the total fruit production for the entire analyzed period amounted to - 0.98%. Compared to the average three-year pre-transition sub-period (1988-1990), the total fruit production in the three-year sub-period (1998-2000) decreased by 12.7%. This is by all means a consequence of all the events in Serbia in the last decade of the 20th century.

The second sub-period, however, is characterized by a significant increase in the total volume of fruit production by as much as 32.5%, when compared to three-year averages between just before the outbreak of the great global financial crisis (2006-2008) and the end of the last century. Even when the pre-crisis sub-period is compared to the pre-transition three-year average, there is an indication of the increase in the total volume of fruit production by 15.8%.

Decrease of 14.9% has been registered when compared the average for the last three years of the observed sub-period (2010-2012) and the average of the pre-crisis sub-period (2006-2008). However, comparing the average of the last three-year sub-period (2010-2012) to the last three-year of the previous century, one can note growth in the total volume of fruit production by 12.8%. It is interesting to establish that the last (2010-2012) and the first (1988-1990) three-year averages, for the whole observed period, differ by a little more than 1.5% to the benefit of the pre-transition sub-period.

Average annual growth rate of the entire production of fruits for the whole analyzed period (1988 - 2012) was -0.98%. Positive annual growth rate was noticed only for production of raspberries (1.34%) and peaches (1.32%), but negative for production of plums -1.05%, grapes - 1.71%, apples -0.42%, sour cherries -1.01%, pears -3.28%, and of the rest of the fruit -0.31%.

Table 1: Structure of total fruit production in Serbia
in the period 1988 – 2012 (%)

Product	Ø 1988-1990	Ø 1998-2000	Ø 2006-2008	Ø 2010-2012
Apples	16,17	15,48	14,74	16,43
Pears	6,37	5,23	3,68	3,65
Quinces	0,78	0,91	0,74	0,86
Plums	32,10	32,38	37,67	33,62
Cherries	2,12	1,90	1,66	1,75
Sour cherries	6,92	5,29	5,52	5,56
Apricots	1,85	1,23	1,37	1,73
Peaches	3,29	3,47	3,83	4,75
Raspberries	3,95	5,00	4,92	5,85
Strawberries	2,29	2,58	2,18	2,30
Grapes	23,02	24,95	22,19	22,05
Walnuts	1,14	1,58	1,49	1,45
Total	100,00	100,00	100,00	100,00

Source: Author's calculations based on data of Statistical Office of Serbia
Note: Without data for Kosovo and Metohija

Therefore, the oscillations were distinct, which means that the production was quite unstable, especially the production of some types of fruits. This can be noted by analyzing the productive results of the most important fruit cultures, observed by participation in the total quantity of fruit produced in the Republic of Serbia. This group primarily includes plums, grapes and apples, which account for approximately three-quarters of the total production for the entire analyzed period (1988-2012). In the same period, immediately after are the raspberries, cherries, peaches and pears, which together with the aforementioned group, make up about 92% of the total production, as can be seen from the Table 1.

4. Conclusion

While analyzing the share of fruit in plant production (15%), the share of plant production in the value of agricultural production (68.5%), the share of agriculture and food industry in creating the country's domestic product (which is around 17%, and more than 40% when considered its indirect contribution to creating GDP), we can see that the fruit growing is an important branch of industry in the Republic of Serbia. However, in spite of this fact and many other favorable predispositions for its development, this production in our country, for the entire analyzed period of 25 years (1988-2012) showed great instability that is particularly visible in certain fruit crops, and insufficient use of available productive recourses. In addition to this, given the economic importance of fruit production, it could have been expected that in such a long period of time the areas with orchards and vineyards, as well as yields, significantly increase, but the results of the conducted research showed that such expectations would have been unrealistic. Such is the current situation that the capacities for the production and processing of fruits available in our country as well as the potentials for export are still unexploited enough and that the Serbian fruit growing is facing major challenges in its struggle to survive, not just in the European and world market, but also in the domestic one.

Reasons for this should be looked for in many of the occurrences and processes that befell the economy of our country during the analyzed period. Long lasting and very difficult process of transition that has been going on for more than twenty years, wars and embargoes in the nineteen-nineties, globalization, European integration and the great global crisis, all affected the economy, standard of living and migration. All of this brought great fluctuation in fruit production, as seen in the analysis given in this paper. Namely, changes in the fruit production coincided with the emergence of stated occurrences and processes.

Observed by participation in the total quantity of fruit produced in Serbia, plums, grapes and apples account for approximately three-quarters for the entire analyzed period (1988-2012). Immediately after are the raspberries, sour cherries, peaches

and pears, which together with the aforementioned group, make up about 92% of total production. This ratio has not changed significantly during the entire analyzed period.

Share of areas with orchards and vineyards in total agricultural land is very small (4,71 and 1,1%). This state should point out that the future development should be directed towards increasing the amount of those areas and their participation in the structure of arable and complete agricultural land, given the fact that the conditions exist and that the fruit production is certainly more cost-efficient than the production of many of the agricultural crops that currently occupy the largest areas in Serbia, especially when it comes to export.

In addition to that, production should be intensified, which should be characterized by high yields and good fruit quality, and to modernize and specialize processing capacities. However, fruit production can be highly profitable if only in compliance with the requirements of the market. Besides, it is necessary to increase the volume of production and export of fruits, especially export to countries with higher purchasing power of the population. The export structure should quickly be increased with the participation of high quality and final products. However, european and global market of fresh fruit is extremely demanding, well-organized, with tough competition, but with high profits. The penetration and survival in such market is a complex process and requires a lot of initiatives and investments. Successful exporting of fruits demands good production planning, well-organized logistics and marketing. Therefore, there is a need to increase the competitiveness and recognizability of Serbian fruit.

Development of the fruit production can have a positive impact on the development of primary agricultural production, but also on the overall economy of the country. Thereby, special attention should be given to planning the organization of fruit production in rural areas, and thus to their development.

Fruit consumption per capita in Serbia is very low (around 60 kg). It is necessary to work on raising awareness of the importance of consuming fresh fruits, as the governments of European countries do by participating in such campaigns.

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COOPERATION OF SMALL-SCALE HORTICULTURAL PRODUCERS IN UKRAINE

Volodymyr Ternovsky[1], Olga Mirzoeva[2]

Summary

Cooperation of small horticultural producers and the effectiveness of this cooperation is a very important issue for the development of the agricultural sector in Ukraine.

Therefore, the goals of this study are analysis of existing models of cooperation, and identification of cooperation models which show promise for effective application among small agricultural producers, within the current legal framework, in Ukraine. Additionally this study aims to identify the factors which act as obstacles to the effective development of cooperation among rural citizens. In the process of conducting the study, the following methods were used: dialectical reasoning, abstract logical reasoning and systematic analysis, theoretical and methodological generalization of cooperation theory, definition of the essence of cooperation and its organizational forms. For identification of the main factors inhibiting cooperation, a survey methodology was used. Surveys were conducted among small-scale and large-scale horticultural producers.

This research is based on the fundamental provisions of economic theory, legal documents (e.g. laws, bylaws and regulations), academic publications of Ukrainian and international scholars in the area of cooperation, Ukrainian government statistics, and data from international development projects in Ukraine.

As a result of the study of the main models of cooperation, and in light of socio-economic conditions and legal environment, the agricultural service cooperative was identified as the most applicable model.

The main social, economic and legal road-blocks to the successful development of cooperation among agricultural producers were determined. Among the main economic barriers is poor access to financial resources for small producers, as available credit options have high interest rates.

***Key words:** cooperation, consolidation, horticulture, marketing, financial resources*

***JEL classification:** Q13*

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1. Introduction

In the international arena, Ukraine is considered as a country with immense agricultural potential. The country is endowed with high quality soil, easily accessible water resources and a hardworking population. Of the 60 million hectares of land in the country, 42 million hectares are considered optimal for farming. All of the components to successfully develop the Ukrainian agricultural sector are present, yet this potential is largely undeveloped.

After the restructuring of large collective farms from 1999-2007 there was a division of state-owned land into plots, which were allocated to rural citizens for the purpose of farming. While many rural citizens received land after the division, a number of reasons contributed to the widespread renting of plots to large-scale agricultural producers who are mainly involved in grain production. To present date the rent received for these plots is generally minimal, especially when compared to the profits of the renter, and given socio-economic conditions in rural areas of Ukraine.

Nevertheless, approximately 70-90% of horticulture products, dairy, and meat in Ukraine come from small-scale producers and subsistence farming households. The long term development of these producers is hindered by a number of factors. One of these factors is ineffective implementation of cooperation strategies among small-scale producers.

Cooperation is one of the oldest forms of reciprocal agreement, enabling cooperating members to benefit from market opportunities that would be inaccessible to them as non-cooperating individuals to present date. It is widely considered that cooperation is one of the most important factors to the function of market-based economies. Without the effective organization of cooperative relationships, the links in the value chain are weakened, and as a result all constituents are less effective in their individual functions. The theoretical and methodological fundamentals of agricultural cooperation were established between the end of the nineteenth century and the beginning of the twentieth century by founders such as F. Bouche, U. King, R. Owen, F. Raiffaisen, M.I. Tougan-Baranovsky, and A.V. Chayanov.

In Ukraine, cooperation has yet to be recognized a major factor in supporting agricultural producers. The process of establishing of cooperatives in the sphere of market-related activities of agricultural producers has not become widespread. Functioning of existing cooperatives is not sufficiently stable and efficient. These findings contributed to the undertaking of this study (by Šapolov (2008)).

The main objectives of this study are analysis of existing models of cooperation, and identification of cooperation models which show promise for effective application among small agricultural producers, within the current legal

framework, in Ukraine. Additionally this study aims to identify the factors which act as obstacles to the effective development of cooperation among rural citizens.

2. Materials and methods

In the process of conducting the study, the following methods were used: dialectical reasoning, abstract logical reasoning and systematic analysis, theoretical and methodological generalization of cooperation theory, definition of the essence of cooperation and its organizational forms. For identification of the main factors inhibiting cooperation, a survey methodology was used. Surveys were conducted among small-scale as well as large-scale horticultural producers.

This research is based on the fundamental provisions of economic theory, legal documents (e.g. laws, bylaws and regulations), academic publications of Ukrainian and international scholars in the area of cooperation, Ukrainian government statistics, and data from international development projects in Ukraine.

3. Results and discussion

As was indicated in the introduction, the agricultural sector of Ukraine is largely comprised of small producers with 70-90% of them engaged in dairy and vegetable production. Considering their activities not as merely production, but in broader market context, we can see the following economic problems, which can arise for every agricultural producer. They are as follows:

- Searching for markets;
- Sales of produce;
- Acquiring production inputs (e.g. seeds, fertilizers, equipment);
- Inefficient use of technology, or lack thereof;
- Insufficient storage capacity, or lack thereof;
- Specialist support services (e.g. that of a veterinarian, agronomist)
- Produce processing

These problems cannot be resolved by small producers on their own. As such, the most progressive of them are motivated to use one or another form of cooperation.

Functioning as a link between agricultural units, a cooperative does not pursue interests other than that of its members. A cooperative is controlled by its members and enables them to reap advantages from the organization.

The functioning of cooperative establishments is regulated by principles of cooperation – a system of historically formed socio-economic norms and requirements. Alignment to those principals identifies a cooperative.

From the perspective of the state, cooperation is currently considered as a promising avenue for enabling small farmers and owners of household plots to be competitive in the marketplace. Previous experienceshowed, that with a weak material and technical base, insufficient funds and monopoly action by some market actors(e.g.agriculturalservice providers, input suppliers, and processing enterprises), achieving stable and profitable production is not possible without cooperation in the industry. In the present conditions of economic reform, there is an objective need to connect farms in the cooperative structure in order to improve the efficiency of individual operations (by Gorelova (2011)).

According to the objectives of the study, discussed are cooperatives which provide services to small agricultural producers such as processing, procurement, storage, sales, and transportation. The study analyzes the organizational and economic aspects of the activities of cooperatives providing such services. Summarizing the above, we can conclude that cooperation is a multifunctional phenomenon, which enables its participants to deepen their specialization, improve the overall quality of services, overcome the barriers to market entry, save time, and accelerate the achievement of specific goals (by Šapolov (2008)).

In general, cooperatives can be grouped together for a number of attributes: purpose of creation, source of origin, size of mutual funds, etc. In agriculture, however, we can distinguish two main categories of cooperatives: production and service (by Šapolov (2008)).

In order to determine the more appropriate model of cooperation for small producers, a study was conducted, looking at fundamental differences between the two models of production and service cooperatives for study was used results of conducted researches by Bondarchuk et al. (2011) and Cimbal (2010).

After analyzing the differences and advantages of each type of co-op, we can conclude that the service cooperative is most suitable for small producer cooperatives because its legal status and operational principles permit the following:

- Unification of small producers as both natural persons and legal entities;
- Members of the cooperative will focus on the production of produce. Other activities such as procurement of supplies and sales and marketing of produce are taken on by the co-op and its hired workers;
- Establishment of more democratic principles, where one member of a cooperative has one vote. The influence of one's vote in a production cooperative is often dependent on ownership stake;
- Minimization of the tax burden while conducting legitimate business with formal financial statements, due to non-profit status.

Table 1: Main differences between production and service cooperatives

Differentiating factor	Type of cooperative	
	Production	**Service**
Ownership	Cooperative owns the land and the production assets, the owner of end products	Cooperative owns production assets; end product of the members remains their individual property
Participation right	Only individuals that are founders and owners. Number of members limited.	Natural or legal persons are the owner-clients that delegatetheir activities to the cooperative
Purpose	Profiting from agricultural production	The provision of services necessary for the activities of its members farmers
Labour	Activities of the cooperative carried out mainly by members of the co-op	Not applicable/hired workers
Status	Commercial entity	Non-profit organisation
Income distribution	Dividends are distributed among members according to their labour participation and property contribution (share)	Earningsis allocated in proportion to the volume of services provided by the cooperative to its members
Limitation on profits	None	Not-profit orientation
State regulation	As a rule, in the form of an enabling legislative environment	Tax relief and subsidised credits
Investments	Multiple sources of investments	Investments mainly from clients
Taxation	Profit and dividends are taxable	Non-profit status
Clients	As a rule, persons who are not the owners of the cooperative	As a rule, persons who are owners of the cooperative

Source: Bondarchuk et al. (2011) and Cimbal (2010).

Our judgements are confirmed by ML Zach, who posited that small-farmer (peasant) cooperatives do not destroy the individual peasant, and vice versa: "Thanks to cooperation, a new type of peasant farming has emerged, where for the individual producer only the core work of agricultural production remains, while other business transactions of purchase, sale, financing and processing are performed through the collective strength of an organized unit" (Zak (1919)).

Ukrainian legislation defines an Agricultural Service Cooperative as: a cooperative, created primarily to provide services to members of the cooperative and to other

non-members to carry out their agricultural activities. Agricultural service cooperatives cannot dedicate more than 20% of their activity to servicing non-members.

The agricultural service cooperative is created on the basis of mutual benefit and economic cooperation. The Law of Ukraine "On Agricultural Cooperation" categorizes service cooperatives depending on which activities they engage in (processing, harvesting, marketing, supply-chain logistics, or multi-service). A more detailed list of services that a service cooperative could provide, may appear as such:

- Storage and sales of produce;
- Processing of agricultural produce and lumber;
- Supply chain logistics management;
- Production of certain agricultural products (seedlings, young poultry, swine and cattle breeding, etc.);
- Repair of agricultural machinery and its maintenance;
- Transport services;
- Gas supply, telephone, "computerization" of agriculture;
- Execution of certain types of agricultural work (plowing, harvesting, pest and disease management of agricultural crops, artificial insemination of livestock, veterinary services);
- Implementation of construction work orders and project documentation;
- Production of certain types of fertilizer, machinery and equipment;
- Consulting services (e.g. accounting, finance, audit, agronomic, zootechnical, economic, etc.)

One of the most important prerequisites for the formation and success of the service cooperatives is not only in the spatial concentration of agricultural producers, but also the concentration of producers of similar products. Also of importance is the support of government and agricultural associations in cooperative formation. A strong leader is alsocritical to driving the process of cooperative establishment and management.

In the absence of appropriate organizational and economic conditions, cooperatives face serious challenges dueto the lack of initial capital for the formation of the material and technical base, the selection of specialists with a cooperative mindset, sales, production, accounting and reporting, taxation, credit, etc. For the determination of negative influence on agricultural service cooperative development was used researches of Pantelejmonenko (2008) and Rižik (2011). At the same time it was conducted among small-scale agricultural producers. The results are introduced in Table 2.

Table 2: Negative factors influencing the development
of agricultural service cooperatives

Groups of factors	Influence
Public-legal	- Inadequate legislative support in terms of recognizing the non-profit nature of agricultural service cooperatives; - Ambiguous status of cooperative taxation; - Lack of support from local government authorities; - Lack of informational support; - Lack of adequate public funding
Economic	- Limited access to credit; - Lack of resources to support learning from international experience in cooperation - Limited amount of working capital, fragmented structure of the agricultural market; - Negative impact of intermediaries, namely their monopoly in the market for support services; - Aggressive competitive environment
Organizational	- Lack of structured vertical cooperation, cooperative distribution centers, etc.; - Low level of knowledge or misinformation about the benefits of cooperation; - Lack of experience in the management of shared resources; - Lack of management capacity among cooperative members; - Absence of a specific strategic plan for the development of cooperatives and markets in rural areas; - Lack of qualified personnel; - Failure of elected Board members to fill their functions
Socio-psychological	- Absence of universally recognized methodological understanding of the agricultural service cooperative; - Heightened sense of risk associated with mutual funds; - Distrust between members of the cooperative; - Comparison of cooperatives to collective farms in the Soviet Union; - Low level of initiative among members of the cooperative; - Temptation to move from the cooperative form of a commercial business; - The spread of "pseudo-cooperatives."

Source: the results of research and survey.

Most of the points of negative impact on cooperative development are indicated by many authors in their scientific work. At the same time they offer solutions to these problems, which are based on the theoretical and practical experience of the formation and functioning of cooperatives.

We propose to draw on the experience of international development projects that operate on the territory of Ukraine. The work of these projects, to varying degrees, is aimed at developing small producer cooperatives.

In our opinion, the most successful case of practical application of cooperation principles among small producersis by the Ukraine Horticultural Development Project (UHDP). The Project (2008-2013) was implemented by Mennonite Economic Development Associates (MEDA) in the network of international technical aid in accordance with Memorandum of Cooperation between Canadian and Ukrainian government represented by Canadian International Development Agency (CIDA) (http://en.uhdp.org.ua/)

For a partial levelling of the negative impact of the factors described in Table 2, the Project staff took the following approach:

- The initial stages of cooperation of small producers employed the "lead-farmer" model. Lead farmers served as informal leaders of producer groups.
- Project staff, in communications with producers, avoided using the word "cooperative", in light of with its negative perception and association with the old SovietKolhoses (collective farms). Instead, the following language was used in describing the cooperation: consolidation cluster, group of farmers, informal cooperation
- Educational programs and trainings for managers of cooperatives were developed and implemented in order to transfer knowledge about the basics of cooperative management.
- Audit firms assisted in the development of record keeping systems and provided accounting support services for the first few months of operation of the cooperative. This has greatly helped in the organization of documents and in reducing the tax burden on cooperatives.
- A financial institution (Agro Capital Management LLC.) was created tofinance the development of members of cooperatives(small farmers and owners of household plots) as well as cooperatives themselves, by providing discounted leasing of agricultural equipment.

The steps described above, among other actions, led to the effective operation of the cooperatives created during the period of activity of the Project.

We see that the organization of service cooperatives in Ukraine requires a series of stepsto create effective conditions for the development of agricultural service cooperatives as an integral component of the agro-industrial complex of Ukraine. It follows that it is necessary to produce educational material on generating the conditions requiredto enable the development of agricultural service cooperatives, as an essential component of the agricultural service industry in Ukraine. In the

development of agricultural service cooperatives, we propose the following main directions:

- Comprehensive informational support, from government, of the agricultural cooperative movement;
- Promotion and governmental support of Ukrainian integration processes with regards to the formation of local institutions in the sphere of agricultural cooperation;
- Application of the experience of international development projects for improvement of legislation around cooperatives;
- Promotion of the development of agricultural service cooperatives by easing the tax burden;
- Strengthening of partnerships between agricultural cooperatives and institutions of higher education
- Acquisition of experience in international collaboration among producers, specifically in the area of agricultural cooperation;
- Strengthening competitiveness of domestic service cooperatives by improving product quality;
- Attracting a wide range of socially active groups and individuals to the development of agricultural cooperatives through direct economic participation or promotion of the cooperative self-help ideology

4. Conclusion

As a result of the study of the main models of cooperation, and in light of socio-economic conditions and legal environment, the agricultural service cooperative was identified as the most applicable model for advancing the agricultural sector in Ukraine. It is of our opinion that this model of cooperation is the most effective in remedying the existing negative attitude in Ukraine toward cooperation. Additionally, the agricultural service cooperative provides benefits to small producers in servicing both the production and sales of their produce.

The main social, economic and legal road-blocks to the successful development of cooperation among agricultural producers were determined. Government must work more intensively on the development of a strategy for cooperation among agricultural producers and provide incentives to stimulate the creation of cooperative units. Among the main economic barriers is poor access to financial resources for small producers, as available credit options have high interest rates.

The authors of the study recommend conducting informational sessions/trainings with rural populations, applying the experience of international development projects.

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THE STATE AND DEVELOPMENT TENDENCIES OF FRUIT AND VEGETABLE SUBCOMPLEX WITH CONSIDERATION OF REGIONAL PECULIARITIES

A. S. Ovchinnikov, O. S. Oleynik, N. N. Balashova[1]

Summary

The development problems of a fruit and vegetable sub-complex in the risky conditions of the Volgograd region agriculture are discussed in the article. The organizational and economic assessment is given to formation of the fruit and vegetable production regional market; the major factors influencing its development are defined.

Keywords: *fruit and vegetable sub-complex, agricultural producers, sale*.

JEL classification: Q10, Q12

1. Introduction

Reliable population support with food of a good quality domestically produced is nowadays the most important mission of Russian economy. Fruit and vegetable sub-complex development is a one of the essential factors of saturation of the food market, because its products are considered as major among the group of the population essential food.

In spite of the fact that Volgograd region is in the risky agriculture zone, its weather conditions permit the agricultural commodity producers of the region to organize the production of the fruit and vegetable competitive products of a good quality.

2. Fruit and vegetable production in Volgograd region

Volgograd region's quota in the crops of the vegetable and melon cultures on the farms of all categories in Russian Federation during last 10 years didn't decrease less 9% and made from 9% in 2002 till 12,7% in 2007. In 2011 vegetable and

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melon cultivated area in the farms of all categories of the region made 102.4 thousand hectares (11.5% of crops in Russian Federation) (Table 1).

Table 1: Vegetable and melon crops on the farms
of all categories in 2002-2011 thousand hectares

	2002	2003	2004	2005	2006	2007	2009	2010	2011
Russian Federation	838.0	853.9	795.3	741.5	754.0	776.2	809.1	809.8	891.5
Volgograd Region	75.8	82.2	82.8	68.3	81.1	98.3	92.8	81.5	102.4
Specific weight of the Volgograd region in the Russian Federation, %	9.0	9.6	10.4	9.2	10.8	12.7	11.5	10.1	11.5

Vegetable, melon and fruit as well as the vegetable crops are irreplaceable raw materials for industrial production. Crops' size of the potatoes and vegetable and melon cultures for the analyzed period were varied in dependence of the demand for their processing products in the limits from 102.4 thousand hectares in 2005 till 136.1 thousand hectares in 2011. For last 10 years (since 2002 till 2011) the crops for the vegetables and melons on the farms of all categories increased for 10.0 thousand hectares (46%) and in conformity with it for 1.8 thousand hectares (34%). On the contrary, fruit crops' plantings have slightly changed (from 17.6 thousand hectares up to 21.8 thousand hectares), the most outstanding results were achieved in 2002, and the poorest results were in the 2011. For the period 2002 to 2011 the area of the fruit crops' planting has reduced for 4.2 thousand hectares (19%).

Marketing relations developed in agriculture affect the cultivation of not only regionally traditional agricultural crops. In recent years the structure of the cultivated areas of the vegetable crops has changed. Thus, among the other vegetable crops, that made 15% in 2011, the quota of the beet, the garlic and the vegetable marrows increased, so their part in the vegetable crops has proved insignificant and make a little more than 8%.

In recent years in the region we can see a steady tendency of the vegetable crops' height. In 2011 in comparison with 2002 the vegetable's gross collecting increased almost by 2.5 times, in general for the account of their crops' increase (on 46,1%) and productivity's increase (on 65.0%). The potatoes and fruit-berries crops' manufacture in 2011 was almost at level of 2002, because it decreased on 2.5% and, accordingly on 0.9%.

Table 2: Vegetable, melon and fruit crops' manufacture
in all categories of farms in 2011, thousand hectares

	Volgograd region	Southern Federal District (SFD)	Russian Federation (RF)	Specific weight of the Volgograd region in SFD, %	Specific weight of the Volgograd region in RF, %
Melon food crops	275.8	595.9	1574.6	46.3	17.5
Potatoes	377.9	1641.7	32681.5	23.0	1.2
Vegetable crops, in total	840.6	3113.5	14696.2	27.0	5.7
Including:					
Onions	302.4	900.4	2122.7	33.6	14.2
Carrots	92.7	193.4	1735.0	47.9	5.3
Cabbage	101.7	308.1	3533.4	33.0	2.9
Tomatoes (of an open ground)	147.6	635.3	2200.6	23.2	6.7
Cucumber (of an open ground)	47.9	205.3	1202.4	23.3	4.0
Pumpkin	43.6	159.3	616.3	27.4	7.1
Vegetable marrows	193.0	153.6	559.6	12.6	3.4
Beet	17.5	98.9	1072.3	17.6	1.6
Garlic	5.7	29.0	234.0	19.7	2.4
Fruits and berries	148.6	781.4	2926.7	19.0	5.7

For the last ten years the maximum gross collecting of the vegetables in all categories of farms was obtained in 2011 and comprised 840.6 thousand tons, the minimal gathering held in 2002 and made 337.2 thousand tons. Fruits and berries were collected in the biggest quality in 2003 that made 164.4 thousand tons, and in the smallest quantity in 2006 that made 61,6 thousand tons (Picture 1).

The main producers of the vegetable crops of the open and closed ground, of the fruit and berry crops and of the grapes in the region are the population farms. Since 2002 till 2011 their quota in the total amount of the potatoes' manufacture made more than 93%, vegetables of the opened and closed ground made from 42 till 79%, melon and food crops made from 49 till 83%, fruits and berries made from 79 till 97% (including small-fruit patch that made till 100%), grapes made 100%.

The population farms cultivate in general such vegetable crops as tomatoes, cabbage, cucumbers, garlic, pumpkin, vegetable marrows, beet, and peas. In 2011 their quota in the total amount of this crops' manufacture in the region made from 45.7% on beet till 100.0% on garlic and green peas.
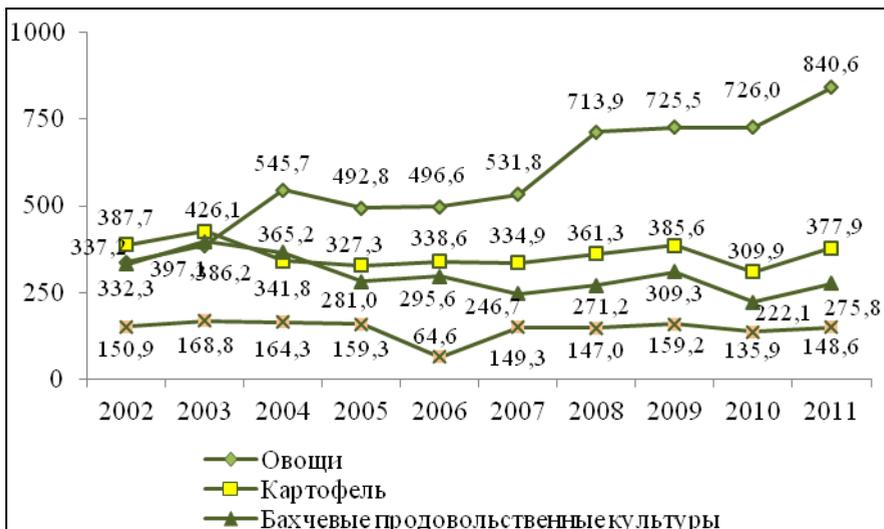
Picture 1 Manufacture dynamics of the fruit and vegetable production
on the farms of all categories of the Volgograd region, thousands of tons

In comparison with the level of the 2002, in 2011 we could see the height of the population's manufacture of all major types of vegetable crops. In 2011 cucumbers' and cabbage's manufacture significantly increased (in 3.0 and accordingly in 2.2 times), on 62,6% - tomatoes, on 58.9% - carrots, on 61.7% - garlic, on 49.1% - onions, on 26.5% - beet (Table 3).

In comparison with the level of the 2010, the vegetables' manufacture in 2011 on population farms also increased (in spite of the beet and the garlic). In 2011 the collecting of tomatoes grew to 3.8 thousand tons plus (3.6%), cucumbers have grown up to 0,5 thousand tons (1.3%), cabbage – up to 7.0 thousand tons (11.2%), pumpkin – up to 1,9 thousand tons (5.2%), vegetable marrows on 0.9 thousand tons (5.2%). The collecting of potatoes and fruit and vegetable crops by the population in comparison with the level of the 2010 increased on 62.3 thousand tons (20.9%) and accordingly 12.2 thousand tons (9.3%).

In reforming years of the agro-industrial complex the farms and the individual entrepreneurs became an integral part of the agricultural production. Carrots, onions, melon food crops, beet, tomatoes and cabbage made the main part of the vegetables cultivated by farmers.

One of the most important indicators of efficiency of the agricultural crops cultivation is the productivity.

On the average on region in the period analyzed, on farms of all categories we could see the steady tendency of the productivity increase of the vegetable crops (except in 2004). For the last ten years vegetable productivity increased from 163.9 till 270.5 centners of hectares (65%). On the contrary, fruit and berry crops productivity from year to year varied from 41.7 till 115.5 centners.

Table 3: Main vegetable crops' manufacture on farms of the population
of the Volgograd region at 2002-2011, thousand tons

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Onions	18.6	18.6	14.8	12.1	15.3	16.0	20.4	20.6	20.7	27.7
Carrots	10.1	12.1	12.5	11.3	11.4	12.6	15.2	17.4	15.5	16.1
Cabbage	31.5	46.9	30.8	25.3	31.1	31.3	35.4	68.3	62.1	69.1
Tomatoes	67.2	84.4	42.5	68.7	76.7	66.1	67.7	93.0	105.4	109.2
Cucumbers	14.1	26.4	19.9	18.1	24.0	21.6	24.4	28.6	42.2	42.8
Beet	6.3	8.3	8.0	7.4	6.9	8.7	10.8	13.2	10.4	8.0
Garlic	3.5	3.2	4.1	3.8	4.2	5.7	6.7	6.0	5.8	5.7
Pumpkin	0.03	48.1	57.2	49.9	30.7	26.1	32.6	30.7	36.6	38.5
Vegetable marrows	-	13.6	15.7	12.4	10.1	8.6	11.1	16.8	16.8	17.7

For the analyzed period vegetable crops productivity in the region annually exceeded the average indicators on Russia. So, the least excess was in 2004 (on 0.1 centner of hectares), the greatest excess was in 2010 (on 75.7 centners of hectares) (Picture 2).
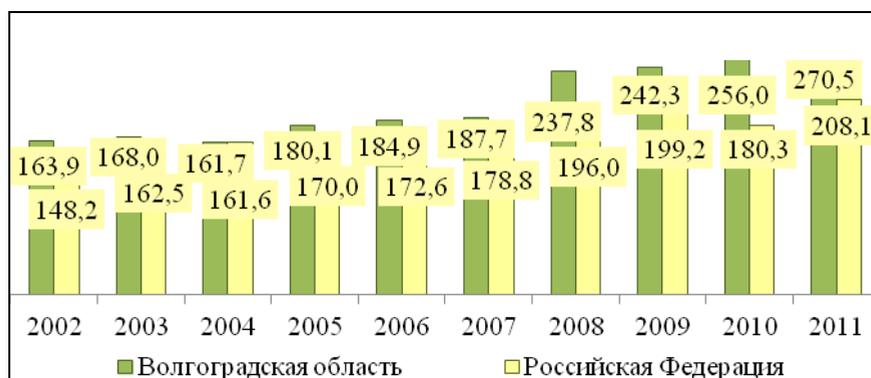
Picture 2 Vegetable crops productivity on farms of all categories, centner/hectare

In comparison with 2002, in 2011 in the region we could see the productivity increase of all the main kinds of vegetable goods. In 2011 onions productivity increased in 2.7 times, cucumbers – in 2.2 times, pumpkin - in 6.1 times, carrots – on 74.5%, cabbage – on 58.1%, tomatoes – on 63.0%, beet – on 28.2%, garlic – on 7.4%, vegetable marrows – on 60.0% (Table 4).

Table 4: Vegetable crops productivity on the farms of all categories in Volgograd region at 2002-2011, centner/hectare

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Onions	148.3	146.8	155.2	199.9	210.1	217.5	346.1	349.1	346.0	395.6
Carrots	126.3	131.2	142.1	151.8	176.3	165.4	213.1	255.6	253.0	220.4
Cabbage	184.8	236.3	196.0	196.2	192.1	191.2	225.8	299.7	271.1	292.2
Tomatoes	142.6	145.2	153.3	183.2	208.6	199.2	175.7	208.9	239.4	232.4
Cucumbers	124.7	153.1	136.0	131.9	151.3	136.5	154.5	188.0	287.6	278.9
Beet	171.9	176.4	138.5	167.1	166.3	172.5	220.8	280.7	266.5	220.4
Garlic	77.5	72.7	84.7	89.9	83.4	89.5	96.2	89.2	85.5	83.2
Pumpkin	34.3	213.0	220.8	222.8	170.8	111.7	190.1	175.6	289.4	207.8
Vegetable marrows	124.2	194.7	202.8	180.2	184.7	186.5	228.7	178.2	184.1	193.7

In recent years, agricultural goods' producers of the region expended amounts of work upon the improvement of the soil fertility under the crops. Mineral fertilizers under vegetable crops and potatoes were introduced annually at 2002-2011. In 2002 agricultural organizations introduced under vegetal crops 87 kilograms of mineral fertilizers on a hectare of the crops, and in 2011 it made 117kg [2].

For the analyzed period, mineral fertilizers for vegetable crops cultivation have been applied in 13 districts of Volgograd region cultivating this kind of production, that allowed them in 2011 to get vegetable productivity higher than on the average in the region on 7.1 – 32.3%.

Domestic fruit and vegetable production is in the increasing demand on the Russian internal market. In comparison with 2002, in 2011 the realization of the vegetable cultures in the region increased almost in 5 times (on 292.5 thousand tons).

The sale of the vegetable goods is being carried out by agricultural organizations. Over the last ten years they realized from 41 till 76% of vegetables. Since 2006 farms and individual entrepreneurs much increased the volumes of the vegetable crops realization. For this period they realized from 42 till 48% of goods. Population farms' quota in the realization of the vegetable production is insignificant and makes from 2% till 12% (Table 5).

Table 5: Realization of the vegetables on farm categories
of the Volgograd region in 2002-2011, thousand tons

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Farms of all categories	74.1	97.7	158.7	194.1	253.8	259.2	314.8	376.5	366.6	366.6
Including: Agricultural organizations	54.7	69.3	121.2	129.8	128.4	124.6	166.1	164.1	150.5	163.4
Farms and individual entrepreneurs	10.7	19.4	34.1	50.1	114.0	108.8	132.6	177.7	177.3	161.0
Population farms	8.7	9.0	3.4	14.2	11.4	25.8	16.2	34.7	38.8	42.2

The main sales channel of the agricultural production is the sale of the cultivated crops directly to the processing organizations and organizations of the wholesale trade (including enterprises and organizations carrying out purchases for state and municipal needs), in the market, through their own shops. In 2011 on this channel large and average agricultural organizations realized 88.6% of vegetables and 99.9% of fruits and berries; including the realization through their own shops, tents, booths and also in the market they sold the tenth part of potatoes and on the average no more than 5% of vegetables. In more degree through this sale channel, among vegetable production, 8-10% of greenhouse and hothouse cucumbers, tomatoes and carrots from total amount were realized.

Table 6: Average consumer prices on fruit and vegetable production
and potatoes in Volgograd region at 2002-2011, rouble/kg

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Potatoes	10.48	7.01	7.55	9.24	10.36	13.52	15.44	11.92	31.41	11.48
Fresh white cabbage	10.54	4.06	5.97	8.75	8.34	17.64	7.89	11.74	31.37	9.02
Onions	10.17	8.21	7.59	9.52	12.70	13.78	8.13	13.96	23.18	8.69
Beet	9.46	8.02	8.59	10.12	12.21	13.95	12.20	10.52	24.10	12.92
Carrots	9.08	7.18	7.15	11.54	11.24	14.78	12.88	12.90	27.88	12.58
Garlic	42.34	44.95	48.55	46.74	49.01	61.28	52.19	90.10	134.75	66.90
Fresh cucumbers	60.00	68.30	51.98	52.08	62.23	67.46	77.40	65.23	77.11	91.87
Apples	27.15	20.14	22.86	30.65	40.53	41.69	52.73	43.86	60.55	54.69

In 2002-2011 years we could see the ambiguous consumer prices dynamics for the fruit and vegetable production. In relation to the last year, the highest rates of the rise in prices were registered in 2002, 2005, 2007 and 2010, that was caused by a

considerable rise in price for potatoes and separate types of vegetable crops. In 2011 the greatest reduction of consumer prices for fruit and vegetable production was noticed. It changed on 38.1%. In a year potatoes became cheaper in 2.7 times, vegetables – in 2.3 times.

Table 7: The consumption of vegetables, potatoes and fruits and berries
in the RF and in the regions of the Southern Federal district
per capita a year at 2002-2011, kg

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetables and melon food crops										
Russian Federation	80	84	85	87	90	93	99	102	101	106
Republic of Adygeya	107	107	108	110	108	116	115	122	123	129
Republic of Kalmykiya	57	62	68	75	84	96	98	107	90	103
Krasnodar Kray	88	86	88	99	106	110	126	130	130	132
Astrakhan region	133	133	135	135	139	146	158	162	165	165
Volgograd region	**135**	**140**	**141**	**151**	**152**	**152**	**158**	**161**	**162**	**166**
Rostov region	87	93	99	94	102	106	118	124	130	137
Potatoes										
Russian Federation	106	109	108	109	110	108	111	112	104	110
Republic of Adygeya	86	81	82	70	71	61	63	61	61	62
Republic of Kalmykiya	25	25	26	26	30	34	41	41	44	47
Krasnodar Kray	79	77	81	80	79	78	84	84	84	88
Astrakhan region	71	76	83	91	98	104	116	115	116	116
Volgograd region	**125**	**135**	**132**	**131**	**132**	**131**	**131**	**132**	**131**	**135**
Rostov region	83	87	99	94	94	91	101	100	92	92
Fruits and berries										
Russian Federation	39	39	43	46	48	51	53	55	58	60
Republic of Adygeya	30	33	34	38	44	46	55	60	63	65
Republic of Kalmykiya	19	20	22	23	24	25	27	28	31	32
Krasnodar Kray	60	71	77	88	88	89	94	95	96	97
Astrakhan region	35	35	38	40	43	51	56	62	66	65
Volgograd region	**68**	**69**	**71**	**70**	**69**	**70**	**71**	**74**	**74**	**75**
Rostov region	38	44	47	49	50	53	58	59	64	67

Needs of the population of the Volgograd region in fruit and vegetable production are satisfied at the expense of their own manufacture and a significant import share of some types of goods.

In 2011 level of the region self-sufficiency made: on vegetables and melon food crops – 218.4%, on potatoes – 78.2%, on fruits and berries – 67.3%.

Formation of resources of vegetables and melon food crops, fruits and berries in the region takes place mainly thanking the private manufacture. In 2011 share of production in resources of vegetable and melon crops made more than 57% (at 2002 – 75.5%), and import share was insignificant and made less than 1% (at 2002 – 0.3%). In fruits and berries resources the private production made 62.5% (at 2002 – 70.3%), import share – 32.1% (at 2002 – 22.1%).

In general, among the fruit and berry production, potato and vegetable and melon crops manufactured in Volgograd region, vegetables and melons are exported in rather considerable volumes. Their export share at 2011 made 29.4% and exceeded personal consumption in the region on 32.6%.

In Volgograd region the average per capita consumption of vegetable and melon crops, fruits and berries, potato considerably exceeds the average Russian indicators and indicators of certain subjects of the Southern Federal district. In 2011 consumption of vegetables in the region made 166kg per capita in a year (in RF 106kg), potato – 135kg (in RF – 110kg), fruits and berries – 75 kg (in RF – 60kg).

In Volgograd region during the period analyzed we can register a steady tendency of vegetable and melon crops consumption volumes increase. Over the last ten years their consumption in the region increased on 23.0%. In comparison with the level of the 2010, in 2011 the height of consumption volumes made 2.5%. The consumption of potatoes and fruits in the region for 2002-2011 also had positive dynamics (Table 7).

3. Conclusion

Fruit and vegetable production is a necessary element of population nutrition. According to selective inspection of house farms, share of the fruit and vegetable production and the potatoes in the structure of the expenses on purchase of food in recent years made on the average 13-15% [3].

Development of the agricultural manufacture in the region, formation of enough of resources, creation of the logistics centers and control of the consumer prices of socially important kinds of fruit and vegetable production will permit to stabilize a situation not only in the market of the fruit and vegetable production, but also of the foodstuff in general.

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ECONOMIC EFFICIENCY OF BROILER FARMS IN VOJVODINA REGION[1]

Nataša Vukelić[2], Nebojša Novković[3]

Summary

Measurement of the efficiency of agricultural production is very important issue especially in developing countries. The major problem of the broiler production in Vojvodina region is low level of productivity and inefficiency in resource allocation and utilization.

The objective of this study was to measure the economic efficiency of broiler farms using a nonparametric approach, Data Envelopment Analysis (DEA) which is used to quantify economic efficiencies of broiler farms in Vojvodina region by determining which farms are located on the production frontier and which are not. Data Envelopment Analysis method, one of new methods of operations research, is used very successfully in the last several years for assessing relative efficiency of organizational units having multiple inputs to produce multiple outputs. It was originated by Charnes, Cooper and Rhodes in 1978. It is an efficiency estimation technique but it can be used for solving many problems of management such as ranking Decision Making Units (DMU). DEA develops a function whose form is determined by most efficient producers and indentifies a "frontier" on which the relative performance of all utilities in the sample can be compared: DEA benchmarks firms only against the best producers.

Furthermore, in order to fulfill the objective of the study, the authors were analyzing the performance of the broiler farms in Vojvodina region, their economic efficiencies. Data were collected from 30 broiler farms from which the input-output data were collected by using a structured questionnaire. The multiple-input, single-output production units (the broiler farms) were evaluated with the individual farms being referred to as individual Decision Making Unit (DMU). For the purpose of efficiency analysis, output (y) were aggregated into one category namely, gross margin of the broiler farms, and inputs were aggregated into five categories, namely, feed, day-old chickens, productivity, used energy and capital.

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Analyzed broiler farms were classified into three categories according to their production capacities. The first category included farms with production capacity between 5000 birds and 10000 birds per production cycle. The second category included farms with capacity of more than 10000 and less that 30000 birds per production cycle and the third category included farms with capacity of more than 30000 birds per production cycle.

***Key words:** Broiler production, economic efficiency, DEA method, Vojvodina*

***JEL classification:** C67, Q12*

1. Introduction

Poultry meat production worldwide indicates a steady growth, whereas the situation in Serbia as well as Vojvodina region differs markedly. Since the 1990s, there has been a decline in chicken population, poultry meat production and its consumption (Vukelic et al. 2010). Major reasons for mentioned situation above are low productivity level and inefficiency in resource allocation and utilization, non-existence of vertical integration of poultry producers, a large share of grey economy, lack of institutional support, and obsolete facilities. Moreover, the production takes place in a large number of small- scale farms which are badly organised, non competitive and also lack of concentration and specialisation. Finally, the low living standards and purchasing power have contributed to this situation as well (Rodic et al, 2009, Rodic et al., 2010).

Measurement of the efficiency of agricultural production is very important issue especially in developing countries. The measurement of the efficiency has become very popular for researchers since Farrell published a scientific paper in 1957 in which he developed the concept of technical efficiency based on the relationships between inputs and outputs (Farrell, 1957). Since then, many researchers have been analyzing economic efficiency of agricultural production (Bravo-Ureta and Evenson 1994, Sharma et al. 1999, Wilson et al. 2001, Alvarez and Arias, 2004, Hansson 2007, Manevska-Tasevska, 2012, Galanopoulos et al. 2006, Coelli et al. 2002). Some of them have been analyzing efficiency (technical, allocative and economic efficiency) in poultry production (Heidari M.D. et al 2011 (a), Mahjoor, 2013, Todsadee et al. 2012, Begum et al. 2010, Beshir Hussien, 2011).

The objective of this study was to measure the economic efficiency of broiler farms using a nonparametric approach, data envelopment analysis (DEA) which is used to quantify economic efficiencies of broiler farms in Vojvodina region by determining which farms are located on the production frontier and which are not.

2. Material and Method

The theory and concept of measurement of efficiency has been linked to the use of production functions. Different techniques have been employed to either calculate or estimate the efficient frontiers (Beshir Hussien, 2011). These techniques are classified as parametric and non-parametric methods. The two most popular techniques used to measure farm level efficiency are the stochastic frontier approach, SFA, introduced by Aigner et al. 1977 and the data envelopment analysis, DEA, which was initiated by Farell in 1957 and reformulated as a mathematical programming problem by Charnes et al. 1978. The DEA uses mathematical linear programming methods, whereas the SFA uses econometric methods. Both methods are empirical approaches, both base their efficiency assessments on the best practice in the sample at hand so that the best farms define the efficient frontier and indentified as "best practice units" are given a rating of one or 100%. The remaining farms get efficiency scores according to their relative position to the efficient frontier and it implies how the least efficient farms can become as efficient as the best practice farms (Hansson, 2007). In general, a large number of studies on efficiency measurements argue that a researcher can safely choose any of the methods since there are no significant differences between the estimated results (Coelli et al. 2002).

Data Envelopment Analysis method, one of new methods of operations research, is used very successfully in the last several years for assessing relative efficiency of organizational units having multiple inputs to produce multiple outputs. It is an efficiency estimation technique but it can be used for solving many problems of management such as ranking Decision Making Units (DMU). Each DMU used varying quantities of inputs to produce different levels of outputs.

A few of the characteristics of DEA that make it powerful are: DEA can handle multiple input and multiple output models; It doesn't require an assumption of a functional form relating inputs to outputs; DMUs are directly compared against a peer or combination of peers; Inputs and outputs can have very different units (Heidari et al. 2011 (b)).

One of the options in DEA is a choice between constant return to scale (CRS) and variable returns to scale (VRS). CRS assumes that all DMUs are operating at the optimal scale. Thus, it is assumed that large poultry farms are just as efficient as small ones in converting inputs to outputs. The main problem of the CRS assumption is that in reality it is rear that all farms run their production activities optimally especially in the developing countries due to their heterogeneous farms conditions (Begum et al. 2010). Therefore, VRS overcomes this problem and the specifications of VRS ca permit the calculation of efficiency scores devoid of scale efficiency effects. Another option is to make the choice between output-oriented

and input-oriented DEA model. In output-oriented model the objective is to continue using the same amount of inputs while producing more outputs where as in input-oriented model the objective to produce the same amount of outputs by using fewer inputs. Begum et al. 2010 explains that it is better and more logical for less developed countries, such as Serbia (Vojvodina), to use input-oriented DEA so that scarce resources can be saved and these resources can be used more efficiently to produce the same output. Furthermore, Galanopoulos et al. 2006, interpreted that input-oriented model is more appropriate in the agricultural sector as a farmer has more control over inputs rather than output levels. According to mention above, in order to compute the efficiency of broiler farmers in Vojvodina region, input-oriented model DEA was used in this study using both CRS and VRS specification. The economics of poultry meat production depends on numerous factors, but the most important is general economic policy. Other factors, include the choice of the production technology, labor organization and productivity, and the extent of the exploitation of the productive factors (Heidari et al. 2011). Variable costs (direct costs) in broiler farms include one-day-old chickens, feed costs, costs of used energy (water, electricity, gas, fuel), labor costs, health care costs (medication, disinfection and vaccinations), etc. A number of multiple-input, single-output production units (broiler farms) were evaluated with the individual farms being referred to as individual Decision Making Unit (DMU). Each DMU used varying quantity of inputs to produce different levels of output. DEA method compares each producer with only the "best" producer. For the purpose of efficiency analysis, output (y) were aggregated into one category namely, gross margin of the broiler farms (rsd per 1 kg of produced poultry meat), and inputs were aggregated into five categories, namely, feed (rsd per 1kg of produced poultry meat), one day-old chicks (rsd), labor (wages in rsd), used energy (rsd per 1 kg of produced poultry meat) and capital (rsd per 1000 bird^{-1}). These variables were used as main variable costs because they cover 75 to 80% of the total cost (Begum et al, 2010).

In the DEA methodology, formerly developed by Charnes, Cooper and Rhodes (1978) (CCR), efficiency is defined as a weighted sum of outputs to a weighted sum of inputs, where the weights structure is calculated by means of mathematical programming and constant returns to scale returns to scale (CRS) are assumed. Input oriented model (CRS):

$$\text{Min} \quad \theta + \varepsilon \left[\sum_{i=1}^{m} S_i^- + \sum_{r=1}^{s} S_r^+ \right] \tag{1}$$

st

$$\sum_{j=1}^{n} \lambda_j y_{rj} - S_r^+ = y_{rp} \quad , r = 1, \ldots, s \tag{2}$$

$$\sum_{j=1}^{n} \lambda_j x_{ij} + S_i^- = \theta x_{ip} \quad , i = 1, \ldots, m \tag{3}$$

$$\lambda_j \geq 0 \qquad j = 1, \ldots, n \tag{4}$$

$$S_r^+, S_i^- \geq 0 \qquad r = 1, \ldots, s \ , i = 1, \ldots, m \tag{5}$$

Banker, Charnes and Cooper developed a model (BCC) with variable returns to scale (VRS). Input oriented model (VRS):

$$\text{Min} \quad \theta + \varepsilon \left[\sum_{i=1}^{m} S_i^- + \sum_{r=1}^{s} S_r^+ \right] \tag{6}$$

st

$$\sum_{j=1}^{n} \lambda_j y_{rj} - S_r^+ = y_{rp} \quad , r = 1, \ldots, s \tag{7}$$

$$\sum_{j=1}^{n} \lambda_j x_{ij} + S_i^- = \theta x_{ip} \quad , i = 1, \ldots, m \tag{8}$$

$$\sum_{j=1}^{n} \lambda_j = 1 \tag{9}$$

$$\lambda_j \geq 0 \qquad j = 1, \ldots, n \tag{10}$$

$$S_r^+, S_i^- \geq 0 \qquad r = 1, \ldots, s \ , i = 1, \ldots, m \tag{11}$$

Data were collected from 30 broiler farms in Vojvodina region from which the input-output data were collected by using a structured questionnaire. The period of investigation covered one calendar year from Januar 2011 to Decembar 2011 but the data was collected during the perod of April 2012 to Jun 2012. The date was compiled in Exel and then analyzed using DEA program DEAOS[1]. Analyzed

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[1] www.deaos.com

broiler farms were classified into three categories according to their production capacities. The first category included farms with production capacity between 5000 birds and 10000 birds per production cycle. The second category included farms with capacity of more than 10000 and less that 30000 birds per production cycle and the third category included farms with capacity of more than 30000 birds per production cycle.

3. Results and discussion

In order to improve broiler production in Vojvodina region, Data Envelope Analysis (DEA) was used to compute the efficiency of farms. In Table 1 descriptive statistics of the variables of DEA model are presented.

Table 1: Descriptive statistics of the variables in the DEA model

Variable	Minimum	Maximum	Mean	SD
Feed	71.9878	85.14	79.3658	3.4488
One-old-day chickens	192500	6000000	1138248.3333	1327828.9053
Labour	40000	840000	169498.6667	155472.598
Capital	2822.4	121350	24791.13	28826.301
Bruto margine	4.41	22.03	11.0813	4.6951

Source: The result of the study

The frequancy distribution of efficiency estimates form DEA models and their summery statistics are presented in Table 2. This Efficiency scores were clustered into 6 groups: 0-50, 51-60, 61-70, 71-80, 81-90 and 91-100 to explain their relative position from the highest efficincy frontier 100%. There is a noticable variability in the gain results (lowest efficiency score of 31.63% (CRS) and 85.85% (VRS) and highest score of 100%). Similar result were gain by Todsade et al. 2012 and Begum et al. 2010. Efficiency scores CRS and VRS models, peer group and frequency are displayed in Table 3.

The estimated mean values of efficiency were 73.55% for CRS DEA and 95.97% for VRS DEA (Table 2). Presented results of broiler farms in Vojvodina imply that the inputs of the farms could potentially be reduced by 26.45% if CRS is assumed or 4.03% if VRS is assumed. Moreover, results also show considerable inefficiencies of broiler farms in Vojvodina especially in CRS DEA model. There is a real need to enhance the efficiency of broiler production in Vojvodina by reducing the cost of production while attaining the same level of output. Based on the result presented in Table 3, 9 broiler farms (CRS model) and 12 broiler farms (VRS model) are fully efficient. In Table 4, Frequancy distribution of efficiency

estimates from DEA models based on farm size are displayed. The distribution of efficiency scores show that larger farms have higher efficiency scores that smaller ones.

Table 2: Frequancy distribution of efficiency estimates from DEA models

Number of farms		
Efficiency index (%)	**CRS**	**VRS**
0-50	7	0
51-60	4	0
61-70	2	0
71-80	3	0
81-90	1	4
91-100	13	26
Mean	73.55%	95.97%
Min	31.63%	85.85%
Max	100%	100%

Source: The result of the study

Table 3: Efficiency scores CRS and VRS models, peer group and frequency

DMU	CRS			VRS		
	Efficiency %	**Peer Group**	**Frequency**	**Efficiency %**	**Peer Group**	**Frequency**
Farm 1	90.70	Farm 2, farm 7	0	93.36	Farm 2, farm 7	0
Farm 2	100.00	Farm 2	15	100.00	Farm 2	19
Farm 3	100.00	Farm 3	4	100.00	Farm 3	1
Farm 4	30.95	Farm 2, farm 6, farm15	0	94.87	Farm 2, farm 6, farm15	0
Farm 5	57.20	Farm 2, farm 24	0	94.33	Farm 2, farm 25	0
Farm 6	100.00	Farm 6	10	100.00	Farm 6	10
Farm 7	100.00	Farm 7	5	100.00	Farm 7	2
Farm 8	100.00	Farm 8	2	100.00	Farm 8	3
Farm 9	41.54	Farm 2, farm8	0	90.57	Farm 2, farm 6, farm 8	0
Farm 10	45.05	Farm 2, farm 6	0	98.03	Farm 2, farm 6	0
Farm 11	66.97	Farm 12, farm 24	0	100.00	Farm 11	4
Farm 12	100.00	Farm 12	7	100.00	Farm 12	2
Farm 13	31.63	Farm 2, farm 7	0	89.98	Farm 2	0
Farm 14	47.20	Farm 3, farm 7, farm 24	0	85.85	Farm 2	0
Farm 15	100.00	Farm 15	3	100.00	Farm 15	3

DMU	CRS Efficiency %	CRS Peer Group	CRS Frequency	VRS Efficiency %	VRS Peer Group	VRS Frequency
Farm 16	48.11	Farm 3, farm 12	0	91.24	Farm 2, farm11, farm25	0
Farm 17	65.52	Farm 12, farm 24	0	99.29	Farm 2, farm 11, farm 25	0
Farm 18	73.98	Farm 2, farm 6	0	88.88	Farm 2,farm 6	0
Farm 19	92.97	Farm 12, farm 24	0	93.48	Farm 2, farm 12, farm 24	0
Farm 20	33.82	Farm 2, farm 7	0	84.59	Farm 2	0
Farm 21	77.22	Farm 2, farm 6	0	94.67	Farm 2, farm 6	0
Farm 22	91.81	Farm 12, farm 24	0	98.83	Farm 2, farm 11, farm 25	0
Farm 23	79.15	Farm 2, farm 6	0	96.18	Farm 2, farm 6	0
Farm 24	100.00	Farm 24	8	100.00	Farm 24	2
Farm 25	80.91	Farm 3, farm 12, farm 24	0	100.00	Farm 25	5
Farm 26	50.90	Farm 2, farm 6	0	92.51	Farm 2, farm 6	0
Farm 27	95.29	Farm 2, farm 6	0	100.00	Farm 27	1
Farm 28	50.19	Farm 2, farm 6, farm 15	0	96.57	Farm 2, farm 6, farm 15	0
Farm 29	55.30	Farm 2, farm 6	0	95.76	Farm 2, farm 6, farm 8	0
Farm 30	100.00	Farm 30	1	100.00	Farm 30	1

Source: The result of the study

In DEA studies, the peer group is a group of best practice DMUs with which a relatively inefficient DMU is compared.

Table 4: Frequancy distribution of efficiency estimates
from DEA models based on farm size

Efficiency	CRS Capacity (no. of birds)			VRS Capacity (no. of birds)		
	5000 - 10000	10001 - 30000	Over 30000	5000 - 10000	10001 - 30000	Over 30000
No. of farms	10	14	6	10	14	6
Mean	69.29%	72.68%	82.66%	96.53%	94.46%	98.54%
Min	41.54%	31.63%	48,11%	90.57%	84.59%	91.24%
Max	100%	100%	100%	100%	100%	100%

Source: The result of the study

4. Conclusion

Poultry meat production worldwide indicates a steady growth, whereas the situation in Serbia as well as Vojvodina region differs markedly. Since the 1990s, there has been a decline in chicken population and poultry meat production. Major reasons are low productivity level and inefficiency in resource allocation and utilization, non-existence of vertical integration of poultry producers, a large share of grey economy, lack of institutional support, and obsolete facilities. Moreover, the production takes place in a large number of small-scale farms which are badly organised, non competitive and also lack of concentration and specialisation. Finally, the low living standards and purchasing power have contributed to this situation as well. A general objective of the study was to calculate the efficiency of broiler farms in Vojvodina region by using DEA approach. The result have shown that under costant return to scale, CSR and variable returns to scale (VRS) specification, efficiency are on average 73.55% and 95.97% respectively. Presented results of broiler farms in Vojvodina imply that the inputs of the farms could potentially be reduced by 26.45% if CRS is assumed or 4.03% if VRS is assumed. Among 30 broiler farms that are included in this research, 9 broiler farms (CRS model) and 12 broiler farms (VRS model) are fully efficient. There is a real need to enhance the efficiency of broiler production in Vojvodina by reducing the cost of production while attaining the same level of output. The distribution of efficiency scores show that larger farms have higher efficiency scores that smaller ones.

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INVESTMENTS AND FINANCING IN AGRIBUSINESS SECTOR

APPLICATION OF ACTIVITY-BASED COSTING IN AGRICULTURAL ENTERPRISES[1]

Vladimir Zakić[2], Natalija Borović[3]

Abstract

The subject of this paper is to analyze the advantages and disadvantages of Activity-Based Costing (ABC) in relation to the classical cost accounting methods. Traditional cost accounting methods were created in a time when direct costs of labor and materials were the dominant factors of production and when changes in technology and consumer demand were not so rapid. Allocation of indirect costs, which could not be directly linked to specific products, was based on specific keys: produced volume of different products, direct material costs, direct labor costs and so on. The problem of the traditional cost accounting became evident when the indirect costs (such as maintenance, insurance, production preparation, etc.) reached significant amount or even exceed the direct costs. In terms of producing multiple products, traditional cost accounting methods may underestimate the small batches production cost per unit and overestimate the mass production cost per unit.

In response to these concerns, during the 1980s in United States was created Activity-Based Costing. The conceptual frame of ABC is based on the activities of the company, which can be differentiated in various ways - the primary and secondary, activities that add value and those that do not add value. ABC is a costing methodology that identifies activities in an organization and assigns the cost of each activity with resources to all products and services according to the actual consumption by each. ABC is generally used as a tool for understanding product and customer cost and profitability based on the production or performing processes. As such, ABC has predominantly been used to support strategic decisions such as pricing, outsourcing, identification and measurement of process improvement initiatives.

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In evaluation of the advantages and disadvantages of ABC, there will be used methodology methods such as: quantitative method of comparison, the method of key business processes observation in the enterprise, as well as the inductive method.

The main objective of this paper is to define a model of activity-based costing in specific conditions of agricultural production and assess its practical significance for cost management process improvement. The results of this research will indicate that the application of ABC in agriculture enterprises can improve the accuracy of cost per unit calculation. However, it should be based on careful cost benefit analysis. Development of ABC could be expensive and implementation could be difficult.

1. Introduction

The primary objective of management accounting is to provide the information to the managers of the company. Origin and first use of management accounting, bind to early 19th century in the United States, especially in the textile, railways, iron and steel production and distribution in retail stores. Corporation in these industries were specialized to certain economic activity - production, transport or distribution. Corporate managers have tried to make all or most phases and processes within these activities under their control. They found that higher profits can be created through centralized management of complete process compared to the traditional exchange of output of certain processes in the market. For example, the outputs of various processes in the textile industry, such as wool, fabrics and final products were traditionally exchanged in the market, largely through retailers. In the early 19th century, however, some entrepreneurs in the United States and Britain took control of the various stages in the production process. Initially, the owners felt that centralized management of all stages of the process lead to increased profits, through the increase in production and sales. Soon, however, they came to the conclusion that the increase in profits could substantially be achieved by reducing costs and increasing productivity. With this in mind, we can say that it was the creation and development of management accounting that significantly speed up the creation of large corporate enterprises and capital accumulation.

The difference between traditional and modern management accounting can be best illustrated through cost accounting methods. Traditionally, management accounting is based on the calculation of the full and variable costs and the actual (historical) and planned (standard) costs. Although these methods are used today in the vast majority of manufacturing enterprises, there are also numerous different techniques

that are used in complex modern systems of management costs. In this paper, special attention will be paid to the concept of Activity-Based Costing (ABC), which could be of great importance in the system of cost accounting.

Activity-Based Costing is one of the most important solutions that accounting theory and practice offered in the last decades of the 20th century. The advantages of this concept are especially obvious in companies with a significant share of indirect costs, a wider product range with a number of different activities.

Importance of an ABC and other modern methods of calculation and cost management can be directly related to the competitive strategy of the company. In companies that apply the cost leadership strategy, they can be of great importance. On the other hand, in companies whose strategy is based on differentiation and creation of unique or superior products (e.g. pharmaceuticals or computer components industry) cost management systems have a different role, which primarily involves providing informational support to managers for development and products marketing. The specificity of these activities is reflected in the fact that they require a significant investment in upgrading or creating a new product, for which there is great uncertainty whether it will be profitable, or even whether it will ever be placed on the market.

2. The disadvantages of the traditional costing methods

Before analyzing the modern costing techniques, it is necessary to point out the shortcomings of traditional methods, which occurred at a time when the direct costs of labor and materials were the dominant factors of production and when there were rapid changes in technology and consumer demand. Allocation of indirect costs, which could not be directly linked to specific products, were based on certain keys: volume of produced different products, direct material costs, direct labor costs and so on. The problem with the traditional calculation of the cost became evident when the indirect costs (such as maintenance, insurance, production preparation, etc.) reached significant amount compared to the direct costs. According to some research, in the 1990s indirect costs were usually higher than the direct costs by 150% and the beginning of the 21st century, this difference increased to 600% or even 1000% in highly-automated plant.[1]

In the modern business environment, most of the traditional cost accounting methods lead to inadequate cost. As an example, some well-known authors state that many traditional systems very accurately calculate the cost at a five-decimal (eg, $ 5.71462), but due to the arbitrariness of the calculation, the first digit (five)

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[1] Blocher Edward, Chen Kung, Lin Thomas, (2002): Cost Management– second edition, Mc Graw-Hill Irwin, p. 104.

incorrect.[1] In terms of producing multiple products, traditional cost accounting methods usually lead to underestimation of the cost per unit in small batches and overestimate the cost per unit of mass production. This can be illustrated by a simple hypothetical example of two companies that produce the same products.

Factory A produces annually a million chocolate candies of the same type. On the other hand, the factory B also produces one million candies, but of different sizes and varieties of flavors - a total of 100 different species. Since they are making the same basic product, both plants will have about the same cost of direct labor and materials, as well as the insurance costs, heating, security guards, etc. On the other hand, the factory B will have to employ a much larger number of workers who will prepare the machine for special orders, make new design, improve existing products, promote products and so on. Also, as a result of more differentiated production there will be more stoppage, scrap, overtime etc. In other words, expanding of the product range and complexity of production typically increases indirect costs.

According to the traditional method of cost calculation indirect costs will be allocated first to the appropriate cost centers (e.g. production, administration and sales), and then to the products. If 99% of the total production of factory B refers to the mass production of standard chocolates, then their cost price would include 99% of the total indirect costs (excluding the part that is accounted as period expenses). On the other hand, special orders, which have approximately the same direct labor costs and material costs per unit as mass production (but require special machines preparation for the production and packaging, higher standards of workmanship, etc.) would calculate only 1% of the total indirect costs.

This means that the standard method of cost accounting gives essentially the same cost per unit for standard and special products, not taking into account the different levels and production requirements. Also, the switch to an alternative method of direct or variable costs calculations, would have similar effects: standard and special products have approximately the same direct costs of labor and materials.

3. Activity Based Costing

In response to these concerns, during the 1980s in the United States was created Activity Based Costing. The concept of ABC is based on the activities of the company, which can be differentiated in various ways - the primary and the secondary, the activities that add value and those effects that do not add value. According to the concept of ABC, cost drivers (effects) occur as a result of the

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[1] Kaplan Robert, (2001): Introduction to Activity-Based Costing, Harvard Business School, No 9-197-076, july 2001, p. 3.

performance of different activities and the activities consume resources and create costs for the company. The most important feature of the ABC concept is that it significantly corrects the shortcomings of traditional cost accounting methods, through the connection of the product cost calculation and the varieties and the complexity of their production.

The basic question that should precede analysis of needs and the necessity of of ABC introduction is: Why indirect costs incur? The usual initial response to this question would be that these costs are necessary for the normal conduct of business and the improvement of business enterprises. The problem, however, occurs in the allocation of these costs to individual products or services of the company. ABC system, as a first step in solving this problem involves the identification of a set of activities that indirectly consume resources. There are several examples of these activities in a company: internal transport of materials, machines preparation, improvement or creation of new products and services, quality control, etc. In this sense, the team that designed the ABC program usually asks the following questions to key employees or managers:[1]

- • What kind of work or activity you performe?
- • How much time do you spend doing these activities?
- • What are the resources needed to carry out these activities?
- • What operating data best reflect the performance of the action?
- • What is the value of activity for the company?

After collecting the necessary data and compiling a list of activities, it is necessary to make a selection of key activities. Application of hundreds of activities that could have been identified in the complex manufacturing or commercial enterprise would be costly and inefficient. As a rough measure of the approximation to determine the importance of an activity, the practice will emphasize ignoring activities that use less than 5% of the time of an individual or total resource (expressed in working hours, monetary units, etc.). Number of activities, however, should be based on cost-benefit analysis and the real needs and specifications of each company (size, complexity, activities, etc.).

In the manufacturing companies three categories of activities are clearly distinguished:[2]

1. Unit level activity - the methodology of traditional costing were primarily based on data analysis from these activities: the direct costs of labor and materials, individual inspection of all products and so on.

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[1] Blocher Edward, Chen Kung, Lin Thomas, op.cit., p. 110.

[2] Kaplan Robert, op. cit, p.3-5

2. Batch level activity - these activities occur every time a specific series or batches is being produced: setting machines, giving orders, internal transport of materials, selective inspection or testing of samples of the product group, etc.; resources necessary to carry out activities on the lots or batches of products have relatively fixed nature and usually are not related to the number of units of production within the party.

3. Product sustaining activity - include activities that are necessary to enable the entire production or production of individual types of products: technical design of products, special servicing, making tools, etc. Viewed in a broader sense, in this activity is necessary to include customer support activities (e.g. online or telephone technical support), aimed at enabling sales to the individual customer, but are independent of the volume of sales.

This categorization of activities in manufacturing companies is primarily based on the possibility of allocating the spent resources to the cost of individual products. On the other hand, there are very significant activities that are not included in this calculation, such as investment in research, development and marketing of new products, which can be classified in the activity of the brand creation. It is very difficult to accurately and reliably allocate resources spent in this activity to individual products or services, as is the case with facility sustaining activity (heating, insurance, security, etc).

After selection of key activities, the next step in the implementation of ABC is the allocation of resources spent on the activity, which can be seen in analogy to the traditional methods of cost allocation and the cost centers. Consumed resources can be allocated to individual activities based on direct measures or by estimation. Direct allocation of resources involves the calculation of an activity spending. For example, the proportion of total electricity bills related to the consumption of the machine can be directly calculated. On the other hand, if there is no possibility of direct measurements, it is necessary to make appropriate assessments (e.g. percentage of time that employees spend on performing certain actions).

After allocation of the spent resources on the activity, the next step is the allocation of costs calculated by the activities on the individual products. Depending on the extent of an activity use, the cost of activities are allocate on the individual products. Activity cost drivers are defined as a quantitative measure of output of an activity. Activity cost drivers explain why costs of an activity increases or decreases. An example of the classification of activities and activities cost drivers of the corporation John Deere is given in Figure 1

Illustration 1 Activities in the ABC system: corporations "John Deere"[1]

Activity	Level of activity	Activity cost drivers
Materials purchasing	Unit	Materials Cost
Direct Labor	Unit	Direct labor cost
Machine Operations	Unit	Machine Hours
Machine Setups	Batch	Setup Hours
Production Order	Batch	Number of orders
Materials Handling	Batch	Number of loads
Parts Administration	Product-Sustaining	Number of parts
General and Administrative	Facility-Sustaining	Amount of value added

4. Conclusion

The problem of the traditional costing methods is particularly pronounced for companies that have a wide range of products and / or relatively high indirect costs. Application of ABC can provide a more precise calculation of the cost per unit, which is very important information on which managers make key decisions on the pricing of products, production lines, capital investment, etc.

In addition to the significant benefits of the ABC method, there are also some disadvantages: (1) the arbitrariness in the choice of activities and the allocation of costs to the cost objects, which is particularly pronounced in indirect costs (2) ABC does not include in the cost per unit calculation some very significant expenses related to marketing, research and development, which in the modern business environment can be characterized as an investment, (3) development of the ABC system can last for long periods and require significant costs.

Importance of an ABC in agricultural enterprises depends primarily on the size of the company and the share of overhead costs to total costs. It can be concluded that the use of ABC as a complementary method is fully justified in the larger corporate food industry businesses, which have a wider range of products and a significant share of indirect costs. Traditional cost accounting methods, however, will remain the most important basis for planning and accounting analysis.

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THE GOVERNMENT SPENDING ON AGRIBUSINESS SECTOR MODEL

Vesna D. Jablanović[1]

Summary

This paper studies relation between government spending on agribusiness sector and the political business cycles. Governments try to improve their reelection prospects with the help of expansionary fiscal policies. Rising fiscal deficits before elections are followed by fiscal consolidation afterwards. Namely, this paper examines the relation between elections and government spending on agribusiness sector.

It is supposed that government expenditure has been grouped into two categories: social protection and "economic affairs". Further, it is supposed that the category 'economic affairs' covers support programmes, subsidies and public infrastructure spending in the agribusiness sector.

Therefore, the structure of government expenditure is summarized by a downward-sloping curve, yielding a trade-off between government spending on social protection (as a short-run goal before election) and government spending on "agribusiness affairs" (as a long-run goal afterward).

An opportunistic incumbent policy-maker has no preferences over government spending on social protection and government spending on "agribusiness affairs" per se and cares only about re-election.

Government spending much more on social protection versus "agribusiness affairs" increases before elections.

The basic aim of this paper is to set the model which describes the cyclical movement of the government spending on agribusiness sector. This model explains why government intervention causes cyclical movement of the government spending on agribusiness sector. The main source of conflict occurs between the short-run and long-run government goals.

Key words: *Agriculture, Government expenditure, Fiscal policy*

JEL classification: *Q10 , H50, H30*

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1. Introduction

Incumbent governments try to manipulate fiscal and monetary policy instruments so as to get reelected and stay in office. Voters are assumed to maximise their individual utilities, and the incumbent is assumed to implement those policies that allow her to retain power, to acquire the maximum number of votes or to get re-elected. This economic policy stimulus in turn causes the economy to fluctuate around its long-run path.

The political business cycles (PBC) models studies how interest groups and political pressures within an economy influence its macroeconomic performance. Political business cycles are cycles in macroeconomic variables generated by the electoral cycle. Political cycles in fiscal policy variables are known as 'political budget cycles'. There are two basic types of the PBC models:

(a) Opportunistic models try to show that the incumbent government manipulates the economy using fiscal or monetary instruments just before the election period to maintain power. It is assumed that the policymakers maximize only their pobability of re-election.

Two main lines of research have characterised these models: (i) the traditional (non-rational expectations) framework, and (ii) the rational expectations approach.

Nordhaus (1975) created formal model of the opportunistic political business cycle (PBC). He identifies a cycle in the 'opportunistic' behaviour of politicians interested only in their re-appointment: the incumbent stimulates the economy before the election period so as to get re-elected. The model is based upon the existence of a stable Phillips curve in which growth (and unemployment) depend upon unexpected inflation. Nordhaus derives the following conclusion: (i) the rate of inflation increases and rate of unemployment decreases around the election time as a consequence of the pre-electoral economic expansion; (ii) after each election one should observe low growth and high unemployment. As Nordhaus stressed, political business cycles (PBC) - like phenomena appear in all areas where short-run and long-run trade-offs differ. For example, the privatization has so far been associated with a decline in output an employment only in the short run. Furthemore, Jablanovic (1998, 1999) shows that the privatization can be a generator of the opportunistic and rational political business cycle.

These non-rational-expectations analytical frameworks were further developed during the mid-eighties to incorporate rational expectations and the game-theoretical approach to the positive theory of macroeconomic policy. The works by Kydland and Prescott (1977), Baro and Gordon (1983), Cukierman & Meltzer (1986), Rogoff (1990), and Persson & Tabellini (2000, 2002, 2003)

include rational expectations into the 'opportunistic' framework. They developed rational 'opportunistic' models.

(b) 'Partisan' political business cycles represent fluctuations in macroeconomic variables over or between electoral cycles resulting from leaders having different policy objectives. Hibbs (1977, 1994) presented a model of partisan policymakers. Different parties maximize different objective function. Namely, different parties, when in office, implement different policies: the left-wing party attributes a higher cost to unemployment, and the right-wing party fights inflation.

Alesina (1988) builds a rational expectations model using a 'partisan' framework. He argues that differences in growth and unemployment associated to changes of government (left wing parties or right wing parties) are only temporary. Alesina and Roubini (1992) test Nordhaus' model on growth and unemployment . They consider the OECD countries in the period 1960 – 1987. They state that there is strong evidence to support the rational partisan model . Alesina and Sachs (1988) test the model on post-Second World War United States data. They state that the growth rate of the GNP in the first half of Democratic administrations tends to be higher than in the second half, and vice versa for Republican administrations.

There is evidence of electoral cycles for efects on the budget in several countries: US (Peltzman, 1992), Colombia (Drazen and Eslava 2005), China (Yinin (Leo) Li, 2011)

The basic aim of this paper is to show that if voting is based on economic performance in the recent past and if expectations of government spending on social protection were backward-looking, an opportunistic incumbent would find it optimal to generate a cycle corresponding to his term in office with an economic stimulus before elections and a recession afterwards. The analysis of the relation between government spending on social protection and government spending on "agribusiness affairs" (support programmes, subsidies and public infrastructure spending in the agribusiness sector) surges from the conventional macroeconomic wisdom that there is a short-run trade-off between them, and the supporting evidence that voters are sensitive to both government spending on social protection and government spending on "agribusiness affairs" in their electoral choice. In this sense , it is important to set up the model of the opportunistic political business cycle (PBC) , extended to include fiscal policy.

It is supposed that government expenditure has been grouped into two categories: social protection and "agribusiness affairs". Further, it is supposed that the category 'agribusiness affairs' covers support programmes, subsidies and public infrastructure spending in the agribusiness sector.

Therefore, the structure of government expenditure is summarized by a downward-sloping curve, yielding a trade-off between government spending on social protection (as a short-run goal before election) and government spending on "agribusiness affairs" (as a long-run goal afterward).

Government expenditure
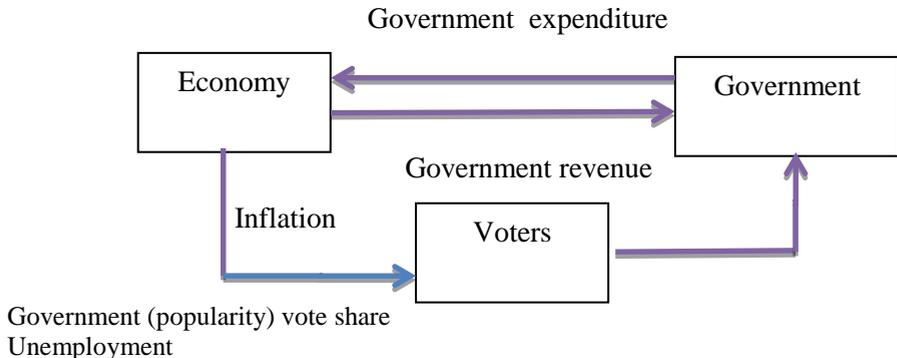
Figure 1 Interactions between the economy and the polity in a politico-economic model

It is supposed that an opportunistic incumbent policy-maker has no preferences over government spending on social protection and government spending on "agribusiness affairs" per se and cares only about re-election.

The basic aim of this paper is to set the model which describes the cyclical movement of the government spending on agribusiness sector . This model explains why government intervention causes cyclical movement of the government spending on agribusiness sector. The main source of conflict occurs between the short-run and long-run opportunistic government goals.

2. The model

The assumption underlying the opportunistic political business cycle model can be characterized as follows:

A.1. It is supposed that government expenditure has been grouped into two categories: social protection and " agribusiness affairs".

A.2. The change of government spending on "agribusiness affairs" (Δa) is described by

$$\Delta a = -\alpha \left(s_t - E_{t-1} s_t \right) \tag{1}$$

where a - government spending on "agribusiness affairs" (support programmes, subsidies and public infrastructure spending in the agribusiness sector); s - government spending on social protection ; E – an expectations operator ; α-parameter.

A.3. Adaptive expectations of government spending on social protection

$$E_{t-1}\, s_t = s_{t-1} \tag{2}$$

mean that expected government spending on social protection is determined by past values of government spending on social protection.

A.4. Government spending on social protection is directly controlled by the policymakers.

A.5. Voters are "retrospective". They judge the incumbent's performance based upon the state of the government spending during the incumbent's term of office. Voters are myopic, they heavily discount the future. Voters are myopic in the sense that they consider the economy's present performance and that is why they heavily discount the future.

$$v_t = -\frac{s_t}{2} + \beta\, \Delta\, a \tag{3}$$

where v – voter's period utility stream; β - parameter.

A.6. It is supposed that politicians are "opportunistic"; they only care about holding office. Politicians are identical and they prefer to stay in office. Party affiliations are ignored.

$$V_t = v_t + \pi\, v_{t-1} \quad 0 < \pi < 1. \tag{4}$$

where V – the government vote share;

A.7. The policy-maker controls a fiscal policy instruments. Government intervention can affect the economy. Fiscal policy under the discretionary control of elected leaders can be used to affect agribusiness-cycle activity. Government leaders can stimulate the economy by reducing government spending on social protection and increasing expenditures on 'agribusiness affairs'. They can also constrict the economy with opposite changes in these fiscal policy tools.

A.8. The timing of elections is exogenously fixed.

Substituting (1), (2), (3), into (4) yields

$$V_t = -\frac{s_t^2}{2} - \alpha\, \beta\, s_t + \alpha\, \beta\, s_{t-1} - \frac{\pi\, s_{t-1}^2}{2} - \alpha\, \beta\, \pi\, s_{t-1} + \alpha\, \beta\, \pi\, s_{t-2} \tag{5}$$

The government maximizes its vote share at elections. There are election periods (E) and non-election periods (N). Let t= E in (5) and, hence, t-1 = N and t-2 = E. Then,

$$V_E = -\frac{s_E^2}{2} - \alpha\,\beta\,s_E + \alpha\,\beta\,s_N - \frac{\pi\,s_N^2}{2} - \alpha\,\beta\,\pi\,s_N + \alpha\,\beta\,\pi\,s_E \tag{6}$$

Which the degree of the government spending on social protection during election and non-election periods maximize votes is determined by the first-order conditions

$$\frac{\partial V_E}{\partial s_E} = -s_E - \alpha\,\beta + \alpha\,\beta\,\pi = 0 \tag{7}$$

and

$$\frac{\partial V_E}{\partial s_N} = -\pi\,s_N + \alpha\,\beta - \alpha\,\beta\,\pi = 0 \tag{8}$$

The resulting policy cycle is characterized by

$$s_E = \alpha\,\beta\,(\pi - 1) > 0 \text{ and } s_N = -\frac{\alpha\,\beta\,(\pi - 1)}{\pi} < 0 \tag{9}$$

during election periods and non-election periods, respectively. The resulting level of the government spending on "agribusiness affairs" (support programmes, subsidies and public infrastructure spending in the agribusiness sector) are

$$\Delta\,a_E = -\alpha^2\,\beta\left(\frac{\pi^2 - 1}{\pi}\right) < 0 \tag{10}$$

and

$$\Delta\,a_N = \alpha^2\,\beta\left(\frac{\pi^2 - 1}{\pi}\right) > 0 \tag{11}$$

Governments maximize reelection prospects by deliberately generated (unexpected) degree of the government spending on social protection during election periods, thus decreasing the level of the government spending on "agribusiness affairs" (support programmes, subsidies and public infrastructure spending in the agribusiness sector). By contrast, the degree of the government spending on social protection is reduced during non-election periods, increasing the level of the government spending on "agribusiness affairs". However, development of the agribusiness sector requires long-term approach.

3. Conclusion

The political – business cycles are the business cycles which are caused by elected government leaders who manipulate the economy to achieve personal political goals, that is, to be re-elected and remain in office. The leaders increase government spending on social protection and decrease government spending on "agribusiness affairs" during election periods to ensure re-election. Then, thez decrease government spending on social protection and increase government spending on "agribusiness affairs" during non-election periods to correct problem.

Under these assumptions (A.1.-A.8.), it is possible to derive the following implications: (i) every government follows the same policy; (ii) the government spending on social protection increases around the election time because the policymakers have incentive to retain power; (iii) after the election, the government spending on social protection is reduced , but the government spending on "agribusiness affairs" (support programmes, subsidies and public infrastructure spending in the agribusiness sector) increases. However, the government spending on "agribusiness affairs" requires long-term approach.

An important consequence of this political business cycles model is that the elected politicians who run government is the primary cause of economic instability. This further implies that the way to correct fiscal policy and economic instability is to limit or prevent government leaders from discretionary control over fiscal policy.

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INSURANCE IN AGRICULTURE OF SERBIA AS PRECONDITION OF RISK MINIMIZATION[1]

Zorica Vasiljević [2], Vlade Zarić[31], Dunja Šević[4]

Summary

Due to its specific nature agriculture is exposed to a number of risks, whose emergence could lead to the losses in production as well as volatility in the business. The risks can not be completely eliminated, but they can be managed and their impacts can be minimized. Insurance could have the most important role in minimization of risk. Insurance is a form of risk management used to limit potential losses. Insurance in agriculture includes crop and fruit insurance, but also insurance of livestock, domestic and wild animals, buildings and machinery, and can be applied in greenhouses, forestry and aquaculture as well.

Insurance in Serbian agriculture is undeveloped. The share of the crop insurance and the animal insurance premiums was only about 2.6% of the total non-life insurance premiums in 2011. In Serbia it has been insured only about 3% of registered farms and 8-10% of the cultivable land areas. It is common practice that governments around the world take an active role in subsidizing agricultural insurance. Since 2006 Serbian government has also introduced the subsidizing of insurance premiums in the case of animals, crops and fruits insurance (in 2006 and 2007 by 30%, while since 2007 onward by 40%). Some local governments subsidize additional 10% of premium. These incentives have not led to the increased interest of farmers to ensure their production and fixed assets.

By utilization of the desk research method it has been analyzed the general situation of agricultural insurance in Serbia, together with comparative analysis of

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the situation in Serbia with the one in the neighboring countries and EU. On the basis of the case study method for 100 family farms belonging to the municipalities of the Belgrade city, there have been analyzed the following parameters: presence of the crop and fruit insurance at the family farms, the types of risk from which the farmers usually insure their crops and fruits, the success of getting fee for damages caused by the insured events, the reasons why insurance is not present in the larger extent in Serbian agriculture and what are the possibilities for greater use of insurance as the safest form of minimization the potential risks in agriculture.

The authors have also discussed a possibility of introducing the mandatory insurance for agricultural production, as well as the participation in agricultural insurance of those stakeholders which have interest for greater use of insurance in Serbian agriculture (insurance companies, food processing companies, banks, veterinary and extension services, local government authorities etc).

Key words: *insurance, agriculture, risk, family farms, Serbia*

JEL classification: *G22*

1. Introduction

The agricultural sector is characterized by a strong exposure to risk. There are several types of risk facing agricultural producers nevertheless they are small family farms or big enterprises. The most important risks can be classified as follows (Hardaker, Huirne and Anderson 1997; USDA 1999):

- ***Human or personal risks*** relate to death, illness or injury of the farm operator and/or its labor force;

- ***Asset risks*** are those associated with theft, fire and other loss or damage of equipment, buildings and other agricultural assets used for production;

- ***Production or yield risks*** are often related to weather (excessive/insufficient rainfall, hail, extreme temperatures), but also include risks like plant and animal diseases;

- ***Price risk*** is the risk of falling output and/or rising input prices after a production decision has been taken;

- ***Institutional risk*** is the risk associated with changes in the policy framework (agricultural and other policies) which intervene with production and/or marketing decisions and in the end negatively affect the financial result of a farm or enterprise;

- ***Financial risks*** include rising cost of capital, exchange rate risk, insufficient liquidity and loss of equity.

The various risks are often interrelated. Risks of all categories have effects on the income situation of a farm household or enterprise.

Insurance is the most important form of protection against the risk, both of individual persons and economic subjects which are realized through the transfer of risk onto the insurance companies i.e. the institutionalized communities of risk. However, the insurance cannot prevent the occurrence of the economically damaging incidents. Through the insurance an indirect economic protection could be realized, so it is the main reason for existence of insurance (Sarić 2010).

The idea behind insurance is that of risk pooling. Risk pooling involves combining the risks faced by a large number of individuals who contribute through premium to a common fund which is used to cover the losses incurred by any individual in the pool (European Commission 2001).

Insurance is a form of risk management used to limit potential losses. According to the conventional definition, insurance provides **the risk transfer of loss** from one entity to another, in exchange for a premium or guaranteed, measurable loss that prevents higher or possibly irreparable loss. Agricultural insurance is a special type of property insurance applied to the farmers **in order to prevent the loss of income from agricultural activities** (Manić 2012).

2. Materials and Methods

On the basis of researching the domestic and foreign literature, by utilization of the desk research method, in the first part of the paper it has been analyzed the general situation of agricultural insurance in Serbia, along with a comparison of the situation in Serbia with the neighboring countries and EU countries as well. Using the case study method for which there have been collected data by the survey and interview from 100 family farms belonging to the municipalities of the Belgrade city, the following parameters have been analyzed: presence of the crop and fruit insurance at the family farms, the types of risk from which the farmers usually insure their crops and fruits, the success of getting fee for damages caused by the insured events, the reasons why insurance is not present in the larger extent in Serbian agriculture and what are the possibilities for greater use of insurance as the safest form of minimization the potential risks in agriculture.

3. Results and Discussion

3.1. Insurance in Agriculture of Serbia

Beginning of insurance in Serbian agriculture is associated with in 1905, when within the Ministry of National Economy it was established the Fund for the

Provision of Livestock. Then, it was also adopted a Law on the Compensation for Damages in Agricultural Production (Milivojčević 2012).[1] The Law on Economic Cooperatives, enacted in 1937, provided a formal legal regulatory framework for insurance of livestock in the pre-war Yugoslavia.

The main indicator of the level of agricultural insurance development in one country is measured by the degree of insurance coverage within certain population in this case the crops and fruits or the animal ones. Serbia has not established Register of insured farms, so assessments on insurance development degree could be only given on the basis of estimates.

As in the entire previous period since there is agricultural insurance, even today agricultural insurance in Serbia has been still underdeveloped. A very small percentage of both farms and arable land is insured (about 3% of the total number of registered farms and only 8-10% of the arable land is insured). The share of the crops' and fruits' insurance premium as well as the animals' one was around 2.6% of total non-life premiums in the 2011 (Milivojčević 2012, Erić Jović 2012).

Several data show where it is Serbia within the world. The direct insurance premiums in agriculture in the world had extremely high growth rates in recent years (from $ 8 billion in 2005 to the estimated level of $ 18.5 billion in 2008). Most of the premium related to USA and Canada, Asia was in the second place with about 18%, while Europe was in third place with about 17% of the total premium. In the premium structure there were dominant those related to the crops and fruits insurance (they had a share of almost 90% in 2008) (Manić 2012).

According to the World Bank data, in the premium structure for 2008 there were dominant the crops and fruits insurance participating by 90% of premium, while all other types of insurance in agriculture referred to 10% premium.

In the neighboring countries, the situation is similar as in Serbia.

There are two basic types of insurance in agriculture, which currently exist in the Serbian insurance market. Those are the following:

> 1) Insurance of crops and fruits, and
> 2) Insurance of livestock.

In the case of the **crops and fruits insurance** it is covered the loss of the crop (yield) as a result of the agricultural crop damage (destruction) from the insured risk. The standard ones and the most present coverage in the case of Serbia are the ones of the prevailing risk: the hailstorm, fire and thunderstorm, with the most emphasis on the protection of the hailstorm. There could be also added the risks of

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[1] The insurance premium was charged through the tax debt of the livestock holder, while the insurance organization was administered by the municipal trials.

storms, floods, frost and insurance against loss of seed quality, loss of quantity and quality of fruit and table grapes, etc.

Table 1: Agricultural insurance in some European countries

Country	Market penetration (in %)	Risk coverage	Subsidies to insurance premiums (in %)
Austria	78	Individually	50
		Combined	50
Italy	8	Combined	54
		Combined	59-64
Cyprus	100*	Combined	50
Portugal	22	Combined	68
Poland	7	Combined	50
Russia	28	Combined	50
Spain	26	Combined	37-43
Bulgaria	52	Individually	0
		Combined	0
Greece	100*	Combined	0
Finland	90	Combined	0
Denmark	90	Combined	0
Sweden	60	Individually	0
		Combined	0

* Compulsory insurance
Source: Manić 2012

In the case of **livestock insurance** there are the basic insurance coverage against the risk of accidents and diseases, whereas the animals could be insured individually or on the floating basis. For this type of insurance in agriculture there could be additionally covered the risks of death or forced slaughtering in the pre-defined cases, as well as the risks of diseases caused by malnutrition, ingestion of foreign bodies, loss of foals and calves at birth or loss of livestock breeding ability.

In addition to the mentioned types of insurance, there could be recently found even an **insurance of the drought risk** for certain crops, as well as the **crop insurance against excess rainfall**. Although those types of insurance in agriculture are still at the very beginning, it could be generally said that at Serbian market the supply of insurance companies in the field of agricultural insurance has been constantly improved and that this type of insurance is the one with progressively more attention (Manić 2012).

Although the agricultural insurance is essentially a commercial activity, it is quite common that governments around the world take an active role in this field. Since 2006 the Serbian government has participated in subsidizing the insurance of animals, crops and fruits (in 2006 and 2007 by 30% and since 2007 by 40%). By the Regulation of insurance subsidizing for animals, crops, fruits, nurseries and young permanent plantation, the registered farmers are entitled to get reimbursement for insurance in the amount of 40% of the insurance premium tax-free if they insured mentioned agricultural purposes prescribed by the Regulation. But, even those incentives have not led to the increased interest of the farmers for insurance of their production and assets, as well as for reduction of risk.

In addition to the state subsidies, some local governments subsidize additional 10% of the insurance premium. Some estimates say that every dry year causes in Serbia the damage of about 500 million € due to the reduced yields.

3.2. Insurance of Agriculture in the Municipalities of Belgrade City

Using the case study method, there have been collected data by the survey and interview from 100 family farms belonging to the 7 municipalities of the Belgrade city (Zemun, Novi Beograd, Palilula, Grocka, Obrenovac, Sopot i Surčin) out of total number of 17 ones. According to the last agricultural census (2012) on the territory of the Belgrade City there are 33,104 family farms and the Belgrade area is the fourth area in Serbia by the number of farms. Accordingly, the analyzed sample represents 0.3% of the total family farms number on the territory of the Belgrade City. The survey collected data on capacities, structure and volume of production on the surveyed farms, the type of crop and fruit insurance, motivation for farm insurance, information and reasons why households choose or not to ensure their production or fixed assets. Data have been collected by the interview consists of 18 questions classified into three segments: data on the farm and the farm owner, data of the recent activities concerning agricultural insurance and finally the opinions about agricultural insurance.

The following parameters have been analyzed: presence of the crop and fruit insurance at the family farms, the types of risk from which the farmers usually insure their crops and fruits, the success of getting fee for damages caused by the insured events, the reasons why insurance is not present in the larger extent in Serbian agriculture and what are the possibilities for greater use of insurance as the safest form of minimization the potential risks in agriculture.

The survey has shown that in the decision-making process the interviewed farmers mostly rely on their own experience.

The farmers who are beneficiaries of insurance declared themselves about their experience so far regarding insurance, and those farmers who are not beneficiaries

of the insurance specified what is the reason for such situation. The survey showed that most insurance beneficiaries are satisfied with the service provided (Graph 1).
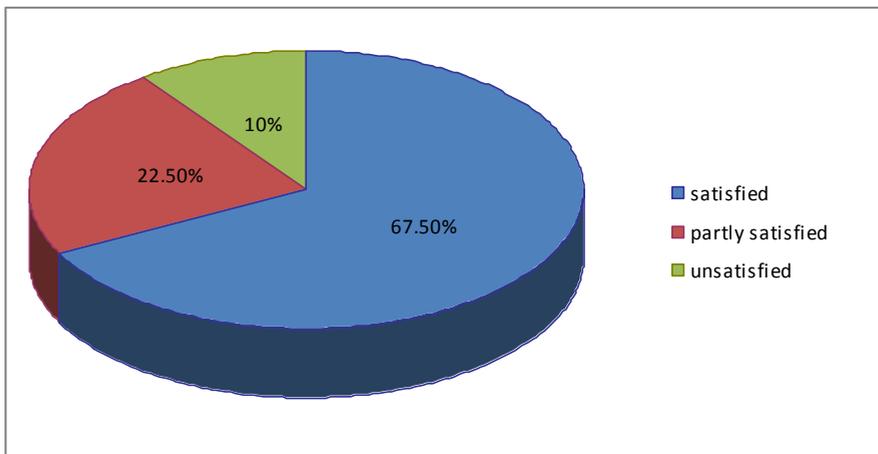
Graph 1 Attitudes of farmers on terms of insurance

Research in the municipalities of Belgrade showed that the largest number of respondents who are not beneficiaries of crop insurance (31.7%) responded that the lack of funds is the main reason for not using insurance for agricultural purposes. An improvement of economic situation would create the possibility of a higher level of agricultural insurance utilization.

Research has also demonstrated that the amount of incentives approved by the state for reimbursement of the insurance costs does not significantly increase the number of insured family farms. The vast majority of respondents (76%) are familiar with the Regulation of the Ministry concerning the state regresses amounting to 40% of the insurance premium. However, for the owners of the surveyed farms this fact is not a decisive factor when make decision for insurance usage.

Analysis of the attitudes of the farm holders denies the claim that lack of information is a major cause of non-utilization of agricultural insurance, as well as that the farm size is a limiting factor as well. Taking in account the state of machinery, the ability of the labor force and the will to improve production, it could be come to the conclusion that the potential for development of agricultural insurance certainly exists, particularly in the region of the Belgrade City region.

Long experience of the agricultural insurance users can be characterized as the positive one, as it can be seen from the fact that those farmers have used insurance for several years as a form of economic protection and that they trust the insurance

companies. As a partial cause of dissatisfaction with insurance companies, the farmers stated the reason of inadequate assessment of damage, but they think at the same time it is not unsolvable problem, nor of such intensity to be the reason for the suspension of insurance utilization.

Previous analysis leads to the conclusion that development of agricultural insurance in Serbia needs a new platform on the basis of which farmers should be adequately stimulated towards securing their own production and assets. It is necessary to create the long-term solutions that would include stable portfolio (with the diversification of risk), an appropriate system of subsidies (at an acceptable level for all stakeholders), the products tailored to the needs of the insured farmers (with the required levels of coverage), as well as the programs which should increase awareness of the risks in agriculture and improve the availability of this type of insurance.

Insurance companies should offer to the market a suitable product in terms of comprehensiveness (coverage of more risks), with clear and as simple as possible definition of the insurance conditions and taxes, as well as easier access to the potential insurance users, which will be of unequivocal benefit for everyone (including farmers, the public sector and the insurance industry). Following the example of developed world markets, the second part of the activities should be undertaken by the state through appropriate system of subsidies, the models of public-private partnerships and the adoption of appropriate laws and regulations in this area. Common commitment should be present in the raising of awareness through intensive training of potential clients on existence of the risk in agriculture, as well as on importance of insurance in the protection and promotion of agricultural production. In time to come, just establishment of quality cooperation between the insurance industry and the public sector to improve the situation that is currently present in the Republic of Serbia will be crucial for the utilization of development opportunities that do exist in this very important area.

Besides the preservation of the living standards of the insured farmers, the insurance performs its function even by investing insurance funds through the financial organizations. By payment of compensation to the insured farmers when it happens the damage which is insured event, it has been enabled the stable production and improvement of living standards of farmers' households. By investment of the free financial funds cumulated by insurance into the economy flows (through financial institutions), it has been enabled an increase of the entire society standard of living. In stable economic conditions, insurance creates conditions for the improvement of living standards, not only of the individuals (insured farmers), but also of the whole society.

In the future, it should be considered the possibility of introducing legal obligation for insurance of agricultural production, with the participation of the following

subjects: the insurance companies and state (by different forms of subsidies and by financing the infrastructural investment projects that reduce risk for farmers), the manufacturing industry (by participation in insurance premiums in order to ensure safe and continuous provision of raw material), the banks (which could use the insurance policy as collaterals), the veterinary and extension services, and finally the local communal governments.

4. Conclusions

Every modern and profitable agricultural production is inconceivable without the insurance of crops, fruits and animals. Insurance costs are relatively small compared to the value of production that can be lost as well as the increasing risks posed by climate changes. In one day, water, fire, disease, or other plague can wipe out a months-long, sometimes years-long efforts of farmers. Despite this fact, insurance in agriculture is not represented in Serbian agriculture at the level it should be, and many farmers remember it only when it's too late.

It is believed that the insurance covers only 70% of the legal entities in agricultural production and a negligible number of the family farms. Due to rapid changes in ownership structure, renewing the insurance of the areas under crops depends on the new owner to this form of assets' protection. They often try to eliminate unnecessary costs, dropping insurance, without taking into account the fact that the biggest expense appears when the invested money has been lost. Alignment with European standards of work and business in agriculture will increasingly highlight the importance of insurance in this high-risk activities such as agriculture. On the other hand, it is on the insurance companies to offer to the producers as much adequate as possible insurance conditions for agricultural production and property. It has to be noted that it is very important competition in the insurance market, because with appearance of new insurance companies in our country (some of which have already tested and great experience on a global level), the supply of services will be improved and become more accessible to users.

One of the most important aspects of raising the level of insured agricultural land and thus reduce the impact and negative consequences for farmers but also for the whole economy of the country, is introduction of compulsory insurance in agriculture. Such a possibility should be analyzed and there should be weightned the *pro* and *contra* attitudes for introduction of compulsory insurance in Serbian agriculture. It should be considered the realistic possibility of introducing compulsory insurance obligation for agricultural production and assets.

As opposed to the crop production where there are ensured the products or annual yields, in livestock production they are ensured the whole animals but not their products. Beside the basic risk in animal insurance, animal death or emergency

slaughter due to illness or accident, there is a possibility of concluding the insurance of many additional risks (loss of breeding ability, loss of a calf or foal, castration or ovariotomy, as well as additional insurance of animals in exhibitions and fairs, in intermediate plants or slaughterhouses depots, etc..). It is not necessary to explain the importance of compulsory insurance in livestock production, due to the increasing risks of disease and natural factors.

Given the fact that the bad weather events are becoming more frequent and more dangerous for crops, animals and machinery, in addition to the subsidies supplied by the state, the insurance will represent the most important form of the agricultural production protection and prevention from the risks, both the primary and supplementary ones.

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CONTRIBUTION OF INVESTMENTS IN RASPBERRY PLANTATIONS TO DEVELOPMENT OF RURAL AREAS OF THE REPUBLIC OF SERBIA[1]

Sanjin Ivanović[2], Petar Gogić[3]

Summary

The Republic of Serbia is the second state worldwide regarding volume of raspberry production and the third one concerning area of raspberry plantations. Therefore, the goal of this paper is to analyze and predict raspberry production in the Republic of Serbia. The paper also aims to determine investments in establishment of raspberry plantations per hectare and total amount of these investments at national level. Appropriate mathematical and statistical methods were used to analyze and predict volume of raspberry production. There were also used adequate calculations of costs needed to establish one hectare of raspberry plantation.

It has been determined that establishing costs per one hectare of raspberries are approximately 22,000 EUR. That means it is necessary to invest 35,000,000 EUR each year at national level to maintain areas used for raspberry production at the current level. It was also found that it is possible to expect a slight increase in the volume of raspberry production. Appropriate measures that can contribute to growth of raspberry production and investments in raspberries are proposed. Results of these measures would be increase in employment and faster development of rural areas.

Key words: *raspberry production development model, investments, socio-economic effects of raspberry growing, rural development, employment*

JEL classification: *Q14*

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1. Introduction

According to FAO statistical data raspberries are produced worldwide on approximately 92,000 hectares. In Serbia raspberry production is present on approximately 15,000 hectares, so that according to this criteria Serbia is on the third place in the world (on the first place is Russia – 26,000 hectares, and the second is Poland – 20,000 hectares). Worldwide raspberry plantations participate by 0.002% in total agricultural area while in Serbia it is 0.30%. Total raspberry production in the world is approximately 500,000 t while in Serbia volume of raspberry production is approximately 85,000 t (which is 17% of total production in the world). Regarding production volume of raspberries Serbia is the second largest producer in the world (the first one is Russia which produces approximately 140,000 t of raspberries.

Production and consumption of raspberries in Serbia are not satisfying, despite very favorable natural conditions for raspberry growing. It is caused primarily by low level of inputs in raspberry production, presence of obsolete cultivars which produce low yields, small plots used for production at family farms etc. Besides, according to Milošević et al. (2001) there are some additional reasons such for such situation - production of raspberries at regions with unfavorable natural conditions, inappropriate organization of transportation of fresh fruits from field to cold storages and processors, unorganized presentation at foreign markets etc. Raspberry production is mostly situated at small family farms in rural areas which do not use appropriate machinery, irrigation and pesticides. Raspberries produced in Serbia are primarily exported frozen.

Obsolete cultivars disable better supply and standard quality in the market. According to Milutinović et al. (2008), the most common cultivar in Serbia is Vilamet (approximately 95%). Increased competitiveness of other countries on international raspberry market is another unfavorable element affecting willingness of Serbian producers to establish new raspberry plantations. During period from 1998 to 2011 areas used for raspberry production remained approximately at the same level (between 14,500 and 15,000 hectares).

The goals of this paper are:

- To analyze importance and volume of raspberry production in the Republic of Serbia during period from 1998 to 2011;

- To asses amount of investments needed to raise one hectare of raspberries;

- To estimate raspberry production development in following years and to determine socio-economical effects of raspberry growing;

- To analyze possibilities and perspectives of investments in raspberry production as well as their contribution to rural development.

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2. Materials and methods

Mathematical and statistical methods are used to analyze participation of raspberry production in Serbian agricultural area and to make an assessment of future development of raspberry production in Serbia.

Costs of establishing raspberry plantations as well as estimation of additional working capital were used to determine amount of investments needed per hectare of new raspberry plantation.

Data sources used in this research could be divided into two groups. Within first group are data from FAO statistical data base as well as statistical yearbooks of the Republic of Serbia. These data were used to analyze situation in raspberry production and to predict its future development.

Besides, realistic organizational, economical, technical and technological data were used to determine amount of investments needed to establish one hectare of raspberry plantation.

3. Results and discussion

3.1. Changes in volume of raspberry production in the Republic of Serbia

Some areas in Serbia have very favorable conditions for raspberry production, regarding land quality and climate. Such important regions are surrounding areas of following cities: Valjevo, Šabac, Arilje, Kosjerić, Ivanjica, Čačak, Kopaonik, Kraljevo and Leskovac (Tomić and Vlahović, 2003). Raspberry plantations in these areas are mostly situated on hilly lands, which cannot be successfully used for other types of plant production (except for production of blackberries and blueberries).

Land used for raspberry production as well as volume of production in the Republic of Serbia is presented in table 1.

Average area of raspberry plantations in Serbia ranged from 14,531 ha (in period 1998 – 2004) to 15,014 ha in period 2005 – 2011 (average area increased by 3.32%). During observed period area of raspberry plantations has increased while total agricultural area has decreased. This is why participation of raspberry plantations in total agricultural area ranges from 0.28% (in period 1998 – 2004) to 0.30% (in period 2005 – 2011). During observed periods volume of total raspberry production increased more than area of raspberry plantations (11.16% comparing to 3.32%) due to growth of average yield per hectare by 8.10%.

Table 1: Area of raspberry plantations and raspberry production
in the Republic of Serbia from 1998 to 2011

Year	Agricultural area (ha)	Raspberry plantations		Raspberry production (t)	Yield (kg/ha)
		ha	Participation in agricultural area (%)		
1998	5,698,000	12,806	0.22	63,796	4,982
1999	5,119,000	12,966	0.25	64,680	4,977
2000	5,109,000	13,519	0.26	55,999	4,142
2001	5,112,000	14,753	0.29	77,781	5,272
2002	5,107,000	15,293	0.30	93,982	6,145
2003	5,115,000	16,354	0.32	78,974	4,829
2004	5,113,000	15,995	0.31	91,725	5,735
∅ 1998-2004	5,196,143	14,531	0.28	75,277	5,155
2005	5,074,000	15,413	0.30	84,331	5,471
2006	5,066,000	15,024	0.30	79,680	5,303
2007	5,053,000	14,496	0.29	76,991	5,311
2008	5,055,000	14,680	0.29	84,299	5,742
2009	5,058,000	14,957	0.30	86,961	5,814
2010	5,051,000	15,171	0.30	83,870	5,528
2011	5,056,000	15,354	0.30	89,602	5,836
∅ 2005-2011	5,059,000	15,014	0.30	83,676	5,572
∅ 1998-2011	5,127,571	14,772	0.29	79,477	5,363
Index: ∅ 2005-2011 ∅ 1998-2004	97.36	103.32	107.14	111.16	108.10

Source: Statistical yearbook of the Republic of Serbia (1999-2012)

According to Mišić et al. (2004) profitability of raspberry growing in Serbia would significantly increase provided that average yield is 10 t/ha or higher. Authors stated that it is possible having in mind genetic potentials of existing as well as new raspberry cultivars.

3.2. Costs of establishing raspberry plantations

Establishment of raspberry plantations usually lasts for two years. On the beginning of the first year land is prepared for planting and planting is done. During the first and the second year of establishment will appear various costs, such as costs of fertilizers, pesticides and some other costs (including interest costs, costs for trellis etc.), as well as revenues (at the end of the second year). Costs and revenues related to establishment of raspberry plantations are presented in table 2.

Table 2: Costs of establishing raspberry plantation (EUR/ha)

The costs of establishing	Year			Total
	0	1	2	
1. Land preparation	1,915.00			1,915.00
2. Planting	7,420.00			7,420.00
3. Trellis, wires		3,055.00		3,055.00
4. Pesticides, fertilizers, etc. (year 1)		2,235.00		2,235.00
5. Pesticides, fertilizers, etc. (year 2)			3,213.00	3,213.00
A. Costs without interest (1 to 5)	**9,335.00**	**5,290.00**	**3,213.00**	**17,838.00**
6. Interest in year 1		746.80		746.80
7. Interest in year 2			1,229.70	1,229.70
B. Total costs including interest (A+6+7)	**9,335.00**	**6,036.80**	**4,442.70**	**19,814.50**
8. Revenue in year 2			3,000.00	3,000.00
C. Total costs of establishing (B-8)	**9,335.00**	**6,036.80**	**1,442.70**	**16,814.50**

Source: authors' calculations

Apart from above enlisted costs it is necessary to increase amount of total investments by additional working capital which is needed to ensure uninterrupted production process. Having in mind that amount of additional working capital for raspberry production is 5,511.09 EUR/ha, total investment for raspberry plantation establishment rises to 22,325.59 EUR/ha. This is very high investment per hectare, so that small family farms usually cannot finance it only with equity. Therefore, establishment of raspberry plantation is financed mostly by combining equity and borrowed sources.

Nevertheless, while projecting investments in raspberry growing it is necessary to analyze not only financial, but also some other limitations. According to Veljković et al. (2008) the main limitation factor for establishment of larger raspberry plantations at family farms is labor needed for harvesting (which is in Serbia mostly performed manually). These authors stated that size of plantation is determined primarily by available labor (at farm and labor market).

3.3. Estimation of future raspberry production and investments in raspberry plantations

Volume of raspberry production in future period is estimated for period 2012 – 2018 having in mind previous volume of raspberry production (for period 1998 – 2011) as well as the fact that establishment of raspberry plantation lasts for two years. Future production volume is estimated using power type trend line (graph 1).
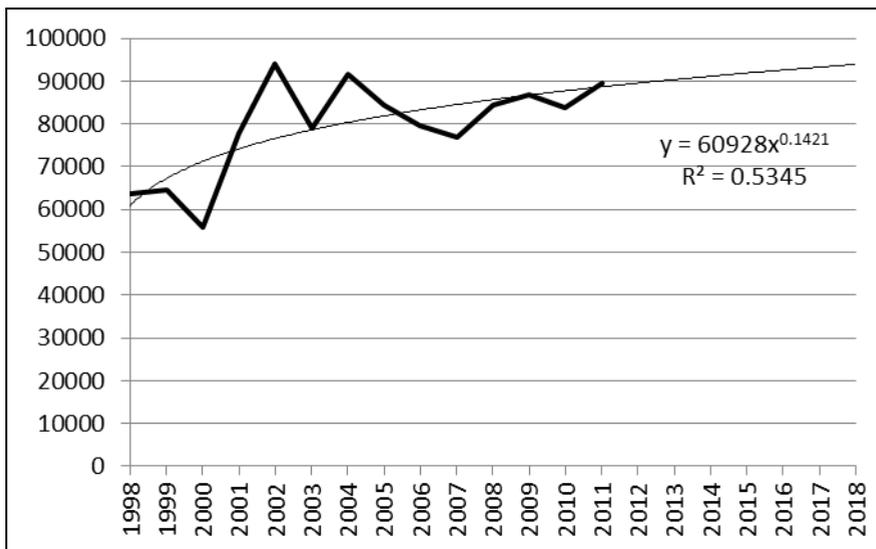
Graph 1 Expected volume of raspberry production in Serbia (t)

This type of trend line is the most appropriate (regarding R^2 – value). According this trend line raspberries production volume in Serbia is expected to rise from 89,524 tons (in 2012) to 93,908 tons (in 2018).

Relationship between average estimated raspberry production (in period from 2012 to 2018) and average achieved production in previous period (from 2005 to 2011) is presented in table 3.

Table 3: Comparison of average raspberry production in observed periods

Production (t)		Index
Achieved ∅2005-2011	Projected ∅2012-2018	∅2012-2018 ∅2005-2011
83,676	91,805	109.71

On the basis of presented data it can be concluded that in future period raspberry production will increase by 9.71%, while average growth rate will be 0.80% per year.

Average area of raspberry plantations in period 1998 – 2011 was 14.772 hectares. Having in mind this fact as well as average economic life of raspberries (which is

approximately 10 years), dynamics of establishment of raspberry plantations (two years), need for regular re-establishment of existing plantations and some other factors it is possible to conclude that in Serbia it is necessary to establish 1,600 hectares of new raspberry plantations each year. Bearing in mind that investment needed to establish one hectare of raspberry plantation is approximately 22.000 EUR that means it is necessary to invest in average 35,000,000 EUR in establishment of raspberry plantations in entire Serbia each year. On the other hand, existing raspberry plantations in Serbia are older than it is expected regarding economic life, which means that it is needed to provide even higher financial resources to ensure faster re-establishment of existing plantations.

Keeping volume of raspberry production on present level or production increase significantly influences employment in rural areas. According to Petrović, S. (2004) if analysis starts from the fact that raspberries are grown on area of 15,000 hectares it is possible to conclude that only in raspberry production is provided employment on annual level for 22,500 employees. This author also estimates that 4,000 employees work each year in other activities connected to raspberry production (trade, processing, marketing and similar activities). Employment in raspberry production and processing involves primarily casual labor, especially for harvesting.

Investments in raspberry plantations should be directed towards enlargement of production plots. The investments should be also directed to other factors which make raspberry production more economically efficient such as irrigation equipment, appropriate machinery, facilities needed to store and distribute raspberries etc. Although such an equipment and buildings are expensive they provide very favorable effects regarding quality of raspberries and labor productivity. In other words, investments in raspberry plantations should not only enlarge size of plantations but also change technical and technological characteristics of production.

One of main problems regarding investments in raspberry production in Serbia is financing of investments. Costs of establishment of raspberry plantations are very high, so that it is necessary to use loans at some extent. On the other hand, interest rates for agricultural loans in Serbia are rather high as well as other costs connected to borrowed capital (even for loans subsidized by the state). Besides, repayment period for loans is short (for example, only 3 years for subsidized loans). Therefore, financing of investments in agriculture is one of the first issues that have to be solved in order to improve raspberry production.

On the basis of the results of previous analysis it is possible to give some suggestions how to facilitate development of raspberry production in Serbia. Apart from solving issues related to investments and financing, many other incentives could be done:

- Introduction of new cultivars and use irrigation,
- Increase in consumption of raspberries in Serbia,
- Specialization of raspberry producers,
- According to Stevanović et al. (2006) it is necessary to produce some final products from raspberries (such as juices or concentrates) to achieve better economic effects from this production,
- Better cooperation between raspberry producers, processors and exporters. If this is not a case than production volume and quality of raspberries will significantly fluctuate. As a consequence production risks, market risks and costs will increase.
- The state is expected to facilitate closer connections between raspberry producers (to support cooperatives and associations).
- Small storage facilities should be formed (by individual owners or cooperatives) in remote rural areas, because producers in such areas have significant problem concerning transportation of fresh raspberries from field to processors.
- It is necessary to ensure that increase of input prices (fuel, fertilizers and pesticides) is not higher than increase of raspberry prices.

All above mentioned factors could have positive influence on profitability of raspberry growing, volume of investments in raspberry production as well as economic effectiveness of these investments.

4. Conclusions

In this paper has been analyzed raspberry production in the Republic of Serbia, investments in establishment of raspberry plantations as well as possibilities of future development of that production. Very favorable natural conditions for raspberry growing are not appropriately used. Anyway, it is expected that volume of raspberry production will increase in following period. Average annual growth rate is estimated at 0.80%.

To keep area of raspberry plantations at current level existed plantations have to be regularly re-established – only for this purpose is required 35,000,000 EUR annually. It will be very difficult to achieve this goal without significant state support such are subsidized loans. Such investments have to provide enlargement of plots as well as technical and technological improvement of raspberry production.

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ECONOMIC AND FINANCIAL ANALYSIS OF INVESTMENTS IN RASPBERRY PLANTATIONS[1]

Petar Gogić[2], Sanjin Ivanović[3]

Summary

Raspberries are one of very important agricultural products of the Republic of Serbia and this production offers a lot of possibilities for employment in rural areas. Therefore, the goal of this paper is to analyze various aspects of economic efficiency and financial feasibility of investments in establishment of raspberry plantations. Models of investments in raspberry plantations are formed using real technological, organizational and economical conditions at rural households. These investment models considered different dynamics of investments in raspberry plantations. Besides, there were assumed various financing conditions for these investments. For evaluation of economic efficiency of the investments are used appropriate capital budgeting methods – net present value, modified internal rate of return and payback period.

The analysis proved that establishment of raspberry plantations is economically efficient for both assumed dynamics of investments. It is economically more acceptable to establish raspberry plantation simultaneously on the entire available surface intended for that purpose, than to do it gradually. It is also determined that investments will be financially feasible if participation of borrowed funds in structure of financial sources is less than 41.07%.

Key words: *raspberry plantation, investment models of rural households, capital budgeting methods, financial feasibility of investments*

JEL classification: *Q14*

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1. Introduction

Raspberry production has great socio-economic significance for the Republic of Serbia. This significance is reflected primarily in the fact that export of fresh and frozen raspberries is important source of foreign currency for Serbia. According to Nikolić et al. (2008), the biggest part of production is frozen, and only small part of raspberries is exported fresh or in some higher level of processing. That fact is not adequate for Serbian economy because it reduces economic effects of raspberry production.

Veljković et al. (2008) stated that the best climatic conditions for raspberries were on the area of Arilje, Valjevo, Ivanjica, Kopaonik, Šabac and Zlatar. In these areas are achieved good yields and high quality fruits.

Due to high demand for human labor raspberry production offers a lot of possibilities for employment. This could significantly contribute to solving socio-economic problems especially in rural areas. Furthermore, raspberry production is market for many industries and their products such as fertilizers, fuel, plant protection means, agricultural machinery etc.

To maintain raspberry production at the same level in the Republic of Serbia (or to increase it) there is need for significant investments in fixed and working assets. On the other hand, there is not enough research regarding economic effects of raspberry production and investments in raspberry plantations in Serbia. Petrović et al. (2004) analyzed raspberry production costs in agro ecological conditions of Arilje in year 2003. Authors determined that high income and profit rate were achieved in this production. Denić et al. (2002) analyzed various aspects of investments in raspberry production with and without irrigation. Amount of investments in raspberry plantations, level of production costs and profit in raspberry production were subject of research conducted by Veljković et al. (2006). Other analysis (Mišić et al., 2004) pointed out that it was necessary to conduct prior research regarding the most important natural and economical conditions. After such research should be determined location of raspberry plantation, cultivar, production technology etc. According to these authors this is the only way to have profitable and long lasting raspberry plantation.

Investments in raspberry plantations as well as investments in all permanent crops are not made in one moment but during longer period. It takes 2 – 3 years to establish raspberry plantation. Afterwards the plantations are used between 10 and 12 years. This is why it is very hard to correct mistakes made in choosing cultivar of raspberry or mistakes in planning purpose of raspberry production. Such mistakes could significantly affect economic and financial effects of raspberry production.

Therefore, the objective of this paper is to examine various aspects of economic efficiency and financial feasibility of investments in raspberry plantations.

2. Materials and methods

The research used a number of methods. Models of investments in raspberry plantations are established having in mind different dynamics of establishment of plantations.

Apart from determination of models (in order to analyze economic effectiveness and financial feasibility of investments) in the research are used the following methods:

- − Enterprise budgeting,

- − Determination of net cash flows,

- − Capital budgeting methods (Net Present Value, Modified Internal Rate of Return, Payback Period).

- − Analysis of financial feasibility of investments (it was performed comparing net cash flow with principal and interest payments).

Methods used in the paper are in accordance with subject and goal of the research. These methods provide a lot of information concerning economic efficiency and financial feasibility of investments in raspberry plantations.

Realistic technical and technological data from a family farm located in south Serbia (at the area of Kopaonik) were used to establish investment models.

3. Results and discussion

3.1. Defining investment models for establishment of raspberry plantations

Different models of raspberry plantation establishment are formed for economical and financial evaluation of investments in raspberry production. These models of investments are defined on the basis of technological and organizational characteristics of one really existing family farm in the Republic of Serbia.

The farmer who plans to establish raspberry plantation possesses in total 6 ha of agricultural land as well as some livestock (cattle, pigs and poultry). The farm is traditionally directed towards fruit and grapes production, but also produces some wheat, corn and barley. Fruit and grapes products are mostly sold on market, and this is the main source of the income for the farm. On the other hand livestock products are intended for farmhouse consumption.

Farmer possesses equipment necessary for fruit and grapes processing, as well. Three family members work at the farm. Casual paid labor is used when it is needed.

On one hectare farmer has an old vineyard, which has to be cleared. On that area will be established new raspberry plantation. Other agricultural areas will be used in the same way as before. Farmer will invest in raspberry plantation and additional working capital needed for plantation, but it will not be necessary to invest in other additional fixed assets.

Raspberry plantation establishment will last for two years. On the beginning of first year land will be prepared (old vineyard will be cleared, land will be plugged and fertilized etc.) and planting will be done. During two years of establishment period costs of care and protection of young plantation will occur, as well as some other costs. Having in mind that investment period lasts for two years interest will be calculated on invested money and added to total investment. In such a way total investment will increase while economic efficiency of investment decreases.

Evaluation of economic efficiency of investments will be performed using various models of raspberry plantation establishment. Models are formed on the basis of realistic organizational and economical data regarding raspberry production. Modes of investments in raspberry plantations differ in the dynamics of plantation establishment:

Model I – raspberry plantation is established (after the vineyard is cleared) at the same time on the entire surface (1 ha).

Model II – Raspberry plantation is established (after the vineyard is cleared) gradually in two phases. The first phase on the surface of 0.5 ha, and the second phase on the remaining 0.5 ha starting next year.

For both models are assumed the same amounts of investments per hectare (for growing of raspberry plantation and additional working capital). For Model I cash revenue in last year of economic life of plantation consists of two elements – the first one is income from raspberry production and the second one is salvage value (which is value of additional working capital). Salvage value of Model II contains not only value of additional working capital but also terminal value of plantation which is not depreciated.

Discount rate of 8% is used to determine net present value of the investments and payback period (the same rate is used to calculate interest costs during period when plantation was established). Discount rate is determined as weighted average cost of capital (investments are financed 50% by equity and 50% by borrowed capital - loan). Equity opportunity cost is estimated at 4.5% while interest rate for loan is 11.5%.

3.2. Economic efficiency of investments in raspberry plantations

Starting from investments needed to establish raspberry plantations, dynamics of investments, cash revenues and cash expenses, net cash flow is determined for both models of plantation establishment (table 1). It is assumed that economic life of raspberry plantation is 10 years.

Table 1: Net cash flows for investments in raspberry plantations (EUR)

Year	Cash revenues	Investments	Cash expenses	Net cash flow
Model I				
1	2	3	4	5[2-(3+4)]
0	0	9,335.00		-9,335.00
1	0	6,036.80		-6,036.80
2	0	6,953.79		-6,953.79
3	10,200.00		6,277.00	3,923.00
4	12,000.00		7,168.00	4,832.00
5	12,000.00		7,168.00	4,832.00
6	12,000.00		7,168.00	4,832.00
7	12,000.00		7,168.00	4,832.00
8	12,000.00		7,168.00	4,832.00
9	12,000.00		7,168.00	4,832.00
10	12,000.00		7,168.00	4,832.00
11	10,200.00		6,277.00	3,923.00
12	14,511.09		5,683.00	8,828.09
Total	**118,911.09**	**22,325.59**	**68,413.00**	**28,172.50**
Model II				
0	0	4,667.50		-4,667.50
1	0	7,685.90		-7,685.90
2	0	6,495.29		-6,495.29
3	5,100.00	3,476.89	3,138.50	-1,515.39
4	11,100.00		6,722.50	4,377.50
5	12,000.00		7,168.00	4,832.00
6	12,000.00		7,168.00	4,832.00
7	12,000.00		7,168.00	4,832.00
8	12,000.00		7,168.00	4,832.00
9	12,000.00		7,168.00	4,832.00
10	12,000.00		7,168.00	4,832.00
11	11,100.00		6,722.50	4,377.50
12	15,951.82		5,980.00	9,971.03
Total	**115,251.80**	**22,325.59**	**65,571.50**	**27,354.72**

Source: authors' calculations

Evaluation of economic efficiency of investments in both models of raspberry growing was analyzed using capital budgeting methods (table 2).

Table 2: Capital budgeting indicators for the investments in raspberry plantations

Indicators of economic efficiency of investments	Model I	Model II
1. Net Present Value	*7,386.66 EUR > 0*	6,918.19 EUR > 0
2. Modified Internal Rate of Return	10.76% > 8%	*10.89% > 8%*
3. Payback period	*7.02 г < 10 years*	7.52 г < 10 years

Source: authors' calculations

According to the results of capital budgeting methods investments in establishment of raspberry plantations would be economically efficient for both models, because net present value is greater than zero, modified internal rate of return is greater than discount rate and payback period is shorter than the economic life of plantation.

When choosing more favorable economic model for plantation establishment, for investors would be more acceptable Model I, because its net present value is greater than the net present value of the Model II, and payback period is shorter for Model I than for Model II. Although Model II has higher modified internal rate of return it is more appropriate for an investor to choose investment Model I because it has grater net present value (Model I will increase investors' wealth more than Model II).

3.3. Financial feasibility of investments in raspberry plantations

Apart from determination of economic effectiveness of investments in raspberry production it is necessary to evaluate financial feasibility of the investments.

Financial sources for investments are usually limited and require certain financial obligation such as principal and interest payments. Therefore it is necessary to determine if the cash flows will be sufficient to make the required principal and interest payments (loan payments). This problem should be deliberated to determine which model is more acceptable for investors. Therefore, it is necessary to analyze financial feasibility for different dynamics of investments in raspberry plantations, for different structure of financial sources and different interest rates. Therefore annuity (loan payment) has been compared to net cash flow for various combinations of financial sources (variants of financing).

Evaluation of financial feasibility of investments in raspberry plantations will be done for following variants of financing:

Variant A: It is assumed that investments in raspberry plantation are financed only with equity funds (100%). Principal and interest payments will not be calculated. It is possible only if investor possesses sufficient equity funds to make a purchase. The drawback of this approach is that interest on equity funds is not calculated (as opportunity cost).

Variant B: Investments are financed 100% with equity funds, but principal and interest are calculated. Interest rate for equity funds is 4.5% (this is estimated equity opportunity cost). Equity funds could be used for 10 years, which is equal to economic life of the projects.

Variant C: Investments are financed 100% by loan. Interest rate for loan is 11.5% and loan repayment period is 5 years.

Variant D: Structure of financial sources for the investments in raspberry plantation is 50% equity funds and 50% loan. Principal and interest payments are calculated on borrowed funds. Loan payments will not be calculated on equity funds, which is usually the case in practice.

Variant E: Investments are financed 50% with equity funds and 50% with borrowed funds. Unlike the version D, here are calculated principal and interest payments not only for borrowed funds, but also for equity funds (as an opportunity cost).

Table 3: Difference between the annual net cash flow
and loan payments for Model I (EUR)

| Year | Variant of financing | | | | |
	A	B	C	D	E
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	3,923.00	1,101.52	-2,193.80	864.60	-546.14
4	4,832.00	2,010.52	-1,284.80	1,773.60	362.86
5	4,832.00	2,010.52	-1,284.80	1,773.60	362.86
6	4,832.00	2,010.52	-1,284.80	1,773.60	362.86
7	4,832.00	2,010.52	-1,284.80	1,773.60	362.86
8	4,832.00	2,010.52	4,832.00	4,832.00	3,421.26
9	4,832.00	2,010.52	4,832.00	4,832.00	3,421.26
10	4,832.00	2,010.52	4,832.00	4,832.00	3,421.26
11	3,923.00	1,101.52	3,923.00	3,923.00	2,512.26
12	8,828.09	6,006.61	8,828.09	8,828.09	7,417.35
Σ	**50,498.09**	**22,283.29**	**19,914.09**	**35,206.09**	**21,090.09**

Source: authors' calculations

For all assumed variants of financing and for both models in table 3 and 4 are determined differences between net cash flows and loan payments (principal and interest payments).

Table 4: Difference between the annual net cash flow
and loan payments for Model II (EUR)

Year	Variant of financing				
	A	**B**	**C**	**D**	**E**
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	-1,515.39	550.77	-1,096.90	432.31	-273.07
4	4,377.50	1,556.02	-1,739.30	1,319.10	-97.65
5	4,832.00	2,010.52	-1,284.80	1,773.60	362.85
6	4,832.00	2,010.52	-1,284.80	1,773.60	362.85
7	4,832.00	2,010.52	-1,284.80	1,773.60	362.85
8	4,832.00	2,010.52	1,773.60	3,302.80	1,892.06
9	4,832.00	2,010.52	4,832.00	4,832.00	3,421.26
10	4,832.00	2,010.52	4,832.00	4,832.00	3,421.26
11	4,377.50	1,556.02	4,377.50	4,377.50	2,966.76
12	9,971.83	7,150.35	9,971.83	9,971.83	8,561.09
∑	**46,203.44**	**22,876.28**	**19,096.33**	**34,388.34**	**20,986.26**

Source: authors' calculations

Financing of investments according to variant C is not financially feasible for both models because cash deficit will occur. In this case the investments for a number of years will not generate sufficient net cash flow to make the loan payments.

For both models the biggest positive difference between net cash flow and loan payments (cash surplus) is occurred if investment is financed only with equity funds (variant A), because for this variant principal and interest payments are not calculated.

The sum of all cash surpluses (and deficits) is in almost all variants of financing higher for Model I, which means that Model I is more financially feasible. Only for financing variant B sum of cash surpluses is higher for Model II.

Within financial feasibility analysis special attention is paid to variants D and E. This is because variant D is usually used in practice, while variant E is important from theoretical point of view. According to variant of financing D both investment models are financially feasible but more favorable is Model I because it has higher cumulative cash surplus (*35.206.09 EUR> 34.388.34 EUR*).

In financing variant E both models have problems with liquidity. Model I has cash deficit in third year of the project, while Model II has cash deficit in third and fourth year of the project. Therefore, Model I is considered to be more financially acceptable. Financial feasibility of both models in this variant of financing is possible in all years only if interest rate for equity is not higher than 4.07%. In this case difference between net cash flows and required principal and interest payments (for equity and loan) would be positive during entire period.

On the other hand, if interest rate for equity funds cannot be lower than 4.5% than (in order to provide financial feasibility of investments during entire observed period) financial structure should be changed - the higher acceptable participation of loan for both models is 41.07% (participation of equity would be 58,93%).

4. Conclusion

It is necessary to increase level of raspberry production in the Republic of Serbia, or at least to keep it at the current level. Therefore, it is needed to invest in re-planting of existing raspberry plantations or establishment of new plantations, which requires significant investments. For that reason there is a need to perform economic and financial evaluation of investments in establishment of raspberry plantations. This has been done on models which have represented different dynamics of investments. Using net present value, modified internal rate of return and payback period it was determined that for investors would be the best to raise raspberry plantations at the same time on entire area (not in the two phases), provided that it is possible to acquire necessary financial funds (equity or borrowed funds).

If principal payment and interest are calculated for equity assets the highest possible participation of borrowed funds in structure of financial sources for both models is 41.07%. If participation of loan in financial structure is 50% (and loan payments are calculated for equity funds), investments will be financially feasible only if interest rate for equity assets is not higher than 4.07%.

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ESTABLISHMENT OF THE SERBIAN FADN INSTITUTIONAL FRAMEWORK[1]

Ivana Ivkov[2], Zorica Vasiljevic[3], Rino Ghelfi[4]

Summary

While the Republic of Serbia is increasingly moving towards EU integration, and while one of the many EU requirements is the yearly transmission of the accountancy data that are important for the annual determination of the incomes of agricultural holdings and analysis of their business operation, the need to establish and develop Serbian Farm Accountancy Data Network (FADN) system becomes a crucial strategic option. This research paper describes how this requirement has been fulfilled for the Republic of Serbia, with special focus on FADN institutional framework.

In this paper it is used unique replicable European Union (EU) methodology that has been applied and adjusted in accordance with national conditions. Furthermore, a comparative research method was used in a particular area of this study, which aimed to make comparisons across different FADN institutional framework of certain EU member states and Republic of Serbia.

The results of this research paper showed that the FADN institutional frameworks in EU member states as well as institutional framework of the Republic of Serbia as candidate country have been established on the same bases, such as accountancy data collection–processing–transmission chain. However, the FADN

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institutional frameworks in EU member states are different and complex. Furthermore, taking into consideration comparison of the current state of FADN institutional framework in certain EU member states and Republic of Serbia, this paper demonstrated that although currently there is no specific sub-legal act, that prescribes the functioning of the FADN system in Serbia, there is a dynamic phase at an early stage of the Serbian FADN institutional framework development.

Evidently, it is in development and needs to be further improved and strengthened while the sub-legal act, that prescribes the functioning of the FADN system, needs to be adopted.

Consequently, for completed Serbian FADN system establishment and its sustainable development and functioning, there are still many challenges to overcome.

Key words: FADN, institutional framework, Republic of Serbia, EU

1. Introduction

Today, Serbia is modern country in transition, recognizing in agricultural sector the needs for viability of innovation in farm accounting and its consequences for data gathering for economic and policy analysis in Farm Accountancy Data Network (FADN).

In contrast to EU member states, Serbia doesn't have farm accounting legal base and as a consequence, in the last years there has been a growing interest for financial results of the agricultural holdings and analysis of their business operation. As the result of the above-mentioned and since the Republic of Serbia is increasingly moving towards EU integration and moreover, taking into consideration that the establishment and functioning of FADN system is one of the preconditions to join the EU, the need to establish and develop FADN system becomes an important strategic option. On this basis, the establishment of Serbian FADN system has officially been introduced in late 2011[5].

2. Methodology

In this paper it is used unique replicable European Union (EU) methodology that has been applied and adjusted in accordance with national conditions.

Furthermore, a comparative research method was used in a particular area of this

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[5] Establishment of FADN system is assisted by the project "Establishment of the Serbian Farm Accountancy Data Network (FADN)" financed under EU IPA 2010 programming cycle.

study, which aimed to make comparisons across different FADN institutional framework of certain EU Member States (such as Republic of Poland, Republic of Estonia, Republic of Croatia) and Republic of Serbia.

3. An overview of the European Union FADN system

The legislation establishing FADN is Council Regulation 79/65/EEC of 15 June 1965. The Farm Accountancy Data Network (FADN) is a European system of sample surveys conducted every year to collect structural and accountancy data on farms, with the aim of monitoring the income and business activities of agricultural holdings and evaluating the impact of the measures taken under the Common Agricultural Policy. The annual survey is carried out by the each member states of the European Union.

Holdings are selected to take part in the survey on the basis of sampling plans established at the level of each region in the Union. The survey does not cover all the agricultural holdings in the Union but only those which due to their size could be considered as the commercial ones. The methodology applied aims to provide representative data along three dimensions: region, economic size and type of farming.

Currently, the annual sample covers +/- 83,000 agricultural holdings. They represent a population of about 6,400,000 farms in the 27 Member States, which cover approximately 90% of the total utilized agricultural area (UAA) and account for about 90% of the total agricultural production of the Union.

The collected data, for each sample farm, concerns approximately 1,000 variables. These variables described in a specific questionnaire called Farm Return refer to:

- Physical and structural data, such as location, crop areas, livestock numbers, labour force, etc.
- Economic and financial data, such as the value of production of the different crops, stocks, sales and purchases, production costs, assets, liabilities, production quotas and subsidies, including those connected with the application of CAP measures.

FADN presents the only source of microeconomic data that is harmonised and comparable, which is governed by EU Regulations and supported by supplementary instructions contained in FADN Community Committee publications (RI/CC documents).

4. Organisational structure for data collection as the basis for FADN institutional framework

The source of accountancy data for the FADN purposes is located at level of individual agricultural holding. The required data are extracted from the appropriate inventory, cash book, ledger or journal kept by the farmer and/or field officer-data collector. In some Member States, the Liaison Agencies have drawn up special entry books to be completed periodically by the farmers.
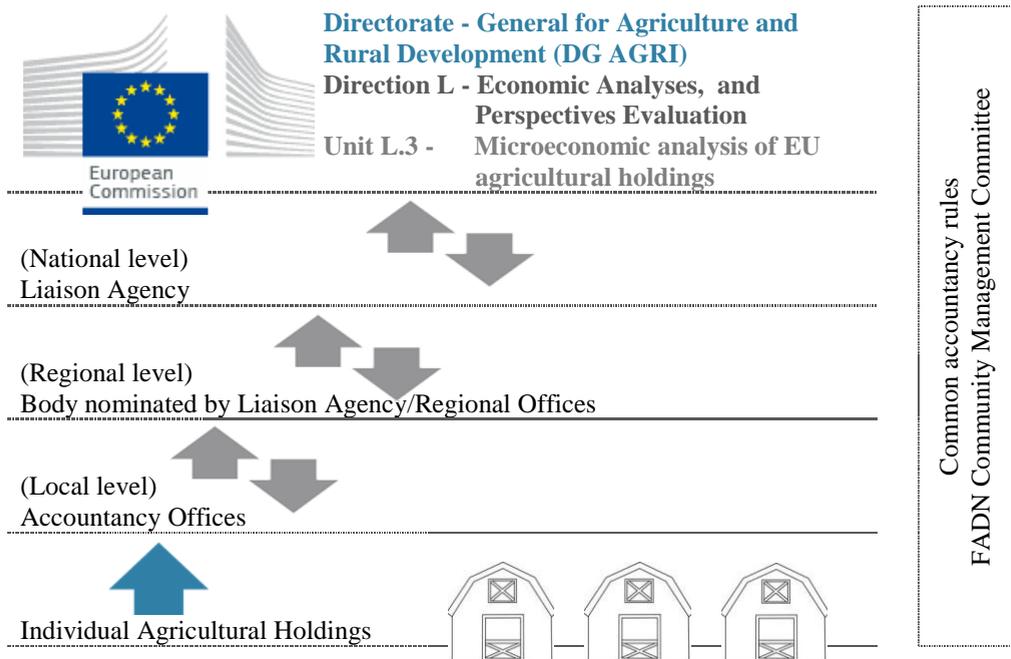
Source: Shaped and modified by authors based on the information contained in the related materials (Presentation: "The Farm Accountancy Data Network of the European Union", Chart: "Organization Chart DG AGRI")

Chart 1 FADN organisational structure for data collection

Further data transmission depends on the Member State's FADN institutional framework and on the characteristics of the national legislation. The most common organizational structure for data collection, which presents the basis for FADN institutional framework, is shown by the Chart 1.

5. EU FADN institutional framework

In this section there are described activities and responsibilities of each participant within EU FADN institutional framework.

European Commission: Data collected in a variety of ways, through different organizations appointed as Liaison Agency always arrive to the EU FADN highest authority - European Commission.

While the European Commission is the primary user of FADN system (for instance, the European Commission is user of analyses based on FADN-data), it also contributes to the system:

- Financially: The Commission recognizes that participation in the FADN survey imposes a cost on the Liaison Agencies. Therefore, a payment is made for each successfully completed (validated and approved) Farm Return received by the Commission.

- Technically:

  - Data Validation: Both the Liaison Agencies and the Commission take great care to ensure that any errors in FADN data are identified and corrected. The Commission checks on the validity of the manner in which the returning holdings were selected, and of the information received, in assistance and consultation with a **FADN Community Committee**, which is composed of representatives of the Member States and over which the Commission presides.

  - Data Storage: Since 1989 FADN public data base presents unique collection of structured, harmonised and comparable agricultural accounting data from a variety of agricultural holdings.

Liaison Agency: The highest authority at national level, which plays a key role in the management of the data network, is Liaison Agency.

Each Member State appoints a relevant organisation as a Liaison Agency, which should be competent authority for the data transmission to the European Commission. The selection of organisations that are appointed as national Liaison Agencies for FADN was approached differently among EU members, as shown in Table No. 1.

Data collection is also the responsibility of a Liaison Agency in each Member State and is also undertaken by the Liaison Agency itself or by bodies nominated by it. These either employ their own staff to visit the sample agricultural holdings and to collect the data, or they contract this work out to accountants, universities, farmers' cooperatives or other organisations.

EU Member States	Organisations appointed as Liaison Agency
Belgium	Office for Agricultural Coordination (BCA/LB) - FADN Liaison Agency / *Verbindingsorgaan ILB-RICA Landbouwbureau/BCA*
Bulgaria	Ministry of Agriculture and Food, Directorate General "Agriculture and Land Relations" / *Министерство на земеделието и храните, Главна дирекция "земеделие и поземлени отношения"*
Czech R.	Institute of Agricultural Economics and Information / *Ústav zemědělské ekonomiky a informací*
Denmark	Statistics Denmark , Division for account statistics for agriculture / *Danmarks Statistik*
Germany	Johann Heinrich von Thünen Institute (vTI)
Estonia	Rural Economy Research Centre (RERC) / *Maamajanduse Infokeskus*
Ireland	Teagasc Hq - The Irish Agriculture and Food Development Authority
Greece	Ministry of Rural Development and Food, General Directorate of Agricultural Extension & Research, Directorate of Agricultural Extension / *Υπουργείο Αγροτικής Ανάπτυξης και Τροφίμων, Γενικη Διευθυνση Γεωργικων Εφαρμογων & Ερευνας, Διεύθυνση Γεωργικών Εφαρμογών*
Spain	Ministry of Agriculture, Food and the Environment, Undersecretariat of Agriculture, Food and the Environment, General Technical Secretariat / *Ministerio de Agricultura, Alimentación y Medio Ambiente, Subsecretaría de Agricultura, Alimentación y Medio Ambiente, Secretaría General Técnica*
France	Ministry of Agriculture, Food and Forestry, General Secretariat, Department of Statistics and Prospective / *Ministre de l'Agriculture, de l'Agroalimentaire et de la Forêt, Secrétariat general, Service de la Statistique et de la Prospective*
Italy	National Institute of Agriculture Economics (I.N.E.A.) / *Istituto Nazionale di Economia Agraria*
Cyprus	Agricultural Research Institute, Scientific support division, FADN Unit / *Ινστιτούτο Γεωργικών Ερευνών, Τομεασ Επιστ Υποστηριξησ, ΔΙΓΕΛΠ*
Latvia	Latvian State Institute of Agrarian Economics / *Latvijas Valsts agrārās ekonomikas institūts*
Lithuania	Lithuanian Institute of Agrarian Economics / *Lietuvos agrarinės ekonomikos institutas*
Luxembourg	Ministry of Agriculture, Viticulture and Rural Development, Department of Rural Economy / *Ministère de l'Agriculture, Viticulture et Développement Rural, Service d'Economie Rurale*
Hungary	Research Institute of Agricultural Economics, Farm Business Analysis Department / *Agrárgazdasági Kutató Intézet,*

	Vállalkozáselemzési Osztály
Malta	Ministry for Resource and Rural Affairs
Netherlands	Agricultural Economics Research Institute / *Landbouw Economisch Instituut* (LEI)
Austria	Federal Ministry of Agriculture, Forestry, Environment and Water Management / *Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft*
Poland	Institute of Agricultural and Food Economics - National Research Institute, Agricultural Accountancy Department / *Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej - Państwowy Instytut Badawczy, Zakład Rachunkowości Rolnej*
Portugal	Ministry of Agriculture, Sea, Environment and Spatial Planning, Office of Planning and Policies, Statistics Unit / *Ministra da Agricultura, do Mar, do Ambiente e do Ordenamento do Território, Gabinete de Planeamento e Políticas (GPP), Divisão de Estatística*
Romania	Ministry of Agriculture and Rural Development, Directorate General of Food Industry, Service for quality policy, RICA Department / *Ministerul Agriculturii si Dezvoltarii Rurale, Direcţia generală de industrie alimentară, Serviciul politici de calitate, Compartimentul RICA*
Slovenia	Ministry of Agriculture, Forestry and Food, Directorate for Agriculture, Education Non-Governmental and Fadn Section / *Ministrstvo za kmetijstvo, gozdarstvo in prehrano, Direktorat za kmetijstvo, Sektor za podnebne spremembe nevladne organizacije, šolstvo in knjigovodstvo*
Slovakia	Research Institute of Agricultural and Food Economics (RIAFE), Department of Informatics, FADN Division / *Výskumný ústav ekonomiky poľnohospodárstva a potravinárstva (VÚEPP), Odbor Informatiky, Oddelenie informačnej siete poľnohospodárskeho účtovníctva*
Finland	MTT Agrifood Research Finland / *Maa- ja elintarviketalouden tutkimuskeskus MTT*
Sweden	Statistics Sweden / *SCB Statistiska centralbyrån*
UK	Department for Environment, Food & Rural Affairs (DEFRA)
Croatia	Agriculture Advisory Service (Public administration) - Department of FADN / *Poljoprivredna savjetodavna služba, Samostalni odjel za sustav poljoprivrednih knjigovodstvenih podataka (FADN)*

Source: Shaped and modified by authors based on the information contained in the related web site and related links under it
http://ec.europa.eu/agriculture/rica/liaisonagency_en.cfm?CodeCountry=EUR

Based on Table 1, it can be concluded that currently there are four basic types of organisations appointed as Liaison Agency. Percentage share of four basic types of organisations in the total number of Liaison Agencies of the EU member states is shown by the following Figure No. 1.

A	Related Ministries, Ministerial Departments and Directorates	43%
B	Research Institutes	46%
C	Statistics	7%
D	Agriculture Advisory Services	4%
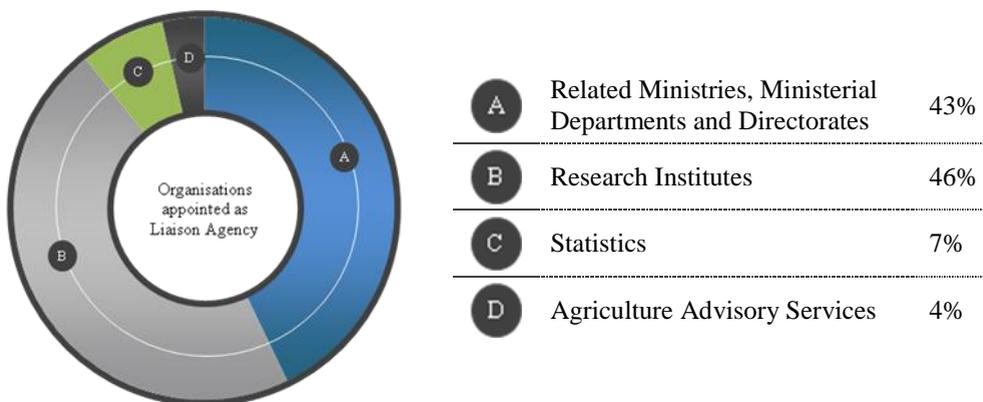
Source: Computed by the authors based on the information presented in the Table 1EU member states organisations appointed as Liaison Agency

Figure 1 Percentage share of four basic types of organisations appointed as Liaison Agency in the total number of Liaison Agencies of the EU member states

Highest percentage of 46% makes Research Institutes as the most frequent type of organisation appointed as Liaison Agency under the EU FADN system. The above mentioned organisations are usually leading Research Institutes in EU member state, undertaking innovative research in the areas of agriculture production, food, the environment and the rural economy.

Research Institutes are immediately followed by the Related Ministries, Ministerial Departments and Directorates with percentage of 43%.

The Statistics appointed as Liaison Agency account only 7% of total number of EU Member States Liaison Agencies, while the Republic of Croatia is currently the only EU member which has appointed Agriculture Advisory Service as national Liaison Agency.

National Committee: For the purposes of FADN each Liaison Agency is guided by a National FADN Committee. The National Committee is formed of representatives of the different organisations which could be considered as corresponding organizations for the FADN sustainable functioning.

Regional Committees: Furthermore, EU member states which have several divisions may, for each of the divisions under their jurisdiction, set up a regional committee of the data network. The Regional Committee, in particular, has the duty of cooperating with the Liaison Agency in selecting the returning holdings.

Accountancy Offices: For the purposes of FADN each EU member states sets up the Accountancy Offices[6].

The National Committee, the Regional Committees, the Liaison Agency and the Accountancy Offices have been bound, within their relevant areas of responsibility, to provide the Commission with any information[7]

6. Serbian FADN institutional framework

Although currently there is no specific legal basis for FADN in Serbia, there is general legal act in power, supporting establishment of FADN in the Republic of Serbia. Existing Law on Agriculture and Rural Development of the Republic of Serbia (Article 33) stipulates that the Ministry of Agriculture, Forestry and Water Management keeps the system of agricultural accountancy data to monitor the level of income and expenses of the registered farms and family farms, assess the efficiency of agricultural production and analyse the agricultural policy measures. It provides the legal base for the establishment of the FADN and will be the ground for the future Rulebook on Farm Accountancy Data Network in the Republic of Serbia.

Serbian FADN system has officially been introduced in late 2011 where the establishment of FADN institutional framework has been got from initial stage. Related organizations are involved in different aspects of FADN system and represent Serbian FADN institutional framework in the early stages, which is shown by the following Organisational Chart (Chart No. 2)

Sector for Agricultural Policy within the Ministry of Agriculture, Forestry and Water Management (MAFWM) is appointed to be the **Liaison Agency** – competent authority for the data transmission to the European Commission. The subsidiary Unit for Analytics and Statistics is appointed to manage the Serbian FADN system. Group for Extension Services within the Department for Rural Development is providing assistance and support to the establishment and

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[6] Accountancy Offices (AO) is official FADN term for the organisations appointed for data collection from agricultural holdings in the FADN sample.

[7] Further duties of the European Commission, the FADN Community Committee, national Liaison Agency, the National Committee, the Regional Committees as well as the Accountancy Offices are described in the COUNCIL REGULATION (EC) No 1217/2009 of 30 November 2009 setting up a network for the collection of accountancy data on the incomes and business operation of agricultural holdings in the European Community.

development of Serbian FADN system considering the fact that it has responsibility for the agricultural extension services and close cooperates with Institute for Science Application in Agriculture (IPN) - authorised organisation by Minister to coordinate and control the activities of Agricultural Extension Services from the R. Serbia, except for those located on the territory of the Autonomous Province of Vojvodina. Furthermore, the Information Technology Sector within the Directorate for Agrarian Payments is appointed to be FADN database hosting provider.
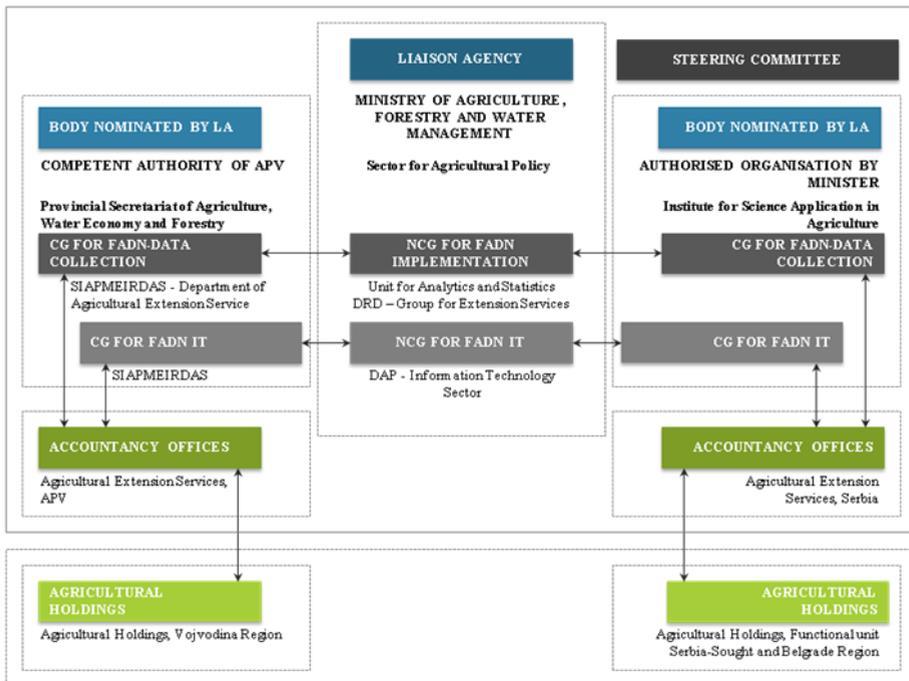
Source: Shaped and modified by authors based on the information contained in the related web sites (http://195.178.40.73/poljoprivreda/node/108#2.1 , http://psss.rs/page.php?63 , http://www.mpt.gov.rs) and related materials (Answers to the European Commission's Questionnaire on Serbia's candidacy for membership in the European Union – Chapter 11: Agriculture and Rural Development, Law on performing consultancy and expertise in Agriculture (Official Gazette of Republic of Serbia No. 30/2010), Leaflet:"Establishment of the Serbian Farm Accountancy Data Network", Presentation: "FADN project implementation experiences", Work Information of the related Ministry)

Chart 2 Organisational chart of current[8] Serbian FADN institutional framework and its relationship with Agricultural Holdings

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[8] In this research paper the term ″current″ is used due to the fact that the structure of the FADN institutional frameworks is changeable and mutable.

Authorised organisation by Minister - IPN and competent authority of Autonomous Province of Vojvodina - Provincial Secretariat for Agriculture, Water Management and Forestry (PSAWMF) are appointed to be **bodies under the Liaison Agency** responsible for management of data collection. Accurately described, within the PSAWMF it is Sector for Implementation of Agricultural Policy, Monitoring of European Integration in the field of Rural Development and Advisory Services (SIAPMEIRDAS) as well as its Department of Agricultural Extension Service.

The total number of agricultural extension services which are appointed as **Accountancy Offices** is 33. Currently, these offices have 66 advisers appointed as Data Collectors responsible for collection, processing, and dissemination of data from agricultural holdings.

Serbian FADN Steering Committee that is precursor of **the National Committee** has been established. Statistical Office of Republic of Serbia (SORS), Faculty of Agriculture in Zemun, University of Belgrade and Faculty of Agriculture, University of Novi Sad, Serbian EU Integration Office (SEIO) are represented in the FADN system through the Steering Committee. Related Ministry as well as EU Delegation is also represented in the Steering Committee.

7. Participating organizations within Serbian FADN

Participating organizations that are currently appointed for the Serbian FADN purposes are described by following Table No. 2.

However, besides organisations, the most important participants of the FADN system are holders and managers of agricultural holdings and their families.

Table 2: Participating organizations that are currently appointed for the Serbian FADN purposes

Participating organization of the Republic of Serbia and its brief description	The role of participating organisations within the FADN
Ministry of Agriculture, Forestry and Water Management	
Is, among other things, responsible for proposing system solutions in the areas of agriculture, creation of agricultural policy and its implementation.	
Sector for Agrarian Policy	Steering Committee member
Performs, among other tasks, providing agricultural analysis; following and analysis of EU legislation, rules, principles; harmonization of regulations, etc.	Liaison Agency
Unit for Analytics and Statistics	
Performs among other tasks related to: analysis of agricultural policy measures, harmonization of national agricultural measures with measures of Common	National Coordination Group for FADN implementation

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Agricultural Policy, etc.

Department for Rural Development – Group for Extension Services	
Performs, among other, tasks related to: programming, monitoring and coordination of agricultural extension services, etc.	Support Group for FADN implementation
Directorate for Agrarian Payments - Information Technology Sector	Steering Committee member
Performs, among other, tasks related to: organizing, managing and executing tasks within the field of information technology, etc.	National Coordination Group for FADN information technology
Provincial Secretariat of Agriculture, Water Economy and Forestry	
Performs in the field of agriculture, forestry, hunting, water management, food, veterinary, plant protection, fisheries, agrarian cooperatives and rural development.	
Sector for Implementation of Agricultural Policy, Monitoring of European Integration in the field of Rural Development and Advisory Services and its Department of Agricultural Extension Service	Steering Committee member
Sector/Department are, among other things, responsible for monitoring and analysis of the development of agricultural extension services in order to improve agricultural production, preparation and monitoring of the implementation of the program for improvement extension services in agriculture in AP Vojvodina.	Body nominated by Liaison Agency responsible for management of data collection from Agricultural Extension Services of Autonomous Province of Vojvodina. It is composed of two Coordination Groups: for FADN data collection and for FADN information technology.
Institute for Science Application in Agriculture	Steering Committee member
Authorised organisation by Minister, which is, among other things, responsible to coordinate and control the activities of agricultural advisory and extension services in Central Serbia (NUTS 1 – Serbia South functional unit and NUTS 2 – Belgrade Region).	Body nominated by Liaison Agency responsible for management of data collection from Agricultural Extension Services of Serbia. It is composed of two Coordination Groups: for FADN data collection and for FADN information technology.
Agricultural Extension Services (AES)	
The agricultural extension services are, among other things, responsible for: giving expert advices and recommendations to farmers, organizing seminars, workshops and publishing expert material, as well as carrying	Accountancy Offices

out other activities which improve the agricultural production. AES include: Agricultural Extension Services of Autonomous Province of Vojvodina that cover NUTS 2 – Vojvodina Region and Agricultural Extension Services of Serbia that cover NUTS 1 – Serbia South functional unit and NUTS 2 – Belgrade Region.	
Statistical Office of the Republic of Serbia	Steering Committee member
Performs among other expert tasks related to: adopting programs, organization and conducting of the statistical surveys, methodology creation, collecting, processing, statistical analysis and publishing of the statistical data, etc.	It will be appointed to carry out tasks such as typology of agricultural holding, standard output coefficient, etc.
Faculty of Agriculture in Zemun, University of Belgrade and Faculty of Agriculture, University of Novi Sad	Steering Committee member
Faculties are a teaching and research institutions whose activities cover all aspects of agricultural production and food technology, etc.	Faculties are providing valuable contributions to the Serbian FADN establishment and development. Furthermore, they will improve cooperation with other agricultural research institutions.
Other Institutions: Serbian EU Integration Office (SEIO)	Steering Committee member
Is, among other things, responsible for: monitoring the realization of obligations of ministries and special organizations in the process of EU association and accession; participating in coordination of the programming of EU's technical assistance; partaking in coordination of activities for planning and use of European funds, etc.	SEIO is providing assistance and support to the establishment and development of the Serbian FADN system.

8. Comparison of the current FADN institutional frameworks in certain EU Member States and Republic of Serbia

The following Table 3 shows the comparisons across different current FADN institutional frameworks of certain EU member states and Republic of Serbia.

Table 3: Current FADN institutional frameworks in Republic of Poland, Republic of Estonia, Republic of Croatia and Republic of Serbia

EU level				
FADN Committee				
EUROPEAN COMMISSION (DG AGRI, Direction L, Unit L.3)				
Country	**Republic of Poland**	**Republic of Estonia**	**Republic of Croatia**	**Republic of Serbia[9]**
National level				
National Committee	Ministry of Agriculture and Rural Development, Ministry of Finance, Ministry of Regional Development, Central Statistical Office, National Council of Agricultural Chambers (KRIR), Institute of Agricultural and Food Economics	Ministry of Agriculture, Statistics Estonia, Estonian University of Life Sciences, Estonian Chamber of Agriculture and Commerce, representatives of producers' organizations	Ministry of Agriculture, Agriculture Advisory Service, Agricultural Holdings, Central Bureau of Statistics, Faculty of Agriculture, University of Zagreb, Faculty of Agriculture, Josip Juraj Strossmayer University of Osijek	MAFWM, PSAWMF, IPN, SORS, Faculty of Agriculture in Zemun, University of Belgrade, Faculty of Agriculture, University of Novi Sad, SEIO, EU Delegation[10]
Liaison Agency	Institute of Agricultural and Food Economics,	Rural Economy Research Centre	Agriculture Advisory Service, Department	MAFWM, Sector for Agricultural Policy

[9] After EU accession, Republic of Serbia has to transmit accountancy data for the FADN purposes to the European Commission (DG AGRI, Direction L, Unit L.3) for the purpose of meeting the requirements of the Common Agricultural Policy.

[10] Serbian FADN Steering Committee is precursor of the National Committee.

			of FADN	
Regional level				
Regional Committees	/	/	/	/
Bodies nominated by Liaison Agency/ Regional Offices	Agricultural Advisory Centres, total number 16	/	Agriculture Advisory Service – Regional coordinators, total number 2	Authorised organisation by Minister - IPN and competent authority of Autonomous Province of Vojvodina - PSAWMF
Local level				
Accountancy Offices	Agricultural Advisers on FADN	Data Collectors, total number 22 (on a contract basis) over Estonia – those are advisors who provide advices relating to accounting and/or economics	Agriculture Advisory Service – County Advisors, total number 56	Agricultural Extension Services, total number 33 with 66 Agricultural Advisers on FADN

Source: Shaped and modified by authors based on the information contained in the related web sites (http://www.fadn.pl/index.php?id=151,http://www.maainfo.ee/index.php?page=9&,http://www.savjetodavna.hr/?page=projects,15) and related materials (Act on the collection and use of accountancy data from agricultural holdings - Republic of Poland, Chart: Croatian FADN institutional framework, Chart: Structure of Polish FADN/ Struktura Polskiego FADN, Leaflet:"Establishment of the Serbian Farm Accountancy Data Network", Presentation: "FADN project implementation experiences", Rulebook on Farm Accountancy Data Network – Republic of Croatia)

The table above indicates that each of the observed member states including the Republic of Serbia as candidate country has a specific FADN institutional framework. Furthermore, it should be taken into consideration that there are some similarities and differences among observed FADN institutional frameworks, which is presented in the following table (Table 4).

Table 4: What are the similarities and differences among observed FADN institutional frameworks?

What are the similarities?	What are the differences?
All observed FADN institutional frameworks have representatives of the related Ministries and Statistics as members of the National Committee.	Only Serbian Steering Committee that is precursor of the National Committee has representatives of SEIO and EU Delegation as members within it[11].
In most observed cases the members of National Committees are representatives of related Faculties.	Most of the observed FADN institutional frameworks have different organizations appointed as Liaison Agency.
All observed FADN institutional frameworks have not the Regional Committees.	
In most observed cases the local Accountancy Offices are Agricultural Advisers directly involved into FADN on a contract basis.	

Source: Shaped by the authors based on the information presented in the Table No. 3 – Current state of FADN institutional frameworks in Republic of Poland, Republic of Estonia, Republic of Croatia and Republic of Serbia

9. Conclusion

The result of this research paper showed that the FADN institutional frameworks in EU member states as well as institutional framework of the Republic of Serbia as candidate country have been established on the same bases, such as accountancy data collection – processing – transmission chain.

However, the FADN institutional frameworks in EU member states as well as Serbian are different and complex. They are different because of differences between member states in historical and cultural backgrounds. They are complex because they have been established within agricultural sector, which itself is very complex.

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[11] Once the project "Establishment of the Serbian Farm Accountancy Data Network (FADN)" has been completed, and when the Steering Committee will become National Committee, the National Committee will be formed without representatives of SEIO and EU Delegation as members within it.

Furthermore, taking into consideration comparison of the current state of FADN institutional framework in certain EU member states and Republic of Serbia, this paper demonstrated that although currently there is no specific sub-legal act, that prescribes the functioning of the FADN system in Serbia, there is a dynamic phase at an early stage of the Serbian FADN institutional framework development.

Evidently, it is in development and needs to be further improved and strengthened while the sub-legal act, that prescribes the functioning of the FADN system, needs to be adopted.

Moreover, relying on the feature that "Institutions are everywhere, governing our lives in fundamental ways", the general conclusion of the entire paper is that the whole Serbian FADN in the early stages finds itself in the middle of different organizations and individual agricultural holdings who are actively involved in the system, or whose interest may be affected in a positive or negative manner as a result of system execution, whereby its future depends on the capacity, support (and goodwill) of the organizations and agricultural holdings within it, as well as governmental support and assistance.

Consequently, for completed Serbian FADN system establishment and its sustainable development and functioning, there are still many challenges to overcome.

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