



AN ANALYSIS OF THE LABOUR PRODUCTIVITY OF THE AGRICULTURAL SECTOR IN THE REPUBLIC OF SERBIA

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Abstract: One of the main objectives pursued in agriculture as the primary sector in the economy is to increase the labour productivity. In order for this objective to be achieved, it is necessary to increase agricultural production, while at the same time preserve natural resources and the environment. If the creators of development policies are to formulate effective policies and strategies, adequate information relating to all vital determinants of productivity of agriculture is required. Therefore, the Statistical Office of the Republic of Serbia annually prepares and publishes, among others, information on the value of agricultural production and the number of employees in agriculture. The aim of this paper is to examine the changes in the level of productivity of agriculture in the Republic of Serbia in the period from 2007 to 2013. It also analyses the impact of labour productivity in agriculture in the share of GDP that is realized in this sector of the national economy. Agricultural population, as one of the factors that affect productivity in agriculture is analysed in terms of education and employment. The aim is to quantify the level of productivity in agriculture, as well as to examine the interdependence between labour productivity and GDP in agriculture, in order to point to the critical determinants of productivity that require improvement. The methods used in this paper are: analysis method, synthesis method, comparison method, descriptive statistics, correlation and regression analysis. Research results show that Serbia has achieved an unenviable level of labour productivity in agriculture within the analysed period of time. Research in this study is useful for the creators and holders of the development policy for the future guidance of development policies and strategies of the agricultural sector in Serbia.

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1. Introduction

Agriculture in Serbia represents a great development opportunity for the economic growth. A large part of the economic development of rural Serbia depends on agriculture and agribusiness as factors for both economic development and social stability. Agriculture faces challenges and demands in terms of efficiency, competitiveness, technological progress, environmental protection, demand for the increasing participation of organic production in total agricultural production, rural development, ensuring healthy food for the population, reduction of unemployment, etc. The agricultural sector in many countries represents the basis of GDP growth, development and competitiveness of the national economy (Gerdien, 2007, p. 5).

Creating preconditions and providing resources for the development of agriculture and improving its competitiveness (infrastructure, incentive measures, various incentives) implies undertaking a series of actions and development programs. Furthermore, the use of both traditional and innovative tools aimed at the development of human resources in agricultural production is essential as one of the key elements for the growth of the productivity indicators of the agricultural sector. However, in recent decades, in Serbia, there has been a noticeable decline in the agricultural population. Also, agricultural population has unsuitable age and education structure.

Knowledge represents a very important factor and resource for successful development of the agri-food sector. The processes of efficient creation, transformation and knowledge transfer are of key importance for the creation of highly productive labour force in the agricultural sector as well. Educational institutions in the traditional education system that are responsible for the education of personnel have an important role in this process.

The existing education system needs to be enhanced, and agricultural structure made more attractive to young people in order to reduce the pronounced problem of unemployment. Also, the education system needs to be adapted to the new requirements of the labour market so that the knowledge acquired in educational institutions can be applicable in practice and that it can efficiently contribute to the further development of agriculture (Noe, Hollenbeck, Gerhart, Wright, 2005, p. 318).

Taking into consideration the importance that human capital has on the growth of productivity in agriculture, this paper analyses the agricultural population in the Republic of Serbia from different dimensions and perspectives. It also assesses the labour productivity in agriculture in Serbia in the period 2007-2013, and for the purpose of its augmentation, recommendations for successful realization of the strategy of the human factor development, continuous growth of agricultural production, export of the

agricultural product to the world market, as well as, the growing competitiveness of domestic agricultural products in the international market.

The paper is organised into several sections. In the first part of this paper, a theoretical overview of the challenges of education and improving human capital in agriculture of Serbia and the role that higher educational institutions play in its development are given. In the second part which refers to research results, an analysis of agricultural production and the agricultural population in Serbia, as well as an analysis of labour productivity in agriculture and the impact that it has on the GDP in the agricultural sector are provided.

2. Theoretical Background

2.1 Education and Human Capital Development in the Aim of Increasing Productivity in Agriculture

Causes for both development or decline of agriculture in a country can be reflected not only in its (un)favourable geostrategic position and natural resources, but also in the institutionalization and management of human and natural resources in the country. In the process of a rapid technology development, specialization and intensive process of globalization, a Serbian farmer lags behind in education (Radovanović, 1999, p. 10). This contributes to the lag in the living standards behind members of other professions and social classes in the country, as well as a lag behind members of the same social class in developed countries (Šuljagić, 2010, p. 81). The modern way of organizing agricultural production requires not only raising the level of knowledge of the agricultural population, but also the development of entrepreneurial skills and abilities (Zjalić, 2009, p. 93). Agriculturalists acquire necessary knowledge through the education system. However, the formal education system is not enough. Also, farmers get additional information, knowledge, recommendations, and advice by using advisory services of the appropriate competent ministry (Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia, 2012, p. 6).

The education system in Serbia, however, is not fully adapted to the needs of modern agriculture. Practice shows that, among other factors, this is one of the reasons for the emigration of young people from rural areas. In order to prevent this phenomenon of depopulating villages, more attention should be paid to solving the problem of improving the education system of the agricultural population in Serbia. Modern agriculture in the 21st century requires a competent, highly educated workforce, which will easily adapt and accept the results of modern technological development, as well as new methods of modern agricultural production (Subić, 2005, p. 80).

The education system in Serbia is characterized by insufficient compliance with the actual needs of the labour market. The development of human capital in agriculture imposes the necessity for creating and implementing lifelong learning strategies by improving the quality and effectiveness of education, especially adult education, in order to acquire the knowledge and skills required for the human capital in modern conditions. These measures are aimed at encouraging professional development, as well as reducing the mismatch of supply and demand in the labour market.

2.2 The Role of Higher Educational Institutions in the Development of Human Capital in Agriculture

In the future, higher educational institutions in the field of agriculture will change the roles they have in the education system. The importance of further investment in the development of human potential in agriculture stems from the need to keep up with the leading countries in agricultural production and to create comparative advantages. Therefore, the most important changes will take place in several directions (Human Capacity Development, 2009, pp. 5-6):

1. *The need for strategic institutional planning.* Institutions that offer elementary education in agriculture should be engaged in the preparation of strategic plans on how to recruit, retain and prepare graduates from agricultural faculties of today and tomorrow in the best possible way. The discussion should include a wide range of interest groups, such as faculties from different fields, current and former students, employers, local organizations focused on food and agriculture, farmers and representatives of the public. Institutions should develop a strategic plan within the next two years and revisit it every 2 to 5 years (Transforming Agricultural Education for a Changing World, 2009, pp. 100-102).

2. *Agriculture through the curriculum.* Academic institutions should take steps to increase the involvement of agriculture in the teaching plans and programs. In particular, faculties of agricultural sciences, in cooperation with other faculties should develop and teach joint introductory courses that will serve more people. By working together, the examples and issues from agriculture can be incorporated into the curricula of a large number of universities (Transforming Agricultural Education for a Changing World, 2009, p. 102-103). One of the most important actions that institutions can take to increase students' interest in agriculture is to increase agricultural literacy. All students, regardless of the study and future career should be offered courses in the field of agriculture in order to make them more familiar with the subject. The aim of the agricultural education is very often "agricultural literacy" (National Research Council Staff, 1988, p. 2).

3. *Changes in the way students are taught.* Academic institutions should broaden student experience to include practical training, so that it includes:

- Numerous opportunities for developing different skills, including communication skills, teamwork, and management;
- The opportunity to participate in undergraduate research;
- The opportunity to participate in further training;
- The possibility of participation in the study and other programs that provide practical experience outside of educational institutions;
- Exposure to international perspectives and introduction with relevant courses in the country and abroad (Transforming Agricultural Education for a Changing World, 2009, p. 104-105).

4. *Changes in the way faculties educate students.* There are several ways to prepare teachers to teach in the most effective manner and adapt their curricula:

- Academic institutions, universities, and professional societies should support all development activities at institutional, local, regional, and national levels. Special attention should be paid to the preparation of teachers so that they can provide appropriate training to a new generation of students and graduates. Also, professional development should be a priority not only for individual faculty members, but for the whole departments.
- Academic institutions and funding agencies must allocate existing and provide additional resources to develop new programs, projects and teaching materials. In addition to financial resources, it should be borne in mind the time teaching staff invests attending various seminars, conferences, reviewing different teaching materials (Transforming Agricultural Education for a Changing World, 2009, p. 104-105).

5. *Stakeholders should take tangible actions* to identify and support the best education at universities and related activities:

- Academic institutions should ensure or increase the rewards for high quality teaching, development of teaching materials, mentoring and other means for training students, including job opportunities after graduation and the like;
- Public and private institutions should provide adequate financial resources;
- Professional associations should work on developing a new profile of professionals who teach relevant disciplines. This would encourage individuals to participate in various social meetings, workshops, publish their works in professional publications, work on improving teaching materials, etc. (Transforming Agricultural Education for a Changing World, 2009, p. 108-109).

6. *Building stronger connections among educational institutions.* Academic institutions in the field of agriculture should partner with each other to provide greater opportunities to students. Four-year faculties should cooperate with each

other, and establish cooperation with funding agencies, as well as with those institutions with whom together can develop programs and courses in the field of agriculture, and direct those who have chosen to pursue their careers in agriculture (Transforming Agricultural Education for a Changing World, 2009, p. 109-110).

7. *Faculties should reach out to primary and secondary schools* to expose students to agricultural topics and generate interest in agricultural careers. Although the partnership may differ from institution to institution, the programs can include agricultural high schools, summer schools for high school students, educational programs based on agriculture, etc. (Transforming Agricultural Education for a Changing World, 2009, p. 109-110).

8. *Increased cooperation between academic institutions and employers.* Stakeholders at universities and in other sectors should develop a partnership that will facilitate communication and coordination with regard to the education of students in the field of agriculture and food production. This partnership should include the following elements:

- Academic institutions should include representatives of industry and other employers in strategic planning, on the advisory board and the like. On the other hand, companies should include academic faculty on their advisory committees.
- Exchange programs should be created so that experts from industry can spend one semester teaching at academic institutions, transferring their practical knowledge related to the theoretical topics that are studied; while academics also have a certain number of hours of sabbaticals outside the university.
- The possibility for students to gain experience outside the job should be put to good use. The program may include internships, cooperative educational programs, mentoring, summer courses, etc. (Transforming Agricultural Education for a Changing World, 2009, pp. 111-113).

2.3 Methodology and Research Questions

The aim of this paper is to calculate the level of labour productivity in agriculture, as well as to examine the interdependence between labour productivity and GDP in agriculture, in order to highlight the critical aspects that require improvements.

Methods used in this paper are: analysis method, synthesis method, comparison method, descriptive statistics, correlation and regression analysis. Correlation analysis is used in the paper with the aim of investigating the GDP in agriculture and labour productivity in agriculture (SPSS statistics).

Regression analysis is applied to examine the impact of agricultural production and employment in agriculture in the GDP achieved in agriculture.

To realize this objective, the paper is based on the following research questions:

1. Is the share of employees in agriculture unchanged in a total employment in Serbia in the analyzed period?
2. Is there a relationship between labour productivity in agriculture and GDP in agriculture in Serbia?
3. Did Serbia in the period from 2007 to 2013 improve the level of labour productivity in agriculture?

3. Results and Discussion

The results of the research are grouped into three categories:

- a) Analysis of agricultural output;
- b) Analysis of the agricultural human capital in Serbia;
- c) Analysis of the labour productivity in agriculture in Serbia in the period from 2007 to 2013.

a) Analysis of Agricultural Output in Serbia

Table 1 illustrates the value of production of agricultural goods and services in Serbia from 2007 to 2013.

Table 1 Agricultural Output in Serbia at Current Producer Prices, in the Period from 2007 to 2013 (in mil. RSD)

	2007	2008	2009	2010	2011	2012	2013
Agricultural output	333,681	419,575	412,265	478,201	520,247	513,404	558,733
Agricultural goods output	324,166	409,102	400,520	466,859	509,388	500,794	546,297
Crop output	223,008	282,764	271,733	342,413	362,489	335,728	378,657
Animal output	101,158	126,338	128,787	124,446	146,899	165,065	167,640
Agricultural services output	9,514	10,473	11,745	11,342	10,859	12,611	12,436

Source: Economic accounts of agriculture in the Republic of Serbia, 2007-2013

The production of agricultural products and services recorded growth in the period between 2007 and 2013, so that in 2013, it achieved a value that was 67% higher compared to 2007. Production of agricultural goods in the analysed period involved a total value of around 97%, while agricultural services recorded a participation of only 3%. In terms of production of agricultural

goods, crop production has higher participation in the analysed period (about 70%) in relation to livestock production (about 30%).

b) An Analysis of the Agricultural Human Capital in Serbia

Due to accelerated industrialization, agricultural population in Serbia has been in decline in the last sixty years. According to a census of the Statistical Office of the Republic of Serbia, in 2011 there was 86.7% less active agricultural population than in 1948 (Table 2).

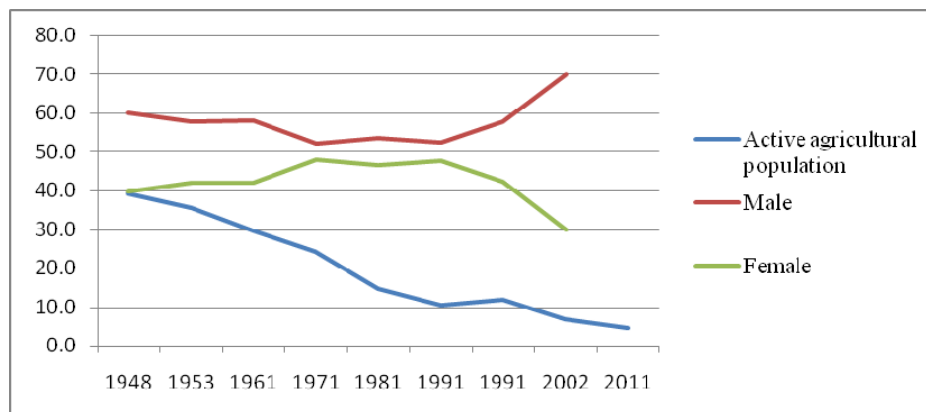
Table 2 Active Agricultural Population in Serbia According to Censuses in the Period from 1948 to 2011

	1948	1953	1961	1971	1981	1991	1991	2002	2011
Total population	6,527,583	6,978,119	7,641,962	8,446,726	9,313,686	9,778,991	7,576,837	7,498,001	7,186,862
Agricultural population	2,563,000	2,485,489	2,269,276	2,069,064	1,371,436	1,040,699	904,127	529,236	340,186
Male	/	1,495,916	1,315,295	1,203,283	715,746	558,217	473,989	305,590	238,215
Female	/	989,573	953,981	865,781	655,690	482,482	430,138	223,646	101,971

Source: Statistical Yearbook of the Republic of Serbia, 2014

Active agricultural population in the total population of Serbia indicates a continuing decline, as Figure 1 illustrates.

Figure 1 The Percentage Share of Active Agricultural Population in Serbia, According to Censuses in the Period from 1948 to 2011



Women generally participate less in the active agricultural population compared to men. In the period between 1981-1991, both male and female population were active in agriculture, but already in the following censuses

there was a noticeable decline of active female agricultural population overactive male agricultural population (in 2011 the ratio was 70% in favour of men, and 30% in favour of women).

The fact that there is a decrease in percentage share of the agricultural population in the overall population indicates that Serbia is going the same way as other developing countries when development is in question. However, simultaneously with the decrease of the total number of employees in agriculture, it is necessary to increase the level of education of the remaining agricultural population in order to compensate physical strength with the ability to manage the manufacturing process. In addition, with the reduction of the labour force in agriculture, there is a necessity to modernize technological processes, i.e. introduce modern machinery, use all contemporary technical and technological achievements and all this for the pursue of agricultural efficiency.

Table 3 Employment in Agriculture in Serbia

Year	Employment in all sectors (agriculture, industry, service sector)	Employment in agriculture	Employment in agriculture as a percentage of total employment in Serbia	Agricultural production, hunting and services	Share in total employment in agriculture	Forestry and wood cutting	Share in total employment in agriculture	Fishing and aquaculture	Share in total employment in agriculture
1999	1,992,293	98,380	4.94%	84,462	86%	9,698	10%	4,219	4%
2000	1,916,248	93,591	4.88%	79,951	85%	9,486	10%	4,153	4%
2001	1,882,016	90,390	4.80%	76,737	85%	9,459	10%	4,193	5%
2002	1,806,175	79,643	4.41%	68,237	86%	7,457	9%	3,948	5%
2003	1,738,155	73,334	4.22%	63,276	86%	7,174	10%	2,884	4%
2004	1,580,140	68,896	4.36%	59,694	87%	6,179	9%	3,026	4%
2005	1,546,471	63,887	4.13%	54,523	85%	6,149	10%	3,215	5%
2006	1,471,750	58,336	3.96%	49,380	85%	5,782	10%	3,173	5%
2007	1,432,851	54,090	3.77%	45,578	84%	5,336	10%	4,232	8%
2008	1,428,457	43,441	3.04%	37,376	86%	5,043	12%	1,023	2%
2009	1,396,792	40,238	2.88%	34,264	85%	4,911	12%	1,062	3%
2010	1,354,637	37,392	2.76%	31,580	84%	4,767	13%	1,045	3%
2011	1,342,892	34,815	2.59%	29,142	84%	4,621	13%	1,053	3%
2012	1,341,114	33,002	2.46%	27,120	83%	4,838	14%	1,043	3%
2013	1,338,082	32,715	2.44%	26,849	83%	4,841	14%	1,025	3%

Source: Statistical Yearbook of the Republic of Serbia, 2003-2014

Table 3 illustrates changes in the overall employment in Serbia during the period from 1999 to 2013 in all sectors (agriculture, industries, service industries) with a focus on the changing number of employees in agriculture in the same period and in particular in the framework of "Agricultural production, hunting and related service activities", "Forestry and Logging" and "Fisheries and Aquaculture". Taking into account that in the period from 1999 to 2013, agricultural employment showed a slight decline from 4.94% to 2.44%, it was observed as a participation in the total employment in Serbia.

Most of agricultural employees were in agricultural production, hunting and the service industry which made it about 83% of the total employment in agriculture, whereas only 3% of employees belonged to fisheries. As for forestry, there was a constant reduction of the absolute number of employees, but also the increase in the relative share from 10% in 1999 to 14% in 2013.

c) An Analysis of the Labour Productivity in Agriculture in Serbia

Labour productivity is a partial indicator of production efficiency that indicates the efficient usage of the labour as a vital resource or a production factor/input (Krstić, Janković-Milić, 2003, p. 497). Labour productivity in agriculture for the observed year (P_t) represents the ratio or quotient between total agricultural output, that is the agricultural production value (Q_t) for observed year t , and labour as a factor or an input in agricultural production (L_t) for the observed year t . In order to analyse the labour productivity as a performance indicator, the number of employees in agriculture is taken as a denominator for the labour productivity ratio (L_t) calculation.

Table 4 The Labour Productivity Ratio in Agriculture (P_t) and Change in Labour Productivity Ratio for Observed Year in Comparison to the Previous Year (ΔP) in Serbia in the Period from 2007 to 2013

Year	Agricultural output	Number of employees in agriculture	Labour productivity ratio	Change in labour productivity ratio for observed year in comparison to the previous year
t	Q_t	L_t	$P_t = \frac{Q_t}{L_t}$	$\Delta P = P_t - P_{t-1}$
2007	333,681	54,090	6.17	-
2008	419,575	43,441	9.66	+3.49
2009	412,265	40,238	10.25	+0.59
2010	478,201	37,392	12.79	+2.54
2011	520,247	34,815	14.94	+2.15
2012	513,404	33,002	15.56	+0.62
2013	558,733	32,715	17.08	+1.52

Source: Economic accounts of agriculture in the Republic of Serbia, 2007-2013

Table 5 illustrates the labour productivity in the period from 2007 to 2013, where the rate of change in labour productivity (Kp) for the ongoing observed period (year) in comparison to the previous period (year) was monitored (Krstić, Sekulić, 2013, p. 287).

Table 5 Labour Productivity in Agriculture in Serbia in the Period from 2007 to 2013

Observed year in comparison to the previous year t/t-1	Coefficient (rate) of change (%)			Coefficient of change under the influence of a certain element of labour productivity indicator (%)		
	$Kq = (\frac{Q_t}{Q_{t-1}} - 1) \cdot 100\%$	$Kl = (\frac{L_t}{L_{t-1}} - 1) \cdot 100\%$	$Kp = (\frac{P_t}{P_{t-1}} - 1) \cdot 100\%$	Kpq	Kpl	$Kp = Kpq \pm Kpl$
2007/2006	-	-	-	-	-	-
2008/2007	25.74	-19.69	56.57	32.05	24.51	56.57
2009/2008	-1.74	-7.37	6.08	-1.88	7.96	6.08
2010/2009	15.99	-7.07	24.82	17.21	7.61	24.82
2011/2010	8.79	-6.89	16.85	9.44	7.40	16.85
2012/2011	-1.32	-5.21	4.11	-1.39	5.49	4.11
2013/2012	8.83	-0.87	9.78	8.91	0.88	9.78

Legend:

Kq – coefficient of change in realised production of agricultural outputs (Q_t) in the current period (t) compared to the previous period (t-1);

Kl – coefficient of change in a number of employees in agriculture (L) in the current period compared to the previous period (t-1);

Kp – coefficient of change in labour productivity indicator in the current period (t) in comparison to the previous period (t-1);

Kpq – coefficient of change in labour productivity under the influence of the dynamics/changes of production of agricultural products as the element of the labour productivity indicator in an observed year in comparison to the previous year¹;

Kpl – coefficient of change in labour productivity under the influence of the dynamics/changes of the number of employees in agriculture as the element of labour productivity indicator an observed year in comparison to the previous year².

Labour productivity in agriculture in 2008 increased by 56.57% compared to 2007. Production of agricultural goods and services increased by 25.74%, whereas agricultural employment fell by 19.69%, which had a positive impact on labour productivity growth in agriculture 2008 in comparison to 2007. The increase of agricultural production by 25.74% caused the 32.05% growth of labour productivity in agriculture, whereas the reduction of the number of employees in agriculture by 19.69% led to the 24.51% growth of labour productivity in agriculture. The combined effects of production growth and a

¹ The formulae for calculation Kpq is the following: $Kpq = \frac{Kq}{1 \pm Kl} \cdot 100\%$ (Krstić, Sekulić, 2013, p. 287).

² The formulae for calculation Kpl is the following: $Kpl = \frac{Kl}{1 \pm Kl} \cdot 100\%$ (Krstić, Sekulić, 2013, p. 287).

reduction the labour as input in agriculture led to labour productivity growth of 56.57% (32.05% + 24.51%). Labour productivity growth in agriculture in the remaining years of the analysed period was also the result of the simultaneous effects of changes in both agricultural production/output (Q) and employment/labour (L) in agriculture.

Table 6 illustrates the correlation analysis between GDP in agriculture and labour productivity in agriculture.

Table 6 Correlation Coefficients between GDP in Agriculture and Agricultural Labour Productivity (2007-2013)

		GDP in agriculture	Labour productivity in agriculture
GDP in agriculture	Pearson Correlation	1	0.051
	Sig. (2-tailed)		0.914
	N	7	7
Labour productivity in agriculture	Pearson Correlation	0.051	1
	Sig. (2-tailed)	0.914	
	N	7	7

Source: Author's calculations (SPSS Statistics 19)

Correlation analysis revealed that there was a positive correlation between GDP in agriculture and labour productivity in agriculture, which meant that the degree of consistency between them was low, but that the changes occurred in the same direction (Soldić-Aleksić, 2011, p. 180).

Table 7 illustrates the regression analysis between GDP in agriculture, agricultural production and agricultural employees.

Table 7 Regression Analysis of GDP in Agriculture, Agricultural Employees and Agricultural Production (1999-2012)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	119552.619	25956.499		4.606	0.001
	Agricultural employees	-0.111	0.117	-0.154	-0.953	0.361
	Agricultural production	1369.379	258.638	0.854	5.295	0.000

Dependent Variable: GDP in agriculture

Source: Author's calculations (SPSS Statistics 19)

Regression analysis provided the data that the impact of agricultural production on GDP in agriculture was much higher (regression coefficient was 0.854) than the impact that changes of employees in agriculture had on GDP in agriculture (regression coefficient of -0.154). This analysis confirmed that the changes in agricultural production had a greater impact on GDP in agriculture compared to the changes in the number of employees. For this purpose, it is necessary to increase labour productivity in agriculture, and not the mere number of employees.

Possible ways of increasing labour productivity in agriculture are the improvement in the technical (productive) farm efficiency, the implementation of new production technology, reduction of unproductive factors of production, etc. (Vučić, Krstić, 2004, p. 667). Increasing the efficiency of use of factors of agricultural production refers primarily to the labour force as a factor. Therefore, it is necessary to reduce agricultural pressure (such as the number of farmers per hundred hectares of arable land) by diverting the excess of unproductive labour force from agriculture to other activities (Vučić, Krstić, 2005, p. 451).

By investing in workers' education, and training for the proper usage of modern technologies, higher worker productivity can be achieved. An insufficient number of agricultural experts represents a clear signal for the necessity to change and adjust the education system in agriculture to the current conditions and future requirements (Stefanović, Grujić, Vojnović, 2011, p. 12). The transformation of the education system requires a strong cooperation of the public education system, universities, agricultural producers, along with a significant increase in public investment (Grujić, 2009, p. 286). The failure of this initiative is unacceptable for several reasons. Public universities and agricultural system would be at risk; other countries, that base their agriculture on science would outstrip Serbia in the global market. This would also lead to loss or pollution of water, land, natural resources (Erić, Arizanović, Bajrić, Milinković, 2011, pp. 65-67).

4. Conclusion

The need for further expanding of agricultural production, taking care of available resources and minimizing negative effects on the environment, imposes the need to take appropriate measures and actions upon agricultural policy and strategy. Agricultural production can be increased by improving technological equipment of agricultural enterprises, increasing the level of technological efficiency, retraining and enabling employees to use modern technology in agriculture, etc.

Special attention should be paid to finding ways to increase the correlation between labour productivity in agriculture and GDP achieved in this sector of the economy of Serbia, since a positive correlation during the analysed period was noted. The system of education in agriculture will be of an immense importance in this process. Future studies will certainly be different from the previous ones due to the changing conditions of performing agricultural production. It will require strong cooperation between different scientific fields and the use of their scientific achievements for the purpose of better understanding crop and livestock production in the context of optimizing available natural resources. Not only will they be a link between the above mentioned sciences, but will serve to document the results obtained, their integration with the previously known achievements and enable their wider distribution.

In this process of transformation and improvement, numerous stakeholders will find their participation: students, colleges, universities, companies and employers, professional organizations and institutions, farmers and agricultural enterprises, governments, NGOs, institutions for environmental protection and other interest groups. All the mentioned participants have an important role in achieving the recommendations, whose implementation will require time, attention and financial resources. Many of the recommendations have already been seen, but unfortunately, many of the recommendations from the previous period were not implemented in practice.

Employers will in future seek to hire workers who have a wider range of skills and who have greater knowledge in the relevant areas of science, not just agriculture. Priority will be given to people with a global perspective and who are environmentally-friendly, with appropriate educational basis. But other qualities such as rapid problem-solving skills, critical thinking, teamwork, management, communication skills, financial management, the possibility of advancement in different settings etc. are also very important. Therefore, agriculture needs workers, managers with wide skills portfolio, who respect the significance of agriculture and will contribute to its productivity growth and competitiveness in the market.

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ANALIZA PRODUKTIVNOSTI RADA SEKTORA POLJOPRIVREDE REPUBLIKE SRBIJE

Apstrakt: Povećanje produktivnosti rada u poljoprivredi jedan je od osnovnih ciljeva kojima se teži u ovom primarnom sektoru privrede. Njegovo dostizanje podrazumeva rast poljoprivredne proizvodnje, uz istovremeno očuvanje prirodnih resursa i životne sredine. Da bi kreatori razvojnih politika formulisali efektivne politike i strategije, potrebne su adekvatne informacije koje se odnose na sve vitalne determinante produktivnosti u poljoprivredi. Stoga, Republički zavod za statistiku Republike Srbije na godišnjem nivou priprema i objavljuje, između ostalih, podatke o vrednosti poljoprivrede proizvodnje i broju zaposlenih u poljoprivredi. Na osnovu ove informacione osnove, u radu se istražuju promene u nivou produktivnosti poljoprivrede Republike Srbije u periodu od 2007. do 2013. godine. Takođe, analizira se uticaj produktivnosti rada u poljoprivredi na deo BDP-a koji se u ostvaruje u ovom sektoru privrede. Poljoprivredno stanovništvo, kao jedan od faktora koji utiče na produktivnost u poljoprivredi, analizira se u pogledu obrazovanja i zaposlenosti. Cilj je da se kvantificira nivo produktivnosti rada u poljoprivredi, kao i da se sagleda međuzavisnost između produktivnosti rada i BDP-a u poljoprivredi, kako bi se ukazalo na kritične determinante produktivnosti koje zahtevaju unapređenje. Metode korišćene u ovom radu su: metod analize, metod sinteze, metod komparacije, deskriptivna statistika, korelaciona i regresiona analiza. Rezultati istraživanja pokazuju da je Srbija u naznačenom periodu ostvarila nezavidan nivo produktivnosti rada u poljoprivredi. Istraživanje u ovom radu korisno je za kreatore i nosioce razvojne politike u svrhu budućeg usmeravanja razvojne politike i strategije agrarnog sektora Srbije.

Ključne reči: poljoprivreda, produktivnost, poljoprivrednici, Republika Srbija