
ENSURING THE IMPROVEMENT OF AGRICULTURAL COMPETITIVENESS THROUGH THE HUMAN RESOURCE DEVELOPMENT

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ABSTRACT

Human resources are one of the driving forces and main determinants of agricultural competitiveness, contributing to its improvement through properly formed and constantly renewed knowledge and skill enhancement of agricultural workers. In the context of scarce natural resources, demographic changes, need for more intensive agricultural production based on modern technology, human resource development in agriculture becomes imperative. The aim of the research is to assess the human resources in agriculture of Serbia through the prism of data available in the Statistical Office of the Republic of Serbia and World Bank. The research results show fluctuations in the rural population and employees in agriculture in the analysed period, confirming their negative trend and predicting further decrease based on the forecast method. In order to overcome limitations related to the number and qualifications of agricultural employees, the special focus has been given to the formal and informal education of workers in agriculture, ensuring their capability to respond to market needs and future challenges.

Introduction

Improvement of the overall national competitiveness, as well as the competitiveness of its sectors such as agriculture, manufacturing and service sector, requires to assess indicators and factors that contribute to the enhancement of their comparative advantages and strengths. Human capital, as a determinant of competitiveness, gains importance in the era of the new economy (Krstić, 2007).

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Knowledge-based competitiveness becomes the main characteristics of economic prosperity in the global economy (Krstić, 2008). In the knowledge economy, that changes in fascinating rates striving to meet challenges of dynamic and new market conditions, traditional factors of production have been replaced by knowledge (Krstić, 2009).

Going towards the sustainability goals of the 21st century reflected in the need to protect the environment for future generations, agriculture as a sector which relies on natural resources needs to adjust to the environmental requirements. Being focused on three major pillars: healthy environment, economic profitability and social and economic justice (Nielsen, Pedersen, Christen, 2009), sustainable agriculture implies certain improvements in terms of production process and resources.

In order to respond to increased demand for food due to the expanded population, and considering the scarcity of natural resources and environmental limitations, development of human resources becomes a priority. This development is foreseen in empowering agricultural workers to use modern technical and technological advances in production, which is manageable only with a strong progress on their knowledge, skills and competences. The process of creating, collecting, transformation, storage and transfer of knowledge is crucial for the human capital development (Krstić, 2007). Knowledge appears as the vital competitive factor and its accumulation is a prerequisite for further advancement in agriculture (Tamura, 2002).

Estimating the impact of human resources on agricultural competitiveness is highly challenging due to the several limitations. However, the study aims, based on the descriptive statistics and forecast trend, to assess changes in the rural population and number of employees in agriculture of Serbia, predicting their further trend, with special focus on the qualifications of workers in agricultural enterprises and holdings. The information base of the research is the statistics of the Statistical Office of the Republic of Serbia and World Bank for the period from 2002 to 2019. Given the research goal, the study aims to respond to the following research questions:

- a) Has the number of employees in agriculture of Serbia, in the analysed period, changed in a same direction as the rural population?
- b) Have changes in the number of employees in agriculture will keep the same trend in the next five years' period?
- c) Have the changes in the number of legal units and farm cooperatives resulted in maintaining the same number of agricultural experts per unit, and what is the role of formal and informal education in that process?

Theoretical framework: Agricultural competitiveness and role of human resources for its improvement

Competitiveness, as a general ability to successfully respond to competition and market requirements aiming to ensure progress over time, can be assessed at the level of the national economy, economic sectors and the firm-level (Bojnec, Ferto, 2009).

Competitiveness of a country includes a set of factors, policies and institutions which indicate the level of its productivity (Savić, Džunić, 2008). Productivity is mostly determined by the level of a country's factors of production such as land, capital, natural and human resources (Alvarado, Molina, Bol, 2008), but also by the efficiency of their use. While traditional theories consider competitiveness to be inherited (Cho, 2013), modern approaches emphasize that the competitiveness of the national economy can be created (Cho & Moon, 2001, Cho et al, 2008).

Creating a highly competitive national economy, as well as the agricultural sector, is a complex task for creators and implementers of economic policy. The role of the state authorities is crucial in applying economic measures, namely agricultural policy measures, in order to secure a proper environment and resources in the function of competitiveness improvement (Latruffe, 2010).

A need to increase the agricultural competitiveness in Serbia stems from its strategic role in the economic development. Agriculture in Serbia is a sector that has resisted challenges of political and economic crisis, continually contributing to the economic performance. Accordingly, the conditions in agriculture should be improved in terms of farm structure, quality standards, marketing of agricultural and food products, capital markets and land, competence of human resources, etc., in order to facilitate the participation in a highly competitive international market, especially in the EU market (Božić et al, 2020).

Although the agriculture in Serbia lags behind agriculture of the EU countries in many indicators, the constant positive trend in export of agricultural products in the last period, indicates its potential to be competitive and equally participate in the European market. Since the EU market is more accessible for agro-food products from Serbia, and based on bilateral trade agreements with neighboring countries offering preferable trade conditions, Serbia has been transformed into the net exporter of food. Currently, the main driving force of agricultural competitiveness in Serbia is low product prices as a result of affordable labour force and low price of land. However, competitiveness in a long run cannot rely only on these primary factors. Insufficient level of yield and lower quality of agricultural products are mostly the consequence of inadequate financial support for agriculture. The greater investments would lead to the use of high-yielding varieties, modern machinery, etc. Despite the opportunities to use the IPA funds, a significant financial support for agriculture in Serbia can be expected with the accession to the EU (Beuk et al, 2012).

Integration processes, such as the accession to the EU and WTO, which will further improve economic conditions and contribute to the liberalization of agriculture, will require its greater competitiveness. Increasing competitiveness, resulted from investments in new equipment and technology and especially in knowledge and human resources, will positively reflect the living standard over a period of time. Being a great challenge for agriculture of Serbia, the ultimate goal for the majority of supporting measures in agricultural production is the development of human competence in order to cope with international competition.

Human resources are one of the determinants of competitiveness that form the Porter's "diamond model" (Porter, 1990). Among other determinants of competitiveness, human resources have been the subject of many studies and researches in this field. Human resources belong to general development conditions of agricultural competitiveness which importance in modern agriculture is foreseen in their role in change and further development of agricultural enterprises and holdings. Agricultural workers are supposed to continually acquire new knowledge, skills and ability in order to be able to respond to the market demand and keep pace with the development of science and technology (Parman, 2012, Inwood, 2017).

The understanding of human resources in the labor process has been drastically changed, putting more emphasis on their role and importance in agriculture. They are not only homo-economicus, focused on profit and production operations, but complex social beings (Stefanović et al, 2011). Due to the increasingly important role of human resources in agriculture, as well as the companies' efforts to improve the business performance and respond to the challenges of global competition, agricultural enterprises should take care of regular investment in education and professional development of workers aiming to gain up to date knowledge and competences (Noe et al, 2005, Antonova et al, 2019).

Research results and discussion: The role of formal and informal education in encouraging the agricultural development and competitiveness

Agricultural development in a country can be insured not only with the favorable geographical position and natural resources, but also with the agricultural institutionalization, further enhancement of human capital and efficient use of natural resources. Economic, political and social reforms in agriculture, related to working conditions and education, have become imperative in the first half of the 21st century, as well as the living standards improvement in rural areas and encouragement to further develop (Forclaz, 2011).

Striving for new knowledge and technologies has been emphasised with adoption of the *Common Agricultural Policy (CAP)* at the European Union level, as the policy aiming to support strengthening the EU farmers' international competitiveness and encouraging rural development (EUR-Lex Access to European Union Law, The Common Agricultural Policy – CAP, 2013). Sustainable rural development through the provision of sufficient employment in agriculture is one of the CAP priorities (Dries et al, 2012).

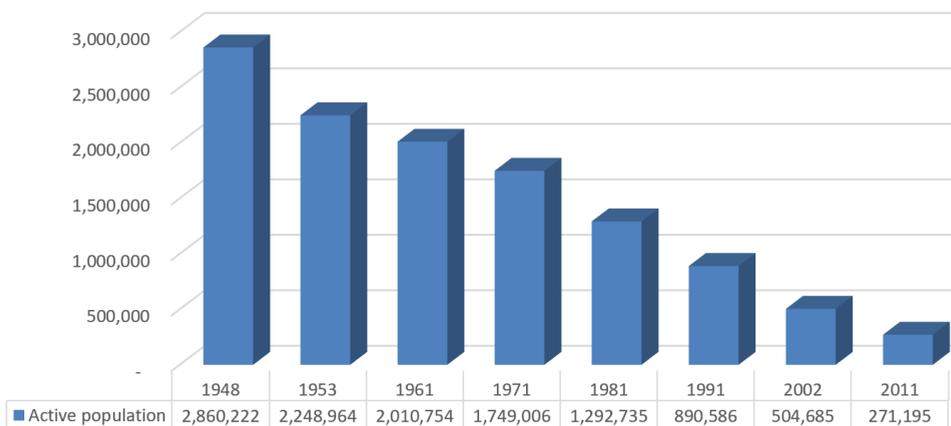
Due to some limitations of the initially adopted CAP (self-sufficiency or even oversupply of the EU market with agricultural products, over-exploitation of natural resources, etc.), the adjusted policy has recognized the importance of global approach to this issue, involving various stakeholders, encouraging research by universities, as well as engaging new institutions and organizations that will modernize the knowledge in agriculture. Therefore, a contemporary system of education in agriculture relies on the following (Werrij, 2007):

- *International cooperation and coordination* - challenges and problems cross the country borders requiring greater resources than those available in a country;
- *The various interests of many stakeholders*, both national and international;
- *Expanding the knowledge base and discipline*. The initial set of disciplines that are closely associated with agriculture is no longer enough to respond to modern challenges. The existing base has been expanding with other scientific disciplines, not closely associated with agriculture, but able to contribute to its development;
- *Moving the sponsorship from the public to the private sector* - intellectual property rights should be under protection of both sectors, not just the public;
- *Population as the consumer of agricultural products* requires to be involved in the decision-making process about the direction of agricultural development, future strategies and priorities.

In a time of rapid technological changes and digitalization, a farmer in Serbia is facing a stagnation in education which result in lagging behind in living standard in comparison to other occupations, as well as compared to farmers in more developed countries (Šuljagić, 2010). It arises as a need to create an education system in line with initiatives of modern society that put emphasis on sustainability, safety and human health, cost efficiency and profitability, the vitality of rural areas, the ethical acceptability etc. (Werrij, 2007).

The education system in Serbia is not fully adjusted to needs of villages and agriculture, which is one of the reasons for youth to leave rural areas. Economically active population in agriculture of Serbia has been decreased from the census in 1948 to the census in 2011 for 90% (Figure 1).

Figure 1. Economically active population in agriculture of Serbia, according to the censuses 1948-2011



Source: Statistical Office of the Republic of Serbia

According to the information available in publications of the Statistical Office of the Republic of Serbia and World Bank (Table 1), share of rural population in total population in Serbia from 2002 to 2019 indicates a negative trend even though the decrease is very low (46.79% in 2002 compared to 43.74% in 2019). In the same period, the share of employees in agriculture, forestry and fishing in total employment of Serbia has been decreased from 4.75% in 2002 to 1.47% in 2019. At the same time, the share of female and male agricultural employees in total employment has the same direction of change.

Table 1. Rural population and employment in agriculture in Serbia (2002-2019)

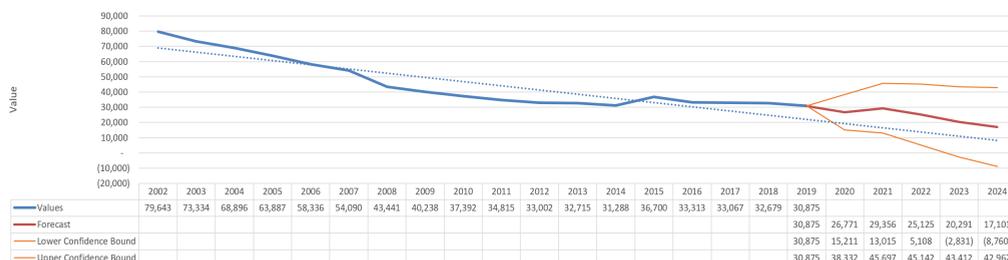
	Employee, total	Employees in agriculture, forestry, fishing	Relative share of agricultural employees in total employees	Employment in agriculture, female (% of female employment)	Employment in agriculture, male (% of male employment)	Rural population	Rural population (% of total population)	Rural population growth (annual %)
2002	1,676,835	79,643	4.75%	25.31	25.26	3,507,248	46.79	-0.57
2003	1,611,632	73,334	4.55%	24.64	24.40	3,483,188	46.56	-0.69
2004	1,580,140	68,896	4.36%	24.13	24.00	3,458,352	46.34	-0.72
2005	1,546,471	63,887	4.13%	23.32	23.32	3,431,459	46.12	-0.78
2006	1,471,750	58,336	3.96%	19.21	21.46	3,401,540	45.90	-0.88
2007	1,432,851	54,090	3.77%	19.52	21.74	3,371,315	45.67	-0.89
2008	1,428,457	43,441	3.04%	25.97	24.36	3,340,676	45.45	-0.91
2009	1,396,792	40,238	2.88%	23.03	24.51	3,311,055	45.23	-0.89
2010	1,354,637	37,392	2.76%	21.01	23.35	3,281,657	45.01	-0.89
2011	1,342,892	34,815	2.59%	19.41	22.58	3,239,791	44.79	-1.28
2012	1,341,114	33,002	2.46%	18.97	22.46	3,213,956	44.64	-0.80
2013	1,338,082	32,715	2.44%	19.81	22.39	3,190,260	44.53	-0.74
2014	1,323,831	31,288	2.36%	17.82	21.40	3,167,188	44.42	-0.73
2015	1,896,295	36,700	1.94%	16.32	21.76	3,143,538	44.30	-0.75
2016	1,920,679	33,313	1.73%	16.17	20.52	3,119,072	44.19	-0.78
2017	1,977,357	33,067	1.67%	14.93	19.02	3,093,250	44.06	-0.83
2018	2,052,546	32,679	1.59%	13.64	17.72	3,065,922	43.91	-0.89
2019	2,101,267	30,875	1.47%	13.27	17.47	3,037,846	43.74	-0.92

Source: Statistical Office of the Republic of Serbia & World Bank

Based on the historical data provided in table 1, and applying the forecast function, it can be predicted the further decrease in the number of agricultural employees (Figure 2) in the next five years' period. In order to prevent further rural exodus, more attention should be given to the proper education of the agricultural population in Serbia. Instead of insufficiently qualified farmers, future agriculture will need a farmer-expert able to accept and apply results of modern technological development, which is achievable by raising the level of knowledge and developing skills for the production and marketing

of quality products. Basic knowledge can be primarily gained through the formal education, but the additional information, recommendations and advices, farmers could approach through the agricultural advisory services.

Figure 2. Forecast trend of the number of employees in agriculture in Serbia



Source: Statistical Office of the Republic of Serbia & authors' calculations

Education of the agricultural population to a large extent depends on their age structure, which is not favorable in Serbia. The share of the youngest population in rural areas (0-14) as the future labour force is only 14% and youth (15-29) as the potential young labour force account to 18%. On the other hand, the share of older population from 50 to 64 (24%) and above the age of 65 (20%) indicates the increased participation of the elderly population in rural areas. Accordingly, compared to the EU, where a farmer has at least secondary education and over 20% of them have tertiary education, the educational level of the rural population and agricultural workers in Serbia is still very low (Raduški, 2009). Almost the half of the rural population is without or with only elementary school, while the share of those with college or bachelor degree is extremely low (6%)(Bodanov&Babović, 2014). The educational structure is particularly unfavourable regarding the female population where more than half is without any qualifications (without any degree, completed or not completed primary education).

According to the data of the Statistical Office of the Republic of Serbia (Table 2), along with a reduction in the number of agricultural holdings and enterprises, there is a decrease in number of agricultural and economic experts and veterinarians. During the period 1999-2011, the number of legal units and agricultural cooperatives decreased by 41%, while the total number of agricultural experts (with bachelor or high school degree) fell by 66.71%. Namely, in 1999 there were 10 agricultural experts (10.34) per one legal unit in agriculture, while in 2011 there were 6 (5.85), indicating not only a decline in the total number of agricultural experts, but also a decline in the number of engaged experts per agricultural holdings and enterprises. At the same time, a number of economists decreased by 71.28%, which indicates that in 1999 there were 5 economists (5.35) per one agricultural unit, while in 2011 there were only 3 (2.61). The number of veterinarians in the analyzed period suffered the least changes (51%) keeping the same number of vets (2) per agricultural unit (Jovanović, Stanojević, 2012).

Table 2. Qualifications of the employees in agricultural holdings and enterprises in Serbia

Year	Number of legal units and farm cooperatives	Employees	Permanent employees in agriculture	Agricultural experts		Veterinarians	Economists	
				With bachelor degree	With high school degree		With bachelor degree	With high school degree
1999	1,239	77,788	65,957	4,670	8,140	2,542	1,361	5,263
2000	1,154	73,482	51,232	4,502	7,728	2,474	1,251	4,917
2001	1,109	70,860	49,371	4,358	7,429	2,491	1,201	4,767
2002	1,059	64,509	44,872	3,948	6,696	2,173	1,123	4,261
2003	1,035	60,519	51,046	3,691	6,383	2,285	1,074	3,854
2004	1,011	52,965	44,899	3,217	5,452	2,032	943	3,320
2005	974	45,687	39,321	2,884	4,517	2,157	829	2,782
2006	903	39,898	33,548	2,533	3,970	1,960	785	2,365
2007	833	35,525	30,055	2,435	3,633	1,834	711	2,112
2008	812	31,970	26,648	2,389	3,321	1,714	700	1,827
2009	793	30,269	24,877	2,297	3,010	1,504	723	1,561
2010	789	27,371	22,743	2,215	2,582	1,432	705	1,396
2011*	728	24,636	19,629	1,983	2,281	1,245	655	1,247

Source: Statistical Office of the Republic of Serbia, 2002-2012

*Note: No information available after 2011

Observing the education of agricultural holdings' managers, it is reflected in a minor role of formal and systematic education and training in the field of agriculture. The majority of them (60%) have gained the necessary knowledge based on practice which indicates a great potential for further improvement (Bodanov&Babović, 2014). Less than 5% of managers have a degree from the secondary agricultural school, college or agricultural faculty as the only place where the systematic knowledge of agricultural production can be gained. From the perspective of a need for more dynamic technological reform and agricultural improvement toward higher competitiveness, low level of competences for those in the management positions is not favorable condition and represent a limitation for the expansion of new technologies. Thus, a certain reform of the agricultural education in Serbia is required in order to be in line with current needs and future perspectives.

Development of human resources should adopt recommendations on improving the quality and effectiveness of education, and lifelong learning. However, the education system in Serbia is characterized by centralization and lack of alignment with the real needs of the labor market. Two major problems in this area in Serbia are the following:

1. Vocational high schools and faculties, as part of the formal education system in Serbia, are characterized by rigidity of their programs and orientation towards the highly specialized professionals. This led to a mismatch of labor force formed by the education system with the labour market demand in Serbia.

2. Another critical point is an informal system of education and training for adults. The need to develop such a system of education in Serbia aims to retrain the existing workforce for another or existing job, but also to support lifelong learning and improving the quality of human resources imposed by modern economic and technological environment.

The current system of agricultural education in Serbia includes 32 organizations involved in research and development in agriculture (Statistical Office of the Republic of Serbia):

- 14 organizations in the government sector,
- 13 organizations in the non-financial sector,
- 5 organizations of higher education.

These institutions are mainly focused on the production in large systems and manufacturing industries, while the level of education needed for small agricultural holdings is not covered. In addition, the informal education in Serbia is not well developed (winter schools, thematic seminars, workshops) which in developed countries takes more attention as a form of education proved to be very practical and productive (Todorović, Vojković, 1999). Thus, the potential improvements in the educational system of agriculture are needed and are foreseen in the following (Erić et al, 2011):

- conduct a comprehensive survey of the labor market in order to identify real needs for specific skills and knowledge;
- considering the dynamics of the modern business environment, new programs that provide a broader education and greater flexibility should be established rather than the existing rigid, highly specialized programs;
- occupational standards must be flexible enough in order to be quickly and easily updated in line with changes in the labor market and technology;
- cooperation between the educational institutions and business sector should be established and maintained in order to match theory and practice and stimulate the implementation of gained knowledge in practice;
- the curriculum should be updated and emphasize the education in the field of information and communication technologies.

In addition to the formal education, an important contribution to the human resource enhancement has an informal education provided by the agricultural advisory services, being an integral part of the innovation system focused not only on providing training for farmers, but on facilitating interaction and learning (World Bank, 2012). Services provided by agricultural extensions are reflected in offering expert advices and recommendations for the implementation of scientific discoveries and new technologies, organization of seminars, workshops, publishing work etc. Thereby, agricultural extension services have a significant impact on improving the efficiency of agricultural holdings (by increasing the rate of return on investment). In addition to the financial, there is a positive social effect which is reflected in the increase of the farmers' knowledge and information, higher competitiveness and modernization of agricultural production, greater inclusion of women and people with lack of education or small-scale farmers, etc.

Advisory services in the agriculture of Serbia are traditionally offered by the *Agricultural Advisory Services of the Republic of Serbia*, which counts 163 advisers in 34 units (12 in Vojvodina, 21 in Central Serbia and one in Kosovo and Metohija) (Agricultural Advisory Service of the Republic of Serbia, 2021). In addition to the public, agricultural advisory services can also be provided by private entities. Although in the future they will play an important role and compete with public services, and despite their current technical competence and the possibility to establish better relationships with customers, the delimitation is reflected in a limited number of farmers who can afford them. For that reason, there are only few private agricultural advisory services in Serbia, mostly located in Vojvodina given the largest and most commercial farms there. However, besides the need for privatization, the state should have a decisive role in the advisory services aiming to make it available for all farmers. The need for government regulation of advisory services arises from its character of a common/public good. This is particularly for regulatory issues, quality control in the production chain, the coordination of all advisors, natural resource management, provision of services to marginal groups who are unable to afford them, etc. (World Bank 2012).

Conclusion

As one of the determinants of the agricultural competitiveness, human resources in Serbia are currently a limiting factor for development. In comparison to developed countries, the share of employees in agriculture is still high, but their qualifications and obtained degrees are much lower. Along with a reduction in the rural population and number of employees, the research results show their further negative trend, but also a decrease in the number of agricultural experts per agricultural units in the analysed period.

Aiming to improve its competitiveness, the agriculture in Serbia needs a farmer-expert - educated, communicative, young, entrepreneurial and marketing oriented, with contemporary knowledge and competences, able to use the results of modern technological development and scientific discoveries. Accordingly, it is necessary to elaborate and implement a functional demographic policy and the concept for the revitalization of agriculture and rural areas.

The rapid science and technology development, availability of the latest agro technology which increases yields and production, points out the need for farmer education since the farmers' education is closely related to productivity and competitiveness. Higher educational institutions in agriculture play a key role in the education of agricultural professionals, contributing to their knowledge which is valuable in the implementation of various agricultural activities. Thus, the competence of human resources in agriculture is determined by the education system. Knowledge acquisition and its wider application, designed for the interest of various stakeholders from the private and public sectors, becomes the basis of a modern education system in agriculture and one of its main determinants of competitiveness. In addition to the formal agricultural education, the necessary knowledge and competences can be gained through the public and private agricultural advisory services. Their role is foreseen in the informal

education of farmers by organizing seminars, workshops, providing expert advices and recommendations, etc.

The adjustment of the education system in agriculture aiming to contribute to the overall agricultural competitiveness in Serbia should be an imperative. Given the importance that farmers have in the planning, organization and implementation of the entire process of agricultural production, multiple positive effects with more effective formal and informal education are foreseen. Development of human resources would undoubtedly enhance the agricultural production, contributing to the competitiveness of agriculture and its strategic position in a highly competitive international market.

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Conflict of interests

The authors declare no conflict of interest.

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