

# INNOVATION POTENTIAL OF AGRICULTURAL COMPANIES IN SERBIA

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## Abstract

*The influences from the environment mostly triggered by the crisis situations, caused by the COVID-19 pandemic and the ongoing armed conflict, have caused some changes in the structure of all industrial sectors, putting considerable pressure on agricultural and food companies worldwide. Moreover, the growing need for agricultural and a food product increases the need for the accelerated development of this sector, which cannot be achieved unless innovative technologies and solutions are introduced.*

*The indicators of the innovation activities in Serbia for the period from 2018 to 2020 suggest that the innovations in this sector were at the lowest level, which determined the subject of the research of this paper. Applying the methodology of EUROSTAT and the OECD, the authors analyse the innovation potential of the companies operating in the agricultural sector. The aim of the paper is to emphasise the importance of these innovations in overcoming the problems faced by the agricultural sector in Serbia, as well as to highlight their impact on the growth of the productivity and competitiveness of the sector.*

*In accordance with the findings, the recommendations for decision-makers will be presented and possible directions for a further research will be recommended.*

**Key words:** *innovation, agricultural sector, innovation potentials, competitive advantage*

## Introduction

The development of the agricultural sector needs to be estimated not only through researching the development of primary agriculture, along with the food industry when trying to achieve higher social growth, but it is also necessary to take into account the wider context - the quality of life of inhabitants in terms of reducing

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poverty and inequality (Jovanović, 2021). Due to the fact that the Republic of Serbia is situated in a favourable geographical position and possesses significant natural resources, accompanied with quality workforce, it can be concluded that “with its recognizable development potential, agriculture is an economic activity that significantly contributes to its economic growth” (Jovanović et al., 2018).

The influences from the environment mostly triggered by the crisis situations, caused by the COVID-19 pandemic and the ongoing armed conflict, have caused certain changes in the structure of all industrial sectors, putting considerable pressure on agricultural and food companies worldwide. Moreover, the growing demand for agricultural and food products increases the need for the accelerated development of this sector, which cannot be achieved unless innovative technologies and solutions are introduced. The movements in this sector are stimulated by the events at the macro level and depend on the movements in the economic and political environment, product market and factors of production, along with technology transfer as well (Rohne Till, 2022). It has been noticed that the transfer and diffusion of technology present a critical factor in the development of rural agricultural areas (Brychan, 2002).

Agriculture is an extremely specific economic activity and “it has specific features associated with knowledge, innovation and transfer of new technologies within the knowledge and information system” (Tomaš Simin & Janković, 2014). Monitoring the innovation potentials of the agricultural sector enables defining the strategic priorities for the development of the sector at the national level. Interestingly, the companies in this area, which until recently used to be considered less innovative, are increasingly turning to innovation so as to improve their products and processes (Aibar-Guzmán et al., 2022; Pavlova et al., 2018). The companies in this area are shifting their strategic focus to innovation aiming to enhance their products and processes. The authors Pavlova et al., (2018) believe that the insufficient use of the innovation potentials mostly results from the lack of institutional support emphasising the importance of national, sectoral and regional innovation development programs.

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faced by the agricultural sector in Serbia, as well as to highlight their impact on the growth of the productivity and competitiveness of the sector.

### **Agriculture within the framework of green economy and sustainable development**

The differences in the growth rates in certain industries are well-known and obvious, that is, the growth rates in certain industries are increasingly declining, whereas the others are recording highly intensive growth. Majority of high R&D-intensive industries emerged in the 20<sup>th</sup> century and have been experiencing substantial growth ever since. It is quite obvious that these high growth rates are associated with a greater share of technological innovations in new products and processes and a high rate of diffusion of these innovations in the global economy. Conversely, the industries that record declining growth rates are mostly linked with insufficient research and development intensity and a low rate of technological change (Mosurović-Ružičić et al., 2018). Nevertheless, the existence of a statistical relationship between technological progresses and the growth of an industry does not necessarily mean that only technological innovations can boost growth (Freeman, 1982). Similarly, it does not necessarily mean that the companies operating in low-tech sectors benefit less from their innovations. For a long time, the term innovation was associated only with high-tech sectors. However, today it is quite clear that innovation is a phenomenon that affects all sectors, and it is significant for both the sectors with a higher and lower technological level (Cornell University et al., 2017; Drucker, 2020), and the agriculture sector as well.

For better understanding and monitoring of an innovation process in a company and its impact on other actors of the national innovation system, OECD experts defined the Oslo manual in 1991. In addition to the activities that take place in innovative companies (innovation activities, innovation expenditures, hampering innovation factors, etc.), the document also presents detailed information on the links between business entities and other stakeholders within the National Innovation System. Moreover, here you can find methodological recommendations for the classification of innovations as well as the identification of the factors that influence the performance of innovative companies and their effects on the entire national innovation system (OECD/Eurostat, 2018; Ružičić Mosurović & Kutlača, 2019). Four editions of this manual have been published up to now, having been methodologically improved with every new edition.

The definition of innovation has not undergone significant changes though: *“An innovation is a new or improved product or process (or a combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).”* (OECD/Eurostat, 2018, p.32).

The fourth, last edition of the Oslo manual is compiled in accordance with the requirements of the contemporary modern business environment and fully incorporates the principles of the 2030 Agenda for Sustainable Development, which was adopted by the United Nations in 2015 (United Nations, 2015). The Sustainable Development Goals (SDG) are defined within the Agenda, where the development of agricultural production plays an important part, with a special emphasis on strengthening the role of women in agriculture, emphasising the importance of the development of agricultural sector in developing countries.

On the other hand, there is a causal link between sustainable development and the green economy. The green economy concept is seen as a means to achieve sustainable development goals. The authors Karuppiah et al., (2022) believe that the green economy concept enables the transformation of natural resources into sustainable wealth. In the literature, it is accepted that organic agriculture is a significant indicator of the transition of the agricultural sector towards the green economy model. The authors Akhmetshina et al., (2018) also highlight the importance of innovations in organic agriculture as a way of overcoming social, economic and environmental challenges, especially when it comes to developing countries. Ecological, i.e. organic production is in itself a social innovation and what distinguishes it from traditional agriculture is “the systematic and continuous application of knowledge and modern achievements” (Tomaš Šimin et al., 2016). It is important to underline the fact that organic agriculture “unequivocally contributes to the achievement of sustainable development” (Đurić et al., 2021) and that its further development, besides the positive trend, is determined by numerous factors. The authors Đurić et al., (2021) state that in addition to the institutional and legal framework, the subsidies from the agricultural budget also play a significant role in the development of this production system in Serbia. Furthermore, certain trends, such as the increase in the number of consumers who opt for organic products, the insufficient supply of these products on the global market, as well as significantly higher price of organic products compared to conventional ones, are just some of the reasons that make organic agriculture an attractive area for investments (Jovanović et al., 2018).

**Table 1.** Key indicators and top countries in organic agriculture

Indicator	World	Top countries
Countries with organic activities	2019: 187 countries	
Organic agriculture land	2019: 72.3 million ha (2011:11.0 million ha)	Australia (35.7 million ha) Argentina (3.7 million ha) Spain (2.4 million ha)
Organic share of total agriculture land	2019: 1.5 %	Liechtenstein (41.0%) Austria (26.1%) Sao Tome and Principe (24.9%)
Wild collection and further non-agricultural areas	2019: 35.1 million ha (1999: 4.1 million ha)	Finland (4.6 million ha) Zambia (3.2 million ha) Namibia (2.6 million ha)
Producers	2019: 3.1 million producers (1999: 200 000 producers)	India (1 366 226) Uganda (210 353) Ethiopia (203 602)
Organic market	2019: 106.4 billion euros (2000: 15.1 billion euros)	US (44.7 billion euros) Germany (12.0 billion euros) France (11.3 billion euros)
Per capita consumption	2019: 14.0 euros	Denmark (344 euros) Switzerland (338 euros) Luxemburg (265 euros)
Number of countries with organic regulations	2019: 108 countries	
Number of affiliates of IFOAM- Organic International	2020: 718 affiliates	Germany: 79 affiliates India: 52 affiliates USA: 48 affiliates Italy: 46 affiliates

*Source:* The World of Organic Agriculture Statistic and Emerging Trends 2021; Willer et al., (2021) based on FiBL Survey 2021, national data sources, the data from certifies and IFOAM - Organic International

Having presented all the facts above, it can be concluded that the green economy and the agricultural sector are closely related, therefore agriculture plays an important part in the development of the green economy since it has both direct and indirect impact on people and the environment (Akhmetshina et al., 2018; Musvoto et al. al., 2018).

The World of Organic Agriculture Statistics and Emerging Trends report presents the basic indicators related to the organic production in 2021 indicating that the largest share of organic agriculture in the total agriculture is situated in Liechtenstein, and the largest markets for the placement of organic production are in

America, Germany, and France (Table 1). Unfortunately, there is a lack of legal regulation in the field of organic agriculture in a large number of countries, in 108 countries out of a total of 187 identified as the producers of organic products (Willer et al., 2021).

### **Innovations in the agricultural sector in Serbia**

The statistical monitoring of the innovation activities in Serbia is conducted by the Statistical Office of the Republic of Serbia, using the methodology of the Oslo Manual. The reports are published every third year for the previous two years and provide an insight, among other things, into the innovative activities of the business entities in Serbia by sectors, which is presented in Table 2 for the period 2010-2020. The innovative business entities are those who, in the analysed period, implemented some innovations in a product/service, business process, or had either ongoing innovations or innovation failures (Table 3).

Based on the data of the Statistical Office of the Republic of Serbia regarding the indicators of the innovative activities for the period 2010-2020, there is a tendency that the sector related to agriculture, forestry and fishing is mostly in the rank of less innovative sectors. The sector was identified as the second one with the lowest level of innovation for the period 2010-2014, the situation slightly improved during the period 2014-2016, but it is still at the very bottom when it comes to (non)innovativeness in this sector. A leap in innovation in this sector compared to the others was recorded in the period 2016-2018 (Table 2).

**Table 2.** *Innovative business entities by sectors*

%		2010-2012	2012-2014	2014-2016	2016-2018	2018-2020
		%	%	%	%	%
<b>In total</b>		44.6	40.5	41.2	50.2	54.8
<b>A:</b>	Agriculture, forestry, and fishing	30.3	22.9	41.9	49.3	34.7
<b>B:</b>	Mining and quarrying	37.0	19.3	27.1	41.9	54.4
<b>C:</b>	Manufacturing	50.5	42.7	47.9	58.2	56.5
<b>D:</b>	Electricity, gas, steam, and air conditioning supply	46.2	53.2	53.7	21.3	37.2
<b>E:</b>	Water supply; sewerage, waste management and remediation activities	32.5	35.1	31.1	45	46.9
<b>F:</b>	Construction	40.6	36.2	36.7	42.6	44.1

%		2010-2012	2012-2014	2014-2016	2016-2018	2018-2020
		%	%	%	%	%
<b>G:</b>	Wholesale and retail trade; repair of motor vehicles and motorcycles	42.0	40.7	31.0	42.8	54.6
<b>H:</b>	Transportation and storage	34.4	31.7	37.3	42	47.8
<b>I:</b>	Accommodation and food service activities	42.6	46.2	30.8	44.8	56.4
<b>J:</b>	Information and communication	53.7	47.6	40.2	61.3	59.2
<b>K:</b>	Financial and insurance activities	72.1	36.3	38.1	32.8	44.8
<b>L:</b>	Real estate activities	24.4	29.9	8.5	41.6	39.3
<b>M:</b>	Professional, scientific, and technical activities	50.6	37.5	47.3	48.7	57.6
<b>N:</b>	Administrative and support service activities	37.7	43.4	53.1	40.7	45.9
<b>Q:</b>	Human health and social work activities	0.0	0.0	0.0	0	-
<b>R:</b>	Arts, entertainment, and recreation	0.0	0.0	0.0	0	-

*Source:* The Statistical Office of the Republic of Serbia, the authors' calculation.

During the selected period, the following sectors were the most innovative in the Serbian economy: information and communications and the manufacturing industry, so this can be interpreted as a driver of innovation in the agriculture, forestry and fishing sector, especially since the largest number of innovations was marked as process innovations (Table 3). There are studies that indicate that there is a causality between a low level of innovation and the implementation of information and communication technologies (ICT) in the agri-food industry. The implementation of ICT has an effect not only on companies but also on the relationships which companies establish with other stakeholders (Aibar-Guzmán et al., 2022; Domenech et al., 2014; Martínez-Gomez et al., 2022; Rudgard et al., 2011). However, after this leap, it is a worrying fact that in the last part of this analysed period this sector is again the least innovative in terms of the indicators of innovation activities.

**Table 3.** *Innovative business entities in agriculture by innovation types*

Agriculture, Forestry and Fishing	Innovators								Non- innovators %
	Total		Product/ service		Production process		Innovation failures or ongoing innova- tions		
	Number	%	Number	%	Number	%	Number	%	
2018- 2020	145	34.7	50	12.0	133	31.8	11	2.6	65.3
2016- 2018	216	49.3	122	27.9	184	42,0	7	1.6	51.7
2014- 2016	177	41,9	136	32.2	138	32.7	97	23.0	58.1
2012 -2014	109	22.9	89	18.7	81	17.0	61	12.8	77.1
2010- 2012	154	30.3	88	17.3	145	28.5	79	15.5	69.7

*Source:* Statistical Office of the Republic of Serbia, the authors' calculation.

The data presented in Table 3 display that the agricultural enterprises in Serbia, in the period 2010-2020, were mostly focused on process innovation. This type of innovation implies the activities regarding the introduction of a new or significantly improved method of production and distribution and thus affects the increase in efficiency through the reduction of unit costs of production and delivery. Some authors believe that process innovation is ore related to the companies in mature phases of the life cycle that build competitiveness based on costs, not on differentiation (Dess et al., 2008).

As for organic production in Serbia, it is evident that it has exceptional opportunities for progress, which is recognized as a development niche. Accordingly, as a result of various government incentives, especially by the Ministry of Agriculture, Forestry and Water Management, there was an increase in cultivable areas for organic production (Simić, 2021) (Table 4). Certain authors pinpoint the necessity of regional diversification regarding the promotion of organic agriculture (Reddy et al., 2022), so it is important to determine the direction for undertaking some future institutional activities.



**Table 4.** *Organic agriculture land in Serbia*

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Organic Agriculture Land (ha)	5.855	6.335	6.340	8.228	9.548	15.298	14.358	13.432	19.254	21.265
Cultivable area (ha)	2.784	3.007	5.364	5.355	7.999	13.398	12.929	11.875	13.723	15.915
Meadows and pastures (ha)	3.071	3.327	976	2.873	1.549	1.900	1.429	1.548	5.531	5.350

*Source:* Organic production in Serbia 2020, Simić (2021) based on the data from the Ministry of Agriculture, Forestry and Water Management

## Conclusion

The paper shows that the innovative potential of the companies in the agricultural sector in Serbia can be a significant factor in improving economic development, especially when it comes to developing countries as it is the case with Serbia. Bearing in mind the specific features of the sector, the paper indicates that institutional support is crucial for the improvement of this sector, which is still weak even globally (Table 1). Authors (Đuričin et al., 2022) showed in their research that there is positive relation between the efficiency of national innovation policy programs and project financing, in Serbia.

Over the last few years, the importance of this type of support has been recognized in Serbia through numerous policies and programmes whose effects will be seen in the future, which can be the subject of a future research.

An overview of the organic production is also presented, as one of the ways of improving the innovation potential of the agricultural sector in Serbia. The importance of this method of production has been noticed at the institutional level and various incentive measures have been defined whose effects can be interpreted as positive ones if the increase in cultivable areas is taken into account (Table 4). Nevertheless, this is only one of the indicators of the evaluation of the development of organic production in Serbia, a deeper analysis would require monitoring of additional indicators that would relate to the evaluation of the share of income from this activity, as well as the analysis of the environmental, economic, and social aspects of the improvement of the agricultural production because, as it is stated in the paper, it is impossible to observe the activities in the agricultural production sector outside the context of green economy and sustainable development.

The analysis, conducted in the paper, undoubtedly shows that the area of innovation and innovative activities is a basis for monitoring the innovation potential of the agricultural companies from different research perspectives. This enables the mobilization of the resources for undertaking a set of activities aimed at increasing and improving the importance of this sector for economic development.

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