THE IMPACT OF EDUCATION ON THE SUSTAINABLE DEVELOPMENT OF AGRICULTURE

VUJIČIĆ SLAĐANA[*1], NEDELJKOVIĆ MIROSLAV[2], COGOLJEVIĆ VLADAN[1]
[1]Faculty of Business Economics and Entrepreneurship, Serbia
[2] Institute of Agricultural Economics, Serbia
*Corresponding author's e-mail: sladjanakonto@gmail.com

Abstract: *Considering the increasing need for a sustainable approach to agriculture, this paper explores how education can contribute to improving practices in agriculture to achieve economic, environmental, and social sustainability. Through the analysis of relevant literature and collected data, various aspects of this complex issue have been examined. Based on the collected data, it is concluded that education plays a crucial role in promoting sustainable development in agriculture. Further research and implementation of effective educational programs are essential to support the transformation of the agricultural sector towards more sustainable practices. This paper provides a basis for the development of policies and support programs for education in agriculture, as well as for identifying areas for further research and interventions to enhance the sustainability of the agricultural system.*

Key words: *Education, Sustainable development, Agriculture, Farmers.*

INTRODUCTION

At the global level, achieving sustainable development is a key priority that requires aligning economic, environmental, and social development goals, with the support of appropriate institutions. Although there is no universally accepted definition of sustainable development, the literature often refers to the definition formulated by the Brundtland Commission in 1987. [15]. According to that definition, sustainable development is described as development that enables meeting the needs of present generations while taking into account the needs of future generations, without compromising their ability to meet their own needs.

The increase in the world population has led to serious depletion of natural resources. The global population growth from 7.4 billion in 2017 to 9.7 billion in 2050 has led to serious depletion of natural resources [14], while it raises numerous questions regarding food consumption [3]. Agriculture as a key sector provides food, employs a large number of people, and plays a vital role in sustaining global ecosystems. However, the traditional approach to agriculture in recent decades has relied on intensive use of fertilizers, irrigation, machinery, pesticides, and excessive land exploitation. The adverse impacts of agriculture on the environment include changes in land use, greenhouse gas emissions, excessive water use, and loss of biodiversity. Therefore, it is crucial to explore new effective strategies for increasing food production in the future, considering the growing pressure on agricultural sustainability. Improving education and changing attitudes can be the key to achieve sustainability in agriculture. Addressing the sustainability challenges in agriculture requires a comprehensive approach, which includes changing practices, developing technology, and educating farmers. Education emerges as a crucial factor that can promote sustainable development in agriculture. Educational processes have the strength to transform the approaches to agricultural production, promote innovation, empower communities, and provide farmers with the necessary knowledge and skills for effective resource management and promotion of sustainable practices. Education is significant in understanding and comprehending global changes in modern society, aligning economic development with ecological principles in the context of science and technology development, preserving the cultural identity of peoples and the sovereignty of their states in conditions of globalization of economy and political domination of the economically most developed countries, as well as democratizing social relations. Many foreign authors have explored the connection between education and agricultural production. Analyses have revealed that more educated

farmers often achieve higher yields, particularly in the production of key crops such as corn, and are more inclined to use of new techniques and fertilizers in their production, further contributing to increased productivity [8][512].

Education enables farmers to better understand the social and ecological aspects of their agricultural activities, which can contribute to more sustainable production. Educated farmers tend to better apply new information in the field of agriculture, especially when it applies modern technological tools that can support their daily work. Farmer education is not only about acquiring theoretical knowledge but also about developing practical skills and abilities for effective farm and resource management. Agricultural educational programs should provide farmers with fundamental knowledge in agronomy, economics, management, and also empower them to consider sustainable practices and environmental challenges.

One of the key aspects of farmer education is familiarizing themselves with modern technologies and innovations in agriculture. Innovation must be part of the business strategy of every entrepreneur, i.e. farm, because, in today's changing environment, innovation is crucial for their survival [4,7]. Innovations have a direct impact on increasing productivity and increasing competitiveness, while continuous business innovation implies constant adaptation and ability to navigate the competitive market [10]. The importance of innovation for gaining a competitive advantage imposes the necessity of detailed and analytical planning of this process [11]. By adequately managing innovations, business entities, i.e. farms, maintain the necessary level of changes and create the potential for performance development and growth of their business results [6].

Asadullah and Rahman [1] state that farmers with higher education possess enhanced decision-making skills and therefore manage resources more effectively for operating farms of various sizes. Besides the ability to utilize available information well-educated farmers also have better access to necessary information, implying that education mitigates information asymmetry in numerous aspects, particularly regarding the quality of inputs crucial for agricultural production. Consequently, highly educated farmers employ a combination of inputs that is superior to those applied by low-skilled farmers, meaning that the former allocate scarce resources more efficiently [9].

Many studies have confirmed that better-educated farmers are more proactive in adopting new technologies [2,5,13]. Well-educated farmers are likely to adopt new technologies earlier because they have clear access to relevant information and can discern promising innovations from those that are not. In contrast, farmers with limited education often prefer not to use new technology until its benefits are proven, or wait for their peers to successfully implement it, giving educated farmers a first-mover advantage and making the new technology even more profitable and appealing. This means that farmer education can encourage them to adopt new technologies earlier and change their attitudes toward risky production technologies (e.g. crops or varieties they were previously hesitant to grow).

Understanding new agricultural techniques, using digital tools for crop monitoring, implementing precision agriculture, and applying agrotechnological innovations can significantly improve the productivity and profitability of farming operations. Additionally, farmer education fosters critical thinking and analytical skills necessary for decision-making in changing market conditions. Farmers who continually educate themselves have greater flexibility and can more easily adapt to the challenges of modern agricultural business. It is important to emphasize that education should not be a privilege reserved for a few but should be accessible to all farmers, regardless of their socioeconomic status or geographic distribution. Investing in farmer education can have long-term benefits for the entire agri-food and agri-input industries, contributing to global food security. Education plays a crucial role in transforming the agricultural sector into a more sustainable and efficient production model. Through continuous learning, farmers can enhance their skills, apply the latest advancements in agriculture, and contribute to the long-term sustainability of this vital sector.

MATERIALS AND METHODS

This study employs a combination of descriptive literature analysis, review of existing research, and collection of new data through surveys to explore the impact of education on sustainable development in agriculture. The research methodology is structured in three basic steps.

Descriptive literature analysis: The first step in methodological framework of this research was a descriptive analysis of relevant literature related to the role of education in sustainable agricultural development. Through this analysis, various aspects of education in agriculture were explored, including educational programs, training approaches, the effects of education on farmers' practices, and the findings of existing research. This literature analysis enabled the identification of key themes and the formulation of questions for the survey and data collection.

Review of existing research: Following the descriptive literature analysis, a review of existing research addressing the impact of education on sustainable development in agriculture was conducted. Through this step, the results of previous research were analyzed to identify trends, gaps, and open questions in the existing literature. This review provided an understanding of the existing knowledge and identified gaps in the literature that were further explored through data collection and research question formulation.

Collection of new data: The survey questionnaire was designed based on the literature review and previous research. The study was organized to allow deeper analysis of themes identified through the surveys, as well as the collection of qualitative data on farmers' perceptions, motivations, and perspectives. These new data were analyzed using both quantitative and qualitative methods to identify key findings and conclusions that support the research objectives.

The study involved 89 respondents (farmers) from the territory of the Republic of Serbia, including 56 males and 33 females, of various educational backgrounds and ages.

RESEARCH RESULTS

The analysis of literature and review of existing research provided insight into the key factors and effects of education on sustainable development in agriculture. The review of existing research offered a glimpse into diverse results and findings regarding the effects of education on the knowledge, attitudes, perceptions, and practices of farmers in various contexts and geographical areas.

Through the collection of new data via survey questionnaires, additional findings were identified that complement and expand the existing knowledge about the impact of education on sustainable development in agriculture. Survey results indicated that the majority of farmers recognize the importance of education in agriculture and believe that education can contribute to improving their practices.

Specifically, 73% of respondents agreed that education plays a crucial role in enhancing agricultural practices to achieve economic, environmental, and social sustainability. Additionally, 68% of respondents expressed willingness to participate in educational programs and activities to enhance their knowledge and skills.

Moreover, 85% of respondents expressed the need to tailor educational programs and activities to the specific needs of farmers in their local communities. Furthermore, 72% of respondents support the idea of strengthening collaboration among governments, educational and research institutions, and agricultural associations to support the implementation of tailored educational programs and promote sustainability in agricultural production.

It is important to note that educational programs and activities should be tailored to the needs and specific conditions of farmers to improve their effectiveness and relevance. There is also a need to strengthen collaboration among different stakeholders in agriculture, including governments, educational and research organizations, and agricultural

associations, to support the implementation of tailored educational programs and promote sustainability in agricultural production.

Research findings also highlight the need for continuous improvement of educational programs and practices in agriculture to address dynamic challenges and changes in the environment. This includes supporting research and development of new technologies, innovations, and approaches in agriculture that align with sustainability principles and the long-term needs of the agricultural sector.

CONCLUSIONS

This study has explored the role of education in improving practices in agriculture to achieve economic, environmental, and social sustainability. Through literature analysis, review of existing research, and collection of new data via survey questionnaires, various aspects of this complex issue have been investigated.

Based on the data collected and literature analysis, we conclude that education plays a crucial role in promoting sustainable development in agriculture. Research results show that the majority of farmers recognize the importance of education in agriculture and express willingness to participate in educational programs and activities to enhance their knowledge and skills.

Specifically, a large number of respondents agreed that education can contribute to improving practices in agriculture to achieve economic, environmental, and social sustainability. This indicates the need for further development and implementation of effective educational programs to support the transformation of the agricultural sector towards more sustainable practices.

It is important to emphasize that agricultural education should be tailored to the specific needs and conditions of farmers to be effective and relevant. Additionally, stronger collaboration among different stakeholders in agriculture, including governments, educational institutions, research organizations, and agricultural associations, is necessary to support the implementation of tailored educational programs and promote sustainability in agricultural production.

Research findings also highlight the need for continuous improvement of educational programs and practices in agriculture to address dynamic challenges and changes in the environment. This involves supporting research and development of new technologies, innovations, and approaches in agriculture that align with sustainability principles and the long-term needs of the agricultural sector.

In conclusion, this study provides a foundation for the development of policies and programs to support education in agriculture, as well as for identifying areas for further research and interventions to enhance the sustainability of the agricultural system. Continuous investment in agricultural education can have long-term benefits not only for individual practices, but also for the entire agricultural industry and global food security.

ACKNOWLEDGMENT

Paper is a part of research financed by the MSTDI RS, agreed in decision no. 451-03-66/2024-03/200009 from 5.2.2024.

REFERENCES

[1]. ASADULLAH M., RAHMAN S., 2009, Farm productivity and efficiency in rural Bangladesh: the role of education revisited. Applied Economics, 41(1), 17-33.
[2]. ASFAW A., ADMASSIE A., 2004, The role of education on the adoption of chemical fertilizer under different socioeconomic environments in Ethiopia. Agricultural Economics, 30(3), 215-228.
[3]. FUKASE E., MARTIN W., 2017, Economic growth, convergence, and world food demand and supply. World Development, 132: 104954
[4]. **JANOŠIK M., MOMČILOVIĆ O., VUJIČIĆ S**., 2023, Analysis of innovation and creativity impact on the entrepreneur career development, International Review, no. 3-4, pp. 37-47
[5]. LINNJ., 1991, Education and innovation adoption in agriculture: evidence from hybrid rice in China. American Journal of Agricultural Economics, 73(3), 713-723.
[6]. MOMČILOVIĆ O., VUJIČIĆ S., DOLJANICA D., 2022, Analysis and influence of the level of innovation & leadership on the level of organizational changes. Journal of Process Management and New Technologies, 10(3-4), 131-140.
[7]. NINH K., 2020, Economic role of education in agriculture: evidence from rural Vietnam. Journal of Economics and Development, 47-58.
[8]. NDOUR C., (2017), Effects of human capital on agricultural productivity in Senegal. World Scientific News, (64), 34-43.
[9]. REIMERS M., KLASEN S., 2013, Revisiting the role of education for agricultural productivity. American Journal of Agricultural Economics, 95(1), 131-152.
[10]. ŠORMAZ G., 2021, Značaj preduzetništva i inovativnosti za ekonomski razvoj Republike Srbije. Trendovi u poslovanju, 9(2), 30-39.
[11]. VUJIČIĆ S., RAVIĆ N., NIKOLIĆ M., 2021, Uticaj planiranja na razvoj inovacija u malim i srednjim preduzećima. Trendovi u poslovanju, 1(17), 78-83.
[12]. WEIR S. KNIGHT J., 2004, Externality effects of education: dynamics of the adoption and diffusion on an innovation in rural Ethiopia. Economic Development and Cultural Change, 53(1), 93-113.
[13]. YASMEEN K., ABBASIAN E., HUSSAIN T., 2011, Impact of educated farmer on Agricultural Product. Journal of Public Administration and Governance, 1(2), 158-164.
[14]. * UNITED NATIONS,** 2019, World Population Prospects: The 2019 Revision. New York: United Nations.
[15]. * WCED,** 1987, Our Common Future. New York, NY: United Nations, World Commission on Environment and Development.