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CONTENT

THE EFFICIENCY OF FINANCIAL SUPPORT FOR WATER INFRASTRUCTURE IMPROVEMENT IN BULGARIA

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A R T I C L E I N F O

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A B S T R A C T

Environmental challenges related to water resources lead to a change in water distribution. This will cause a change in water infrastructure which will need financial support. This article proposes an analysis of the efficiency of financial support for water infrastructure improvement in Bulgaria. The aim of the article is to describe state of the population's access to water infrastructure and financial support for the development of the water infrastructure and based on the statistical data to analyze the effectiveness of the financial support under OPE 2007-2013 and OPE 2014-2020, axis Water for the development of water infrastructure. The parts of the article are as follows: 1) Introduction, presenting the theoretical views on the financing for the improvement of the water infrastructure; 2) Research methodology 3) Analysis of the effectiveness of financial support for the development of water infrastructure (correlation and DEA analysis); 4) General conclusions.

Introduction

Environmental challenges related to water resources such as floods, droughts, pollution lead to a change in water distribution. These challenges are expected to increase due to climate change, socio-economic development and increasing water consumption (EIP Water, 2014). All these processes will cause a change in water infrastructure to meet the needs of all stakeholders who depend on this natural resource. Significant investments are necessary to build, operate, maintain and adapt water infrastructure. In many areas, further initiatives are expected to meet basic water and sanitation needs. Interventions in water infrastructure are necessary if environmental and social problems arising from the water crisis have to be solved (NIC, 2018).

The growing occurrence of extreme events intensifies the need of use new planning technologies, that will answer the question how and where to be rebuild existing or build new infrastructure with greater resilience (US Environmental Protection Agency of Water, 2014). Pathirana et al. (2021) add that operation and management initiatives would not lead to good results if funding and investment in the water sector are limited.

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Frone & Frone (2014) point out that in the last 20 years the main driver of water supply is not the need to expand the services provided, but rather the necessary for capital-intensive investments in water infrastructure because of the new standards and requirements or the need for new research and development initiatives. The authors share that despite the very large investments made in the last 25 years related to European environmental legislation, significant new investments are still needed to achieve a "good state" of water infrastructure. That investment needs will continue to increase because the environment is constantly changing.

A number of studies examine the benefits of financial support for improving water infrastructure. From an economic point of view, the benefits of improved water infrastructure are associated with efficient water use, as the cost of damage and repairs to obsolete water infrastructure are reduced (Dworak et al., 2007). Also, the inclusion of new agglomerations in the water network helps to improve and expand the access of various economic sectors and industries to water services. A research conducted by the US Water Alliance (2017) states that investments in water infrastructure generate quality jobs, increase business competitiveness and lead to financial stimulation of economic activity. In the long run, all economic sectors will benefit from improvements and efficiency gains in water systems. Pattanayak et al. (2005) explore how investment in water infrastructure can lead to improved well-being, especially in the less developed and poorer regions of the world, by describing the benefits of avoided health risk. Stoyanova and Todorova (2018) conclude that increasing investment in the water sector generates benefits in socio-economic and environmental aspects. Investments in the improvement and construction of water infrastructure and project implementation has a direct impact on socio-economic and environmental aspects of sustainable development.

Materials and methods

The aim of the article is to describe state of the population's access to water infrastructure and financial support for the development of the water infrastructure and based on the statistical data to analyze the effectiveness of the financial support under OPE 2007-2013 and OPE 2014-2020, axis Water for the development of water infrastructure.

The methodological framework of the research includes: 1) Introduction, presenting the theoretical views on the financing for the improvement of the water infrastructure; 2) Research methodology 3) Analysis of the effectiveness of financial support for the development of water infrastructure (correlation and DEA analysis); 4) General conclusions.

The analyses in the paper are limited to the financial support for the water infrastructure development under OPE 2007-2013 and OPE 2014-2020, axis Water.

The tools used in the paper are data analysis, correlation and data envelopment analysis (DEA).

The analyzes are based on data from the: 1) National statistical institute in particular The annual statistical monitoring for water supply and sewerage for the period 2010-2018 and Macroeconomics statistic for the period 2010-2018; 2) The Information system for management and monitoring of EU funds in Bulgaria and own calculations.

Correlation analysis was chosen to determine the strength of the connections between quantitative indicators related to the water sector, which is an appropriate statistical method for the purposes of the paper. In the study, we assume that we work with a probability of 5%, ie. α-error equal to 0.05, as this is the most commonly used error rate for socio-economic research. The coefficient of determination is also calculated and interpreted in term to be defined what percentage change in one variable affects the other variable.

The realized correlation analysis determines the strength of the connections between:

- ✓ The financing under the procedure for improvement and development of the infrastructure for drinking and waste water and access to sewerage in 2013.
- ✓ The financing under the procedure of improvement and development of the infrastructure for drinking and waste water (OPE 2007 – 2013, axis Water) and Gross value added in 2013.
- ✓ Funding under the procedure for improvement and development of drinking and wastewater infrastructure (OPE 2014 – 2020, axis Water) and access to sewerage in 2017.
- ✓ The financing under the procedure of improvement and development of the infrastructure for drinking and waste water (OPE 2014 – 2020, axis Water) and Gross value added in 2017.

Data envelopment analysis is a method that is widely used in research in the water sector. Lambert and Dichev (1993) performed a comparative evaluation of the efficiency of private and public water supply companies. The DEA analysis was used to calculate the performance results of 238 public and 32 private enterprises. Shreekant et al. (2006) assessed the efficiency of the urban water supply system in 27 selected Indian cities. The authors apply DEA analysis as an analytical tool for measuring technical efficiency. De Witte (2008) uses the DEA to compare the efficiency of the drinking water sector in the Netherlands, England and Wales, Australia, Portugal and Belgium. The results show that regulatory incentive schemes have a significant positive effect on effectiveness.

The DEA analysis is appropriate for the purposes of the article, as it can provide an opportunity to evaluate and compare indicators with different units of measurement and to be able to identify business operations, processes or objects that are subject to comparative evaluation. DEA analysis uses "decision units" (DMUs), and for each DMU there is a set of corresponding input and output parameters that can allow to compare the performance of the units (Charnes, Cooper, Rhodes, 1978). The method is applied by comparing all units and determine the best working ones. In recent study is applied

Output oriented DEA analysis. It assumes one level of efficiency for optimal. The optimal level is defined as 100% efficiency and all units are compared with it. This method was chosen in order to determine the coefficient of efficiency of financial support under OPE 2007 - 2013 and OPE 2014 - 2020, Water axis and the obtained GVA (district level), produced production, population connected with public sewerage, population connected with public water supply and population connected with wastewater treatment plants in 2013 and 2018. The following output-oriented DEA models are constructed:

- ✓ Input - the financial support under the procedure for improvement and development of the infrastructure for drinking and waste water (OPE 2007 - 2013, Water axis) by district level and Exits - the received GVA by districts, the produced production, the population connected with public sewerage, the population connected with public water supply and the population connected with wastewater treatment plants, 2013.
- ✓ Input - the financing under the procedure of improvement and development of the infrastructure for drinking and waste water (OPE 2014 - 2020, axis Waters) by district level and exits - the received GVA by districts, the produced products, the population connected with public sewerage, the population connected with public water supply and the population connected with wastewater treatment plants, 2018.

The results in the article are part of a study related to the sustainable management of the water sector in Bulgaria (Stoyanova, 2021).

Results and discussions

Analysis of the population's access to water infrastructure

To present the state of the population's access to water services, it is necessary to analyze and evaluate some of the indicators connected with this issue.

Bulgaria has a well-developed water supply system, which at the end of 2017 provides water to 98.6% of the country's population *(Table 1).*

According to NSI data, the water supply network is 75,000 km long. The districts of Kardzhali and Smolyan have low share of population's access to water supply for 2017 (86.9% and 91.9%), and the increase for the period 2010 - 2017 is by 6% for the district of Kardzhali and 1% of Smolyan. Blagoevgrad also has a lower share of the population with assess to water supply compared to other districts in the country, where the percentage of population with access to water supply is over 95%. Montana district has about 1% less population with assess to water supply than the national average. The districts of Pleven, Razgrad, Ruse, Silistra, Varna, Shumen, Yambol, Sofia, Sliven and Plovdiv have 100% population with assess to water supply. In the districts of Vratsa and Targovishte there is a preservation of the share of the population with access to public water supply, and in Montana there is a slight decrease of 0.1% compared to 2010. In all other districts in the country there is an increase in the share of the population with access to public water supply from 0.1 to 5.3%.

Table 1. Share of the population with access to public water supply, %

District	Share of the population with access to public water supply		Change	
	2010	2017	%	
Bulgaria	98.1	98.6	0.5	↑
Vidin	98.5	99.3	0.8	↑
Vratsa	99.5	99.5	0.0	=
Lovech	99.6	99.7	0.1	↑
Montana	97.4	97.3	- 0.1	↓
Pleven	100.0	100.0	0.1	=
Veliko Tarnovo	99.2	99.6	0.0	↑
Gabrovo	98.1	98.4	0.4	↑
Razgrad	100.0	100.0	0.3	=
Ruse	100.0	100.0	0.0	=
Silistra	100.0	100.0	0.0	=
Varna	100.0	100.0	0.0	=
Dobrich	99.7	99.8	0.0	↑
Targoviste	99.8	99.8	0.1	=
Shumen	100.0	100.0	0.0	=
Burgas	99.6	99.9	0.0	↑
Sliven	99.9	100.0	0.3	↑
Stara Zagora	97.5	98.8	0.1	↑
Yambol	100.0	100.0	1.3	=
Blagoevgrad	92.7	96.7	0.0	↑
Kiustendil	96.0	96.1	4.0	↑
Pernik	95.8	96.3	0.1	↑
Sofia	99.0	99.5	0.5	↑
Sofia city	100.0	100.0	0.0	=
Kardzhali	81.6	86.9	5.3	↑
Pazardjik	99.6	99.8	0.2	↑
Plovdiv	100.0	100.0	0.0	=
Smolyan	90.8	91.9	1.1	↑
Haskovo	98.4	98.8	0.4	↑

Source: NSI - annual statistical survey for water supply and sewerage (2010, 2017) and own calculations

In 2017, the share of the population with access to public sewerage was 64.2%. In the districts of Kardzhali, Targovishte, Silistra and Razgrad the constructed sewerage network covers less than 50 % of the population *(Table 2)*.

The districts with the highest share of the population covered by sewerage are Sofia-city (96.4), Gabrovo (85.5%), Sofia (83.7). For the period 2010 - 2017 the share of the population with access to public sewerage in the districts of Vidin, Montana, Silistra, Kyustendil, Kardzhali, Plovdiv and Haskovo has decreased. In other districts, the share increases. For the different districts the change in the share of the population with access to sewerage varies from 28.2% decrease in Silistra district to 11.6% increase in Blagoevgrad district.

The share of the population connected with Wastewater treatment plants (WWTPs) is increasing from 47% (2010) to 63% (2017), as number of WWTPs increases from 79 in 2010 to 170 in 2018. WWTPs with secondary treatment and post-treatment also increase from 50 to 91 and from 16 to 75. The number of treatment plants with primary water treatment decreases from 16 to 4.

There were 169 existing municipal wastewater treatment plants in 2017. In 2010 only 47.8% of the Bulgarian population was connected with WWTP. As a result of national and European funding, the connection of the population with the WWTP reaches 64% in 2018.

Table 2. Share of the population with access to public sewerage, %

District	Share of the population with access to public sewerage		Change	
	2010	2017	%	
Bulgaria	64.7	64.2	-0.5	↓
Vidin	75.5	64.7	-10.8	↓
Vratsa	54.0	-	-	-
Lovech	62.5	66.4	3.9	↑
Montana	77.1	59.8	-17.3	↓
Pleven	58.1	68.0	9.9	↑
Veliko Tarnovo	56.4	58.9	2.5	↑
Gabrovo	84.4	85.5	1.1	↑
Razgrad	41.9	42.4	0.5	↑
Ruse	74.9	76.1	1.2	↑
Silistra	72.9	45.7	-27.2	↓
Varna	59.1	62.2	3.1	↑
Dobrich	63.2	67.3	4.1	↑
Targoviste	47.6	48.1	0.5	↑
Shumen	60.9	62.1	1.2	↑
Burgas	64.0	66.1	2.1	↑
Sliven	53.4	57.3	3.9	↑
Stara Zagora	61.7	62.2	0.5	↑
Yambol	56.5	59.5	3.0	↑
Blagoevgrad	66.4	78.0	11.6	↑
Kyustendil	77.0	60.7	-16.3	↓
Pernik	53.2	59.2	6.0	↑
Sofia	80.7	83.7	3.0	↑
Sofia city	94.3	96.4	2.1	↑
Kardzhali	42.2	38.4	-3.8	↓
Pazardjik	80.3	81.0	0.7	↑
Plovdiv	70.9	71.5	0.6	↑
Smolyan	65.4	68.7	3.3	↑
Haskovo	68.6	63.1	-5.5	↓

Source: NSI - annual statistical survey for water supply and sewerage, (2010, 2017) and own calculations

Analyses of the financial support for the development of the water infrastructure under OPE 2007 - 2013 and OPE 2014-2020, axis Water

Projects financed under OPE 2007-2013 related to the improvement and development of drinking and wastewater infrastructure supported activities in 26 municipalities. The largest financial support is received by the municipalities of Ruen, Pernik, Gabrovo, Vratsa, Veliko Tarnovo, and the lowest is the support for Targovishte, Kazanlak, Gorna Oryahovitsa, Varshets. In the municipalities of Straldzha and Kaolinovo there is contracted financing, but there is no final one. The average share of final financing in Bulgaria is 60 % from the contracted. The highest share of the final amount of funding contracted is in Primorsko and Ruen - about 89 %, and the lowest in Gorna Oryahovitsa, Tundzha and Targovishte, respectively 20%, 27% and 27% *(Table 3)*.

Table 3. Contracted and final amount of funding for projects under the procedure for improvement and development of drinking and wastewater infrastructure under OPE 2007-2013

Municipality	Amount of the contracted financing from OPE 2007-2013, BGN	Final amount of funding from OPE 2007-2013, BGN	Share of final amount of funding from contracted, %
Beloslav	21127709	16901772.09	79.9
Blagoevgrad	14468169.51	11548616.62	79.8
Бургас	13558465.81	7515185.26	55.4
Бургас	5363499.63	5276173.17	98.4
Veliko Tarnovo	43560616.79	29142766	66.9
Vratza	123523616	32146572.65	26
Valchi dol	9193164.31	8072873.85	87.8
Varshetz	5707900	4154355.56	72.8
Gabrovo	117447251.2	34343143.38	29.2
Glavinitsa	9582865.04	7631488.86	79.6
Gorna Oriahovitsa	9235929.97	1847186	20
Kavarna	8196187.09	7,041,322	85.9
Kazanlak	6128896	4020133.99	65.6
Kaolinovo	21952569.8	0	0
Loznitsa	20069602.46	6723612.17	33.5
Pernik	33561592.58	25882671.38	77.1
Popovo	10017512	7117651.97	71.1
Primorsko	19172935	17036972.32	88.9
Ruen	32168747.49	28573303	88.8
Sopot	17750564.63	14021839.3	78.9
Sofia	10561037	8324769.37	78.8
Straldza	2163155	0	0
Troyan	7889673.25	5087231.59	64.5
Tundza	24583723.33	6812189.88	27.7
Targoviste	15858922.54	4433728	27.9
Hisarya	22200038.28	14701970.13	66.2
Yambol	9773972.68	6927419	70.9
Total	511294700.4	308243625.5	60.3

Source: OPE 2007 - 2013, (2014). List of beneficiaries under procedure BG161PO005 / 08 / 1.10 / 01/02 improvement and development of drinking and waste water infrastructure and own calculations

During the second programming period, under OPE 2014 - 2020 under the procedure Second phase of projects for construction of water supply and sewerage structure, the implementation of which has started under OPE 2007 - 2013, eight projects were financed at a total value of BGN 272 399 249.88. The share of self-financing varies from 18 to 32%. The paid amounts are from 34% in the municipality of Vratsa to 95% in Radnevo *(Table 23).*

Table 4. Beneficiaries and financing by procedure - Second phase of projects for construction of water supply and sewerage structure, the implementation of which has started under OPE 2007 - 2013

Municipality	Total amount, BGN	Financial support, BGN	Share of self-financing, %	Share of amount paid, %
Bansko	33 170 034.99	25 925 510.62	22	86
Varna	37 150 155.07	28 658 890.06	23	73
Vidin	19 505 984.15	15 632 301.53	20	90
Vratza	114 506 125.63	78 246 103.33	32	34
Radnevo	7 411 571.06	5 319 850.47	28	95
Tervel	6 199 965.60	4 898 642.95	21	88
Shumen	13 149 478.47	9 812 748.29	25	65
Yambol	41 305 934.91	33 883 824.36	18	59

Source: Information system for management and monitoring of EU funds in Bulgaria (2020) and own calculation

Under the procedure Construction of water supply and sewerage structure, eleven projects were financed at a total value of BGN 1 020 254 030.37. The relative share of self-financing under this procedure varies from 24 to 30% *(Table 5).*

Table 5. Beneficiaries and financing by procedure - Construction of water supply and sewerage infrastructure, OPE 2014-2020

District	Total amount, BGN	Financial support, BGN	Share of self-financing, %
Varna	138 372 401.80	96 760 214.66	30
Ruse	131 783 167.65	95 873 605.70	27
Sliven	133 326 939.91	95 563 025.22	28
Vidin	23 653 635.80	17 937 564.47	24
Plovdiv	137 830 825.33	97 480 851.19	29
Silistra	79 364 379.48	59 442 622.45	25
Kardzhali	67 762 390.21	49 750 793.17	27
Pernik	104 913 130.63	78 591 375.19	25
Stara Zagora	121 996 236.26	89 667 233.65	27
Yambol	31 231 619.65	23 241 530.29	26
Vratza	50 019 303.65	36 347 360.66	27

Source: Information system for management and monitoring of EU funds in Bulgaria (2020) and own calculation

The efficiency of financial support for water infrastructure improvement in Bulgaria (Correlation and DEA analysis)

The correlation between funding under the procedure for improvement and development of drinking and wastewater infrastructure for the period 2007-2013 and access to sewerage in 2013 is relatively weak at the district level. The correlation coefficient is 0.364 with a significance coefficient of 0.08. The coefficient of determination is 0.133, which means that 13% of the change in project funding is related to the change in access to sewerage.

The correlation between the funding under the procedure for improvement and development of drinking and wastewater infrastructure for the period 2007-2013 and GVA in 2013 at the district level is high, which means that with the increase of funding related to drinking and wastewater infrastructure, GVA in the districts also increases. The correlation coefficient is 0.701 with a significance coefficient of 0. The coefficient of determination is 0.492, which means that 49% of the change in project funding is related to the change in GVA by districts.

The correlation between the funding under the procedure for improvement and development of drinking and wastewater infrastructure for the period 2014 - 2020 and access to sewerage in 2017 is relatively weak at the district level. The correlation coefficient is 0.36 with a significance coefficient of 0.24. This result can be approached with reservations due to the fact that one of the conditions of the correlation analysis is not fulfilled; the level of significance is less than the permissible error.

Similar to the previous programming period, the correlation between the funding under the procedure for improvement and development of drinking and wastewater infrastructure for the period 2014 - 2020 and GVA in 2017 at the district level is high, which means that with the increase of funding for drinking infrastructure and wastewater increases and GVA at district level. The correlation coefficient is 0.647 with a significance coefficient of 0.009. The coefficient of determination is 0.418, which means that 41% of the change in project funding influence on the change in GVA by district.

The data from the DEA analysis regarding the financing under the procedure for improvement and development of the drinking water and wastewater infrastructure under OPE 2007-2013 and OPE 2014-2020 by districts (independent variable) and the obtained GVA by districts, produced production, population related to public sewerage, the population related to public water supply and the population related to wastewater treatment plants (dependent variable) in 2013 and 2018 show the effect of funding on the dependent variables by districts *(Table 6).*

Funding during the first programming period (2007-2013) is most effective in the districts of Ruse, Haskovo and Dobrich. These districts are the benchmarks for efficiency. The lowest coefficient of efficiency is calculated in the districts of Sofia, Plovdiv, Burgas, Kardzhali, where the coefficient is below 0.1 points. The other areas have an efficiency ratio from 0.1 to 0.5. During the second programming period (2014-2020), the financing under OPE 2014 - 2020 is most effective in the districts of Burgas, Shumen, Blagoevgrad and they are those that are the benchmark for efficiency. The lowest efficiency ratio is reported in the districts of Silistra and Sliven, where the efficiency ratio is below 0.15 points. The other districts have an efficiency ratio from 0.15 to 0.5.

Table 6. Coefficient of efficiency of the financial support under the procedure of improvement and development of the infrastructure for drinking and waste water under OPE 2007 - 2013 and OPE 2014 - 2020 on district level

District (DMUs)	2013		2017	
	Coefficient	Rank	Coefficient	Rank
Blagoevgrad	0.1158	18	0.69	3
Burgas	0.0862	21	1.00	1
Varna	0.3017	6	0.30	6
Veliko Tarnovo	0.1006	19	-	-
Vidin	0.1853	10	0.30	5
Vratza	0.0426	24	0.10	15
Gabrovo	0.1367	15	-	-
Dobritch	0.5084	3	0.15	12
Kardjaly	0.0954	20	0.18	8
Lovech	0.1521	12	-	-
Montana	0.1423	14	-	-
Pazardjik	0.116	17	-	-
Pernik	0.2544	8	0.17	10
Pleven	0.2274	9	-	-
Plovdiv	0.0786	22	0.18	7
Razgrad	0.1198	16	-	-
Ruse	1	1	0.16	11
Silistra	0.2763	7	0.11	14
Sofia	0.0743	23	-	-
Sliven	0.4193	4	0.11	14
Stara Zagora	0.345	5	0.31	4
Targoviste	0.1446	13	-	-
Haskovo	1	1	-	-
Shumen	0.1644	11	1.00	1
Yambol	0.1158	18	0.18	9

Source: own calculations

Conclusions

Based on the performed data analysis, correlation and DEA analysis, the following general conclusions related to the efficiency of financial support for improvement of water infrastructure in Bulgaria could be drawn:

- ✓ Bulgaria has a well-developed water supply system, which at the end of 2017 provides water to 98.6% of the country's population. There are districts (Pleven, Razgrad, Silistra, Varna, Shumen, Sliven, Yambol, Sofia, Plovdiv, Ruse) in which 100 % of the population have access to water supply. There is an increase in the share of the population with access to public water supply in all other districts in the country.

- ✓ The access of the population to the sewerage network in the country for the period 2010 - 2017 is increasing. In some of the districts (Kardzhali, Targovishte, Silistra, Razgrad) the constructed sewerage network covers less than 50% of the population. For the period 2010 - 2017, the share of the population with access to public sewerage in some districts (Vidin, Montana, Silistra, Kyustendil, Kardzhali, Plovdiv, Haskovo) decrease, in others it has increased. The districts with the highest share of the population covered by sewerage are Sofia - city, Gabrovo, Sofia district.
- ✓ There is an increase in the constructed WWTPs between 2010 and 2017, but there are still many settlements without a sewerage network.
- ✓ The average final amount of financing compared to the contracted for the projects under the priority axis Water related to the improvement and development of the infrastructure for drinking and waste water during the first programming period is 60 %. During the second programming period, under OPE 2014 – 2020, procedure Second phase of projects for construction of water supply and sewerage structure, the implementation of which has started under OPE 2007 - 2013 the relative share of self-financing varies from 18 to 32% and the amounts paid are in the range of 34% to 95%.
- ✓ The correlation between the financing under the procedure for improvement and development of the drinking and waste water infrastructure 2007-2013 and the access to sewerage is low. For the analyzed period, 13% of the change in funding for water projects at the district level leads to a change in access to sewerage.
- ✓ The correlation between the financing under the procedure for improvement and development of the infrastructure for drinking and wastewater 2007 - 2013 and GVA is high, as 49% of the change in the financing by projects influence on the change of GVA on district level.
- ✓ The correlation between the financial support under the procedure for improvement and development of drinking and wastewater infrastructure 2014 - 2020 and GVA in 2017 at the district level is high. 41% of the change in project funding influence on the change in GVA.
- ✓ The conducted DEA analysis showed that the financing during the first programming period 2007-2013 is most effective in the districts of Ruse, Haskovo and Dobrich and is most inefficient in the districts of Sofia, Plovdiv, Burgas, Kardzhali. During the second programming period, the financing under OPE 2014 - 2020 is most effective in the districts of Burgas, Shumen, Blagoevgrad and most inefficient in the districts of Silistra and Sliven.

In conclusion, the challenges facing water resources require construction, operation and maintenance of sustainable water infrastructure. This force the realization of infrastructural projects in the sector and the implementation of innovations that need financial support. In this regard an approach that takes into account all specific sector requirements in legislative, environmental, technological, technical, investment and information aspects have to be applied.

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Conflict of interests

The authors declare no conflict of interest.

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THE RELATIONSHIP BETWEEN AGRICULTURAL RAW MATERIALS AND OIL PRICE: AN EMPIRICAL ANALYSIS

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ABSTRACT

The motivation of this study is to investigate the relationship between the price of agricultural raw materials and the real exchange rate of the USA and the price of crude oil. For this purpose, annual data from 1990 to 2020 were used. In the study, the cointegration relationship and the elasticity coefficients of the variables were estimated with the help of ARDL bounds test. In addition, the causality relationship was determined with the help of the Granger test. According to the results obtained, it was concluded that there is a cointegration relationship in the models established for agricultural raw materials. In addition, the elasticity coefficient of oil price was found to be positive. According to the Granger causality analysis results, a one-way causality relationship from oil price to agricultural raw materials was determined. We present some policy implications based on our findings in this study.

Introduction

While the rise in oil prices since 2003 rose to 145 dollars in July 2008, it decreased to 40 dollars in December 2008 with the effect of the international crisis. It has been observed that the fluctuations in the dollar affect the agricultural commodity prices in a similar way. The similarities in price volatility between oil prices and agricultural commodity prices have generated interest in the literature to understand the relationship between food prices and energy (Abbott vd., 2009; Fowowe, 2016).

The effects of the economic crisis experienced in the world in 2008 also made its impact on agricultural commodity prices. Agricultural commodity prices, which have a fragile structure, have undulant fluctuations throughout the years. Studies in recent years show that fluctuations in oil prices have a significant effect on agricultural commodity prices (Adam et al ., 2018; Vu et al., 2019, Roman et al., 2020). Fluctuations in oil prices have had various reflections on our lives. One of these results is the changes that cause

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inflation in product prices depending on the prices of agricultural materials. Shocks in the prices of agricultural materials can be caused by various factors. One of these factors is fluctuations in crude oil prices. Increases in crude oil prices increase the prices of agricultural materials. Demand and climate changes also cause the prices of agricultural materials to increase (Chen et al., 2010).

The reasons why the prices of agricultural materials have similar volatility with the prices of crude oil consist of the reflections in terms of supply and demand. When examined in terms of supply, there are supply costs of agricultural materials. Agricultural materials inherently have high logistics costs. In addition, chemical fertilizers used in the production of agricultural materials consist of petro derivatives. As the increase in crude oil prices increases production and logistics costs, it also causes an increase in agricultural materials prices. The increase in economic activities and the increase in the demand for food products, goods and services as well as crude oil prices with the expansionary monetary policy are among the reasons for the increase in agricultural materials prices in terms of demand (Hanson et al., 1991; Hochman et al., 2012; Baumeister and Kilian, 2014; Pal and Mitra, 2018). As the consumption of the world population increases and the level of welfare increases, the prices of agricultural materials also increase. In addition, the increase in speculative investments in commodity markets is another factor that increases the prices of agricultural materials (Gorton ve Rouwenhorst, 2006; Yahya vd., 2019; Bekiros vd., 2017; Bhardwaj vd., 2015).

The aim of this study is to examine the effect of oil price and real exchange rate on agricultural raw materials prices. The Autoregressive Distributed Lag (ARDL) method was used to estimate the empirical relationship between oil price, real exchange rate and agricultural raw materials prices by taking data from annual observations. The ARDL method used in this study estimates the cointegration relationship between the series and the cointegration coefficients of the series. In this way, the elasticity coefficients of the variables in the long run are estimated and their effects on each other are analyzed.

The study provides various contributions to the literature. The first contribution of this study was that the effect of oil price and real exchange rate on agricultural raw materials prices was examined, and the effect of possible petroleum shocks on agricultural raw materials prices was investigated in this study, which was analyzed using the ARDL method. The second contribution of the study to the literature was the analysis of the relationship between agricultural commodity price and oil price in the literature (Nazlioglu and Soytas, 2012; Rezitis, 2015; Fowowe, 2016; Taghizadeh-Hesary et al., 2019; Aye and Odhiambo, 2021). In this study, it is aimed to add a different dimension to the literature by emphasizing the relationship between agricultural raw materials prices and oil price.

The main content of this article is as follows: In the second part, information will be given about the various data range examining the relationship between agricultural raw materials, the oil market and the real exchange rate, and the recent literature investigating different countries and country groups with different methods. In the third section, the data and the methodologies used in this study will be explained. In the fourth chapter, the cointegration relationship between the prices of agricultural raw materials, the real exchange rate and the price of crude oil and the cointegration coefficient estimates will be obtained and interpreted economically. In the fifth chapter, the results will be evaluated and policy recommendations will be made.

Review of the literature

In a market where the prices of the agricultural commodity fluctuate, economists closely monitor the factors due to which the prices fluctuate. In this part of the study, studies examining the relationship between commodity price (CP) and oil price (OP) are included. Baffes (2007) analyzed the relationship between OP and CP by examining the period from 1960 to 2005. According to the empirical results, an increase in OP increases CP. Zhang and Qu (2015) investigated the relationship between six types of agricultural commodities and OP by adding daily data from 2004 to 2014. The findings are that shocks on the five agricultural commodities of the shocks are asymmetrical.

Among the studies examining the relationship between agricultural CP and OP, Paris (2018) examined the long term relationship between agricultural CP and OP by examining the period from 2001 to 2014. In the empirical results, it has been determined that OP causes an increase on agricultural CP. Zafeiriou et al. (2018) aimed to predict the relationship between crude OPs and agricultural products in their study. Empirical findings show that crude OP directly affect the prices of agricultural products used in biodiesel and ethanol production. Olasunkanmi and Oladele (2018) analyzed the relationship of OP shock with agricultural CP covering the period of 1997 and 2016. Using Linear ARDL and Non-linear ARDL techniques, they found that OP had a positive effect on CP.

Jiang et al (2018) investigated the relationship between OP, agricultural raw, metal markets, material markets in their study, discussed the period between 1986 and 2017. The findings showed that the oil market lags behind the agricultural raw material market. Using monthly data from 1997 to 2016, Fasanya et al (2019) analyzed the empirical relationship between OP and CP. In the findings, it was determined that the increase in OP increased the agricultural CP.

In another study, Roman et al. (2020) analyzed the relationship between crude oil and food prices in their study using monthly data from 1990 to 2020. In their findings, there is a long-term relationship between crude oil and meat prices. In addition, the relationship between crude oil and food and cereal in the short term was determined. Vu et al (2020) examined the relationship between ten agricultural commodities and OP by using monthly data for the period 2000 to 2019. According to the empirical results, it has been determined that OP can change biofuel and exchange rates and agricultural prices. Aye and Odhiambo (2021) investigated the effect of OP on agricultural growth in South Africa in their empirical study using quarterly data from 1980 to 2020. According to the empirical results, it was concluded that OP negatively affect agricultural growth.

In this part of the literature review, studies examining the causal relationship between agricultural commodity and OP will be discussed. The results of studies examining the causal relationship between agricultural commodity and OP are remarkable. We can divide such studies into four groups:

i) Unidirectional hypothesis: Nazilioglu (2011) investigated the causality relationship between OP and agricultural CP by examining the period from 1994 to 2010. According to the findings, nonlinear causality relationships were determined between OP and agricultural commodity. Ma et al (2015) analyzed the relationship between OP, agricultural CP and exchange rate using monthly data from 2002 to 2013. In their findings, they concluded that OP causal of soybean price, and exchange rate is not the dominant factor over CP. Kuhe and Uba (2018) analyzed the period between 2006 and 2017 and investigated the relationship between OP, exchange rate and CP. In their findings, it was determined that crude OP and exchange rate increased the agricultural CP. According to the causality analysis, a one-way causality relationship was determined from crude OP and exchange rate to agricultural CP. Mokni and Ben-Salha (2020) investigated the relationship between oil and food. According to the causality relationship findings, they found one-way causality from food prices to OP.

ii) Feedback hypothesis: Nazlioglu and Soytas (2012) analyzed the relationship between 24 CP and OP. The results of cointegration and causality analysis between the variables showed that OP has an effect on agricultural CP. In addition, they found a bidirectional causality relationship between OP and CP. Yang et al. (2021) found similar results using monthly data from 1992 to 2019. In another study, Resitis (2015) found similar results for the period between 1983 and 2013. Coronado et al. (2018) examined the causal relationship between OP and agricultural CP for the period 1990 to 2006. In the obtained findings, they found bidirectional causality between OP and CP. Su et al. (2019) examined the relationship between OP and CP using data from 1990 to 2017. They determined that there is a positive bidirectional causality relationship between OP and agricultural CP that changes over time. Cheng and Cao (2019) found a bidirectional causality relationship between food price and crude OP in their study, in which they examined the relationship between crude OP and global food price using the data from 1990 to 2017.

iii) Neutrality hypothesis: In their study, Nazlioglu and Soytas (2011) found results that support neutrality hypothesis. Fowowe (2016) analyzed the relationship between OP and CP for the period 2003 to 2014. According to the empirical findings, no causal relationship was found between OP and agricultural CP.

iv) Mixed results: Saghaian (2010) investigated the relationship between CP and OP by taking the period 1996 to 2008. In the findings, a correlation was determined between OP and CP. In addition, while the causal relationship from oil to some CP was determined, a bidirectional causality relationship was determined towards some others. Vo et al. (2019) investigated the causality relationship between oil markets and agricultural products by using monthly data from 2000 to 2018. According to the findings, it has been determined that not every oil shock makes the same contribution to the effects of agricultural price fluctuations on the agricultural market. Thus, it proves that the crude oil market causes fluctuations in agricultural CP.

Materials and methods

In this study, annual data of the real effective exchange rate and crude oil price of the USA are used for the price of agricultural raw materials for the period 1990 to 2020. All data were obtained from the IMF database and detailed explanations are given in Table 1.

Table 1. Data description

Agricultural Raw Materials	Description	Unit
Cotton	Cotton Outlook 'A Index', Middling 1-3/32 inch staple, CIF Liverpool	US cents per pound
Hard Logs	Best quality Malaysian meranti, import price Japan	US$ per cubic meter
Hard Sawnwood	Dark Red Meranti, select and better quality, C&F U.K port	US$ per cubic meter
Hides	Heavy native steers, over 53 pounds, wholesale dealer's price, US, Chicago, fob Shipping Point	US cents per pound
Rubber	Singapore Commodity Exchange, No. 3 Rubber Smoked Sheets, 1st contract	US cents per pound
Soft Logs	Average Export price from the U.S. for Douglas Fir	US$ per cubic meter
Soft Sawnwood	Average Export price of Douglas Fir	US$ per cubic meter
Wool, Coarse	23 micron, Australian Wool Exchange spot quote	US cents per kilogram
Wool, Fine	19 micron, Australian Wool Exchange spot quote	US cents per kilogram
OIL	Brent Crude	US$ per barrel
REER	US (reel effective)	Index 2010=100
ARM	Agricultural Raw Materials Index	

The econometric method used in the study is given below:

$$ARM_t = f(REER_t, OIL_t) \tag{1}$$

here, ARM stands for agricultural raw materials; REER refers to the real effective exchange rate of the USA; OIL represents the price of crude oil and t represents the time dimension.

$$lnARM_t = \beta_0 + \beta_1 lnREER_t + \beta_2 lnOIL_t + \varepsilon_t \tag{2}$$

lnARM refers to the natural logarithm of agricultural raw materials; lnREER represents the natural logarithm of the real effective exchange rate of the USA; lnOIL refers to the natural logarithm of the price of crude oil; ε stands for the white noise error term; t represents the time dimension.

In this study, Peseran et al (2001) technique was used to test the cointegration relationship between the variables. The prerequisite for this test is that the variables must be stationary at the level or at the primary difference. Therefore, before the ARDL bounds test, the stationarities of the variables were determined with the help of (ADF) and Phillips and Perron (PP) unit root tests.

When the ARDL bound test is compared with the cointegration test of Johansen and Juselius (1990), it is seen that it is used more frequently in the literature. We can collect the advantages of ARDL bound test in four groups: i) It gives better results in small samples (Ghatak and Sidekick, 2001). ii) The ARDL bound test can be used for both I(0) and I(1) order series. However, in Johansen and Juselius (1990) cointegration test, the variables must be stationary in I(1). iii) The ARDL bound test addresses the endogenity of some variables in the regression by giving long term estimates (Odhiambo, 2009). iv) The ARDL bound test can predict the long and short term effects of the variable (Bentzen & Engster, 2001).

The ARDL bounds test adapted to our study:

$$\Delta lnARM = \alpha_0 + \sum_{i=1}^{m} \alpha_{1i} \Delta lnARM_{t-1} + \sum_{i=1}^{m} \alpha_{2i} \Delta lnREER_{t-1} + \sum_{i=1}^{m} \alpha_{3i} \Delta lnOIL_{t-1} + \delta_1 lnARM_{t-1} + \delta_2 lnREER_{t-1} + \delta_3 lnOIL_{t-1} + \varepsilon_t \quad (3)$$

Δ; denotes the first difference, α; denotes the parameters to be estimated, ε_t denotes the white noise error term. In Equation 3: $H_0: \delta_1 = \delta_2 = \delta_3 = 0$, and $H_1: \delta_1 \neq \delta_2 \neq \delta_3 \neq 0$ (Gövdeli, 2019).

$$(1-L)\begin{bmatrix} ARM \\ OIL \\ REER \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} + \sum_{i=1}^{p}(1-L)\begin{bmatrix} b_{11i} & b_{12i} & b_{13i} \\ b_{21i} & b_{22i} & b_{23i} \\ b_{31i} & b_{32i} & b_{33i} \end{bmatrix} X \begin{bmatrix} ARM_{t-1} \\ OIL_{t-1} \\ REER_{t-1} \end{bmatrix} + \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{bmatrix} + ECT_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \quad (4)$$

where 1-L is the delay operator; ECT_{t-1} ECT_{t-1}, delayed error correction term; β_j (j=1,2,3) are correction coefficients and ε_{jt} (j=1,2,3) are error correction terms (Shahbaz et al., 2015).

When determining long-term causality, it is checked that the ECT_{t-1} coefficient is between (-1, 0) and is statistically significant. Thus, the effect of a shock that may occur in the variables will continue to decrease and it will approach the equilibrium again in the long run.

Results

After explaining the techniques used, empirical results and evaluations will be made in this part of the study. Before proceeding to the ARDL bound test, it should be investigated whether the prerequisite variables are stationary at level or first difference order. The unit root test results of the variables are presented below:

Table 2. Unit root test results

Variables	LEVEL		1ST DIFFERENCES		Result
	ADF	PP	ADF	PP	
	t statistics	t statistics	t statistics	t statistics	
Cotton	-2.5531	-2.6520	-5.3534*	-5.4451*	I(1)
Hard Logs	-2.4109	-2.5105	-5.4186*	-5.4186*	I(1)
Hard Sawn Wood	-2.0493	-2.1944	-4.7665*	-4.7649*	I(1)
Hides	-0.1157	-0.0407	-5.2674*	-5.2657*	I(1)
Rubber	-1.4046	-1.5357	-4.1034*	-4.0835*	I(1)
Soft Logs	-2.8376	-2.9281	-4.3257*	-4.2713**	I(1)
Soft Sawnwood	-3.2604	-3.2316**	-4.1360**	-3.9891*	I(1)
Wool, Coarse	-1.0401	-1.0772	-4.3866*	-3.7690*	I(1)
Wool, Fine	-1.8689	-1.8706	-5.1266*	-8.2909*	I(1)
OIL	-1.1739	-1.1692	-4.3226*	-4.2242*	I(1)
REER	-2.6301	-1.6306	-3.8485*	-3.8784*	I(1)
ARM	-1.6570	-1.7620	-4.4762*	-4.4762*	I(1)

Note: 1% and 5% are represented by * and **, respectively.

In the results obtained, it has been determined that the Soft Sawnwood variable has a unit root at the level according to the ADF test and becomes stationary by taking the difference. According to the PP test, the Soft Sawnwood variable was found to be stationary at the level. For this reason, it is accepted that the variable is stationary by taking the difference, that is, it becomes stationary in the first order. Other variables are unit rooted at the level and stationary at first difference. In summary, all variables are stationary at order 1. Thus, it has been proven in Table 2 that the precondition of ARDL bound test is met.

Table 3. Cointegration test results

Dependent Variables		Critical Values		
		1%	5%	10%
	I(0) Bound	4.13	3.10	2.63
	I(1) Bound	5.00	3.87	3.35
	Stats	Cointegration Results		
Cotton	4.49	□		
Hard Logs	6.27	□		
Hard Sawn Wood	8.23	□		
Hides	4.88	□		
Rubber	4.40	□		
Soft Logs	4.74	□		
Soft Sawnwood	4.87	□		
Wool, Coarse	4.46	□		
Wool, Fine	4.08	□		
ARM	5.69	□		

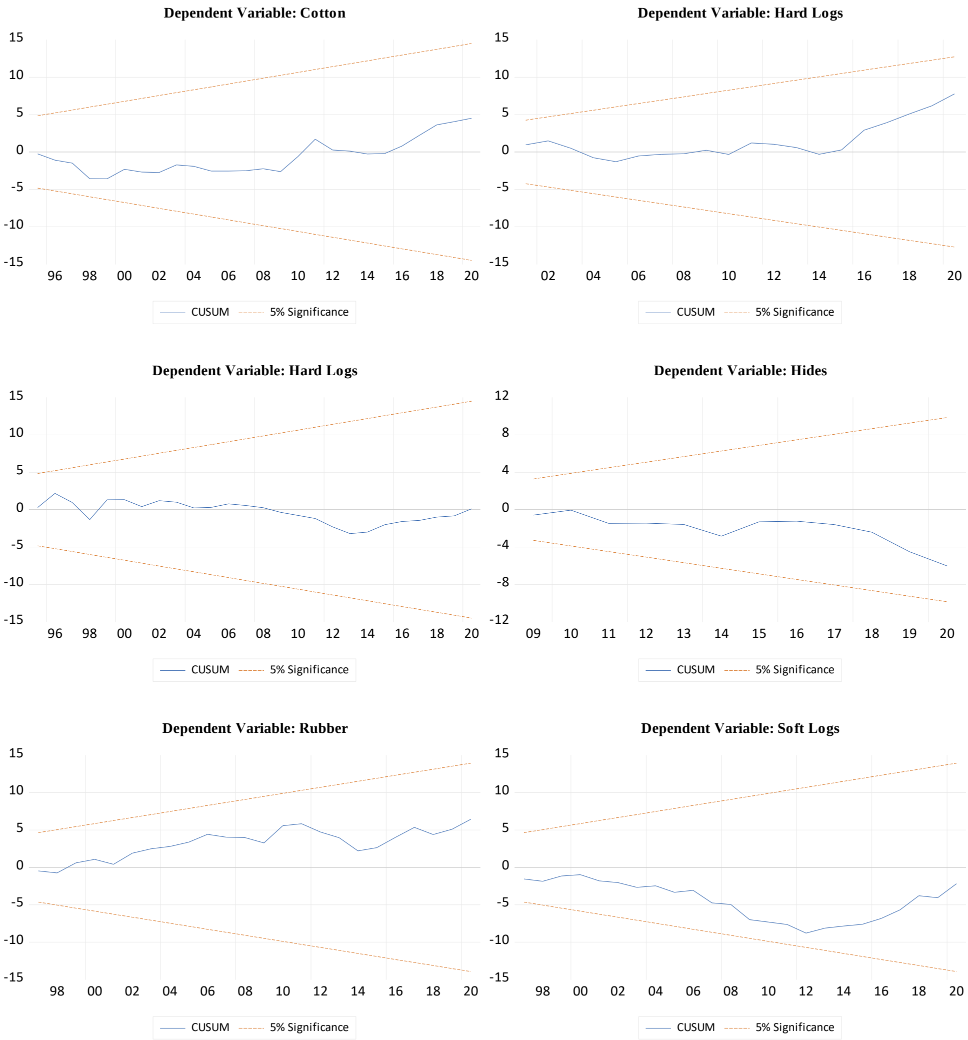
The results of the cointegration relationship between the variables are presented in Table 3. According to the findings, since the null hypothesis of Hard Logs and Hard Sawn Wood variables was rejected at the 1% level, the finding that “there is a cointegration relationship between the alternative hypothesis variables” was accepted. The null hypothesis of “variables at the 5% level” was rejected because the other variables remained in the unstable region at the 1% significance level.

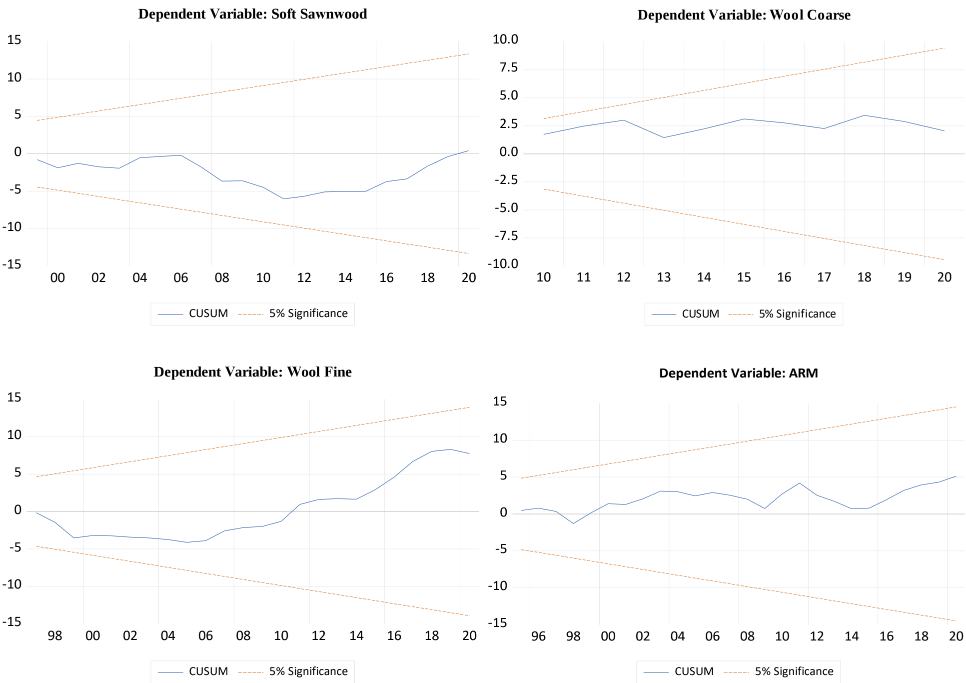
Table 4. Long-term estimates

	ARDL Estimate				**FMOLS Estimate**				**DOLS Estimate**			
	OIL		**REER**		**OIL**		**REER**		**OIL**		**REER**	
Dependent Variables	Coef	p value	Coef	p value	Coef	p value	Coef	p value	Coef	p value	Coef	p value
Cotton	0.08	0.31	-2.10	0.01	0.10	0.15	-1.84	0.00	0.09	0.32	-2.34	0.03
Hard Logs	0.22	0.03	-1.42	0.08	0.13	0.03	-1.78	0.00	0.06	0.31	-2.62	0.00
Hard Sawn Wood	0.13	0.01	-1.69	0.00	0.14	0.00	-1.43	0.00	0.10	0.00	-1.82	0.00
Hides	0.01	0.96	-0.42	0.14	-0.09	0.33	-1.84	0.03	-0.06	0.52	-1.45	0.19
Rubber	0.52	0.00	-2.58	0.01	0.59	0.00	-2.60	0.00	0.52	0.00	-3.79	0.00
Soft Logs	-0.09	0.11	-0.71	0.17	-0.05	0.33	-0.23	0.62	-0.06	0.30	-0.53	0.32
Soft Sawnwood	0.08	0.01	0.17	0.47	0.13	0.00	0.48	0.11	0.10	0.01	0.12	0.73
Wool, Coarse	0.69	0.00	0.41	0.79	0.76	0.00	0.44	0.78	0.68	0.00	1.18	0.49
Wool, Fine	0.42	0.01	-0.02	0.99	0.41	0.00	0.23	0.75	0.26	0.01	-1.65	0.09
ARM	0.19	0.00	-1.37	0.00	0.21	0.00	-1.19	0.00	0.17	0.00	-1.78	0.00

Table 4 presents the long-term estimation results of the variables. The reason why FMOLS and DOLS estimator results are given in addition to the ARDL bound test estimator is to support the empirical findings. According to the empirical results where the dependent variable is agricultural raw materials and the independent variable is OIL and REER variables, we see that the ARDL, FMOLS and DOLS estimator results give approximately similar results. In empirical findings, the OIL variable increases the prices of agricultural raw materials. It has been determined that the elasticity coefficients of the REER variable are generally negative. In the model where the ARM series is the dependent variable, the probability values of the OIL and REER variables were found to be significant at 1%. As expected, the elasticity coefficient of the OIL variable was positive and the elasticity coefficient of the REER variable was negative.

Figure: 1. CUSUM Charts





Cumulative sum (CUSUM) graphs are presented in Figure 1. With the help of CUSUM graphics, the stability of the parameters can be determined. When the CUSUM graphs of the models in which agricultural raw materials are dependent variables are examined, it has been determined that they remain within the line limits at the 5% level, thus the estimated parameters are stable.

Table 5. VECM causality results

	Short-run causality			Long-run causality
Dependent Variable	Δ(ARM)	Δ(OIL)	Δ(REER)	Ect(t-1)
Δ(ARM)	-	9.527 (0.008)	0.040 (0.980)	-0.817 (0.005)
Δ(OIL)	1.748 (0.417)	-	2.264 (0.322)	-0.661 (0.370)
Δ(REER)	4.031 (0.133)	5.255 (0.072)	-	0.138 (0.164)

Note: p values are in parentheses.

Table 5 presents the short- and long-term causality results between agricultural raw materials and oil price, real effective exchange rate. According to the results of the short-term causality analysis, one-way causality relationship from OIL to agricultural raw materials and REER has been determined. In the results of the long-term causality relationship, a causality relationship has emerged from OIL and REER to agricultural raw materials. The findings are in line with the results of Kuhe and Uba (2018), Nazlioglu ve Soytas (2012)'s study.

Conclusions

In the study, the relationship between the prices of agricultural raw materials and the real effective exchange rate of the USA and the price of crude oil was analyzed. Thus, whether the real effective exchange rate and crude oil price have explanatory power on agricultural raw materials has been investigated. For this purpose, annual data from 1990 to 2020 were used. The main results and policy recommendations obtained in this study, in which cointegration causality analysis was conducted, are given below:

First, crude oil prices have a positive effect on agricultural raw materials prices. In the last 30 years, when crude oil prices have fluctuated, it has been observed that agricultural raw materials prices have similar fluctuations. In particular, the increase in the prices of agricultural raw materials due to the jumps in oil prices can cause some problems in the sectors. Secondly, the prices of agricultural raw materials, which directly affect the input prices, are very important for the country's economy. In particular, countries that import agricultural raw materials will feel the impact of oil price shocks in the short term, as well as their reflections on agricultural raw materials prices. Here, policy makers need to develop and implement policies that will minimize external dependence on agricultural raw materials. Third, the cointegration relationship was determined in the models established for nine agricultural raw materials. Thus, it has been determined that agricultural raw materials will act together with crude real effective exchange rate and oil prices in the long run. Our recommendation to policy makers in this regard is to take precautionary measures against negative volatility in prices of agricultural raw materials. In this way, it will be possible to prevent investors and sectors from being affected too much. Fourth, one-way causality relationship from oil price to agricultural raw materials has been determined. Thus, it has been concluded that the changes that may occur in the oil price in terms of supply and demand directly affect the agricultural raw materials. It would be beneficial for policy makers to develop a policy for oil price that directly affects agricultural raw materials. It would be appropriate to provide logistics activities with alternative sources other than oil, such as solar energy, energy from renewable energy sources. It is recommended to make the necessary technological investments in this regard. In this way, the logistics costs of agricultural raw materials will decrease and more stable agricultural raw materials prices will be formed.

Our results are a guide to policy makers and it is necessary to take precautions against oil price fluctuations for agricultural raw materials that countries need. In particular, investments in agricultural raw materials should be evaluated well in this regard and it should be aimed that policy makers and economists produce policies together. It is recommended to increase the competitiveness of countries by minimizing the reflections of oil shocks on agricultural raw materials.

Conflict of interests

The authors declare no conflict of interest.

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THE SIGNIFICANCE OF ARCHIVING DOCUMENTATION AND ASSESSMENT QUALITY OF ARCHIVING FINANCIAL DOCUMENTATION GIVEN BY TOP MANAGERS

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A B S T R A C T

The company's top management uses innovative methods in making management decisions in companies, which can be used to improve the overall business. This author's study was focused on discovering the importance of document archiving, especially if the electronic movement of documents is applied in the company. The conclusion reached by the authors of the study is that there is a strong correlation between the standard and innovative forms of document archiving (control has been established in the company). The author's next conclusion would be that in the business of companies that have introduced financial management and control, electronic movement of documents is basically taking place. In companies that have not introduced the mentioned form of control, the classic flow of documentation dominates. The last conclusion would be that the highest level of security in archiving is achieved in companies that have introduced electronic archiving.

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Introduction

Successful management of agricultural enterprises uses numerous ways to improve business, such as: the application of internal control (Cantino, 2009), but an increasingly strong determination to introduce digitization in business can also be observed (Burville & Seton, 2010; Aezel, 2015; Bratten et al., 2016: Barok et al., 2019).

Agricultural enterprises try to have good records in all parts of the enterprise that will monitor all movements of the workforce, the organization of plant production, production costs, incoming goods, issuing goods and more (Johnson, 2012; Cunningham, 2014; Jones, 2016; Escobar-Varela & Lee, 2018; Kokorović-Jukan et al., 2020).

The organization of agricultural production is very specific and requires the management staff to introduce numerous forms of business control and audit in the process of functioning of the agricultural enterprise, which was pointed out by numerous authors (Soltani, 2009; Popović et all., 2014; Chen et all., 2017, Novaković et al., 2018; Barok et al., 2019; Murphy, 2019; Simić et al., 2021; Popović et al., 2021).

In observing the organization of agricultural production, the processes of introducing internal controls should be seen as an inseparable process with the introduction of standardization processes in all segments of the agricultural company (Cai & Wong, 2010; Nowak et al., 2016; Vujanić et al., 2021; Baráth & Fertő, 2017; Biščak & Benčina, 2019; Finžgar & Brezovnik. 2019).

The organization of agricultural production is specific. In order for it to take place successfully, it is necessary for decision-makers in agricultural enterprises to constantly adapt to the conditions on the market for agricultural products, as well as to take into account the level of production costs and the expected effects (Kukovic et al., 2016; Pantić et al., 2021;Baker et al., 2018; Hafsa & Cohen, 2019; Liu et al., 2020).

Analysis in very many variants as an important tool in the management of agricultural enterprises is increasingly present in the real management of many companies, which is indicated in the broadest sense by numerous studies (Vukadinović, 1990; Propheter, 2019; Panikarova, 2019; Zahirović et al., 2021; Juričić et all., 2020; Pjanić, 2020, Podgorski, 2020).

Agricultural production has specifics and a specific way of organization, so top management tries to improve the general level of management in companies in which it manages in various ways, as indicated by numerous authors (Molineux, 2016; Scalera, 2016; Wang, 2019; Leković et al., 2020; Obrenović, 2021; Radović et all ., 2021; Vitomir et al., 2021 Ugrenović et al., 2021).

Used material and used methods

The research was conducted in 145 companies, which in terms of size belonged to medium and large agricultural companies whose headquarters were in the Republic of Serbia. The authors conducted the survey during the first half of 2021. At the same time, they undertook not to disclose the name of the company, as well as to use the data obtained from the survey exclusively for scientific purposes.

In the next step, the authors processed the data obtained from the survey. The purpose of such actions was to reveal possible differences in the number of agricultural enterprises that have introduced financial management and control mechanisms into their regular operations. The entire observation of differences in the use of financial management and control was carried out by the authors comparing classical and electronic archiving of documentation.

The authors gave the opportunity to the decision-makers of the surveyed companies to give their opinion on the two forms of document archiving (classical form and electronic archiving) that is carried out in the regular business of the company in a given interval, which was between 1 and 10. The lowest score was 1, and the highest score was 10 and represented the value with which the decision-makers showed their satisfaction in relation to the mentioned forms (types) of document archiving.

In the last step, the authors performed a statistical analysis. In that step, they used the Phi / Cramer's correlation coefficient to determine the relevant phenomena that can be used to explain the relevant processes in the operations of medium and large agricultural enterprises.

Hypotheses

As part of the process of creation and creation of this study, the authors decided to put forward two hypotheses.

The first hypothesis put forward by the authors was focused on the premise that there is no correlation between the form of storage and storage of documentation and the form of internal control introduced.

The second hypothesis put forward by the authors was focused on the premise that there is no clear connection between the form of storage and storage of documentation and the obtained assessment expressed by decision makers in agricultural enterprises regarding the safety of stored and stored documentation.

Statistical analyzes

After the basic analysis of the surveyed 145 medium and large agricultural companies, the authors processed the data using the SPSS IBM program.

The goal of using statistical processing was to determine the possible existence of trends.

Results

Managers in agricultural enterprises can improve the quality and safety of their overall management by applying valid documentation archiving.

In the first part of the research, which was carried out in the first part of 2021, the authors, for the purpose of determining the valid archiving of documentation, made an observation of the organization of agricultural production by comparing the form of control introduced in the operations of an agricultural enterprise and the form of archiving introduced by the aforementioned enterprises.

In the second part of the research, a focus was made on the holders of business decision-making based on the assessment they made in relation to the form of archiving introduced in the regular business processes of agricultural enterprises.

Review of the relationship between the number of archived documents and electronic and classical archiving of documentation of agricultural companies

The display of systematized data after statistical processing is shown in Table 1, and it refers to the display of the resulting connection between the form of control and the form of archiving that is carried out in the processes of regular business of agricultural enterprises.

Table 1. Overview of the type of disposal and storage of documentation and introduced internal controls.

Type of disposal and storage of documentation	Control form		Total
	Introduced financial management and control in the company	Existence of weak control	
Electronic	78	3	81
Classic	4	60	64
Total	82	63	145

Source: Authors.

After presenting the obtained results in Table 1, the authors gave a presentation in Table 2.

Table 2. Obtained results illustrating the display of the correlation coefficient

	Display Correlation coefficient	Display of statistical significance
Phi	.929	.000
Cramer's V	.929	.000
Total	145	

Source: Authors.

Review of the evaluations given by decision-makers in agricultural enterprises

Table number 3 shows the obtained results related to the display of the form of documentation archiving and the evaluation given by the decision-makers in agricultural enterprises in relation to issues that ensure the security of documentation archiving and therefore in relation to the overall safe operation of the mentioned enterprises.

Table 3. An overview of the form of documentation archiving and security assessment given by the holders of the organization of agricultural production in enterprises.

		Safety assessment given by the company's management						Total
		1	2	3	8	9	10	
Type	Electronic	0	0	0	1	5	75	81
	Classic	41	20	3	0	0	0	64
Total		41	20	3	1	5	75	145

Source: Authors.

The previously presented research results are strengthened by the presentation of the obtained results through correlation, and the presentation itself is given in the presentation of Table 4.

Table 4. Display of results using correlation.

	Correlation	Significance
Contingency Coefficient	.708	.000
Total	145	

Source: Authors.

Discussion

Based on the presentation of the results obtained in this study, it can be pointed out that Hypothesis 1 can be refuted with certainty, that is, no clear connection can be established between the type of documentation archiving and the form of established control by the decision-maker in the agricultural enterprise.

In addition, the results indicate that it can be emphasized that if an agricultural company has established a financial management and control system within its regular operations, there is a high probability that it has introduced electronic archiving in its regular operations (Table 1). Also, if the agricultural company has not established a system of controls within the framework of regular operations, there is a high probability that the archiving is done according to the established archiving model (the classic model of documentation archiving). It has been strengthened after the obtained results, which are presented by the author in table 2, that is, the obtained results indicate the existence of a significance of about 99%, the ratio ($p = .00$).

Based on the presentation of the results obtained in this study, it can be pointed out that Hypothesis 2 can be refuted with certainty, because based on the presentation of descriptive indicators (Table 3), it can be concluded with certainty that according to the assessment given by the leading decision-makers in agricultural enterprises, it can be observed that there the highest degree of security if the archiving of documentation in the mentioned companies is done within the framework of electronic storage and management of documentation.

In addition, these data presented also indicate that the companies in which the holders of the highest management decisions gave low ratings mainly refer to agricultural companies in which there is classic archiving of agricultural and other documentation. It was previously strengthened after the presentation of the results obtained and shown in the last table, that is, it can be pointed out that there is a significance of the security of archiving and the existence of a form of archiving documentation in the work of an agricultural enterprise, namely (p =, 00).

The results obtained in this study largely coincide with the already stated views of numerous authors who in their works already indicated the importance of realistic reporting to decision-makers in companies (mainly financial reporting) (Popović, 2014; Popović et al., 2015; Popović et al. dr., 2018; Nikolić, 2020; Jackovicz et al., 2020).

Conclusion

Results obtained in this study show that there is a real need to study the issue of archiving documentation by decision-makers in agricultural enterprises.

Based on the presentation in the study, the existence of the following conclusions can be emphasized and that.

First, that there is a correlation between the type of documentation archiving and the form of control introduced within the regular operations of agricultural enterprises.

Second, in companies where a financial management and control system has been introduced, documentation is most often archived through electronic archiving. In addition, in agricultural enterprises where significant control has not been established, the documentation is archived using the classic documentation archiving of all organizational parts within the functioning of the agricultural enterprise. Thirdly, the decision-makers achieve the highest degree of archiving security through the introduced electronic business, that is, archiving.

Fourthly, the decision-makers achieve low security of document archiving in agricultural enterprises mainly in the conditions of dominant use of classic archiving of all documents in the operations of all organizational parts of agricultural enterprises.

The fifth includes the previous four stated conclusions. Essentially, this means that the safe operation of all organizational parts in agricultural enterprises will be if the decision-makers are determined to introduce a high degree of internal control in regular operations with simultaneous electronic archiving of all documents.

Conflict of interests

The authors of this study have no conflict of interest.

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AGRICULTURE IN THE SOUTHWESTERN REGION OF BULGARIA AND ITS IMPACT ON RURAL DEVELOPMENT

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ABSTRACT

The aim of the study is to analyze and evaluate the development of agriculture and its impact on rural areas in the Southwest Region. To assess the importance of agriculture in the region and trends in its development, a mixed methodology is used, combining quantitative and qualitative methods. The results and conclusions are based on statistical information from the Ministry of Agriculture and the National Statistical Institute, as well as on expert assessment of specialists from the regional offices of the State Fund "Agriculture" and the National Agricultural Advisory System in the four rural areas. The changes and features of the formed model of agriculture in the Southwest region have been analyzed and evaluated. The emphasis is placed on the processes for reducing the number of small family farms, in their size, on the processes of diversification of activities, on the greening of economic activity, etc.

Introduction

Rural areas are extremely important for the development of the European Union and our country. Rural areas of Bulgaria occupy 80.9% of the territory and include 87.5% of the total number of municipalities with 38% of the population. Despite its declining economic importance, agriculture continues to be vital for the sustainable use of natural resources and for the diversification of the rural economy (Corral et al., 2017) Climate change processes, the Common Agricultural Policy and national development rural areas policies change and expand the impact of agriculture on rural development (Horlings, Marsden, 2014; Peter, Knickel, 2016; Woods, 2013; Subić et al., 2016).

A number of studies show that the processes of concentration of agricultural production continue, the polarization in the size of organizational structures are increasing, which

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contributes to serious problems in rural areas, both in intensive and underprivileged areas (European Commission, 2010; European Commission, 2011; FAO, 2021).

The analysis of these changes in the regions shows that not only the specific natural, climatic and other characteristics of the regions, human resources and traditions, but also the connections with other sectors are of great importance and lead to different results in using the potential of the region (Doitchinova and Miteva, 2020; Doitchinova and Stoyanova, 2020; Doitchinova, Zaimova, Miteva, 2019) and in the use of natural resources and environmental protection (Stoyanova and Harizanova, 2019).

The purpose of this article is to analyze and evaluate the development of agriculture and its impact on rural areas in the Southwest Region of Bulgaria.

Methodology

In this article is used the method of expert assessment. For its implementation a questionnaire has been developed for the expert assessment of the impact of agriculture in rural areas and for the development trends. 32 specialists from the regional directorates „Agriculture“ and the offices of the National Agricultural Advisory System in the Southwest Region (BG31) were interviewed. The expert evaluation uses a five-point positive Likert scale. The highest degree is 5 (indicating complete agreement with the tested statement or opinion) and the lowest is 1 (complete disagreement).

The expert assessment is combined with an analysis of statistical information on the development of agriculture and rural areas for the period of our country‘s membership in the EU. In doing so, the directions and trends of change have been assessed.

The Southwest Region is the object of the study, and the subject are the changes in production specialization, the size and characteristics of agricultural holdings and the impact on the economic, social and environmental characteristics of rural areas.

Socio-economic characteristics of the Southwestern region

The area of Southwestern region occupies 18.3% of the country‘s territory. It covers the territories of districts - Blagoevgrad, Kyustendil, Pernik, Sofia and the city of Sofia and 52 municipalities, 48 cities and 904 villages. The agricultural territories are 46%, 47.1% are forest, and the urbanized ones occupy 4.9%. The relief is mostly mountainous, with rich biodiversity reflected in the three national parks - „Pirin“, „Rila“ and part of the „Central Balkans“ (*Figure 1.*).

In 2019, the population numbers 2,102,205 people (30% of the total number of the country) and ranks first in the country. 63% of the population lives in the capital, while in the other four districts live only 39% of it. The population density (105 people per sq. km) is significantly higher than the national average (66.3 people per sq.km), which is due to the Sofia-city district, which has a density of 960 people per sq.km.

The Southwestern region follows the general trend of negative natural growth in the country. Thanks to Sofia-city district, the natural growth is only minus 4.3% for 2018, compared to minus 6.5% for the country. There are big differences in the region, the lowest being the natural growth in Pernik district (minus 11.9%) and Kyustendil district (minus 13.4%) for 2018, while for the capital it is only minus 1.9%.

Figure 1. Southwest region

Source: https://bg.wikipedia.org/

The trend of aging of the population in the region is negative, which ranks it fourth among the rest in terms of share of the population over 65 years of age - 19.3%. This is above the national average - 18.5%. Only the North-West region and the South-Central region are in a worse situation. The share of the population in the region under 15 age old is 12.5% and is lower than the national average - 13.2%, which is a sign of the unfavorable demographic structure of the region.

The surveyed region ranks first in the country in terms of gross domestic product per capita and creates 50.5% of national GDP for 2019. Characteristic of the region is the great importance of the capital city, which produces 84.7% of the region‘s GDP and 42.8% of the country‘s GDP, while for the other districts of the region the relative share in the national GDP is from 1 to 3.5%.

GDP per capita is more than twice as large as the next region (Southeast) and is 14,751 euros (*Table 1.*) compared to the national average 8779 euros (2019). In this area, the largest intra-regional differences in this indicator are observed. Sofia city district has the highest value of GDP per capita - 19758 euros in 2019, while Pernik and Kyustendil districts have the lowest values - 4784 euros and 4841 euros, respectively. An explanation for this can be found in the structure of gross domestic product, in which the services sector is leading (over 81.7%).

The services sector in the region has a share of 57.9% of the gross value added of services in the country, 34.7% of industry and only 14.4% of agriculture and forestry in 2019. The Southwestern region is the region with the least importance of agriculture among the other regions, due to the peculiarities of the mountainous terrain, the development of industry and tourism, the presence of the capital Sofia in the region, which is the largest industrial, financial and investment center of the country. This emphasized directing of resources to Sofia city for the economy and development of the region leads to depopulation of its western and southern parts.

Table 1. Socio-economic indicators of the Southwestern region

Index	GDP per capita, euro	Share of agriculture in the regional GVA (%)	Share of agricultural sector in national GVA (%) by region
Blagoevgrad	5281	7.89	5.78
Kyustendil	4841	9.12	2.45
Pernik	4784	5.2	1.2
Sofia	8691	4.4	3.86
Sofia-city	19738	0.14	1.6
Southwestern region	14751	1.07[3]/6.24[4]	15
Bulgaria	8779	3.75	100

Source: National Statistical Institute, 2020

For these reasons, the average unemployment rate is 3.6% for 2020, which is 30% lower than the national average of 5.1% and is the penultimate place among other regions. The average employment rate of the population is 58.7%, also above the national average - 52.4% and the region retains its first place among other regions on this indicator. Within the region, Kyustendil and Blagoevgrad districts have the highest unemployment, and Sofia-city district - with the lowest value.

In 2020, the population at risk of poverty or social exclusion is the lowest for the Southwest region -26.9%, compared to the national average of 32.6%. Within the region, the lowest percentage of population at risk of poverty is in Sofia-city district, and the highest in Kyustendil district.

In 2019, the highest in the country average annual salary of employees in employment and official relations was formed in the region - 9727 euros. At district level there are large differences between the incomes received in the capital - 10758 euros and other districts, with the lowest annual salary in Blagoevgrad - 5016 euros.

The leading position of the region in the socio-economic indicators for the development of the country is due to the priority development of one of its districts - Sofia-city, which leads to an imbalance in the development of the districts in the region. The favorable demographic indicators of the region are again due to the capital, as the indicators for the labor market remain negative.

3 For the five districts in Southwestern region

4 Without Sofia-city

Conditions and changes in the agricultural sector

The southwestern region has a diverse, mostly mountainous terrain and different soil and climatic conditions in different areas, which presupposes the specifics of crops and animals raised in each of them. This determines the low share of utilized agricultural area of the region within the country in 2020 - 11.8%, and due to the mountainous nature, the share of arable land is even lower - 5.7%. The mountainous terrain, the predominant soil types of lower category, the development of other sectors are the reason for the declining importance of agriculture in the region in the gross value added created in the region - 8.4% for 2019. The share of the gross value added from agriculture in Sofia is the lowest - only 0.14%, the highest is in Kyustendil district - 9.12% and Blagoevgrad district - 7.89%.

In 2020, 25,154 farms operate in the district. This is 18.95% of farms in the country, with 8.4% of the used agricultural area (UAA). Cereal crops account for the largest share - 29.2%. Technical crops occupy 12.4% of the UAA of the region, with sunflower and tobacco being the leading crops.

In the Southwestern region (mainly in Blagoevgrad district) there are 39.2% of all farms in the country growing tobacco and together with the South-Central region they are leaders in the production of this crop. The region is a leader in the country UAA where potatoes are grown - 50.8% of the total UAA in the country of this crop is in the Southwest region. But this area represents only 1.5% of the UAA of the region. The production of potatoes is concentrated in the districts of Sofia, Pernik and Sofia-capital, their production is less in the district of Blagoevgrad.

Favorable soil and climatic conditions and proximity to the Mediterranean Sea are a prerequisite for 8.5% of UAA of the whole country for growing field and greenhouse vegetables, watermelons and melons to be in the region, while this area represents only 1.75 of UAA in the region. Over 70% of the production of field and greenhouse vegetables is concentrated in Blagoevgrad district. 96% of the grape production in the region is concentrated in this area, as the vineyards occupy 0.95% of the UAA of the region. Orchards are an important sub-sector, as their area is 9.4% of the total utilized land ocupied by them in the country, and within the region they occupy 2.1% of UAA. Over 50% of them are in Kyustendil district.

The low relative share of irrigated areas in the region creates difficulties for the development of production. They are only 6% of the area's utilized land and 13.8% of all irrigated areas in the country. Due to the structure of production of the irrigated areas in the first place are the areas occupied by perennials and vineyards - 22% of all irrigated areas, followed by areas for growing potatoes - 16.4%, areas occupied by cereals - 11%, followed by areas with vegetables - 10, 3 and the areas with industrial crops - 6%. Negative is the fact that 96.4% of farms use gravity irrigation, only 3.6% of farms use drip irrigation.

Due to the mountainous nature of the region, 43.3% of its utilized agricultural area is occupied by permanent grassland. Logically, 64.6% of the farms in the region also keep animals. It raises 11% of the livestock units in 21.3% of the livestock farms of the country.

The presence of large areas of pastures, the lack of opportunity to produce a large amount of grain feed predetermines the greater number of raised cattle, sheep, goats and rabbits. 12.5% of the cattle in the country are kept in the region with an average of 8 animals in one farm. 16% of the sheep in the country are raised in the region (average size of the herd are 27 sheep) and 22.2% of the goats (average size of the herd - 8 animals). The southwestern region ranks first in the number of goats raised in the country. Compared to other animals, the share of poultry farms is the largest (49.2% of the farms in the region), but only 5% of the birds in the country are kept in them. Although the share of pig farms in the region is 37% of the total number of farms in the region, they keep 3.8% of pigs in the country, and these are farms mainly of individuals breeding several animals.

The development of agriculture under the conditions of application of the Common Agricultural Policy is characterized by a change in the importance of the production of animal products and their income. At the beginning of the period, the ratio between the value of plant and livestock production was 55:45. After the substantial increase in the value of crop production and reduction of livestock production, in recent years the ratio has reached 76:24. In the studied area the observed trend is less pronounced - for 2019 it is 65.8: 34.2 in favor of crop production, as the reduction in the number of animals compared to other areas is less.

Specialized farms predominate in the region, with the largest share of specialized cereal crops - 24.6% of all farms, followed by specialized sheep farms - 14.8%, specialized dairy farms - 8.4%, specialized farms for vines and fruits - 5.8% and 6.8% respectively. The importance of mixed farms is not insignificant. Mixed farms with predominantly field crops and grazing animals occupy 6.3% of the total number of farms, those with predominantly grazing livestock - 5.5% and those with other crops and animals - 11.4%. A large number of functioning agricultural holdings in the country are registered in the region - 20.96% of the total number in the country, only the South Central region has more farms. They hire 19.8% of all employed in the agricultural sector in the country who provide 18.4% of the annual working units of labor. The share of the family workforce is very high - 94.7%. For 56.7% of the family workforce, this is the only or main employment. These data confirm the pronounced family character of farms in the region.

After 2007, the number of agricultural holdings continues rapidly to decrease and the average size of the agricultural used area increases. The average size of farms in the Southwest region remains low - 7.39 ha, which is almost three times less than the average size of farms in the country - 20.58 ha. The reasons for this are the specialization of farms, their family nature and the significant number of produced products, which requires high labor costs.

Significant changes occurred in the farms in the region. The largest decrease was registered in the holdings of individuals (by 36.4%), followed by cooperatives and associations. The importance of trading firms and sole traders is increasing, growing by 55% and 8.26% respectively. The average size of farms is between 173.7 ha for cooperatives and 4.96 ha for individual farms. Due to the production specialization of the region and the soil and climatic features there is a decrease in the average size of farms registered as commercial companies, despite the large increase in their number - in 2010 their average size was 101.2 ha, in 2013 reached 128. 8 ha and in 2016 decreased to 95 ha. The trend is reversed, although not so clearly expressed in the holdings of sole traders, where the average size of the holding increased from 52.7 ha in 2010 to 66.1 ha in 2016 (Table 2).

Table 2. Agricultural holdings by legal status in the South-Western region

Legal status	**Number of agricultural holdings**			**Changes in number 2016 (2010 (%)**	**Structure, 2016 (%)**	**Average size in ha (2016)**
	2010	**2013**	**2016**			
Agricultural holdings	62464	50794	39728	63.6	97.13	4.9
Sole traders	230	248	249	108.26	0.6	66.1
Cooperatives	98	76	73	74.48	0.18	173.7
Commercial companies	369	489	802	154.92	1.97	95
Associations and others	60	40	47	78.3	0.12	25.7
Southwestern region	64221	51647	40900	63.68	100	7.39

Source: MAFF, Agristatistics, 2019

The regional characteristics of the production of the agricultural holdings, the specifics of the applied technologies determine the lower efficiency indicators - net income and net added value per annual work unit. Their values put the region in last place among the regions in Bulgaria, lagging behind the Northern region and the South-East region. At the same time, the values of net added value and net income per hectare in the region are the highest for the country (Table 3.).

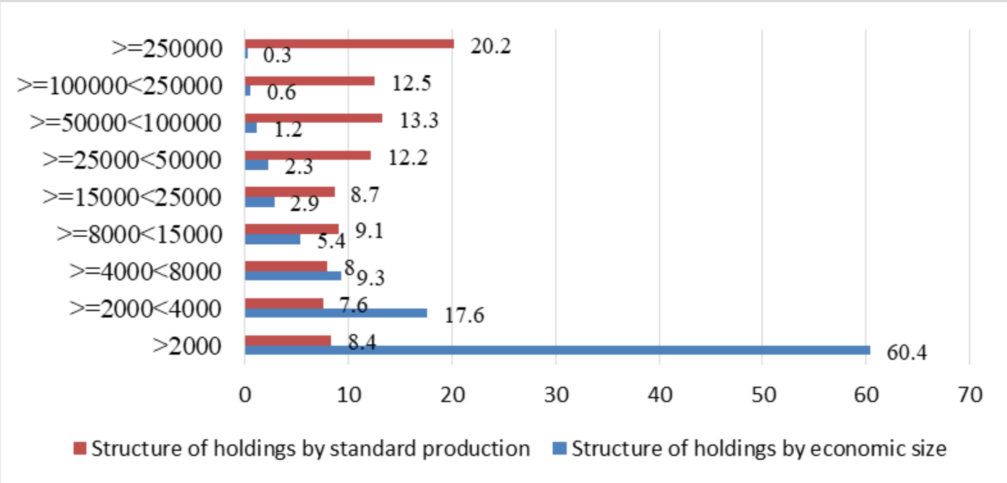
The area is heavily dominated by small farms with an economic size of up to 2 economic units and between 2 and 4 economic units - 78%. Farms over 25,000 euros are relatively evenly represented. Farms with economic sizes 25 - 50 thousand euros, 50 - 100 thousand euros and between 100 and 250 thousand euros have a similar contribution to standard production, varying between 12.2% and 13.3%. Only farms with an economic size of over 250,000 euros have a contribution to standard production of 20.2%, which is well below the national average share of large farms - 58.52%. These data, together with information on legal status, show the importance of family farming in the area. (Figure 2.).

Table 3. Regional differences in net value added and net income of AWU and ha (2020)

RegionS	**Net value added per annual work unit (euros)**	**Net income per annual work unit (euros)**	**Net value added per ha in euros**	**Net income per ha in euros**
Northwest	24290	11104	644	295
North Central	17314	5648	584	190
Northeast	15940	3354	535	113
Southwest	11854	8259	721	501
South Central	10755	6452	762	457
Southeast	13762	4968	490	177

Source: MAFF, Agristatistics, 2022

Figure 2. Distribution of agricultural holdings by economic size and by standard production volume produced by them



Source: NSI, Agristatistics, 2019

The characteristics, features and opportunities for development of the agricultural sector in the Southwestern region were assessed by 32 interviewed experts, as Sofia-city district due to the minimal importance of agriculture in it and the special status of the capital is excluded from the assessment. Most of them have more than 20 years of experience - 62.5%. 84% work in the state administration. More than half - 56.2% have a professional qualification in agriculture, 21.9% have a qualification in social sciences, 9.4% - technical sciences, 6.2% - humanities.

The importance of agriculture in all four districts is highly appreciated by most experts. In general, for the planning region the score is 4.19 (max 5), ranging from 3.5 for Sofia district to 4.5 for Blagoevgrad district (*Table* 4.).

Table 4. Expert assessment of the importance of agriculture by districts in the region

Expert assessment	Blagoev-grad	Kyusten-dil	Pernik	Sofia district	Southwest region
Importance of agriculture in rural areas	4.5	4.45	3.8	3.5	4.19
Agriculture provides income	3.7	3.82	2.8	3.5	3.38
Agriculture provides jobs	4	3.55	2.8	3.5	3.28
Agriculture positive impact on the environment	3.5	3.55	3.0	3.5	3.25
The region is dominated by small and medium-sized family farms (%)	100	91	100	50	87.5

Source: Own research

The average assessment of the social function of agriculture is relatively high - 3.38. The opinion that agriculture generates income is highest in Kyustendil region, followed by Blagoevgrad and Sofia region. The assessment of the experts from Pernik region is significantly lower. The possibilities of agriculture to create jobs are highly rated in Blagoevgrad district - 4, followed by Kyustendil - 3.55, Sofia district - 3.5. These estimates can be explained by the more favorable climatic and soil conditions in these areas and the opportunities for the development of other industries in Pernik region.

Expert assessments of the impact of agriculture on the environment are close in value - an average assessment of 3.25. Highest are the assessments of the experts from Kyustendil region - 3.55, and the lowest in Pernik - 3.0.

The predominantly family nature of the farms is supported by the experts, especially for the districts of Blagoevgrad and Pernik, followed by Kyustendil.

The importance of large settlements and urban centers in stimulating the development of agriculture and especially direct sales is rated highly with 3.5 (*Table 5.*). The assessments of all experts are close, ranging from 3.2 for Pernik region to 3.7 for Blagoevgrad region.

The low quantity of irrigated areas and unmaintained irrigation facilities are highly rated (with a 4.3 area average rating) as being among the main reasons for limiting vegetable and fruit production. For the districts of Blagoevgrad and Kyustendil, these ratings are higher - 4.8 and 4.5, respectively. This is understandable as a large part of the production of field and greenhouse vegetables and fruits is concentrated in these two areas and these productions are important on a national scale.

The lack of labor as a reason for the reduction in the cultivation of labor-intensive crops finds high support from the experts (3.9 average rating for the region). The highest expert ratings are for Blagoevgrad district (4.2) and Kyustendil (3.9). It should be taken into account that in Blagoevgrad district, along with vegetables, a significant part of tobacco in our country is grown, which is a labor-intensive crop.

Table 5. Expert assessment of the peculiarities and problems of the agricultural sector

Expert assessment	Blagoev-grad	Kyusten-dil	Pernik	Sofia district	Southwest region
Proximity to settlements or local markets stimulates farmers for direct sales	3.7	3.36	3.2	3.4	3.5
Farmers participate in cooperatives, producer organizations and other network structures	1.8	2.0	1.8	2.2	1.9
Farmers provide ecosystem services	2.7	2.27	2.6	2.4	2.5
The small number of inhabitants, the deteriorating age structure and their low qualification are the reason for limiting the labor-intensive productions on the agricultural holdings (labor shortage).	4.2	3.0	3.5	3.8	3.9
Insufficient irrigated areas and unsupported irrigation facilities are a reason to limit the production of vegetables and fruits	4.8	4.5	3.3	3.8	4.3

Source: Own research

A low score of 1.9 receives the statement that farmers participate in cooperative-type collective organizations, producer organizations, and other network structures. The evaluations of the experts vary from 1.8 for the Pernik and Blagoevgrad regions to 2.2 for the Sofia region. Proximity to major urban consumer centers and processing facilities, as well as the small size and predominantly family-run nature of the area‘s farms, are part of the explanation for this low rating.

The provision of ecosystem services by farmers was rated with a 2.5 average score for the Southwest region. The highest rating is for Blagoevgrad region (2.7), followed by Pernik region (2.6), Sofia region (2.4) and in last place is Kyustendil region (2.27).

The difference in the expert assessment of trends in the development of agriculture is significant (*Table 6*.). There is relatively high support for the statement that the number of farmers who strive to produce better quality products and not just aggrandize their quantity is increasing (average score 3.2). The experts for Blagoevgrad district have the highest rating of 3.7, followed by Pernik and Sofia districts, and the experts‘ rating for Kyustendil district is significantly lower - 2.7.

Slightly weaker support from experts finds the statement that the number of organic producers is increasing - 2.9 for the region within limits - 3.4 (Blagoevgrad) and 2.7 (Kyustendil region). The proximity to the capital, which is the largest consumer of organic products, explains the relatively high support for this statement.

The tendency to increase the number of farms with agro-ecological practices is estimated at 2.9 for the region. The higher ratings for Blagoevgrad region - 3.1, as well as for Sofia region - 3.4, are explained due to the greater variety of cultivated crops and animals and slightly more favorable conditions for agriculture.

Table 6. Expert assessment of the tendencies for development of the agricultural holdings

Expert assessment	Blagoev-grad	Kyusten-dil	Pernik	Sofia district	Southwest region
There is a growing number of farmers who aim to produce better quality products, not just to increase the quantity	3.7	2.7	3.4	3.2	3.2
There is a growing number of farmers who aim to produce organic products	3.4	2.7	3.3	3.0	2.9
There is a growing number of farmers who apply agri-environmental practices	3.1	2.64	2.3	3.4	2.9
The number of farms aiming to provide food for the household has increased	3.6	3.4	3.8	2.2	3.3
The number of farms with non-agricultural activities increased	3.6	2.2	2.0	2.2	2.6
The number of farms executing direct sales has increased	4.0	3.7	2.2	2.7	1.6
The number of farms that process agricultural products has increased	3.1	2.7	2.6	3.5	2.5

Source: Own research

An object of special interest are the changes in the direction of diversification of activities with non-agricultural activities, direct sales and processing of agricultural products. The estimate that the number of farms that have diversified their activities with non-agricultural activities is growing is relatively low - 2.5 for the region. For the Blagoevgrad district, the rating is 3.6, but for the other three districts, the ratings are from 2.0 to 2.2. The situation is similar in support of the claim that the farms process agricultural produce - an average rating for the region of 2.5. And here the regions are divided into two groups. Blagoevgrad (3.1) and Kyustendil (2.7) show expectedly higher support due to the specificity of the cultivated crops and the possibilities for their processing. The ratings of Pernik region (2.0) and Sofia region (1.6) are significantly lower. Due to the weaker development of agriculture and cultivated crops, there is no development of this trend.

The increasing trend in the number of farms with direct sales is estimated at 3.5 on average for the region. The highest support is for the districts of Blagoevgrad (4.0) and Kyustendil (3.7).

There are various estimates for the increase in the number of farms providing livelihood for households. They range from 3.8 in Pernik, 3.6 - Blagoevgrad, 3.4 - Kyustendil to 2.2 in the Sofia region, which is explained by the more diverse means of livelihood in Sofia region.

Conclusion

The analysis of the development of agriculture and its impact on the development of rural areas in the South-West region of Bulgaria created opportunities for the following conclusions and conclusions:

- In the structure of agricultural holdings in the studied area, a significant increase in the number of commercial companies and sole traders is observed. Although the number of small family farms that produce a large number of agricultural products is decreasing, they are still dominant. In these farms, only or mostly family labor is used, and only part of the work processes are mechanized. These farms have a number of characteristics of the Southern European model of agriculture.

- The product specialization of agricultural holdings is strictly profiled according to the location and soil-climatic conditions of the respective area. The production of oilseeds, cereals and potatoes is concentrated in the districts of Sofia, Pernik. Over 70% of the production of field and greenhouse vegetables, 96% of the production of grapes in the region is concentrated in Blagoevgrad district. Over 50% of the orchards are in Kyustendil district.

- The formed organizational structure of the farms in the region shows a relatively even distribution of farms by standard production with amounts over 25,000 euros. The relative share of large farms in standard production is more than twice lower than the national average, which is proof of the importance of family farming for the region.

- The formed model of agriculture contributes to the lower level of unemployment in some municipalities and the slower migration processes compared to other regions in the country.

The limited number of labor force and the low relative share of irrigated areas are among the reasons for not using the potential opportunities for production of crops and vegetables.

In the Southwestern region, the processes of increasing the production of high-quality products, the creation of new short chains involving producers and consumers, the development of organic agriculture, the management of nature and the landscape by farmers are taking place more slowly. In addition, diversification of holdings and direct sales in fruit and vegetable production areas is observed. Tourism is strongly represented in all municipalities in the district - especially winter, spa tourism, ecotourism.

In conclusion, it can be summarized that the implementation of the Common Agricultural Policy in the last 14 years has contributed to dynamizing the development and increasing the efficiency of the agricultural sector in the Southwest region. At the same time, the forming model of agriculture, the size and production specialization of farms did not allow agriculture to become a source of new jobs and income for the population, its opportunities for regional development have not been revealed.

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ENSURING THE IMPROVEMENT OF AGRICULTURAL COMPETITIVENESS THROUGH THE HUMAN RESOURCE DEVELOPMENT

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A B S T R A C T

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 homoeconomicus, 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;

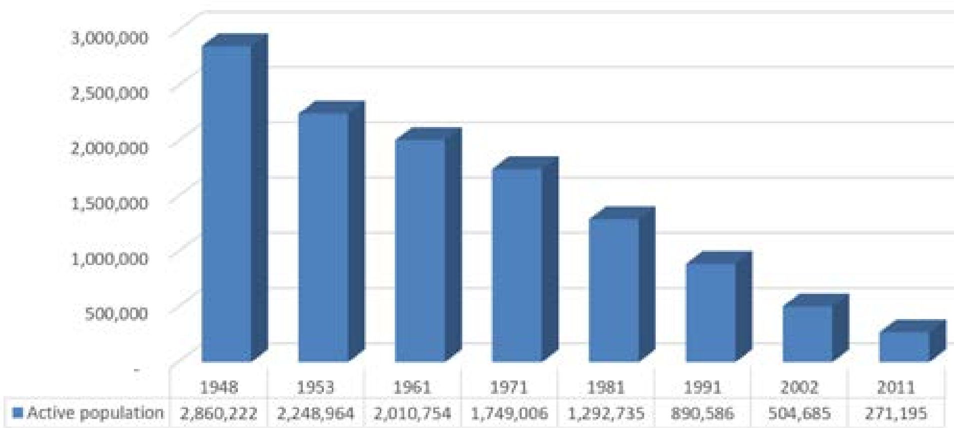
- *Moving the sponsorship from the public to the private sector* - intellectual property rights should be under protection of both sectors, not just the public;

- *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.

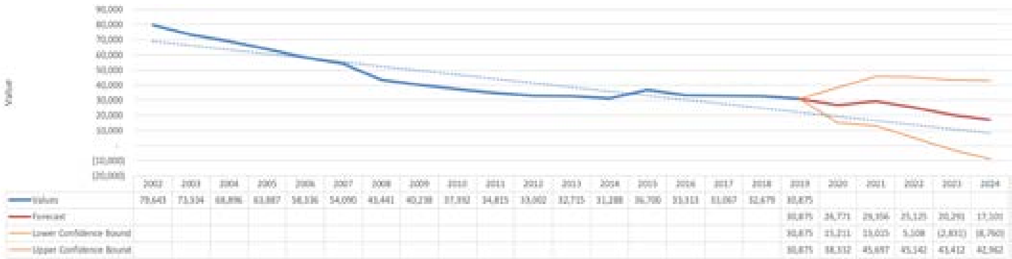
Table 1. Rural population and employment in agriculture in Serbia (2002-2019)

	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

				Agricultural experts			Economists	
Year	Number of legal units and farm cooperatives	Employees	Permanent employees in agriculture	With bachelor degree	With high school degree	Veterinarians	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 futher 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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FACTORS INFLUENCING FARM PROFITABILITY IN THE REPUBLIC OF SERBIA

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A B S T R A C T

The paper deals with the production and economic indicators of farms in the Republic of Serbia based on data collected from the FADN sample for 2019. The aim of the research is to analyze and evaluate the influence of important factors on profitability of farms of different economic size. According to their economic size, farms are classified into four groups: very small, small-sized, mid-sized and large-sized farms. Factors influencing profitability are grouped into: production management, financial management, human resources management and subsidies and natural factors. The statistical technique used in the paper is a multiple regression model applied to determine statistically significant influence of certain factors on profitability. The results of the research show that equity turnover is the factor with the greatest positive impact on profitability of farms regardless of their economic size. Paid labour has the greatest negative impact on very small, small-sized and mid-sized farms. Further research should focus on analysis of the financial performance of small and medium farms which, based on the available capacities and income, are the main drivers of development of the entire agricultural sector.

Introduction

Over the following two to three decades, agriculture will be faced with a serious challenge to provide sufficient food for the projected 9.6 billion people on the planet in 2050 (FAO, 2014). Accordingly, there is a need for constant increase in agricultural production in all countries of the world. Increase in production must be accompanied

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by appropriate increase in farm profitability so that farms have an interest to continue producing food for a constantly growing population.

Determining the level of farm profitability is very important also for assessing the economic viability of farms. This is because profitability indicators, together with the indicators of productivity, liquidity and stability, are the most commonly used indicators for assessment of economic viability of farms (Latruffe et al., 2016). In recent years, economic viability of farms has been extensively investigated by researchers across the European Union (EU). The focus of the research has been on small and medium farms, as they are considered to be the "engine of renovation" of the entire agricultural sector in one country (Galluzzo, 2017; Slavickienė & Savickienė, 2014).

Farm profitability can be measured using a number of different indicators, the most commonly used being ROA (Return on Assets) and ROE (Return on Equity). Spicka et al. (2019) recommend using the following indicators: ROE, Return on Invested Capital (ROIC) and Return on Sales (ROS). These authors consider ROA indicator as problematic because large agricultural holdings (AH)[4] in the Czech Republic have more than 80% of hired agricultural land. As this land is not included in the total assets of farms, and ROA is calculated as the ratio of net profit and total assets, the obtained results may significantly deviate from the real situation.

It is not easy to define the benchmark for profitability ratios, which thus also determine economic viability of farms. According to Scott (2001), if ROE indicator is higher than 0.05, and provided that other indicators are acceptable, farms are considered as economically viable. However, O'Donoghue et al. (2016) argue that in agriculture it is necessary to develop "more comprehensive and detailed measurement techniques to provide more clarity on viability and vulnerability levels in the sector". This is because there are a number of factors influencing profitability, which thus also influence economic viability of farms.

Therefore, it is necessary to consider the impact of different factors on farm profitability. DuPont model is a frequently used model, which breaks down ROE into three components – profitability, operating efficiency and financial leverage – so it is used to analyze the impact of profit margin, asset turnover and equity multiplier on ROE (Balezentis & Novickyte, 2018; Nehring et al., 2015). This analysis indicates the economic and financial performance of all economic entities, including AH.

Certainly, these are not the only factors influencing farm profitability. Gloy et al. (2002) group the determinants of profitability into: production management (farm size, efficiency and technology use), financial management (record-keeping practices, debt use, asset structure and rental practices), human resources management (number of operators, education level, age of farm manager). In addition, Kryszak et al. (2021) considered the impact of another group of factors on profitability – subsidies in agricultural policy. Hloušková & Lekešová (2020) and Hloušková et al. (2020) divided

4 Agricultural holding (AH) is used as a synonym for "farm" in the text.

the observed factors into the following groups: production factors (crop yield, livestock yield, etc.), economic factors (labour productivity, direct costs per unit, ROE), financial stability (liquidity ratio, debt to asset ratio, etc.) environmental factors (organic manure use, mineral fertilizers, crop protection, etc.) and social and other factors (gender, age of owner or farm manager, number of employees). Mishra et al. (1999) group the factors affecting profitability into four basic groups: operator characteristics (age of farm manager), farm characteristics (diversification of farm, crop insurance, type of business organization, etc.), management strategies (use of bookkeeping, ratio of variable and fixed costs of production to total value of production, etc.) and other factors.

For the purposes of the analysis, farms in this research are classified according to their economic size, reasonably assuming that there will be certain differences in profitability indicators between farms of different sizes. According to the current FADN regulations, the criterion for defining the economic size of farms is standard output (SO). SO value is obtained by multiplying the standard output coefficient by the area on which the observed crop is cultivated (for crop production), or with the number of heads of the observed livestock (for livestock production) (FADN Europe, 2021).

The main aim of this research is to analyze and evaluate the impact of important factors on profitability of farms of different economic size. The research is based on the FADN data from 2019 for the Republic of Serbia. The paper first provides a detailed description of the variables and the used method, followed by presentation of the obtained results, while the last section presents research conclusions and recommendations.

Materials and methods

The research deals with the general, production and economic indicators of agricultural holdings based on the FADN sample from 2019 for the Republic of Serbia. For the purposes of the analysis, farms are classified according to their economic size, i.e. according to their standard output value. Kryszak et al. (2021) classify farms into six groups of economic size, where farms with standard output value between EUR 2,000 and EUR 8,000 are classified as very small farms, while farms with SO value above EUR 500,000 are classified as very large farms. Miceikiene and Girdžiute (2016) divide farms into four groups: from very small farms (SO value between EUR 4,000 and EUR 8,000) to large-sized farms (SO value above EUR 100,000). Bearing in mind that farms in our country are specific and that there is a small number of very large farms in the population, farms are divided into four groups: very small farms (VS) with standard output value between EUR 4,000 and EUR 8,000; small-sized farms (SS) from EUR 8,001 to EUR 25,000; mid-sized farms (MS) from EUR 25,001 to EUR 100,000; large-sized farms (LS) with SO value above EUR 100,000.

Farm profitability in this paper is measured by ROE, calculated as the ratio of farm net income (SE420) and net worth (SE501). Since a very small percentage of domestic farms in the FADN sample report external liabilities in their balance sheets, ROE as an indicator of profitability relative to its equity has an advantage over ROA which shows profitability relative to its total assets. Also, since the value of liabilities is not reported, there is correspondence between the values of ROE and ROA indicators in a large number of farms in the sample.

According to previous research conducted by a number of authors (Kryszak et al., 2021; Hloušková & Lekešová, 2020; Hloušková et al., 2020; Balezentis & Novickyte, 2018; Nehring et al., 2015; Gloy et al., 2002 and Mishra et al., 1999), factors that influence profitability of farms include: production factors, economic factors, financial factors, social factors and natural factors. On this basis, we have identified 10 variables that can potentially influence profitability of farms of different economic size. We classified these variables into the following groups: (1) production management, (2) financial management, (3) human resources management and (4) subsidies and natural factors.

The first group includes "production management factors". In this group, the most prominent factor which can significantly affect profitability is type of farming (TF). As a rule, farms with more intensive production are more profitable, which must be taken into account when assessing the impact of various factors on profitability (Miljatović, et al., 2020). We have selected 7 basic types of farming: (1) field crops (FC), (2) horticulture (HC), (3) vineyards and fruits (VF), (4) dairy production (DP), (5) grazing livestock (GL), (6) granivores (GN), (7) mixed crops-livestock (CL). Specialization of agricultural production (SP) can also significantly affect profitability. To express the level of specialization, we used the diversification index (Ir) to determine the share of the value of each individual production line (production of cereals, industrial plants, fruit, milk, pork, eggs, etc.) in the total value of production. This indicator is calculated using the following formula:

$$I_r = \frac{100^2}{p_1^2 + p_2^2 + \cdots + p_i^2 + p_n^2} \quad (1)$$

Where: p_i – the share of the value of the production line "i" in the total value of production (%) i=1(1)n, and n – the number of all production lines. The diversification index is 1 in case of monoculture, and the higher the index, the more diverse the production (Novković & Šomođi, 2016). Equity turnover (ET) can also significantly affect farm profitability. The assumption is that farms with a higher equity turnover ratio are more profitable. ET is calculated as the ratio of total output (SE131) and net worth (SE501).

The second group of independent variables in the model includes "financial management factors". The first indicator within this group is current to total assets ratio (CA), which is calculated as the ratio of total current assets (SE465) and total assets (SE436). Another indicator is the share of external costs (EC), which can also have significant impact on profitability. This indicator is calculated as the ratio of total external factors (SE365) and total inputs (SE270). In addition, a very significant indicator of profitability is the share of farming overheads (OVS), which is calculated as the ratio of total farming overheads (SE336) and total inputs (SE270).

In the group “human resources management”, the first variable is education level of farm manager (ED), according to which farms are divided into three groups: (1) farmers with practical experience (PE), (2) farmers with basic education (BE), (3) fully educated farmers. Another indicator that belongs to this group is the share of paid labour (PL), which is calculated as the ratio of paid labour input in hours (SE021) and total labour input in hours (SE011).

The last group of indicators include “subsidies and natural factors”. Subsidy rate (SR) is the first indicator in this group and it is calculated as the ratio of total subsidies – excluding subsidies on investments (SE605) and total farm incomes (SE131 + SE605). Region (RG) is a variable that can also potentially affect farm profitability. According to NUTS[5] classification, there are four regions: (1) Belgrade (BG), (2) Autonomous Province of Vojvodina (APV), (3) Šumadija and Western Serbia (SWS), Southern and Eastern Serbia (SES) (www.stat.gov.rs).

The data were first processed using the standard methods of descriptive statistics, followed by multiple linear regression applied to determine the impact of the described factors on profitability of the observed farms. Regression analysis was used to estimate the relationship between one or more independent variables (X_1, X_2,..., X_p) and the dependent variable (Y_i) (Kleinbaum et al., 1998). The applied regression model has the following form:

$$\hat{Y} = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_p X_{pi} + \varepsilon_i \quad (2)$$

$\hat{Y}$ is the value of the dependent variable in the model, and X_{1i}, X_{2i},..., X_{Pi} are the values of the observed independent variables, while β_1, β_2,..., β_p are the partial regression coefficients. Partial regression coefficients show the influence of a certain independent variable on the dependent variable, provided that the other variables are held constant. α is a parameter that shows the average initial level of the dependent variable Y, while ε_i is the random error of the model (Novaković, 2019).

The assumptions of the applied multiple linear regression for the described models included: linearity between the dependent and independent variables; the dependent variable is random, while the independent variables are non-random variables; the expected value of the random error is zero; there is no autocorrelation; homoskedasticity; normal residual distribution; there is no problem of multicollinearity (Čavlin, et al., 2021). The presence of multicollinearity was detected using variance inflation factor (VIF) and tolerance (TOL). Multicollinearity occurs when VIF is higher than 5 or 10, and TOL is less than 0.2 (0.1) (Judge et al., 1988). Owing to the presence of multicollinearity, certain variables (e.g. asset turnover) were omitted from the model. Also, variables such as debt to asset ratio and liquidity ratio were not used because only a small number of farms in the sample reported their liabilities, so it was not possible to calculate these variables.

5 NUTS – The Nomenclature of territorial units for statistics.

The influence of outliers on the obtained results was reduced by using the Tukey fence method, according to which all values below $Q_1 – 1.5IQR$ or above $Q_3 + 1.5IQR$ were removed from the series, where Q_1 is the first quartile, Q_3 is the third quartile, and IQR is interquartile difference (Hlavsa et al., 2020; Schwertman & Silva, 2007). After the outliers were removed, the sample comprised 115 VS farms, 736 SS farms, 545 MS farms and 126 LS farms.

After testing the validity of the assumptions of the applied regression analysis, the significance of the model as a whole was determined by applying variance analysis for regression. As an accompanying analysis to regression, correlation analysis was also performed. In order to accurately interpret the results obtained by regression analysis, we used adjusted coefficient of multiple determination, which indicates the proportion of variation in the dependent variable explained by the selected independent variables.

Results

The results of descriptive statistics for the dependent variable and independent variables used in regression analysis are presented in table 1. The results suggest that the highest profitability, i.e. the highest rate of return on equity (ROE) was recorded in large-sized farms (LS). The average coefficient for these farms is 0.367, which means that they make EUR 0.367 net income per euro of invested equity. Very small farms (VS) have the lowest profitability, where the mean value of ROE was 0.144. These results indicate that, when it comes to the economic size of farms in Republic of Serbia, larger farms are more profitable. This pattern determined on the observed sample is not necessarily the rule. Namely, Kryszak et. al. (2021) found that smaller farms have a slightly higher profitability rate in EU countries. However, these authors also point out that, although smaller farms are profitable, they do not generate sufficient “mass” of income, while medium large and large farms (farms with SO value between EUR 50,000 and EUR 500,000) provide optimal rates of return.

Table 1. Descriptive statistics of variables used in regression models

Variable	VS		SS		MS		LS	
	mean	**SD**	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**
ROE	0.144	0.110	0.146	0.109	0.172	0.128	**0.367**	1.002
SP	2.175	1.010	2.611	1.160	2.416	1.041	1.975	0.834
ET	0.329	0.255	0.303	0.183	0.373	0.225	0.744	1.452
CA	0.111	0.121	0.098	0.097	0.107	0.100	0.111	0.128
EC	0.067	0.124	0.073	0.109	0.128	0.118	0.199	0.127
OVS	0.279	0.118	0.231	0.107	0.202	0.094	0.186	0.100
PL	0.078	0.168	0.087	0.164	0.139	0.209	0.277	0.310
SR	0.071	0.073	0.083	0.075	0.063	0.064	0.029	0.042

Source: Authors’ calculations based on FADN data

Small-sized farms have the highest coefficient of production specialization (SP) of 2.611, which indicates relatively high diversification of production in these farms. As a rule, large farms have a lower coefficient, i.e. a higher degree of production specialization. Larger farms have higher equity turnover (ET) compared to smaller farms. Kryszak et al. (2021) attribute this finding to the fact that small farms have considerable value of equity compared to their real production capacity, or because larger farms are more productive as they use better and more modern technology. Considering the current to total assets ratio (CA), it can be observed that there are no large differences in the calculated coefficient between farms regardless of their economic size. Namely, current to total assets ratio for the farms in the sample ranges from 9.8% to 11.1%. Farms are characterized by a higher fixed to total assets ratio owing to the considerable value of land, perennial crops, livestock unit, machinery and facilities. However, such a low current to total assets ratio can negatively affect the liquidity of farms.

Total external factors, i.e. costs for inputs that are not owned by the farm (land, labour, assets), do not have a high share in the cost structure. This is particularly pronounced in small farms where the share of total external costs ranges from 6.7% to 7.3%. VS and SS farms have a higher share of farming overheads (OVS), while they use paid labour (PL) to a very small percentage. These farms base their production primarily on the family labour and other unpaid labour. On the other hand, MS and LS farms have a slightly lower OVS share (20.2% and 18.6%, respectively), while the share of PL is slightly higher. Large-sized farms have the highest share of PL (27.7%), but this percentage is still significantly lower compared to EU countries where the share of paid labour on farms of this economic size is 42.0% (Kryszak et al., 2021). Subsidies (SR) have no significant share in the total income of farms in RS. The results also indicate that larger farms have lower subsidy rate. Namely, SR for very small farms is 7.1%, while for large-sized farms it is 2.9% (tab. 1).

In the following part of the analysis, the validity of the assumptions of the applied regression model was tested for each model separately. After testing all the assumptions, four regression models were formed according to the economic size classes of farms: VS, SS, MS and LS farms (tab. 2). Their significance was tested by applying the variance analysis for regression and it was determined that all models were statistically highly significant ($p < 0.01$). The estimated regression models explain the variation of profitability well, the adjusted coefficient of multiple determination ranges from 45.6% for very small farms to 95.6% for large-sized farms.

Type of farming has no significant impact on farm profitability in the first three economic size classes, while for LS farms type of farming has statistically highly significant and positive impact. This means that large-sized farms with more intensive production can achieve significantly higher rates of return on equity, which is certainly expected.

Specialization of agricultural production proved to be a significant factor of profitability only in very small farms. There is a negative relationship between SP and ROE indicators in VS farms, which means the higher the coefficient, the less profitable the farms. In other words, when the level of production specialization in very small farms increases, it will result in lower rate of ROE. This poses a problem given that small farms have a lower level of production specialization according to available data. On the other hand, Kopta et al. (2013) state that the level of production specialization has no significant impact on profitability of Czech farms, except in dairy cattle breeding, where a higher level of specialization leads to lower profitability.

Equity turnover is statistically highly significant determinant of farm profitability regardless of the economic size class of farms. This indicator has very positive impact on profitability, so increase in equity turnover is expected to increase profitability of all observed farms.

Table 2. Results of regression analysis of farms' profitability by economic size

Variable	VS	SS	MS	LS
TF	0.007	0.001	-0.001	0.057***
	(0.004)	(0.001)	(0.002)	(0.012)
SP	-0.020**	0.001	0.004	0.004
	(0.010)	(0.003)	(0.004)	(0.029)
ET	0.325***	0.472***	0.445***	0.597***
	(0.045)	(0.015)	(0.018)	(0.015)
CA	0.102	0.052*	0.010	0.076
	(0.070)	(0.029)	(0.039)	(0.164)
EC	0.208*	0.044	-0.050	0.079
	(0.123)	(0.038)	(0.042)	(0.189)
OVS	-0.005	0.108***	0.078*	2.494***
	(0.077)	(0.027)	(0.043)	(0.227)
ED	0.022	0.001	0.003	-0.047
	(0.013)	(0.004)	(0.005)	(0.030)
PL	-0.290***	-0.054**	-0.062***	-0.034
	(0.105)	(0.024)	(0.019)	(0.068)
SR	0.214*	0.136***	0.071	-0.312
	(0.118)	(0.039)	(0.071)	(0.673)
RG	0.003	0.006*	0.002	0.052*
	(0.009)	(0.003)	(0.004)	(0.031)
Observations	115	736	545	126
Adjusted R-squared	0.456	0.607	0.580	0.956

***, **, * means $p < 0.01$, $p < 0.05$, $p < 0.1$, respectively

Source: Authors' calculations based on FADN data

Current to total assets proved to be a significant factor of profitability only for small-sized farms. For these farms, any increase in current to total assets ratio may have positive impact on profitability. However, the structure of assets does not significantly determine farm profitability, so the impact of this determinant can be considered as marginal. Share of external costs has statistically significant and positive impact on profitability of very small farms, while for other groups of farms this indicator did not prove to be significant. This means that increase in the share of hired land and borrowed capital could be justified for this group of farms. Share of farming overheads is an important determinant of profitability for farms of all economic sizes, except for very small farms. Increasing the share of farming overheads in these farms can increase their profitability, except for very small farms, which generally have highly diversified production.

Education level of farm manager is not a significant factor of profitability in any of the evaluated models. This is in line with Gloy et al. (2002) who point out that the age of operators and the maximum age difference have no significant impact on profitability of dairy cattle farms. On the other hand, paid labour has statistically significant impact on profitability of very small, small-sized and mid-sized farms. The sign before the regression coefficient of this variable, in all evaluated models, indicates the negative impact of the share of paid labour on profitability, i.e. increase in the share of paid labour may result in lower farm profitability. Accordingly, these groups of farms should rely primarily on family labour if possible, while in large-sized farms additionally hired paid labour has no significant negative impact on profitability (tab. 2).

Subsidy rate has statistically significant and positive impact on very small and small-sized farms, which indicates that these farms are more dependent on subsidies compared to mid-sized and large sized farms. In large farms, increase in the share of subsidies in total farm income may often result in reduced profitability (Kryszak et al., 2021). Region can be a factor of influence in small-sized and large-sized farms, but with very small probability.

Conclusion

Considering the crucial importance of agriculture, economic viability of farms has been extensively investigated in recent years by researchers across Europe. In order to further develop this extremely important industry, it is very important to reach an appropriate level of economic viability of farms. Farm profitability is one of the indicators that can be used to reliably assess the level of economic viability of farms. This paper calculates ROE as an valid and reliable indicator of profitability.

Growth of profitability is influenced by various factors including production, economic, financial, social and natural factors. In this paper, the factors influencing profitability are grouped as: production management, financial management, human resources management and subsidies and natural factors. Within each of these groups of factors, we identified two or more variables that could potentially affect profitability. The influence of these factors on the dependent variable (ROE) was assessed using a multiple regression model. For the purposes of the analysis, farms were divided into four groups according to their economic size: very small, small-sized, mid-sized and large-sized farms.

Based on the obtained results, it can be concluded that equity turnover is the factor with the greatest impact on profitability in farms of all economic sizes. This means that if equity turnover ratio increases, farm profitability will increase significantly. This is especially important for small farms, which on average have lower profitability rates.

On the other hand, the factor that has the greatest negative impact on farm profitability is paid labour. Increasing the share of paid labour will significantly lower profitability of very small, small-sized and mid-sized farms. According to the obtained results, large-sized farms have adequate funds for hiring additional paid labour, while the incurred additional labour costs do not greatly affect their profitability.

The research presented in this paper can provide valuable guidance to researchers from our country and abroad. Certainly, the model can be extended by including additional variables, primarily those related to financial stability and liquidity of farms. Further research should certainly focus on small and mid-sized farms, which are the basis for agricultural development, both in Serbia and in EU countries. Growth of profitability, i.e. achieving a higher level of economic viability in these farms, will have positive impact on development of the whole agricultural sector in Serbia.

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Conflict of interests

The authors declare no conflict of interest.

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ENHANCING THE PRODUCTIVITY OF SMALL FARMERS IN CROATIA THROUGH THE AGRICULTURAL FUND FOR RURAL DEVELOPMENT

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A B S T R A C T

Since 2015, investment subsidies from the EAFRD through the Rural Development Program have been available to farmers in Croatia. The most numerous holdings in Croatia are those with an economic size of up to 8,000 euros, characterized by a low level of productivity due to insufficient production capacity and inadequate machinery They are the intended aid recipients in the sub-measure 6.3. In the three tenders held so far, this sub-measure has been mostly used for the purchase of machinery (62% of all users), which most often includes old tractors inadequate for modern agricultural production. The increase in production capacity with the growth of the Standard Output was used by only 38% of sub-measure users , with a slightly higher share of young farmers and those working in flower production. The conclusion of the paper is that in order to increase the productivity of small farmers, it is necessary to redefine the criteria for approving applications in sub-measure 6.3 in a way that preference is given to farmers committing to activities that will increase their production capacity and Standard Output.

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Introduction

In late May 2015, the European Commission approved the Croatian Rural Development Program for the period 2014-2020 (hereinafter the Program). The Program, inter alia, contains 19 measures aimed at increasing the competitiveness of Croatian agriculture and improving development factors in rural parts of Croatia. One of the measures within this Program is measure 6, which includes Sub-measure 6.3, – "Support for the development of small agricultural holdings". The name of the sub-measure as well as its description in the Program indicate that it is intended for small, potentially sustainable agricultural holdings that are market-oriented, but have a lack of main resources for a more active market role. This support will help those holdings to transition to market-oriented production, which is a precondition for achieving competitiveness in the agricultural sector.

Small, numerous, fragmented and partially autarchic agricultural holdings occupy a high share in the agricultural producers structure in Croatia and are one of the reasons why Croatian agriculture is lagging behind. It is understandable that agricultural policy creators want to transform these holdings into production and market units through various forms of investment support, that would, alongsideproductivity growth, generate higher agricultural output and contribute to the growth of Croatian agricultural income.

Due to the considerable size of the targeted market group, the simplicity of the project application and the direct grants it includes, the sub-measure 6.3 is the most popular measure of the Program. A total of 11,673 farms have applied for the three tenders held so far, which is more than for any other investment measure. Although the defined goals of the sub-measure are aimed at increasing and/or improving production resources, it is questionable to what extent it will achieve its basic goal – transition to market-oriented production. Among the applicants there are also older farmers as well as holdings in the category of self-sufficient agricultural holdings whose market orientation is dubitable. In the previous three tenders, eligible activities included purchase of old used machinery with subpar technical properties thast do not meet the needs of modern agriculture. The conditions of the tender do not give precedence to the holdings with regard to the holders' education and age or type of production. Any farm with the economic size between 2,000 and 8,000 euros can be an eligible applicant, regardless of the type of agriculture it engages in.

The goals of this paper are:

a. to determine the socio-demographic characteristics of the beneficiaries of sub-measure 6.3 aid, intended for small farmers,

b. to determine the types of investments financed under this aid,

c. to determine the differences between investments in regards to the age of the users and the type of agricultural production of the holdings.

The research assumptions are as follows:

• (H1) beneficiaries of sub-measure 6.3 are more focused on the modernization of production resources than on increasing production, i.e. increasing production capacity,

• (H2) Younger holders of the farms decide to increase production resources and production to a greater extent than older ones.

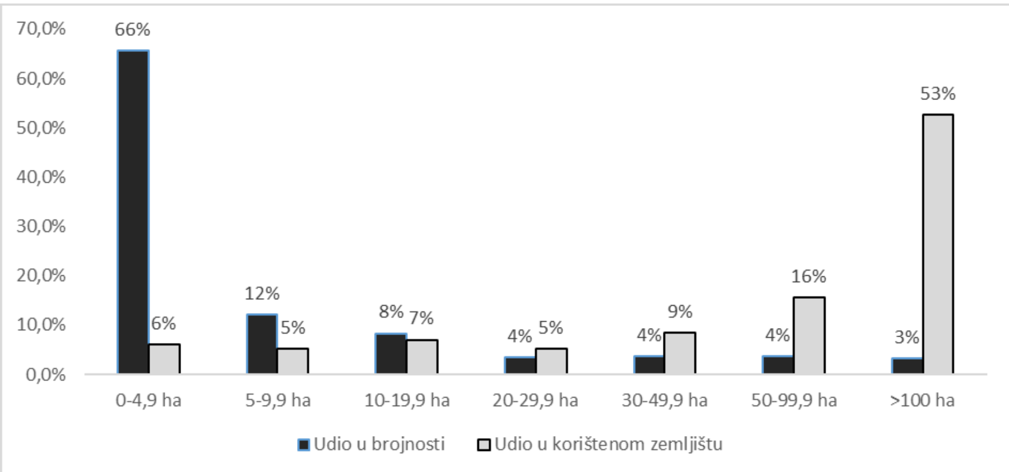
Data required for the paper were obtained from the database of beneficiaries of the rural development program of the Agency for Payments in Agriculture, Fisheries and Rural Development (hereinafter PAAFRD) omitting any personal data (name and address of the beneficiary). By applying a univariate statistical analysis, measures of central tendency and dispersion of socio-demographic characteristics of respondents and planned investments during the project implementation were determined.

Small farms in Croatia and in the European Union

Despite the continuous consolidation of agricultural producers, small farms remain the main exponents of agricultural activity in most European Union member states. Due to some indisputable market mechanisms (cost competitiveness by applying economies of scale and mass production, productivity of intensive specialized production, market advantage of standardized products in larger production quantities), small farmers' economic power is realistically lower than the respective economic power of larger, industrialized and specialized agricultural farms (Guiomar et al., 2018). Nevertheless, the concept of multifunctionality, comprising the idea that the purpose of agriculture is not exclusively food production but also the preservation of natural environment and cultural and historical heritage of rural areas, became a generally accepted model of European agriculture in the late 20th century (Subić et al., 2017). In addition to contributing to the overall agricultural output and food security through their agri-food production, small farms generate jobs, thus contributing to local rural employment and ensuring social, cultural and environmental contribution to the sustainability of rural areas.

Small farms are often described as low-income, non-economically viable holdings, relying on limited resources (in terms of quality and quantity) and producing mainly for their own consumption (Hubbard, 2009 according to Nagayets, 2005, Dixon et al., 2003, Narayanan and Gulati, 2002, Sarris et al., 1999). In the formal sense, there is no universally accepted definition of small farms (Davidova and Thomson, 2014), which is why the categorization of farms by size is most often derived from their spatial and economic size (Gioia, 2017). The spatial size of the holding means the area of used agricultural land, while the economic size is the total monetary value of agricultural production expressed in euros (Official Gazette, 89/2011). At the European Union level, small economies are usually considered to be those whose economic size does not exceed the value of 8,000 EUR (Eurostat, 2018). Croatia also took over this categorization criterion, so the funds from the Rural Development Program for the development of small agricultural farms are intended for farmers whose farms have economic size between 2,000 and 8,000 EUR. One of the classifications of farms by size coincides with their role in the market. Farms are therefore divided into self-sufficient, semi self-sufficient and commercial. Self-sufficient farms are usually the smallest farms that are not market-oriented, but their production is spent entirely on the farm (household). In semi self-sufficient farms up to 50% of production is spent on household needs, while in commercial farms most of the production is intended for the market. The congruence of the shares of small, self-sufficient and semi self-sufficient farms (SSFs) is noticeable in the group of newer EU member states:in Romania, for example, 93% of small farms (up to EUR 8,000 in economic size) are also marked as SSFs. In the older EU member states, the share of SSFs is significantly lower, so that only 16% of small farms are also classified as SSFs (calculated by Eurostat, 2010). Although the EU agricultural sector is still characterized by a predominant number of very small farms, there is a trend of consolidation, i.e. an increase of the average size of farms accompanied by a decrease in their number (Eurostat, 2018). Between 2005 and 2013, the total number of farms in the EU (excluding Croatia) decreased by 26.2%, which is equivalent to an average annual decline of 3.7%. The largest decline in the number of farms was registered in Slovakia (-12.5% per year), Bulgaria (-8.9% per year) and Poland (-6.6% per year). Ireland is the only EU member state that recorded an increase in the number of farms between 2005 and 2013, with an average annual growth rate of 0.6%. Out of a total of 10.5 million farms in the European Union, according to Eurostat (2016), 78% of them used up to 10 hectares of agricultural land. On the other hand, the fewest farms are large ones with over 100 hectares of used land, whose share is 3.3%. Despite their numerical inferiority, the largest farms covered more than a half of the total used land, while the largest group of small farms (up to 10 ha of used land) covered only 6% of the total used land area.

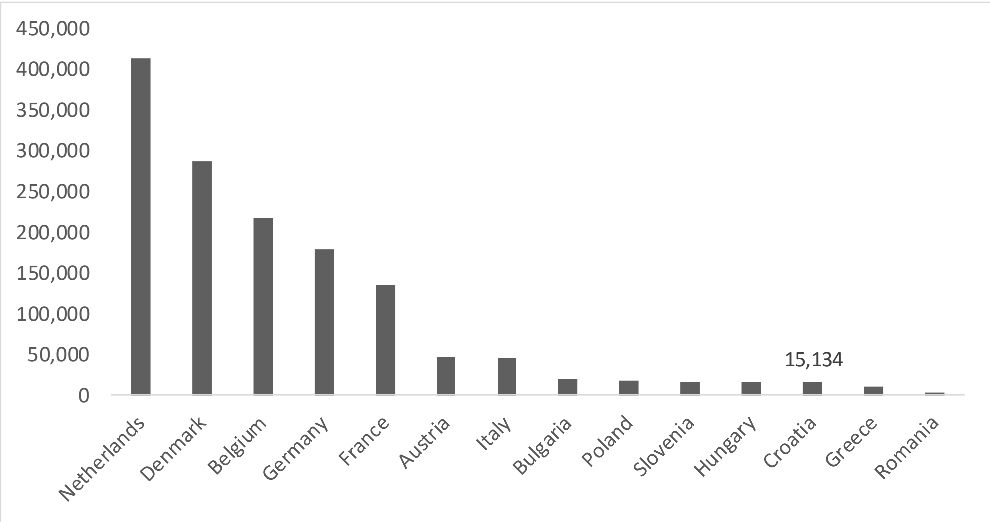
Figure 1. Distribution of farms in the EU by number and land used



Source: Author’s calculation according to Eurostat (2016).

Considering the average economic size, Croatia belongs to the group of EU countries with the smallest farms. According to Eurostat (2016) data, the average SO in Croatian agriculture is 15,134 EUR. According to this indicator, only Lithuania, Greece, Malta and Romania have economically smaller farms in the EU. The highest average economic size is registered in the Netherlands, where the corresponding SO amounts to 414,638 EUR, i.e. 27 times higher than in Croatia.

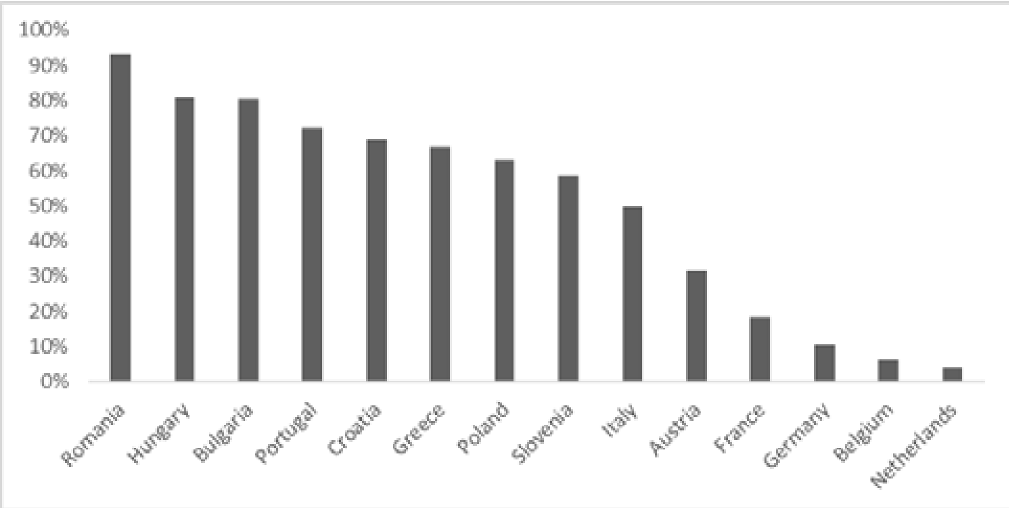
Figure 2. Average economic size (SO) of farms in selected EU members



Source: Author's calculation according to Eurostat (2016).

Apart from the average economic size, Member States also differ significantly in the distribution of the number of farms of different economic size. Assuming that economically "small" farms are those with an economic size of less than EUR 8,000, their largest share is found in Romania, 93% of all agricultural holdings. On the other hand, only 4% of Dutch farms could be considered "small" according to the same criteria. Croatia belongs to the group of member states in which small farms make up more than two thirds of all agricultural economies. Their share in Croatian agriculture is 68.7%, which objectively forms a structural constraint on the development of a highly productive market-competitive agriculture, focusing on the non-economic externalities of a multifunctional agriculture.

Figure 3. Share of small farms in selected EU member states (2,000 EUR> SO <8,000 EUR)



Source: Author's calculation according to Eurostat (2016).

Small farmers productivity increase

The most important economic feature continuously present in the population throughout human history is the desire to increase one's quality of life and living standards. In addition to the mathematical expression of the growth of living standards through the gross domestic product indicator, the growth of living standards is simply explained by the improvement of general well-being and satisfaction of citizens. The basic precondition for the living standard growth is an increase in personal income, which is attained in the conditions of productivity growth. As in all economic activities, productivity growth in agriculture can be achieved:

a. by increasing production capacities alongside economic size growth (Standard Output) in order to increase production according to the theory of growing economies of scale with subproportional growth of resource consumption

or

b. by improving the technical equipment of the agricultural holding, which will enable the growth or maintenance of the existing level of production with a more rational use of resources.

Rada and Fuglie (2019) investigated the relationship between farm size and productivity. They concluded that there are significant differences in this tendencybetween the world's poorest and developed countries. In the underdeveloped parts of the world (Africa and Asia), farmers have smaller production areas, mostly farms with less than 5 hectares of land. In such conditions, production per unit area is higher on smaller farms, with sufficient human resources. In such conditions, higher productivity is achieved on smaller farms. As a consequence of economic development and better technical equipment on farms, the role of human resources is reduced, which is why higher productivity is achieved on larger farms with bigger production capacities. A similar study on the example of 80 European regions was conducted by Błażejczyk-Majka et al., 2012. They concluded that in the developed European Union member states (EU15) the largest economies with more than 100 European units of size (ESU) are also the most productive ones. In the newer members, including Croatia, productivity increases with the size of the economy as well. However, the the most productive farms are not the largest ones (above 100 ESU), but those that dispose with 16 to 40 ESUs.

In addition to higher production capacity as a factor in increasing the productivity of small farmers, there is no doubt that replacing obsolete machinery with new and technically better helps the productivity increase. Sims and Kienzle (2016) identified a number of benefits brought to small farmers by the appropriate mechanization adjusted to the size of the farm. These benefits are especially noticeable in countries with labor shortages and continuous deagrarization processes with the participation of young and vital members of agricultural households. According to Solow's theory of growth (Solow, 1988), the contribution of technical equipment to productivity growth is the greatest in economically less developed societies. Croatia is among the least developed members of the European Union with this state of agriculture, so it is reasonable to expect that better machinery in agricultural holdings would lead to an increase in their productivity and income growth in agriculture.

Rural Development Program of the Republic of Croatia and support for small agricultural holdings

The growth of the average agricultural holding size is an inevitable precondition for the development of agriculture in less developed EU member states. Many small farms struggle daily with insufficient and unadapted machinery, the inability to occupy important market positions due to small quantities and inhomogeneous products. Longer and more complex supply chains as well as hygiene and health standards demands that some small farms cannot meet due to lack of capital are an additional barrier to their sustainability. In order to solve the problem of lagging behind larger farms in terms of production capacities and technical/technological handicaps, small farms have the need for financial resources for investment purposes. Classic sources of financing in the form of commercial bank loans are less available to small farmers. This was shown by a study conducted in 2019 by the European Commission. It points out that, due to aversion to higher risk in doing business with smaller entities, banks refused to lend to 17.4% of small farms, 7.7% of medium-sized farms and 2.7% of large farms (European Commission, 2019). In the same research, banks cited the insufficient quality of business plans as one specific reason for rejecting the requests of small farmsthe other being the lack of loan repayment instruments that are difficult to obtain for small farmers compared to large ones.

The importance of small farms and the need to favor them in relation to larger farmers has been recognized by the European Commission, which is why since 2015 all member states have the opportunity to use payments for small farmers. This opportunity was used by 15 members in the programming period, among which the newer EU members predominate, along with Germany and Italy. Direct payments in Croatia include a program for small farmers, whose total annual amount of direct payments does not exceed HRK 5,000. This allows them to simplify application procedures and receive direct payments without having to meet the requirements for green payments and cross-compliance.

Support for rural development is the second pillar of the European Union's Common Agricultural Policy, that provides funding to Member States in order to achieve the six economic, environmental and social development priorities of rural areas.

The European Commission adopted Croatian Rural Development Program (hereinafter the Program) on 22 May 2015, which allocated EUR 2.3 billion of public funds for the period from 2014 to 2020. Eligible investments under the measures of the Program are mostly co-funded through the European Agricultural Fund for Rural Development (EAFRD).

Measure 6 is one of the four most generous measures of the Program. Through this measure, 226 million EUR intended for the development of agricultural operations is available to farmers in Croatia. Measure 6 contains four sub-measures, one of which is sub-measure 6.3 intended for the development of small farms. The categorization of the economies into „small" was made according to their economic size, i.e. according to the value of the total standard output (SO). Eligible applicants for tenders in sub-measure 6.3 are farms spanning between two and eight thousand euros in economic size. Translated into production resources, these would be farms with 2.5 to 9.5 hectares used under wheat, corn and similar crops, fruit farms with fruit production on an area between 1.2 and 4.5 hectares, milk producers with at least one and maximum of 3 dairy cows, or holdings with a combination of production resources whose total standard output is less than 8,000 euros.

Conducted tenders for sub-measure 6.3

Three tenders for sub-measure 6.3 have been conducted to date. The first tender was conducted in mid-2015. Data from the Croatian Ministry of Agriculture (2020) state that a total of 1,475 applications were received for this tender and 974 Decisions on the allocation of support funds in the total approved amount of EUR 14,939,771.82 were issued. The second tender was held in the first half of 2017. It received 4,189 applications,1,334 of which were approved for funding.

The third tender for sub-measure 6.3 was open from June 27 to December 13, 2018. A total of 6,009 applications received, 4,251 were approved for funding. The total number of applications in the three tenders was 11,673, of which 56.2% were approved for funding. In the three-year period between the first and the third tender, the number of applications has tripled. The main reason for this is the farmers being better informed about the possibilities of using EAFRD funds. This was largely due to the promotional activities of the Ministry of Agriculture, as well as numerous private consultants who, for their own financial reasons, recruited farmers' associations and individual farms.

In all three tenders, farmers could apply for modernization of production, which was mainly reduced to the purchase of new or used machinery, financing the increase of production capacity (purchase of agricultural land, purchase of livestock, raising perennial crops, building protected areas – greenhouses), or for both the aforementioned purposes.

Results and discussion

Statistical analysis of conducted tenders

Of the total number of approved applications for funding from sub-measure 6.3, most holders (4,910 or 75.0%) are men. The average age of sub-measure users is 49.7 years. The economic size of the agricultural holding (SO) was on average 5,219.80 euros. The largest number of applicants had secondary education (44%). The majority of applicants (72.1%) were agricultural producers with plant production, most of whom engaged in fruit and vegetable production.

Table 1. Characteristics of the user of sub-measure 6.3

Characteristics		**f**	**%**
Gender of the holdings' holder	male	4910	75.03
	female	1634	24.97
Age of the holder	18-40	1868	28.55
	41-55	2334	35.67
	55+	2338	35.73
	n/a	4	0.06
	Average age	49.7	
Standard Output	Average SO	5219.80	
	EUR 2000-4000	1788	27.32
	EUR 4001-6000	2275	34.76
	EUR 6001-8000	2481	37.91
Completed level of education of the holder (only for the 3rd tender)	n/a	2299	35.13
	Primary school	603	9.21
	Secondary school	2878	43.98
	College education	260	3.97
	Higher education	504	7.70

Characteristics		f	%
Predominant production of the holder	Cultivation of cereals and oilseeds	1741	26.60
	Floriculture	80	1.22
	Cattle breeding	950	14.01
	Sheep and goat breeding	301	4.60
	Pig breeding	249	3.81
	Viticulture	550	8.40
	Fruit and vegetable growing	2331	35.62
	Other	342	5.95

Source: Paying Agency

Purpose of investment

In the context of this paper, investments imply the primary investment of funds in order to obtain certain economic benefits or profits. By acquiring financial resources through the tender, agricultural producers have invested mainly in real forms of assets that enable the realization of economic benefits or profits through certain productive business activities.

The three possible objectives for investing support for small farmers according to the used PA database are:

(a) Modernization and/or improvement of work and business processes (business plan activities must relate to investment in tangible and intangible assets related to the restructuring and modernization of agricultural holdings that improve business processes)

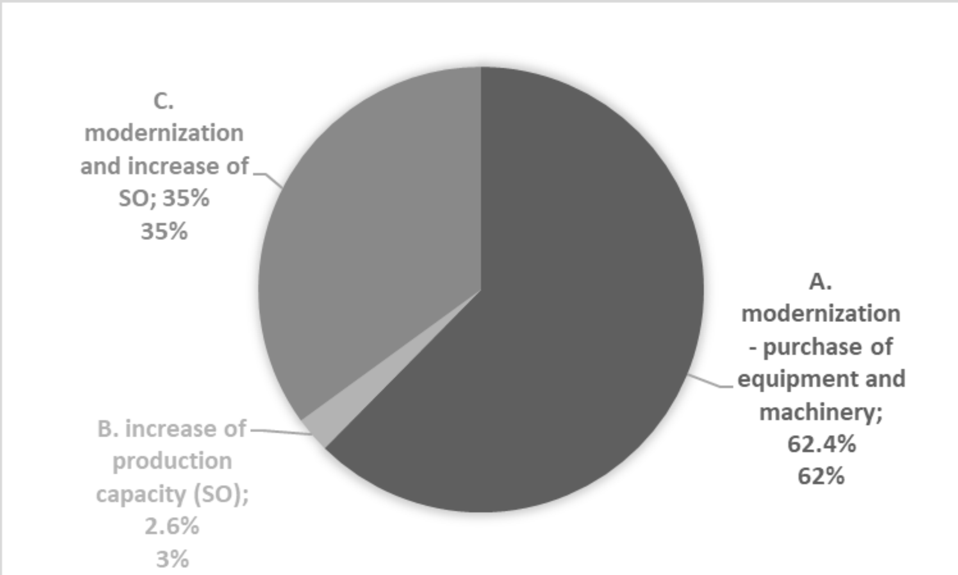
(b) Increase in production capacity expressed through increase in overall standard economic result

(c) Modernization and/or improvement of work and business processes and increase of production capacity expressed through increase of overall standard economic result (combination a and b)

Within these three categories, in accordance with the description and goal of the project, nine eligible investment activities are defined, including purchase and development of agricultural land, construction and/or equipping of farm buildings, purchase of planting material and domestic animals, planting of perennial crops, purchase of agricultural machinery until acquiring professional knowledge, and operating business activities.

Out of the total number of users in all three tenders, the majority applied for activities in the category “Modernization and/or improvement of work and business processes”; 4,082 or 62.4%. The smallest share of those who applied falls into the category “Increase of production capacity expressed through an increase in the overall standard economic result”; 2.6%. The share of participants who reported a combination of activities – modernization of business and increase of production capacity – is 35.0%.

Figure 1. Planned investments in sub-measure 6.3



Source: Authors according to PA data

If we look at the implementation of activities by individual subcategories shown in the following table, the most investments, i.e. applications for funds were intended for the purchase of agricultural machinery (A4). Of the total number of participants, only 1.5% did not mention the purchase of machinery in their portfolio of activities. On the other hand, only 1.1% of participants planned activities of investing in the acquisition of professional knowledge during the project implementation (A8).

Table 2. Distribution of sub-measure 6.3 beneficiaries with regard to reported activities

Subcategory	f	%
(A1) Purchase of domestic animals, perennial plants, seeds and planting material	1303	19.91
(A2) Purchase, construction and/or equipping of facilities	1055	16.12
(A3) Purchase or lease of agricultural land	977	14.93
(A4) Purchase of agricultural machinery	6449	**98.55**
(A5) Raising new and/or restructuring existing perennial plantations	1164	17.79
(A6) Arranging and improving the quality of agricultural land	634	9.69
(A7) Construction and/or equipping of facilities for the sale and presentation of own products	94	1.44
(A8) Acquisition of necessary professional knowledge and skills	72	**1.10**
(A9) Operating business	2924	44.68

Source: Author's calculation according to the PA data

The relationship between agricultural productivity and the level of education of its stakeholders has been researched in numerous studies. The authors Nguyen (1979), Lau and Yotopoulos (1989) proved that a higher level of farmers' education also implies higher productivity of their agricultural activity. Reimers and Klasen (2013) cite some recent research in which this relationship has not been determined (Frisvold and Ingram, 1995; Vollrath, 2007) or is even negative (Craig, 1997). Reimers and Klasen pointed out the methodological shortcomings of these papers, as they are based on problematic indicators of farmers' literacy and their access to various educational programs. Instead, as an indicator of farmers' education, these authors used the attained level of education of farmers in 95 developing countries and accompanied this indicator with the change in agricultural productivity in the period from 1961 to 2002, thus provingthe contribution of education to productivity growth of 3.2% annually. Considering this assumption, only 1.1% of small farmers in Croatia, users of sub-measure 6.3, is ready to invest in education, i.e. to meet this precondition for increasing the productivity of their agriculture.

Another problem that hinders the increase of agricultural productivity is related to the procurement of inadequate machinery, specifically old tractors. Although the Agency's data do not show how many users reported the purchase of tractors, gray literature data reveal that the purchase of used tractors with older years of production is an activity found in more than a half of funded projects where the investment structure includes the purchase of machinery. The possibility of financing the purchase of tractors from the EAFRD has led to a significant increase in their purchase and sale. In the first 6 months of 2019, 2,125 used tractors were registered in Croatia for the first time, which is 2.3 times more than in the same period last year and twice as many as the total annual figures in the period from 2014 to 2017. The purchase of used tractors regardless of age has been allowed in all three previous tenders for support to small farmers. According to the internal data of the Faculty of Agriculture, authorized to determine the compliance of tractors with the conditions of import specifications, the average age of imported tractors is about 30 years, and among them there are some older than 50 years (Šimić, 2021). The most numerous are IMT tractors, whose manufacturer has ceased to exist for some time. Although it is unrealistic and financially unreasonable to expect that small farmers would buy modern tractors that meet precision farming settings with starting prices at around 40,000 euros, it is certain that the purchase of old, used tractors will not increase the productivity of their farms. Accordingly, Dhoubhadel (2020) concluded that on predominantly small farms, modern tractors adapted to precise agriculture cannot increase business productivity, while Popescu et al. (2017) used the example of agricultural machinery inventory in Romania to conclude that old and technically obsolete tractors are not able to perform agricultural work at the same level as new ones, require frequent repairs and with higher fuel consumption result in higher total production costs and reduced productivity.

The largest number of agricultural holdings in Croatia has outdated machinery of a lower average age and condition than the average level of EU as a whole. A significantly better situation is seen in large agricultural companies, larger farms that are equipped with modern tractors, combines and other machinery and have enough land to be able to use this machinery optimally.

Of the total number of applicants for all three tenders, 29% were under 40 years of age, i.e. belonging to the category of young farmers. Although their planned activities under the sub-measure do not differ significantly from their older counterparts and most farmers in both age groups decide to modernize production, the share of young farmers deciding to increase production capacity is double.

Table 3. Distribution of sub-measure users 6.3 given the age of the holder and planned activities

	Up to 40 years (n=1868)		Above 40 years (n=4676)	
	N	%	N	%
A. Modernization and/or improvement of work and business processes	1055	56.48	3027	64.73
B. Increase in production capacity expressed through increase in overall standard economic result	76	4.07	95	2.03
C. Combination A and B	731	39.13	1546	33.06
n/a	6	0.32	8	0.17

Source: Author's calculation according to the PA data

The conclusion that younger farmers are more focused on increasing the size of the farm than older farmers is in line with the results of research by Katch and Ahearn (2014), who concluded that the increase in average farm size is more common among younger farmers, while among fifty or more year-old holders the size of the farm stagnates.

Tauer (1995), based on data from the U.S. Census of Agricultural Holdings, also concludes that farmers' productivity increases until the age of 35 to 44, after which it begins to decline. The increase in productivity at a younger age is explained by the increase in experience, while after the age of 44, the effects of experience give way to a decrease in life vitality and motivation.

An analysis of planned activities with regard to the predominant agricultural activity of the beneficiaries of the sub-measure shows that the greatest interest in increasing production capacity is registered among florists. The share of those who want to increase production either as an independent activity within the sub-measure or in combination with modernization amounts to 63.8%. On the other hand, only 35.8% of cereal and oilseed producers plan to increase the production capacity of the farm, of which only 2.4% will do so without modernization through the purchase of machinery. These results are somewhat surprising given that, in capital-intensive production of cereals and oilseeds, a prerequisite for business success are large agricultural areas where economies of scale are expressed. Given that the beneficiaries of this measure are small agricultural holdings with a small average size of land used, it is illogical to expect that they would use sufficient land areas in crop production for the financial sustainability of the farm.

Table 4. Distribution of users of sub-measure 6.3 with regard to predominant production

Sector/category of activities	(a)	(b)	(c)	n/a
	f (%)	f (%)	f (%)	f(%)
Growing cereals and oilseeds	1115 (64)	581 (33.4)	41 (2.4)	4 (0.2)
Floristry	29 (36.3)	38 (47.5)	13 (16.3)	
Cattle breeding	573 (60.3)	351 (36.9)	24 (2.5)	2 (0.2)
Sheep and goat breeding	173 (57.5)	123 (40.9)	5 (1.7)	
Pig breeding	179 (71.9)	69 (27.7)	1 (0.4)	
Viticulture	427 (77.6)	115 (20.9)	4 (0.7)	4 (0.7)
Fruit and vegetable growing	1433 (61.5)	818 (35.1)	77 (3.3)	3 (0.1)
The rest	142 (41.5)	195 (57.0)	4 (1.2)	1 (0.3)

Conclusions

Small farms of economic sizes up to 8,000 euros are the most numerous group of agricultural producers in Croatia. As in other EU member states, the main obstacles to their productivity growth are insufficient production capacities and inadequate equipment with modern machinery. In order to overcome these restrictions, financial support for investments from sub-measure 6.3 of the Rural Development Programe has been made available to small farmers since 2015.

Although the main goal of this sub-measure is to ensure the growth of production capacity and standard output of the farm, the research confirmed the hypothesis (H1) that most users use this measure to purchase machinery, while only 1/3 of users plan to increase production capacity. An additional problem is the fact that tractors whose excessive age and technical specifications do not meet the needs of modern, highly productive agriculture predominate among the purchased machinery. Although the education of farmers has been highlighted in numerous studies as one of the preconditions for increasing their productivity, only 1% of beneficiaries will use the funds from the sub-measure for the purpose of education.

The second hypothesis (H2) has also been confirmed; among the farmers with an intention to increase production capacity there is a slightly higher share of young farmers as well as those engaged in flower production.

From the presented results, it is certain that thusly defined sub-measure 6.3 and the conditions of its use will not ensure the growth of small farms productivity. Although the 15,000 euros allocated to the beneficiaries of this measure will help their daily lives, it is necessary for the long-term productivity growth of small farmers to reshape the conditions of using the sub-measure in a way that favors those producers who commit to increasing production capacity, which implies growth in business productivity.

Conflict of interests

The authors declare no conflict of interest.

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ONLINE BOOKING ACCOMMODATION IN RURAL TOURISM: AN UTAUT PERSPECTIVE

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A B S T R A C T

The paper investigates the most important factors that cause tourists to intend or to already use a website for booking accommodation in rural areas of the Republic of Serbia. On a sample of 212 respondents who had previously used websites to book accommodation in rural tourism, using a modified model of acceptance and use of technology (UTAUT), the impact of four predictor variables (expected impact, expected effort, social impact and facilitation conditions) on the intention of tourists to use, and two independent variables (facilitating conditions and intentions of tourists) on the use of websites for booking accommodation in rural households in Serbia was examined. The SPSS software package was used for data analysis, using descriptive statistics and standard multiple regression. The conducted research indicates that the expected effect and facilitating conditions have a positive influence on the intention of tourists to use websites for booking accommodation, as well as that facilitating conditions and intentions of tourists have a positive impact on the use of websites when booking accommodation.

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Introduction

The accelerated pace of life, stress, noise, and pollution present in urban areas have created a demand for clean air, peace and quiet, and natural food, namely rural areas where all these elements are present in the residents' daily lives (Ertuna & Kırbaş, 2012). Although many rural areas have experienced a decline in traditional agricultural activities, numerous rural areas have experienced socio-economic development thanks to tourism, and tourism has begun to be seen as an important tool for rural regeneration (Iorio & Corsal, 2010; Košić et al., 2015; Chivu et al., 2020; Luković et al., 2021). It is particularly interesting that growth in rural tourism was recorded during the COVID-19 pandemic in certain countries (such as France and the Czech Republic), which showed that crisis situations can create opportunities for its further development (Seraphin & Dosquet, 2020; Vaishar & Šťastná, 2020).

Rural tourism is not easy to define. Various definitions can be found in the literature, from those that are completely simple and describe rural tourism as "any tourism activity that takes place in rural areas" (Commission of the European Communities, 1986), to more complex ones, such as the definition of the World Tourism Organization. The World Tourism Organization (2019) defines rural tourism as a "type of tourism activity in which the visitor's experience is related to a wide range of products generally linked to nature-based activities, agriculture, rural lifestyle/culture, angling and sightseeing" (p. 34). It was also emphasized that these activities within rural tourism take place in non-urban (rural) areas characterized by low population density, agriculture and forestry, and a traditional way of life. In order to organize tourism in a rural area, it is necessary, in addition to these conditions, for agricultural farms with facilities for tourist accommodation to exist. According to the Law on Hospitality of the Republic of Serbia ("Official Gazette of the Republic of Serbia" No. 17/2019, Paragraph 2), "accommodation is organized in rural tourism households, which means a facility or a group of facilities that provide housing, food and beverage services, located in a rural environment with elements of local landmarks and heritage". These can be facilities that are registered as rural tourism households, as well as rooms for accommodation in villages.

Within the Master Plan for Sustainable Development of Rural Tourism in Serbia (2011), it was pointed out that, according to data for 2010, overnight stays in rural tourism account for 27% of the total number of tourist nights, while with a revenue of 10.4 billion dinars, rural tourism accounts for 16% of GDP from travel and tourism. By researching the opinions and perceptions of existing rural services' users in different municipalities in Serbia, national and foreign tourist agencies and tour operators, it was found that the places most visited in rural tourism are: villages of eastern Serbia, Šumadija, Zlatibor (mountain), Mokra Gora, and western regions. According to Vuković et al. (2016), after 2010 there is an increase in investment in rural tourism, which is developing in almost all parts of the Republic of Serbia.

The advance in information and communication technologies (ICT), especially invention of the Internet, has enabled various tourism companies to increase efficiency and gain a competitive advantage with low distribution costs (Kim et al., 2008; Kim et al., 2009). Also, there have been changes in the habits of tourists. Approximately 43% of Italian tourists consult websites during preparation for a holiday, while 34% consider the recommendations of important people such as friends, colleagues, or relatives. Personal experience is the base for planning for a quarter of the respondents (Statista, 2016c). In Austria, recommendations of friends, colleagues, or relatives are primary in holiday planning for 60% of respondents. Over half of respondents browsed websites, while 40% chose to base their vacation plans on personal experience (Statista, 2016a). For about 57% of French tourists, the primary way to organize their vacation is the recommendations of friends, colleagues, or relatives. Almost half of the respondents used websites, while 37% planned based on personal experience (Statista, 2016b). This data indicates that the Internet takes precedence over other media.

Vuković et al. (2016) believe that the Internet benefits rural tourism destinations in numerous ways. Firstly, it makes them visible outside the local area. Secondly, the Internet allows small rural tourist households to achieve a competitive advantage in the tourist market. Finally, it makes the process of purchasing services easier. Although so far there has been a growing interest among scholars in examining the role of ICT in tourism, according to San Martín and Herrero (2012), there is a lack of research aimed at the identification of the connection between tourists' attitudes towards information technology and their future intentions in rural tourism.

The importance of tourism in rural areas is mainly evident in its role in reducing depopulation and unemployment, but also in rural renewal, protection of the environment, conservation of traditional architecture, and preservation of natural and cultural heritage. It has proven to be an excellent backup strategy for rural areas' development and a chance to generate additional income besides the profit made from the agricultural activities of the local population (Violeta & Gheorghe, 2009; Rokvić Knežić et al., 2020).

The primary goal of this paper is to identify the factors that cause tourists to intend to use and use the website for booking accommodation in rural tourism in the Republic of Serbia. For this purpose, the UTAUT model will be used as a proven tool for measuring the degree of acceptance of ICT by users. In this way, the study will contribute to new knowledge in the field of rural tourism. Identifying the factors influencing the intention of tourists to book accommodation in rural tourism can help all stakeholders to create an adequate strategy for further development of rural tourism. In that way, the study will have concrete practical implications as well.

Theoretical basis and hypothesis development

Over the years, a number of theories and models have been developed that have studied the degree of technology acceptance and user satisfaction with these technologies. They are all, more or less, interconnected, regardless of the point of view they represent or the constructions or determinants on which they are based. According to Momani and Jamous (2017), the most famous of these are: the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), which has been extended to the Theory of Planned Behavior (TPB) (Ajzen, 1985), which was then extended to the Decomposed Theory of Planned Behavior (DTPB) (Taylor & Todd, 1995b). Probably the most commonly used of all, and the first to focus on information systems, is the Technology Acceptance Model (TAM) (Davis, 1986), which is based on TRA and was later extended into TAM2 (Venkatesh & Davis, 2000). This was followed by the creation of a combination of TAM and TPB (C-TAM-TPB) (Taylor & Todd, 1995a). In addition to the aforementioned, Model of PC Utilization (MPCU) (Triandis, 1979), Innovation Diffusion Theory (IDT) (Rogers, 1983), Motivational Model (MM) (Deci & Ryan, 1985), and Social Cognitive Theory (SCT) (Bandura, 1986) have been developed in several different fields and are also frequently used. As a result of the analysis of a number of models that serve to assess IT acceptance (Blair et al., 1988; Davis, 1989; Taylor & Todd, 1995b; Thompson, 1991; Vallerand, 1997; Bandura, 1986), with the aim of developing models that will be more comprehensive, the UTAUT model (Venkatesh et al., 2003) was developed. According to the UTAUT model authors, this model can explain 70% of the variance in user intentions making him one of the most efficient models for technology acceptance analysis. The base of this model is four variables - Performance expectancy, Effort expectancy, Social influence, and Facilitating conditions. Behavioral Intention, as well as Use behavior, are derived from them.

Performance expectancy (PE)

Venkatesh et al. (2003) define PE as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p. 447). Oh et al. (2009) concluded that the intentions of tourists to use mobile devices while travelling primarily depend on PE and that this variable is considered to be the strongest predictor of intent to use. The results of research conducted by San Martín and Herrero (2012) show that PE has the dominant impact on the intention to book accommodation online in rural tourism among the UTAUT variables.

Chi et al. (2020) compare the impact of PE that tourists have of artificial intelligence in the provision of airline services, compared to PE in catering services. The expected performance mainly measures the use and functional value in the process of providing services, and higher values of this variable indicate that tourists attach more importance to advantages such as accuracy and consistency of services. It is therefore not surprising that the authors have reached results that confirm that the use of artificial intelligence in the provision of airline services can increase these use and functional advantages. Also, the assessment of tourists on PE in catering services is lower. The reason could be that tourists want more hedonistic services in catering, and they believe that artificial intelligence cannot serve them as well as employees who provide warmer interpersonal interaction. In conclusion, it is stated that tourists believe that devices with artificial intelligence are more suitable for providing functional services than for providing hedonistic services.

Anita et al. (2021) use PE as an indicator of the degree of acceptance of the virtual tour of the museum by visitors to the museum's website. The realization of the virtual tour enabled the community to have various activities related to the museum's setting, despite the current restrictions of social distancing during the COVID-19 pandemic. In a study conducted by Gharaibeh et al. (2021) empirical results have clearly shown that the expected effect is the most important factor at the level of 0.001, which influences the intention of the respondents to use mobile augmented reality in the tourism sector. That result indicate that utilitarian values are the most important aspect for users and that they crucially shape their intention to use this technology in tourism.

According to the literature review, the following hypothesis is set:

H1: PE of using websites has a positive effect on the intention to use websites to book accommodation in rural tourism households in the Republic of Serbia.

Effort expectancy (EE)

Venkatesh et al. (2003) define EE as "the degree of ease associated with the use of the system" (p. 450). It is common for effort-based assessments to be more pronounced in the early stages of adopting new behaviors when problems in the adjustment process are obstacles that need to be overcome (Davis, 1986; Szajna, 1996).

The results of a study conducted by Khalilzadeh et al. (2017) showed that EE has both direct and indirect impacts on technology usage when paying for services, in this case, in restaurants. Sair and Danish (2018) equate expected effort with ease of use. As their research confirmed a strong link between the expected effort and the intention to use mobile e-business, the paper recommends making mobile services easy to use while providing an easy-to-understand environment. Examining the intention of online bookings in rural tourism, San Martín and Herrero (2012) showed that the importance of EE increases in case of services whose booking process is more complex or which requires greater customer engagement.

In multiple papers (e.g., Wenli & Caixia, 2016; Gupta & Dogra, 2017; Palos-Sanchez et al., 2020), the authors, in addition to the already established association and positive impact on intended use, confirmed that PE is positively affected by EE. That means that EE defines the user's image of the effort he needs to put in to get the expected result.

According to the above, the following hypothesis is derived:

H2: EE in using websites has a positive effect on the intention to use websites to book accommodation in rural tourism households in the Republic of Serbia.

Social influence (SI)

SI, Venkatesh et al. (2003) explain as "the degree to which an individual perceives that important others believe he or she should use the new system" (p. 451). This variable shows the extent to which a person's behavior is influenced by the judge of how they think others will view them as a consequence of using a particular technology. Khalilzadeh et al. (2017) concluded that the impact of SI on the intention to use mobile payment is significant and that even if the user thinks that the use of mobile payment is convenient, suitable, and even fun, they will not start using it until it is socially acceptable.

Investigating consumer behavior related to online travel reservations, Sharma et al. (2020) concluded that the impact of SI on intent to use is not significant. The main reason for this is already present the wide utilization of the Internet in the tourism industry. This lack of direct connectivity makes the social environment's normative pressure to make online reservations, whether negative or positive, to be less important.

As several other authors (e.g., Sykes et al., 2009), so did Zuiderwijk et al. (2015) consider ways to improve the model of acceptance and use of technology by modifying SI. Most agree that it is necessary to consider the construction of social networks when researching the use of the system, so they emphasize the importance of network density and centralization. Density refers to the number of connections a person can use to get help, and centralization refers to their involvement in helping others. In this way, SI can be increased, and thus the intention to use technology.

Using the cited scientific literature as a basis, the following hypothesis is set:

H3: SI on the use of websites for booking accommodation in rural tourism households has a positive effect on tourists' intention to use websites for booking accommodation in rural tourism households in the Republic of Serbia.

Facilitating conditions (FC)

Venkatesh et al. (2003) explain FC as "the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system" (p. 453). When variables related to PE and EE participate in technology acceptance assessment models, FC have an insignificant role in predicting intended use. It was observed that FC have a direct impact on the use itself, regardless of the perceived intention to use. This direct impact on use increases with experience, as technology users find it easier to find new ways to get help and support, creating the conditions for further sustainable use.

San Martín and Herrero (2012) came to the interesting conclusion that there is no significant impact of FC on the intention to shop online in rural tourism. They assume that this absence of influence is caused by situations when the necessary FC are not present, so they practically act as a limiting factor. Further, the mere presence of FC fails to prompt the necessary motivation to shop online.

In contrast, FC are one of the most influential factors in online airline ticket reservations (Escobar-Rodríguez & Carvajal-Trujillo, 2013). In other areas as well, as confirmed in numerous papers (e.g., Farooq et al., 2017; Hsu et al., 2017; Hossain et al., 2019; Abdat, 2020), FC have a significant and positive impact on the intention to use. Therefore, the following hypothesis is set:

H4: Existence of conditions for the use of websites positively affects tourists' intention to use websites for booking accommodation in rural tourism households in the Republic of Serbia.

Behavioral intention (BI) and use behavior (UB)

BI is the individual's intention to perform a given behavior (Eisen, 1991). When the BI to use technology rises, at the same time rises the intention to use this technology.

As in this research, in research models, the intention to use is usually set as a dependent variable. Thus, Fuchs et al. (2011), when examining the intention of passengers to use mobile technologies, observed the dependence of the intention to use on several independent variables. This is based on UTAUT variables, which are joined by Perceived Hedonic Quality, Perceived Information Quality, Perceived Trust, Perceived Monetary Transparency and Perceived Price Fairness. Perceived Monetary Transparency, Perceived Price Fairness, Perceived Hedonic Quality and SI were found to have a positive and statistically significant impact on BI. Lam and Hsu (2006) set BI as a dependent variable in relation to Past behavior, Attitude (as Behavioral beliefs), Subjective norm (Normative beliefs) and Perceived behavioral control (Control beliefs). The results of the study show that Past behavior, Subjective norm and Perceived behavioral control, but not Attitude, have a direct impact on BI. In addition, the intention to use, according to UTAUT, directly conditions the use, so it is used in research as a causal variable.

While BI represents an interest in use, UB represents actual use of technology. According to the UTAUT model, use is directly dependent on FC and intention to use. Lubis and Rahmiati (2019), observing the acceptance of online travel agents by Gen Z and Millennials, find that BI significantly affects UB.

Based on the aforementioned studies, the following hypotheses are set:

H5: Existence of conditions for the use of websites has a positive effect on the actual use of websites for booking accommodation in rural households of tourists in the Republic of Serbia.

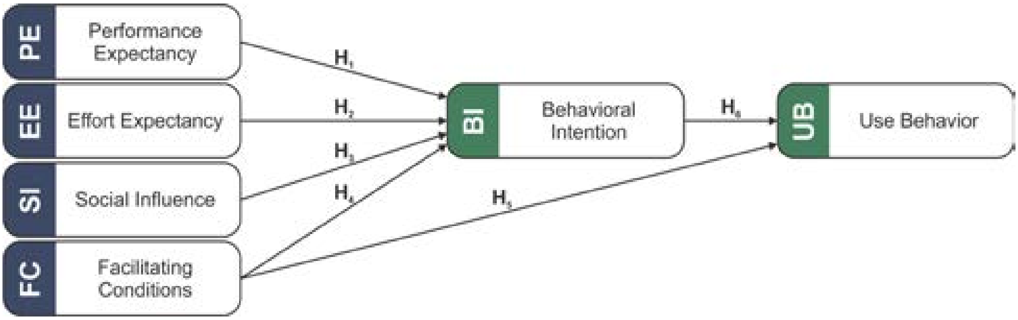
H6: Tourists' intention to use websites to book accommodation in rural households in the Republic of Serbia has a positive effect on the use of websites for online booking.

Methodology

In order to realize the goal of the paper, i.e., to identify predictors of intention to use and predictors of use of websites for booking accommodation in rural tourism households in the Republic of Serbia and test the hypotheses set, a research model was formed (*Figure 1*) and empirical research was conducted. The sample was 212 students of all levels of study at the Faculty of Hotel Management and Tourism in Vrnjačka Banja. Since students come from different cities across Serbia, making it feasible to gather a suitable sample in a reasonable amount of time and without incurring significant fees, it was thought to be an appropriate sample for the objectives of the research.

In August 2021, a questionnaire composed of 24 questions was forwarded to students to e-mail addresses received from the Faculty student office. In addition to questions related to the demographic characteristics of respondents, 19 questions, phrased based on relevant claims proposed in the literature (Venkatesh et al., 2003; Herrero & San Martín, 2012; San Martín & Herrero, 2012; Venkatesh et al., 2012; Gupta & Dogra, 2017), referred to the predictors of intention (PE, EE, SI, and FC), intention to use and actual use of websites for booking accommodation in rural households in Serbia.

Figure 1. Research model



Source: Authors' elaboration

Using a five-point Likert scale, respondents indicated their agreement with statements in the questionnaire (1 - I completely disagree, 5 - I completely agree). In order to ensure that the survey was filled out only by respondents who have used this type of reservation so far, a control question was asked - "*Have you ever booked accommodation in a rural household in Serbia through a website?*". Only respondents who answered affirmatively to that question were allowed to proceed with the questionnaire. Out of 700 surveys sent, 264 answers were received, which gives a response rate of 38%, of which 212 passed the control question with an affirmative answer. There was no missing data since all survey questions were mandatory.

The collected data was processed using the *Statistical Package for Social Sciences* (SPSS 20). Mean value and standard deviation were calculated for each statement. Taking into account that the questionnaire statements were taken from other studies, Cronbach's alpha coefficient was utilized to analyze the internal agreement of each scale employed in the study. The Cronbach's alpha coefficient ranges from 0.749 to 0.912, indicating that each individual scale is extremely reliable. The normality of the distribution was assessed using the Kolmogorov-Smirnov test, followed by correlation analysis, the Durbin-Watson test, and calculated values of Tolerance and VIF, in order to check the assumptions about the data on which multiple regression is based. Finally, in order to test the set hypotheses, i.e., to examine the influence of independent variables on the dependent variables, a standard multiple regression was used.

Results and discussion

A total of 212 respondents participated in the survey, of which 42 respondents (19.8%) were male, while 170 (80.2%) were female. When it comes to age structure, 189 respondents (89.2%) are younger than 35 years, while 23 respondents (10.8%) are 35 years old or older. The most represented group of respondents was those under 25 years of age, with a share of 61.8% in the total sample. The highest level of education acquired by most respondents is high school degree (39.6%), followed by bachelor's degree (32.5%), and master's degree (25.5%). The lowest number of respondents received an associate's degree (0.9%). Respondents mostly use mobile devices (94.8%) and laptops (64.6%) to access the Internet, while desktop computers are the least common (26.4%). Šumadija (66%) and Eastern Serbia (51.9%) stood out as the regions in which the largest percentage of respondents intend to visit rural tourism households in the coming period.

Descriptive statistics were used to investigate the mean values and standard deviations of the observed variables. As shown in *Table 1*, the mean for all variables is above 4.20, while the standard deviation does not exceed 1.201. The estimated Cronbach's alpha coefficient for each scale is over 0.7, which implies that scales have a high level of internal consistency (Bagozzi & Yi, 1988; DeVellis, 2012).

Table 1. Summary of statistics of used scales and statements

Scales and statements	Mean value	Standard deviation	Cronbach's alpha coefficient
Performance Expectancy (PE)	**4.57**		**0.912**
Using a website offering rural accommodation is very useful for finding accommodation	4.52	0.656	
Using a website offering rural accommodation provides me with a simpler and faster process of finding accommodation	4.61	0.632	
Using a website offering rural accommodation increases my efficiency in the process of finding accommodation	4.54	0.648	
Using a website offering rural accommodation makes it easier to find the accommodation I want	4.60	0.619	
Effort Expectancy (EE)	**4.45**		**0.755**
Using a website offering rural accommodation is simple for me	4.47	0.691	
Using a website offering rural accommodation is an activity that I think I have enough skills to do	4.41	0.795	
Using a website offering rural accommodation is easy for me	4.50	0.664	
Using a website with rural accommodation does not require much effort	4.40	0.946	
Social Influence (SI)	**4.29**		**0.878**
People whose opinions I respect consider it useful to use a website offering rural accommodation	4.32	0.761	
People in my area find it useful to use a website offering rural accommodation	4.23	0.837	
People who are important to me think that it is good to use a website offering rural accommodation	4.33	0.751	
Facilitating Conditions (FC)	**4.54**		**0.749**
I have the resources to use a website offering rural accommodation	4.51	0.770	
I have the knowledge necessary to use a website offering rural accommodation	4.59	0.685	

Scales and statements	Mean value	Standard deviation	Cronbach's alpha coefficient
I feel comfortable using a website offering rural accommodation	4.42	0.760	
I have no problems with using a website offering rural accommodation	4.62	0.661	
Behavioral Intention (BI)	**4.41**		**0.881**
I intend to use a website offering rural accommodation for making reservations for future trips	4.45	0.737	
I will probably use a website offering rural accommodation for making reservations for future trips	4.45	0.717	
I have decided to use a website offering rural accommodation for making reservations for future trips	4.33	0.910	
Use Behavior (UB)	**Single-item scale**		
How often do you use the website offering rural accommodation for making reservations	3.35	1.201	

Source: Authors' calculation

In order to examine the influence of BI predictors on tourists' intentions to use websites for booking accommodation in rural tourism households in the Republic of Serbia, a standard multiple regression analysis was employed. First, analyses were conducted to determine that there are no problems of autocollinearity and multicollinearity among the observed variables. The results of the Kolmogorov-Smirnov test indicated that the normality of the sample distribution of data has not been proven. For this reason, the strength of the relationship between the variables was investigated using the Spearman rank correlation coefficient (ρ). According to Cohen (1988), a value of ρ from 0.10 to 0.29 indicates a small correlation between independents, from 0.30 to 0.49 indicates a medium, while a value of ρ from 0.50 to 1.0 shows a large correlation. A moderate positive and statistically significant correlation was calculated between all variables (*Table 2*). By checking the correlation matrix, it was determined that the correlations between independent variables, as well as between independent variables and the dependent variable, have values greater than 0.3 and less than 0.7, which excludes the possibility of autocorrelation. Additionally, the Durbin-Watson test showed a value of 1.035, indicating that there is a significant difference between independent or predictor variables and the dependent variable (i.e., BI). The absence of multicollinearity between the variables was also confirmed by the values of Tolerance and VIF, which are above 0.10 and below 10. These results showed that the assumptions about the data on which multiple regression is based were not violated.

Table 2. Spearman rank correlation coefficients between measured values of predictors of behavioral intention and behavioral intention, and predictors of use behavior and use behavior

Scale	1	2	3	4	5
1. Total performance expectancy	-				
2. Total effort expectancy	0.331 **	-			
3. Total social influence	0.457 **	0.403 **	-		
4. Total facilitating conditions	0.375 **	0.586 **	0.462 **	-	
5. Total behavioral intention	**0.487 ****	**0.420 ****	**0.400 ****	**0.490 ****	-
6. Use behavior	0.304 **	0.279 **	0.254 **	**0.321 ****	**0.389 ****

** p <0.001 (2-tailed)

Source: Authors' calculation

The standard multiple regression showed a determination coefficient $R^2 = 0.379$, meaning that the model (which includes PE, EE, SI, and FC) explains 37.9% of the variance in tourists' intention to use websites to make reservations in rural households in Serbia. *Table 3* shows the contribution of each variable to the prediction of the dependent variable, statistical significance, and the results of the conducted collinearity diagnostics. The results of multiple regression reveal that only PE and FC are significant predictors of respondents' intention to use websites to book accommodation in rural tourism households in the Republic of Serbia, while EE and SI do not significantly contribute to predicting BI.

Table 3. Relationship between predictors and behavioral intention

Independent variables	Standardized coefficient	Significance	Diagnosis of collinearity	
	β		Tolerance	VIF
Total performance expectancy	0.321	0.000	0.681	1.469
Total effort expectancy	0.137	0.055	0.594	1.682
Total social influence	0.099	0.145	0.654	1.528
Total facilitating conditions	0.222	0.003	0.552	1.810

[a] Dependent variable: Total behavioral intention

Source: Authors' calculation

Based on the obtained results, hypotheses H1 and H4 were accepted, while hypotheses H2 and H3 were rejected. The predictor that has the highest β coefficient is PE (β = 0.321), while SI has the lowest β coefficient (β = 0.099). These results are in accordance with the results of a study conducted by San Martín and Herrero (2012) in the context of rural tourism in Spain. However, unlike the study conducted on the example of rural households in Spain, which found that EE is the second strongest predictor of intention, while FC do not contribute to the prediction of tourists' intention to use websites to book accommodation in rural households, in the context of Serbia, EE is not a predictor of intention (β = 0.137), while FC are the second strongest predictor of tourist intention (β =

0.222). A significant impact of FC on the respondents' intentions has also been identified in studies conducted in other contexts (e.g., Venkatesh et al., 2012; Escobar-Rodríguez & Carvajal-Trujillo, 2014; Gupta & Dogra, 2017).

Standard multiple regression was also used to examine the impact of FC and BI (predictor variables) and UB as a dependent variable (*Table 4*). No assumption about the data on which multiple regression is based was contradicted (DW = 2.025; *ro* < 0.7; Tolerance > 0.10; VIF < 10). The determination coefficient is $R^2 = 0.174$, which means that 17.4% of website use for booking accommodation in rural tourism households in the Republic of Serbia is explained by FC and BI. Of the two variables, BI provides the largest singular contribution (*beta* = 0.288), although FC make a statistically significant contribution (*beta* = 0.190), which means that the hypotheses H5 and H6 are accepted. The obtained results are in agreement with the results of previous studies (e.g., Escobar-Rodríguez & Carvajal-Trujillo, 2014; Ali et al., 2016), which found that FC and BI are significant predictors of website use, i.e., that the greater the intention of tourists to book accommodation through websites, the more likely it is that an online reservation will actually be made.

Table 4. Relationship between predictors and use behavior

Independent variable	**Standardized coefficient**	**Significance**	**Diagnosis of collinearity**	
	Beta		**Tolerance**	**VIF**
Total facilitating conditions	0.190	0.009	0.758	1.320
Total intent to use	0.288	0.000	0.758	1.320

[a] Dependent variable: Use behavior

Source: Authors' calculation

Conclusion

The results of the previous studies indicate that tourists recognize the need for efficient websites that would enable them to book accommodation in rural tourism in a simple and accessible way. It is interesting to note that even the possible additional effort that needs to be invested, as well as the lack of support from the social environment, do not diminish the expressed desire to use these websites.

The results of this paper provide new evidence that previous research on the acceptance and dissemination of technology, especially papers based on the UTAUT model, can be used as a starting point for research on the use of websites in the domain of rural tourism. The relationships among the common UTAUT model constructs reached in this study are largely consistent with the results of previous similar UTAUT studies. Descriptive results shed additional light on the profile of potential users of rural tourism accommodation booking websites. This and the factors that stand out in influencing the intention to use these sites are a key contribution to marketing theory and practice. Their practical implications can serve all other stakeholders in this field to come up with a better strategy for improving and promoting the use of websites offering accommodation in rural tourism households, which, ultimately, should result in acquiring new clients while retaining existing ones.

The main limitation of this research is the significant imbalance in the gender and age structure of the sample. Of all respondents, only 19.8% are male, and 89.2% are under 35 years of age. This is expected considering that another limitation is the fact that the sample is comprised solely of students, i.e., 212 students of all levels of study at the Faculty of Hotel Management and Tourism in Vrnjačka Banja. As a direction in which some future research could go, research on a more representative sample is a clear necessity, as is finding ways to respond to the expressed wishes of tourists for more affordable websites for booking accommodation in rural tourism in Serbia.

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Conflict of interests

The authors declare no conflict of interest.

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THE IMPACT OF INTERNAL GREEN MARKETING ON MANAGERS' ORGANIZATIONAL IDENTIFICATION AND FINANCIAL PERFORMANCE OF ORGANIZATIONS OF THE AGRIBUSINESS SECTOR IN SERBIA

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ABSTRACT

The purpose of the paper was to examine the impact of internal green marketing on managers' organizational identification and the financial performance of the organizations. The empirical research was carried out by an online survey. The model proposed in this paper was tested on a sample of 53 managers of Serbian organizations in the agribusiness sector. For empirical testing of the proposed hypotheses, partial least squares structural equation modeling was used. The findings revealed that the direct effect of internal green marketing on managers' organizational identification as well as the direct effect of managers' organizational identification on financial performance is positive and statistically significant. Managers' organizational identification fully mediates the relationship between internal green marketing and financial performance. This paper can contribute to better understanding of green internal marketing and its effect on organizations, especially in the agribusiness sector. The results can be useful to managers in the agribusiness sector.

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Introduction

Green orientation of an organization is the imperative of modern business. The implementation of green orientation in an organization is supported by the implementation of green marketing, its dimensions and programs. The implementation of green marketing leads to the achievement of organizational goals including more successful environmental protection (Crittenden et al., 2011), better organizational performance (Fraj et al., 2011; Papadas et al., 2019), and satisfaction of all stakeholders (Polonsky, 1995).

The internal green marketing concept is based on the concept of internal marketing and the concept of green marketing. From the internal green marketing perspective, organizations take care of their employees – the most important internal stakeholders (from the internal marketing perspective) as well as of the environment (from the green marketing perspective). Internal green marketing, as the dimension of green marketing, has recently begun to attract the attention of researchers and practitioners. The focus of the research in this field is on the organizations operating in the environmentally sensitive sectors including the agribusiness sector.

The relevant literature states that internal green marketing orientation contributes to the promotion of environmental (or green) awareness in an organization (see: Papadas et al., 2017), the creation of green organizational culture and the promotion of green organizational identity (Chen, 2011). The role of leaders and managers, especially middle managers, in building member identification "lays the foundation for internal marketing" (Wieseke et al., 2009, p. 123; Šapić et al., 2018), and thus the foundation for its green dimension. It is confirmed that managers' internal marketing adoption can improve employees' perception of internal marketing as well as the level of employees' organizational identification (e.g. Boukis et al., 2015), which results in better employees' performance and better financial performance of the business unit of the managers identified with the organization (Wieseke et al., 2009). However, there is a lack of empirical studies on the impact of internal green marketing on the organizational identification both of employees and managers, especially the studies from less developed countries as well as the studies on the impact of managers' organizational identification on the financial performance of an organization. Finally, although it is confirmed that environmental marketing positively influences the organization's commercial and operational performance (Fraj-Andrés et al., 2009), that green marketing strategy positively influences marketing performance (Fraj et al., 2011), and that strategic green marketing orientation has a positive (indirect) effect on financial performance (Papadas et al., 2019; Vukosavljević et al., 2021), there is no empirical research on the impact of internal dimension of green marketing on the financial performance of an organization. At the same time, taking care of employees, the environmental protection, and financial results is not always easy to harmonize. Managers play a key role in this organizational task. In regard with that, the purpose of this paper is to examine the impact of internal green marketing on managers' organizational identification as well as the financial performance of the organizations operating in the environmentally sensitive sector such as the agribusiness sector.

Conceptual framework and the development of hypotheses

Most definitions of green (environmental) marketing "suggest that the firm's, consumer's and society's needs be satisfied in a profitable and sustainable way and be compatible with the natural environment and eco-systems" (Papadas et al., 2017, p. 237). Therefore, green marketing construct includes the following dimensions: 1) strategic green marketing 2) tactical green marketing, and 3) internal green marketing (Leonidou, Leonidou, 2011). However, not all its dimensions have been empirically examined equally. In this regard, most previous studies have examined both strategic and tactical dimensions of green marketing rather than the internal dimension of green marketing (e.g. Fraj et al., 2011; Papadas et al., 2019; Santoso et al., 2019; Sharma et al., 2017; Milošević et al., 2021; Ullah, Qaiser Danish, 2020; Wang et al., 2021).

Internal green marketing orientation as a holistic orientation "involves the pollination of environmental values across the organization to embed a wider corporate green culture" (Papadas, Avlonitis, 2014 as cited in Papadas et al., 2017, p. 238). Managers spread the philosophy of internal green marketing among employees. In addition, managers develop and shape the internal green culture of the organization (adapted by Papadas, Avlonitis, 2014 as cited in Papadas et al., 2019, p. 636) while all internal stakeholders should follow its values. Therefore, it is important that managers adopt internal green marketing philosophy and that they are identified with the organization, especially as it was confirmed that managers' internal marketing adoption can improve employees' internal marketing adoption (e.g. Boukis et al., 2015). At the same time, organizational identification of managers affects the organizational identification of their employees i.e. followers (Wieseke et al., 2009). So, if employees identify with their organization than they can contribute to the organization's effective facing with green environmental challenges (adapted from Chen, 2011). Finally, it is confirmed that managers that are identified with their organizations in the internal marketing context contribute to improving the financial performance of their business unit (Wieseke et al., 2009; Pantić et al., 2021). However, the internal green marketing construct has been recently given (Qureshi, Mehraj, 2022), so there is a lack of the empirical research on the effects of the application of internal green marketing in practice as opposed to the research on the effects of the application of internal marketing. In this regard, to authors' knowledge, no previous study has tested the relationship between the mentioned variables – between internal green marketing and managers' organizational identification, on the one hand, and between internal green marketing, managers' organizational identification, and the financial performance of the organizations operating in the agribusiness sector, on the other hand. Therefore, this paper relies on the studies on these relationship in the internal marketing context conducted in other sectors (Boukis et al., 2015, banking sector; Hernández-Díaz et al., 2017, higher education institution; Wieseke et al., 2009, pharmaceutical company, travel agencies) as well as on the study on strategic and internal green marketing orientation in the organizational outcomes context (Papadas et al., 2019). In regard with this, it is assumed that:

H1: Internal green marketing has a positive direct effect on managers' organizational identification

H2: Managers' organizational identification has a positive direct effect on financial performance

H3a: Internal green marketing has a positive indirect effect on financial performance through managers' organizational identification

H3b: Internal green marketing has a positive direct effect on financial performance.

Methodology

Data collection: The empirical research was carried out by an online survey on a sample of the managers of the organizations operating in the agribusiness sector of the Republic of Serbia in the period March - June 2022. The e-mail addresses of organizations or managers were taken from various sources (e.g. Agro club, https://www.agroklub.rs/partner; All companies in Serbia, https://kompanije.co.rs; Best of Serbia, https://www.bestofserbia.rs; Agriculture sphere, https://www.poljosfera.rs/agrosfera/adresar/; Vojvodina organic cluster, https://vok.org.rs).

Sample: The number of active business entities in the agribusiness sector at the end of 2017 in the Republic of Serbia (enterprises/entrepreneurs) was 12,823, of which micro: 11,142 or 86.90%, small: 1,249 or 9.75%, medium: 350 or 2.7%, and large: 82 or 0.65% (The Serbian Business Registers Agency as cited in: The analysis of prospective occupations in the agro-business sector, *Table 7*). The small (10-49 employees), medium (50-249 employees) and large organizations (>250 employees) were selected for this survey. From 421 distributed questionnaires (by a random sampling method), 53 completed questionnaires were returned (the response rate: 13%). Questionnaires were filled out by managers. The reluctance and the unwillingness of many managers to participate in this survey were noted.

Sample structure: The structure of the organizations in the sample is following: 28.3% were small organizations, 64.2 were medium organizations, and 7.5% were large organizations. Besides, 43.4% of these organizations operate in the Sector A – Division 01 "Agricultural production, hunting and related service activities" (or "Crop and animal production, hunting and related service activities", SIC codes - https://www.siccodes.net/classification/): A01, code 01.1; 01.2; 01.3; 01.4, 01.5, 01.6), 37.7% of these organizations operate in the Sector C – Division 10 and 11 "Manufacturing": C10 "Manufacture of food products" and C11 "Manufacture of beverages", 11.3% of these organizations operate in the Sector G – Division 47 "Retail trade, except of motor vehicles and motorcycles": G47.11 "Retail sale in non-specialized stores with food, beverages or tobacco predominating" and G47.2 "Retail sale of food, beverages and tobacco in specialized stores", 7.6% have no data (this question was not answered by all respondents).

Regarding the gender distribution of managers as the respondents: 49% of them are male, whereas 51% are females. As for the age distribution of managers as the respondents, 22.6% of managers are under 31, 28.3% of them are aged 31-40, 20.8% between 41-50, 18.9% between 51-60, and 9.4% are over 60. The educational distribution of the managers is following: 84.9% of them have higher education whereas 15.1% have secondary education. Most managers have been working less than 20 years (less then 11 years: 32.1%, from 11 to 20 years: 30.2%), 22.6% from 21 to 30 years, 11.3% from 31-40 years, and 3.8% over 40 years. Regarding the position of the managers, 34.5% of them are general or executive managers, 21.3% are financial managers, 19.4% are marketing managers, 19% are human resource managers, and 5,8% are managers of business unit.

Measurement scales: Three constructs were defined in this paper: internal green marketing (IGM), managers' organizational identification (OIm), and financial performance (FP). Internal green marketing implies the extent to which an organization endorses green (environmental) values as well as develops green culture (adapting to Qureshi, Mehraj, 2022). According to Papadas et al. (2019) internal green marketing (orientation) was observed as one-dimensional construct. In this paper, internal green marketing (IGM) was observed as a multidimensional construct i.e. a second-order reflective construct including: green internal communication – GIC (five items; GIC1=GIC1; GIC2=GIC2; GIC4=GIC3; GIC5=GIC4; GIC6=GIC5, Qureshi, Mehraj, 2022, *Table 3* = this paper, *Table 1*), green skill development – GSD (five items), and green rewards – GRs (five items) (the scale from Qureshi, Mehraj, 2022). Organizational identification is defined as the perceived oneness of an employee with his/her organization, and experience of its "successes and failures as one's own" (Mael, Ashforth, 1992, p. 103). Managers' organizational identification (OIm) as a reflective construct was measured by four items (the scale was adapted from Mael, Ashforth, 1992). The managers rated on a scale of 1 (strongly disagree) to 5 (strongly agree) the extent to which they agreed with statements offered in the survey regarding internal green marketing and the managers' organizational identification. A subjective measure was used regarding financial performance. A subjective measures of performance are still used in many studies. In previous research, economic performance, marketing performance and operative performance (Fraj et al., 2011) or financial performance (Papadas et al., 2019; Wieseke et al., 2009) were observed, including firm's profitability, sales growth, firm's economic results, profit before tax, market share (according to Morgan 2004 as cited in Papadas et al., 2019, *Table 2*). Based on the previous studies (Fraj et al., 2011; Papadas et al., 2019), in this paper financial performance was defined as a reflective construct including three indicators. Namely, the managers were asked to indicate the level of sales revenue growth, the level of profitability growth as well as the level of costs reduction that were achieved in the year 2021 (1–not achieved at all; 5–fully achieved).

Data analysis: Partial least squares structural equation modeling (PLS-SEM) was used. All calculations were done in SmartPLS, version 3.3.9. This method was chosen for several reasons. First, PLS-SEM is a technique that is more advanced and gives better results than regression analysis and other first-generation methods, because it can test causal relationships (Lowry, Gaskin, 2014). Second, this method enables the establishment of relationships between latent variables (latent constructs) that are unobserved, i.e. that are described through a set of indicators (Hair et al., 2019). It also enables the modeling of higher-order constructs (Sarstedt et al., 2019; Karavelić et al., 2021). Third, PLS-SEM is suitable for working with small samples because it generates a large number of sub-samples using the Bootstrapping procedure, and in this way, the maximum information is obtained based on the available sample (Hair et al., 2017). PLS-SEM technique requires two steps. The first is testing of the measurement model, and the second is testing of structural relationships in the model (Hair et al., 2019). Since the proposed model includes the variable IGM, which is a second-order variable, the disjoint two-stage approach was used in order to generate appropriate indicators of reliability and validity of the model (Hair et al., 2018).

Results

Measurement model assessment: Indicators of the reliability and validity are obtained by using PLS Algorithm function. The results of the both phases of the disjoint two-stage approach are presented in *Table 1*. Descriptive statistics for all the indicators and variables are also provided in *Table 1*.

All constructs in the model are defined as reflective. That is why, in order to validate the measurement scales, factor loadings, Chronbach's alpha coefficient (Ch. Alpha), composite reliability (CR), and average variance extracted (AVE) were observed. In order to acquire convergent validity for the OIm variable, some of the items were deleted and excluded from further analysis. Items excluded from further analysis in this paper are: "When someone criticizes" my organization, "it feels like a personal insult" (1); My organization's successes are my successes (4); „If a story in the media criticized" my organization, „I would feel embarrassed" (6) (Mael, Ashforth, 1992, p. 122). Hence item 2 (Mael, Ashforth, 1992, p. 122) is OIm1, item 3 (Mael, Ashforth, 1992, p. 122) is OIm2, item 5 (Mael, Ashforth, 1992, p. 122) is OIm3 (see: *Table 1*). Besides, the item that was added is statement of employees' level of awareness of belonging to their organization (OIm4 in *Table 1*). After the refinement of the OIm scale, factor loadings for all constructs were higher than 0.708 meaning that convergent validity was established for all constructs (Carmines, Zeller, 1979). In order to establish internal consistency reliability of the measurement scales the value of Chronbach's alpha should be above 0.7 (Churchill, 1979) and composite reliability should be between 0.7 and 0.95 (Diamantopulous et al., 2012). This requirement is also satisfied for all the constructs defined in the model. Convergent validity was assessed based on composite reliability and the values of average variance extracted (AVE). CR values are greater than 0.7, AVE values are greater than 0.5, and CR values are greater than AVE values (CR>AVE) for all constructs indicating that convergent validity exists (Fornell, Larker, 1981).

Table 1. Descriptive statistics, reliability and convergent validity

Constructs and their indicators	Mean	Std. Dev.	Factor loadings	Ch. Alpha	CR	AVE
IGM (second-order reflective construct)	3.40	0.012		*0.917*	*0.947*	*0.856*
GIC (first-order reflective construct)	3.72	0.054		0.948	0.959	0.825
GIC1	3.94	1.134	0.878			
GIC2	3.77	1.235	0.943			
GIC3	3.58	1.184	0.891			
GIC4	3.60	1.198	0.945			
GIC5	3.72	1.277	0.882			
GSD (first-order reflective construct)	3.47	0.063		0.922	0.941	0.761
GSD1	3.25	1.239	0.873			
GSD2	3.53	1.154	0.908			
GSD3	3.85	1.133	0.836			
GSD4	3.58	1.082	0.912			
GSD5	3.15	1.215	0.827			
GRs (first-order reflective construct)	3.01	0.040		0.947	0.957	0.817
GRs1	3.06	1.277	0.932			
GRs2	3.06	1.277	0.959			
GRs3	3.02	1.308	0.923			
GRs4	2.34	1.208	0.828			
GRs5	3.57	1.233	0.871			
OIm (reflective construct)	4.52	0.174		0.753	0.842	0.572
OIm1	4.21	0.885	0.822			
OIm2	4.75	0.477	0.710			
OIm3	4.57	0.605	0.736			
OIm4	4.55	0.722	0.752			
FP (reflective construct)	4.13	0.459		0.818	0.879	0.709
FP1	4.36	0.787	0.813			
FP2	4.11	0.847	0.831			
FP3	3.92	0.730	0.880			

*Note: Italics were used for the indicators obtained in the second stage of the disjoint two-stage approach.

Source: Authors' calculation

Discriminant validity is assessed based on Heterotrait-Monotrait ratio (HTMT) as suggested by Henseler et al. (2015). HTMT values greater lower than 0.9 for all constructs in the model confirm that constructs conceptualy differ, and that discriminant validity is acquired. The obtained results are presented in *Table 2*.

Table 2. HTMT ratio

	FP	OIm	GSD	GIC	GRs
OIm	0.428				
GSD	0.173	0.479			
GIC	0.115	0.404	0.800		
GRs	0.091	0.320	0.869	0.780	
IGM	*0.121*	*0.464*	*n.a.*	*n.a.*	*n.a.*

*Note: Italics were used for the values obtained in the second stage of the disjoint two-stage approach

Source: Authors' calculation

Testing of the structural relationships: Before the testing of the structural relationships in the model, the quality of the structural model was assessed. It was shown that collinearity does not present a problem in this research, since VIF values for both predictors of FP (OIm and IGM) were 1.191 which is below 3, as recommended by Hair et al. (2017). The model's explanatory power was assessed based on the coefficient of determination (R^2). Value of R^2 for the endogenous variable FP is 0.128, which is satisfactory in social science research (Falk, Miller 1992; Shmueli, Koppius, 2011).

After the structural model was assessed, Bootstrap procedure (BCa method; 5000 subsamples; one-tailed t-test; 0.1 significance level) was applied in order to test the hypothesized relationships. The results are presented in *Table 3*.

Table 3. Hypotheses testing

Hypotheses	Beta coefficient	t-value	p-value	Supported
H1: IGM -> OIm	0.400	2.667	0.004	Yes
H2: OIm -> FP	0.361	2.186	0.014	Yes
H3a: IGM -> OIm -> FP	0.145	1.553	0.060	Yes
H3b: IGM -> FP	-0.018	0.113	0.455	No

Source: Authors' calculation

Based on the results (*Table 3*), there is a positive and statistically significant relationship between IGM and OIm (β=0.400; $p<0.1$), and between OIm and FP (β=0.361; $p<0.1$). The first hypothesis is confirmed: Internal green marketing has a positive direct effect on managers' organizational identification. The second hypothesis is confirmed: Managers' organizational identification has a positive direct effect on financial performance. In accordance with the third hypothesis (H3a), the indirect effect of IGM on FP through OIm is positive and statistically significant (β=0.145; $p< 0.1$). The third hypothesis - H3a is confirmed. At the same time, a positive direct effect of IGM on FP was not supported, rejecting thus the hypothesis H3b. Managers' organizational identification (OIm) fully mediates the relationship between IGM and FP.

Discussion

The studies that tested the relationship between internal marketing and employees'/managers' organizational identification are scarce (e.g. Boukis et al., 2015; Bogavac et al., 2021; Hernández-Díaz et al., 2017). In addition, the studies that examined the impact of managers' organizational identification on employees' organizational identification in the internal marketing context are scarce as well as the studies that examined the impact of managers' organizational identification on financial performance (e.g. Wieseke et al., 2009), especially in the agrobusiness sector. In this regard, there are no studies that tested these relationships in the internal green marketing context and the agribusiness environment. That is why the results of this paper are even more significant.

The one of the results of this paper confirmed that internal green marketing affects organizational identification (in this case managers' organizational identification in the agribusiness sector), similar to the impact of green marketing on employees' organizational identification in the service sector (Boukis et al., 2015; Hernández-Díaz et al., 2017). This result confirmed the relevance of an implementation of this concept and its effects in the sector where services are not the primary activity. Relying on the finding of Wieseke et al. (2009), it is expected that the managers' organizational identification of the organizations operating in the Serbian agribusiness sector will affect the organizational identification of their followers in the context of implemented internal green marketing orientation. Having in mind that the employees who are identified with their organization achieve better performance (Wieseke et al., 2009), it is necessary to constantly improve the organizational identification of employees and managers, which also applies to the agribusiness sector. Managers, especially middle managers, play a significant role in this.

The second result of this paper confirmed that managers' organizational identification has a positive and significant effect on the financial performance of the organizations in the agribusiness sector of Serbia. Thus, the finding of the previous research (Wieseke et al., 2009) was confirmed, although Wieseke et al. (2009) conducted their examination at the business unit level in the context of internal marketing, and in the service sector. At the same time, the third result of this paper can be based on this finding of Wieseke et al. (2009) that there is the indirect, positive and statistically significant effect of internal green marketing on financial performance through managers' organizational identification. A direct effect of internal green marketing on financial performance was not supported. Previous study confirmed that even strategic green marketing orientation (SGMO) has no significant direct impact on financial performance (competitive advantage mediates the impact of SGMO on financial performance) and that internal green marketing orientation "intensifies the positive effect of SGMO on competitiveness" (Papadas et al., 2019, p. 639). In this sense, the level of managers' organizational identification should be constantly improved because managers' organizational identification fully mediates the relationship between internal green marketing and financial performance of the organizations in the Serbian agribusiness sector.

Effective, open, two-way and continuous green internal communication, rewarding both green initiatives and green activities of managers, as well as training and education to develop their green skills affect the level of managers' organizational identification of the agribusiness sector. In this regard, the managers feel respected by their organization. The managers, also, are becoming aware of their role in achieving green marketing and organizational goals as well as implementing green marketing and business (environmental) strategy. As a result, managers feel a sense of belonging to their (green) organization. When they talk about their organizations, they usually say "we" (rather than "they"). When someone praises their organization, they feel it as a personal compliment. Managers are also very interested in what others think about their organizations. Such managers contribute to financial performance of their organizations i.e. sales revenue growth, profitability growth, and costs reduction. This is very important, given the need for organizations operating in the environmentally sensitive sectors to align financial, marketing and environmental goals.

Conclusion

Having in mind that taking care of employees, the environmental protection, and financial results are not always easy to harmonize, and that managers play a key role in this task, this paper examined the impact of internal green marketing on managers' organizational identification and financial performance of the organizations operating in the agribusiness sector in Serbia. A review of the literature found that there is a lack of empirical studies in this field. In this regard, one of the main contributions in this paper is that the hypotheses were tested in the agribusiness sector organizations of less developed country such as Serbia, where these relationships have not been tested. Environmental protection, green orientation, green marketing and management, and thus internal green marketing are keys in these organizations. Besides, this paper extends the results of earlier research with regards to the relationship between internal dimension of marketing, managers' organizational identification as the individual outcome and financial performance as the organizational outcome.

The findings of the research revealed that there is a positive and statistically significant direct effect of internal green marketing on managers' organizational identification, a positive and statistically significant direct effect of managers' organizational identification on financial performance as well as a positive and statistically significant indirect effect of internal green marketing on financial performance through managers' organizational identification. According to the research findings in this paper, organizations in the agribusiness sector of Serbia should implement internal green marketing, and pay attention to the organizational identification.

This findings contribute to better understanding of internal green marketing, its impact on employees, especially on managers, their organizational identification and financial performance. In addition, the results of the paper can be used by managers in agribusiness sector in Serbia to improve their organizational identification as well as employees' organizational identification, and finally to improve financial performance.

Since internal green marketing a priori includes environmental protection, it is easier to optimize environmental, marketing and economic goals in these conditions.

The results of this paper refer to small, medium and large-sized organizations (enterprises and entrepreneurs) operating in the agribusiness sector in the Republic of Serbia. The number of managers (organizations) that participated in the survey is modest. Besides, the responses may be biased. Although the findings show some interesting insights into links between internal green marketing, managers' organizational identification and financial performance, these results cannot be generalized in another business context. There is a lack of controlling for other factors including contextual factors and some exogenous effects that could affect managers' perception of internal green marketing adoption and its effects on the observed dependent variables. These limitations should be taken into account in future research.

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Conflict of interests

The authors declare no conflict of interest.

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AGRICULTURAL LABOUR PRODUCTIVITY GROWTH AND FOOD INSECURITY TRANSITIONS AMONG MAIZE FARMING HOUSEHOLDS IN RURAL NIGERIA

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A B S T R A C T

Agriculture in rural Nigeria is labour-intensive. Thus, the much-desired transition from food insecurity to food security by householdsrequires growth in labour productivity. Labour productivity growth and its effect among other factors on food security transitions of maize farming households in rural Nigeria were assessed. Food insecurity indices were constructed using the second and third waves of data from the General Household Survey-Panel (2012 and 2015), and a probabilistic model was specified. The analytical tools used were descriptive statistics, Partial factor (labour) productivity, Foster-Greer-Thorbecke Model, Markov chain model, Tobit, and Multinomial Logit Regression Models. Labour productivity increased between the two periods although labour productivity growth was very low. Labour productivity growth negatively and significantly affected the transition into food security and being chronically food insecure. Thus, a boost for labour productivity growth should be targeted as a safetynet, especially for the food insecure and households vulnerable to food insecurity.

Introduction

Globally, aboutone-third of theworld's labour force is employed by the agricultural sector. Neither men nor women who work as agricultural labourers own or rent the land where they do their work, as well as the tools and equipment they employ(FIAN International, 2014; ILOSTAT, 2022). Therefore, in many regions of the world, a significantfractionof them are food insecure and comprise the rural poor (World Bank, 2022).It is a fact that adequate quantity and quality of food is a basic need for food security and hence food insecurity affects rural farmers' ability to survive, thrive and

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sustain life. Food insecurity thus poses a clear, substantial threat to our society's well-being given the myriad of negative consequences linked with hunger.

While household food insecurity is described as a scenario where access to or consumption of food is uncertain, insufficient, or unavailable, food security is defined as "a situation in which all individuals at all times have physical and economic access to sufficient, safe, and nutritious food which fits their dietary needs and food choices for an active and healthy life"(FAO, 1996; Aboaba*et al.,*2020; Obayelu *et al*., 2021). In other words, a household is food insecure when it is unable to buy or have access to the amount and quality of food necessary for a healthy lifestyle (Obayelu and Orosile 2015). Due to an increase in the number of malnourished people in the world in recent years, the majority of global conversations have continued to centre on hunger and food security(Ayinde *et al.,* 2020). In 2021, 20.2% of Africans were considered to be undernourished, compared to 9.1% in Asia, 8.6% in Latin America and the Caribbean, 5.8% in Oceania, and less than 2.5 per cent in Northern America and Europe(FAO, IFAD, UNICEF, WFP and WHO, 2022).

In Nigeria's rural areas, where a higher proportion of smallholder farming households reside and operate their farms, food insecurity and hunger are major concerns. The benefits of increasing food production have not resulted in a higher proportion of the population being food secure in the nation. (Otekunrin *et al.,* 2019;2021). Small-scale farmers, who control the nation's food production experience socioeconomic and institutional limitations that reduce their productivity (Oyebanjo *et al.,* 2015) and even though rural households which are primarily made up of farmers grow and sell crops in markets, they nevertheless struggle with food insecurity and hunger (Nkegbe, 2017; Ogunniyi *et al*. 2018)

Agricultural labour productivity is correlated with food insecurity because lower agricultural labour productivity would result in a smaller food supply, higher food costs, lower farm income, and ultimately reduced buying power to meet other needs for achieving household food security(Squires and Gaur, 2020). Moreso, it isbelieved that sub-Saharan Africa's agricultural productivity, particularly in Nigeria, may be constrained by the inefficient use of hired and family labour, which will have a significant impact on farming households' food security. This is becauseNigerian agricultureis labour-intensive andstill largely supported by small-scale resource-limited farmers who live in the country's rural areas. Although the sector has a lot of human resources, its contribution to economic growth has been declining over time (Manyong et al., 2005; Mohammed-Lawal and Omotesho, 2010).In other words, the low productivity has been attributed to the fact that the sector is primarily made up of small-scale farmers who still employ primitive production techniques, making them heavily dependent on manual labour and maintaining their level of production at a subsistence level(Gocowski and Oduwole, 2003; Oluyole *et al*., 2013; Anyaegbunam *et al.,*2010).

Several causes, including but not limited to migration, the desire for a better education than what is provided in rural areas, the prevention of child labour, and the search for white-collar work, have contributed to a recent trend of a declining family labour supply.The success of the International Labor Organization in preventing child labour, along with growing recognition of the value of education even in rural regions, has raised the percentage of children enrolled in schools, limiting the amount of time available for farm work (Diallo *et al*., 2013). The demand for an alternate source of farm power, such as hired labour, to meet households' needs for food security is growing even though family labour is most sought by peasants due to its lower transaction cost. That is, in order to make the highly desired shift from small-scale farming, which is typically defined by food insecurity, to a commercial level of output (status of food-secure households) through an increase of production resources, extra labour must be outsourced. This is especially important when family labour is insufficient to ensure high levels of food security for farming households.

Given the connection between low labour productivity and food poverty, there is a significant likelihood that Nigeria's agricultural labour productivity will be constrained by inadequate utilisation of labour. The relationship between rising labour productivity and changes in food insecurity, however, has not gotten much attention. Thus, this study aims at highlighting the link between labour productivity growth and food insecurity transitions among maize farmers in Nigeria. This is pertinent as incomefrom growth in labour productivity has great implications for the affordability of food and by extensionmovements into and out of food insecurity.Maize farmers were chosen because maize(Zea Mays) is one of the crops in the highest demand in the world. In addition to beingamajor staple food for families in Nigeria and a key constituent of livestock feeds, it has other varying industrial uses(ThriveAgric,2021).Given the foregoing, it is imperative to provide empirical support for the relationship between rising labour productivity and changes in food insecurity among maize farming households in rural Nigeria.

Materials and methods

The scope of this study is Nigeria. Nigeria is located in West Africa, the Gulf of Guinea between the Republic of Benin and Cameroun and is positioned between latitudes 4^{0}1` and $13^{0}$ 9`Nand longitudes 2^{0}2` and 14030' E. Its 923,777 square kilometre area is bordered to the east by Cameroun, the northeast by Chad, the north by the Niger Republic, and the west by the Benin Republic. It is made up of 774 Local Government Areas and 36 federating states, including the Federal Capital Territory (Abuja) (LGAs). With a population of roughly 219,463,862 and a rural population of about 99,033,580, Nigeria is the most populated country in Africa (Central Intelligence Agency, 2022). Approximately 90% of those living in rural areas work in agriculture. The GHS-Panel data for the second and third waves of surveys, which were gathered in February–April 2013 and 2015, respectively, through cooperation between the National Bureau of Statistics (NBS) and the World Bank Living Standard Measurement Study (LSMS) team, served as secondary data for this study (NBS, 2014; 2016). Because these were the most recent data available at the time of this investigation, the second and third waves were utilised. The information, which was gathered from a sample of 5000 households, is nationally representative and includes details about household characteristics, literacy rates, on- and off-farm income-generating activities, paid and unpaid employment, agricultural practices and output, labour, household food expenditure, wage rates, and farm characteristics. The data also provides enough information to assist the researcher to respond to important study issues, and it is representative of both rural and urban areas as well as all of the country's geopolitical zones.The analytical techniques used in this investigation were descriptive statistics, the Food Insecurity Index, Tobit and Multinomial Regression models, and the Markov Chain model. Frequencies, percentages, and tables were utilised as descriptive tools, and the Food Insecurity Index, which was calculated as the ratio of each household's per capita food spending to the mean per capita expenditure, was used to categorize households according to their level of food security. As a result, households classified as food-secure had per capita food expenditures that were greater than or equal to two-thirds of the mean per capita monthly food expenditure for households, while households classified as food insecure had per capita food expenditures that were lower than that threshold.

The ratio of labour output (Y) to labour input (L) is known as labour productivity (L). It is a partial indicator of productivity that is heavily reliant on the efficient utilisation of other inputs (Schreyer, 2001). Labour productivity (y_p) is expressed as:

$$_p = \frac{\text{volume measure of output}}{\text{Measure of labour input}} = \frac{Y}{L} \ldots\ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

or

$$y_p = \frac{\text{total revenue of maize farmed at time t}}{\text{cost of labour used by maize farmers at time t}} = \frac{Y}{L} \ldots\ldots\ldots \ldots\ldots.. \quad (2)$$

Tobit regression was used to examinethe factors influencing labour productivity growth among maize farming households in rural Nigeria. The explicit form of the regression model is stated as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_{11}X_{11} + \beta_{12}X_{12} + U \ldots\ldots \ldots\ldots\ldots \quad (3)$$

Where Y = Labour Productivity Growth

X_1 = Age of farmers (years),

X_2 = Education level (years of schooling),

X_3 = Household size (number)

X_4 = Marital status (Yes=1 if married, 0 if otherwise)

X_5 = Member of cooperative society (Yes =1; 0 if otherwise)

X_6 = Extension visits (number),

X_7 = Access to credit (Yes =1; 0 if otherwise),

X_8 = Household food expenditure (₦)

X_9 = Gender (Male =1, 0 if otherwise)

X_{10} = Dependency ratio (number)

X_{11} = Value of assets (Naira)

X_{12} = Farm size (Ha)

B_0 = constant term,

$\beta_1 - \beta_{12}$ = regression coefficients of independent variables, and U = Error term.

A Multinomial Logit model was used to examine the effects of labour productivity growth on food insecurity transitions of maize farming households in rural Nigeria. Considering a random variable Y_i that takes one of several discrete values, which is index 1, 2, 3….., *J*. in this study, Y_i is the food insecurity transitions categories and it takes the values 'Always food secure', 'Entering food insecurity', Exiting food insecurity, and 'Chronically food insecure, which are indexed 0, 1, 2, 3.According to the model, there is a chance that every person will fit into one of the categories. Since the household categories 0, 1, 2, 3 … ,j are unordered, the most preferred way to relate π_i to covariates is through a set of j* - 1 baseline-category logits. Taking j* as the baseline category, the model is

$$\text{Log}\left(\frac{\pi ij}{\pi ij*}\right) = \chi_I^T \beta j, \;\; j \neq j* \text{………… ……………} \quad \text{…… (4)}$$

The baseline-category probability (Yi = j* (0) can be written as:

$$\pi_{i0} = \frac{1}{1+\sum j=1 \exp(\chi_i^T \beta j)} \text{….} \qquad .\ (5)$$

Following Adepoju (2012)and Ayantoye (2011), the multinomial logit regression model can be expressed explicitly as

$$Y_0 = \alpha_0 + \beta_{10}X_1 + \beta_{20}X_2 + \text{……………} + \beta_{n0}X_n + \varepsilon_{i0} \text{……………………….(6)}$$

$$Y_1 = \alpha_1 + \beta_{11}X_1 + \beta_{21}X_2 + \text{……………} + \beta_{n1}X_n + \varepsilon_{i0} \text{……………………….(7)}$$

$$Y_2 = \alpha_2 + \beta_{12}X_1 + \beta_{22}X_2 + \text{……………} + \beta_{n2}X_n + \varepsilon_{i0} \text{………………………. (8)}$$

$$Y_3 = \alpha_3 + \beta_{13}X_1 + \beta_{23}X_2 + \text{……………} + \beta_{n3}X_n + \varepsilon_{i0} \text{………………………. (9)}$$

Where Yi represents 4 unordered categories of food insecurity transition:

Y_0 = Always food secure in both waves (which is the reference case)

Y_1 = those who were food secure in the first, but food insecure in the second wave (i.e.) transitorily food insecure).

Y_2 = those who were food insecure in the first wave, but food secure in the second wave (i.e. transitorily food insecure).

Y_3 = those who were food insecure in both waves (chronically food insecure)

X_1… Xn representvector of the explanatory variables where n = 1….12

$B_1 \ldots \beta_{12}$ represent the parameter coefficients

εi = representsthe independently distributed error terms

$\alpha_{0-}\alpha_3$ = shows the intercept or constant terms.

Results and discussion

According to this study,more than four-fifths (85.3%) of maize farming households in rural Nigeria are male-headed, implying that agriculture is still predominantly dominated bymales. The distribution of the respondents with respect to age indicates that most rural household heads were between ages 46 and 65 years with a mean age of 52.8 ± 14.2 years.Household sizes of between 6 and 10 members, were predominant while the average household size stood at about 8 members per household.While more than four-fifths (81.7%) of maize farming households heads in rural Nigeria were married, more than two-fifths had no formal education nor access to credit and extension services respectively. In addition, almost all the respondents (97.1%)farmed less than one hectare of land (*Table 1.*).

Table 1. Distribution of maize farming household in rural Nigeria by socioeconomic characteristics.

Socioeconomic characteristics	**Frequency**	**Percentage**
Gender		
Male	696	85.3
Female	120	14.7
Age		
< 25	11	01.4
26-45	264	32.4
46-65	377	46.2
> 65	164	20.1
Marital Status		
Married	667	81.7
Never Married	149	18.3
Household size		
≤5	178	21.8
6-10	427	52.3
11-15	182	22.3
≥ 16	029	03.6
Credit		
Yes	148	18.1
No	668	81.9
Farm size		
< 1	792	97.1
1-2	018	2.20
> 2	006	0.70
Extension Service		
Yes	138	16.9

Socioeconomic characteristics	Frequency	Percentage
No	678	83.1
Educational Level		
No Formal Education	314	38.5
Primary Education	290	35.5
Secondary Education	143	17.5
Tertiary Education	069	08.5
Value of Asset		
≤ 25000	331	40.6
25001-50000	180	22.0
50001-75000	137	16.8
≥ 75000	168	20.6

Source: Authors' computation from GHS data

Table 2. Food insecurity profile of respondents by selected socioeconomic variables

Socioeconomiccharacteristics	Incidence (F_0)	Depth (F_1)	Severity (F_2)
Gender			
Male	0.39	0.14	0.07
Female	0.50	0.18	0.09
Age			
< 25	0.73	0.26	0.12
26-45	0.43	0.16	0.08
46-65	0.37	0.12	0.06
> 65	0.43	0.18	0.10
Marital Status			
Married	0.37	0.14	0.08
Never Married	0.52	0.19	0.24
Household size			
≤5	0.57	0.24	0.13
6-10	0.41	0.15	0.07
11-15	0.25	0.06	0.03
≥ 16	0.21	0.06	0.02
Credit			
Yes	0.35	0.12	0.05
No	0.41	0.15	0.08
Membership of Cooperative			
Yes	0.24	0.07	0.03
No	0.41	0.15	0.08
Extension Service			
Yes	0.33	0.14	0.07
No	0.42	0.15	0.08
Educational Level			
No Formal Education	0.48	0.19	0.10
Primary Education	0.36	0.12	0.05
Secondary Education	0.41	0.15	0.08
Tertiary Education	0.25	0.07	0.03
Value of Asset			

Socioeconomiccharacteristics	Incidence (F_0)	Depth (F_1)	Severity (F_2)
≤ 25000	0.50	0.20	0.11
25001-50000	0.37	0.13	0.06
50001-75000	0.36	0.11	0.05
≥ 75000	0.28	0.08	0.03
Zone			
North Central	0.51	0.22	0.12
North East	0.39	0.14	0.07
North West	0.40	0.15	0.08
South East	0.35	0.11	0.05
South South	0.23	0.05	0.01
South West	0.53	0.16	0.07

Source: Authors' computation from GHS data

The line for food insecurity was calculated to be ₦2883.20, or two-thirds of the average per-capita food expenditure for all households. Three food insecurity indices of incidence (F_0), depth (F_1), and severity (F_2), adopting the Foster, Greer, and Thorbecke poverty measure,were used to create a profile of the respondents' food insecurity. According to the distribution of households depending on their level of food insecurity,about two-fifths (40.1%) of the households experienced food insecurity, while approximately three-fifths (59.9%) did not. The condition of the households' food insecurity was further broken down based on a few socioeconomic factors, including gender, age, marital status, level of education, household size, and membership in a cooperative organisation. The final profile is shown in (*Table 2*), and the following points are discussed:

When data were broken down by gender, it became clear that households headed by women experienced food insecurity at a somewhat higher rate than those headed by men. Additionally, the level of food insecurity showed that female-headed households would need more money to escape food insecurity than male-headed households would, which would cost ₦518.90. The same pattern was observed in the food insecurity severity indices, which assess the degree of inequality in the distribution of food expenditures among the food insecure. Female-headed households had a marginally higher food insecurity severity index than male-headed households.

Regarding marital status, the findings revealed that married household heads had a lower rate of food insecurity than their counterparts who were single. According to the food insecurity depth indices of 0.37 and 0.52 for married and single heads, respectively, married household heads would need ₦1066.80 to escape food insecurity, whereas single heads would only need roughly ₦1499.30 to do so. A low level of inequality in the distribution of food expenditures between married and unmarried household heads was also indicated by the food insecurity severity indices of 0.08 and 0.24 for married and unmarried household heads, respectively.

The household heads without a formal education had the highest incidence of food insecurity (0.48) and depth (0.19), according to the educational status profile. This suggests that for household heads without a formal education, the average amount needed to end food poverty is ₦183.90. Household heads with tertiary education, on the other hand, had the lowest incidence (0.25) and depth of food insecurity (0.07). Additionally, as compared to household heads with primary, secondary, or tertiary levels of education, inequality in the allocation of food expenditures was greatest among those without a formal education. Additionally, research on access to extension services revealed that household heads who lacked access had greater food insecurity than their counterparts who did. The gap and severity indices for food insecurity also displayed this pattern. The age breakdown also showed that household heads under 25 years had the highest frequency, depth, and severity of food insecurity, followed closely by household heads 65 years of age and above.

With regard to household size, there is less food insecurity as the size of the household rises. In particular, households with less than five members had the highest frequency (0.57), depth (0.24), and severity (0.13), whereas those with more than 16 members had the lowest incidence (0.21), depth (0.06), and severity (0.02). The number of labourers available to work on maize farms tends to grow with household size, especially if the distribution of household members allows for more adults to work, which lowers food insecurity in that household. This outcome is consistent with those reported by Omonona and Agoi (2007) and Babatunde et al. (2008).

The food insecurity transition matrix and their probabilities (*Table 3.*)show that while some households remain food insecure, some households indeed move in and out of food insecurity over a specific period. Specifically, about four-fifths of those who were food secure in 2012 remained so in 2015, while one-fifth of those who were food secure in 2012 transitioned to food insecurity in 2015. This study’s significant conclusion is that no respondent went from being food insecure in 2012 to being food secure in 2015. As a result, all (100%) of the respondents who were food insecure in 2012 remained so in 2015. This finding makes it abundantly evident that people who are currently in a position of food security may not remain so tomorrow, especially if they are exposed to risks and uncertainties for which they lack the necessary resources as well as a lack of resilience when confronted with shocks.

Table 3. Food insecurity transition matrix of respondents included in this study

Food security status	Frequency	Percentage
Always food secure	489	59.9
Moving into food insecurity	125	15.3
Exiting food insecurity	0.0	0.0
Always food insecure	202	24.8
Total	816	100.0

Source: Authors’ computation from GHS data

Labour Productivity Growth Among Maize Farming Households in Rural Nigeria.

The average labour productivity growth of maize farming households in rural Nigeria in 2012 and 2015 is shown in Table 4. The mean labour productivity in 2015 (6.1) was higher than the mean labour productivity in 2012 (2.3) implying that there was an increase in labour productivity of maize farming households between the periods. The labour productivity growth in rural Nigeria however stood at 0.2 indicating that the labour productivity of maize farming households in rural Nigeria is still very low.

Table 4. Labour productivity of maize farming households in rural Nigeria

Labour productivity	**Mean**	**Standard Dev.**
Labour productivity in 2015	6.1	15.1
Labour Productivity in 2012	2.3	4.7
Labour productivity growth	0.2	0.1

Source: Authors' computation from GHS data

As presented in Table 5, formaize farmers transiting from food securityinto food insecurity, household size, access to extension services and labour productivity growth were major factors influencing the transition into food insecurity. Specifically, household size had a negative effect and was significant at 1 per cent. This indicates that a member increase in household size would lead to a 0.116 unit decrease in the likelihood of maize farming households transiting from food security into food insecurity. An increase in household size increases the number of labour available to work on the farm and by extension labour productivity. This outcome is consistent with the findings of Okoedo-Okojie and Onemolease (2009), who found that a typical rural farmer's closest family members serve as his primary source of labour. A negative and significant 'access to extension' variable also implies that having access to extension services will lead to a 0.9879 unit decrease in the likelihood that households will transit from food security to food insecurity relative to those who remained food secure between the periods. This is probable since extension services enhance theability of the farmers to efficiently utilize resources and adopt new and improved methods of maize production, which in turn improve yield and help in meeting other necessities and by extension attaining food security status. This is in line with Obwona (2006), who reported that extension service is very essential to the improvement of farm productivity and efficiency among farmers. Labour productivity growth in line with *a prori* expectations had a positive effect on moving into food insecurity. Hence, a unit increase in labour productivity growth will lead to a 0.02987 decrease in the likelihood of maize farming households transiting from food securityinto food insecurity relative to households that are always food secure. In other words, the increase in labour productivity growth, although insignificant, was enough to pull some farmers out of their food-insecure state. An increase in labour productivity leads to an increase in output as well as income, profit, and investment opportunities. thereby reducing the transition into food insecurity.

The always food insecure category represents maize farming households in rural Nigeriathat were food insecure in 2012 and remained food insecure in 2015. Key determinants of this category include years of formal education, household size, membership in cooperatives and labour productivity growth. Years of formal education had a negative effect on being always food insecure or chronically food insecure. Thus, a year increase in the years of formal education will lead to a 0.0542 unit decrease in the likelihood of maize farming households remaining chronically food insecure relative to households who are always food secure. Hence, households with more years of formal education are more likely to exit food insecurity. . Human capital development improves farmers' awareness, perception, and adoption of innovations that can result in an improvement in productivity, which has a favourable impact on their ability to make decisions. This result is consistent with the claim of Ntshangase et al. (2018) that education makes it easier for people to adopt new technologies and better farming methods.Household size also had a negative effect. Specifically, a member increase in the household size will lead to a 0.219 decrease in the likelihood of maize farming households remaining food insecure relative to households that are always food secure. In other words, households with more members have a higher probability of exiting food insecurity, probably due to the possibility of higher availability of family labour.Being a member of a farmers'cooperative society also had negative effects. Specifically, being a memberwill lead to a 1.104 decrease in the likelihood that households would remain food insecure. This is because membership in a farmers' cooperative affords the farmers such benefits as improved access to production resources and agricultural information that will improve their production practices. This finding is in line with Ekong (2003) and Ajayi and Ogunlola (2005), who both reported that farmers who are members of cooperatives have advantages of accessibility to resources, micro-credit, input subsidy and social capital needed to improve productivity. Again, labour productivity growth had negative effects indicating that labour productivity growth reduced the likelihood of households remaining food insecure. This finding shows that labour productivity growth is a pertinent driver of food security in rural Nigeria.Thus, a boost for labour productivity growth should be targeted as a safety net, especially for the food insecure and households vulnerable to food insecurity.An interesting finding of this study is that no household exited food insecuritybetween the two periods, hence only 3 unordered categories of food insecurity transitions could be assessed.

Table 5. Effect of labour productivity growth on food insecurity transitions

Food insecurity transition categories	**dy/dx**	**SE**	**Z-value**	**P>|Z|**
Always food secure	(base outcome)			
Moving from food secure to food insecure				
Labour productivity growth	-.02987 **	0.012	-2.39	0.017
Years of formal education	-.02177	0.020	-1.08	0.282

Food insecurity transition categories	dy/dx	SE	Z-value	P>|Z|
Household size	-0.1160***	0.337	-3.45	0.001
Member of cooperative (yes)	-0.3181	0.534	-0.59	0.552
Access to extension (yes)	-0.9879***	0.369	-2.68	0.007
Distance to road (yes)	-.00088	0.006	-0.15	0.879
Access to credit (no)	-0.0801	0.267	-0.30	0.764
Always food insecure				
Labour productivity growth	-0.0242**	0.011	-2.10	0.035
Years of formal education	-0.0542***	0.018	-3.05	0.002
Household size	-0.2190***	0.030	-7.21	0.000
Member of cooperative (yes)	-1.1039 **	0.541	-2.04	0.042
Access to extension (yes)	0.1096	0.243	0.45	0.653
Distance toroad (yes)	0.0021	0.007	0.32	0.750
Access to credit (no)	0.3616	0.249	1.45	0.147

Source: Result of Regression Analysis

*** Significant at 1%, ** at 5%, * at 10%

Number of obs= 802

Wald chi2(14) = 89.28

Prob > chi2 = 0.0000

Pseudo R2 = 0.0692

Log pseudolikelihood=-696.6942

Conclusion

This study empirically established the link between labour productivity growth and food insecurity transitions among maize farming households in rural Nigeria.Labour productivity increased between the two periods although labour productivity growth was very low. Food insecurity was more chronic than transitory in rural Nigeria. In other words, the probability of remaining food insecure than exiting food insecurity, if already food insecure was higher. This has implications for government, policymakers and stakeholders in their targeted efforts, programs, and policies at reducing food insecurity in rural Nigeria. Labour productivity growth had significant effects on food insecurity transitions of maize farming households in rural Nigeria.

Labour productivity growth hadnegative effects on transitions into food insecurity and remaining food insecure. Labour productivity growth should therefore be one of the major focuses of interventions targeted at reducing food insecurity in rural Nigeria. Factors such as access to extension, distance to road, membership in cooperatives, and years of formal education also had significant effects on food security transitions among maize farming households in rural Nigeria.Based on the findings of the study, policymakers should focus on policies aimed at enhancing labour productivity on the farm. This could be through improved access to extension services, social institutions,and by extension agricultural information targeted at cooperative farmers' groups.Further, human capital development in rural Nigeria should be prioritized by stakeholders since education allows the farmers to better understand the dynamics of agricultural labour productivity and resource management for improved food security.

Conflict of interests

The authors declare no conflict of interest.

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APPLICATION OF HOLISTIC MARKETING IN THE FORMULATION OF A BUSINESS CONCEPT OF AGRICULTURAL PRODUCERS FROM SOUTH SERBIA

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A B S T R A C T

The purpose of this paper is to analyze business concept of agricultural producers in Serbia and to show the necessity to define a new concept based on a holistic marketing approach. The components of holistic marketing are viewed from the standpoint of small scale fresh food producers in Serbia as economic entities. Analysis of current business situation, position of Serbian agricultural producers in agri-food supply chain and problems which they are facing are defined. Results of the analysis show the existing business orientation of producers and reveal their views regarding future business orientation. A presented solution to overcome the existing problems includes modernization of business by using combination of holistic marketing elements to create business concept which will provide conditions for improving competitiveness of agricultural producers. The conclusion has indicated the necessity of a new marketing approach for small scale producers in order to meet the challenges of modern business.

Introduction

Modern agri-food supply chains represent globally connected systems and networks with a large number of complex relationships between participants, who replace the autonomy and independence of traditional chains, with continuous innovation of products, processes and forms of cooperation (van der Vorst et al., 2007; Zylbersztajn, Omta, 2009). Today's market puts pressure on agri-food supply chains, directing them towards improving coordination between buyers and sellers and towards continuous

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innovation, development and improvement of quality, logistics and information flows (Ruben et al., 2006). Successful coordination, integration, and management of key business processes among supply chain participants determine their competitive advantage and success (Himanshu et al., 2012).

Modern chains must be organized in order to respond to the challenges posed by intense competition and by consumers, whose increased expectations regarding price and quality becomes of great importance, as they are able to choose from a number of products offered by competing chains. Market development place dynamic demands on the agri-food supply chain performance, which drives the change of roles, activities and strategies of participants, both in developed and developing countries (van der Vorst et al., 2007; Milojević et al., 2020). According to Ruben et al. (2006), in order to bridge the gap between local economic development and global chain integration, it is necessary to create new institutional and organizational marketing networks that enable producers to meet business requirements and standards, to adjust their deliveries and align them with consumer requirements and become a recognizable part of the global supply system. These requirements can be met by marketing-oriented producers and businesses.

Adopting a holistic marketing model can affect the competitiveness of each participant in the agri-food supply chain and the competitiveness of the entire chain. The concept of holistic marketing starts from the development, design and implementation of marketing programs, processes and activities, which recognizes the breadth and interdependence of effects (Keller, Kotler, 2006). By adopting a holistic marketing approach, agricultural producers as participants in the chain can develop their marketing strategies and programs based on the components of holistic marketing. These programs must be designed depending on the characteristics of agricultural production, products and distribution processes, and then included in the business activities of the company. A change in the business concept of producers that leads to the improvement of their business, can further affect all related parties in the chain and ultimately to the improvement of business and competitiveness of the entire supply chain.

The paper brings holistic marketing approach to the context of the agricultural producers' business concept, based on the characteristics and specifics that arise from the nature of agricultural activity and production of fresh food. The main topic of this paper is to propose a model of marketing structure based on the principles of holistic marketing, which can improve the market position of small producers of fresh food, based on the analysis of the characteristics of the supply chain of fresh food (fruits and vegetables) and the position of small producers in Serbia. Modern marketing models of supply-chain organization can be used as a basis for redesigning the existing market of fresh fruits and vegetables in Serbia, in order to improve the position of small producers in the chain. The aim is to develop a model that modernizes the fresh food supply chain through the application of holistic marketing as a solution to overcome some of the existing problems in the production and distribution of fresh agricultural products.

Holistic marketing concept in the agri-food sector

Marketing challenges are most serious in areas where it is most difficult to identify sustainable strategies to improve market access, and that is precisely the fresh food production sector. Agricultural producers who have not accepted the marketing concept in business are always at a disadvantage in relation to intermediaries in the supply chain and often are obligated to accept unattractive conditions. In order to achieve a competitive advantage, they must consider future market changes, and align supply with consumer demands and needs and the ability to create a sustainable competitive advantage. A holistic marketing approach can play a key role in this process. A comprehensive, holistic, approach to marketing and business development, considers a range of marketing constraints to improve the conditions in which producers participate in the market. By adopting a holistic approach, a company can balance market requirements with technological, infrastructural, educational and legal requirements.

The implementation of a holistic marketing approach in the food production sector aims to create an efficient integrated network for the movement of safe agricultural products by covering all four components of a holistic approach, using a unique and functional business concept. From the aspect of agricultural producers as economic entities, and given the new marketing environment, the components of holistic marketing can be viewed as follows.

Relationship marketing as part of a holistic marketing philosophy is focused on long-term relationships with all key partners to the mutual satisfaction, which will enable earnings and business sustainability. Relationship marketing aims to create a marketing network consisting of the company and its stakeholders with whom it has built mutually profitable business relationships. This marketing network is a unique and invaluable asset of the company. Increasingly, competition is not between companies but between marketing networks. (Kotler, Keller, 2016)

Producers as participants in agri-food chain must develop close and long-term relationships with all stakeholders inside and outside the chain - individuals and organizations that can directly or indirectly affect the success of their marketing activities. Relationship marketing aims to build strong economic, logistical and social ties between relevant partners. In addition to agricultural producers, the key elements of the chain, whose relationships are most important to the success of the chain, are their suppliers, distributors, wholesalers, retailers, customers and consumers. Relevant ministries, faculties, institutes, banks and insurance companies, chambers of commerce, business associations, business support organizations and national and regional development agencies are also important actors for agricultural producers. According to Lambert and Cooper (2000) the ultimate business success of an individual business depends on the ability to manage the integration of the individual business into the complex network of business relationships and processes. This imposes the need to implement new organizational systems that aim to improve logistics, efficient use of information, increased use of new technologies, and improve quality management.

New generation cooperatives are being developed, which strengthen the position of agricultural producers by forming strategic partnerships and vertical alliances that strengthen the sustainability of partnerships formed through supply chains (Cook et al., 2001; Zylbersztajn, Farina, 1999). Stakeholders, together with the participants in the chain, can form an effective marketing network with clearly defined roles of all members of the network dealing with food issues, directly or indirectly. By joining the marketing network, modern fresh food supply chains gain a competitive advantage in domestic and international markets.

Integrated marketing develops marketing activities and creates marketing programs, in order to create, communicate and deliver values for consumers above expected or usual. The planning and implementation of any marketing activity is done so that all other marketing activities are taken into account. By integrating marketing activities and processes, their combined effects are maximized. (Kotler, Keller, 2016)

By integrating business activities with marketing activities, agricultural producers can communicate with customers in all phases of the business process - procurement, production and sales, thus strengthening the effect of marketing activities on customers. The planning and implementation of any marketing activities aims to improve the business process, and is done keeping in mind all other business activities. This approach creates a unique experience of consumer interaction with producers, creating and directing communications so that everyone works together to create and deliver greater value to the customer.

Internal marketing has the basic task of hiring, educating and motivating capable, talented employees who want to nurture existing and gain new consumers. Holistic marketing explains that marketing activities are not only extremely important externally, they are also of great importance internally in the company. Internal marketing is done at multiple levels and in multiple departments, but it is common that marketing functions must be coordinated according to the customer’s point of view. (Kotler, Keller, 2016)

Agricultural producers as internal users play a key role in marketing their products and selling products to external customers. As Serbia is dominated by small producers who are faced with limited resources, information and knowledge, they implement internal marketing activities themselves. Their education is usually not in the domain of market research, logistics, sales, finance and other business functions and does not enable the implementation of customer-oriented marketing activities. By organizing producers into modern marketing organizations as modern forms of association, the amount of knowledge and experience at the organizational level is expanded, marketing relationships are accepted and internal marketing activities are implemented within the organization. By combining business functions, significant resources are created and specific knowledge is combined, which increases the business potential of the organization. Joining producer organizations best illustrates the meaning of a holistic approach aimed at maintaining and growing in an increasingly demanding market. By building quality marketing relations, agricultural producers organized in associations create two-way communication with all stakeholders and their activities, except with internal members, can be implemented together with institutes, ministries, faculties, professional services, chambers and others whose purpose is to help agricultural producers gain competitive advantage.

Socially responsible marketing refers to the understanding of broader interests and codes of ethics from all areas of marketing, environmental protection, respect for legal and social activities and marketing programs. The concept of socially responsible marketing requires adherence to the social and ethical aspects of marketing practice. Socially responsible marketing of a company encompasses different types of social initiatives of the company. (Kotler, Keller, 2016)

Environmental protection, food safety, the use of modern clean technologies in food production, socially responsible and ethical behavior, fair trade, are today used as powerful marketing tools to communicate with consumers and a significant factor in the competitiveness of agricultural producers. For consumers, issues of food safety, production conditions and environmental impact play a more significant role in purchasing decisions (van der Vorst et al., 2005; Perčić & Spasić ,2021; Simić et al., 2021). These trends lead retailers to use product quality traits in their marketing and competition strategies, and food producers are urged to place greater emphasis on product quality traits (Bijman, 2002; Lakićević et al., 2022). Producers use these tools to create and maintain their reputation, which further affects the reputation of the chain and the reputation of retailers. The inclusion of the fresh food supply chain in international trade flows is accompanied by measures that impose quality standards relating to chemical residues in food, additives and microbiological contamination. The sustainability of the chain can be improved through the application of marketing measures, such as environmental labelling, differentiation of food products that are compatible with special safety and health standards, and within national and international standards and socio-cultural customs.

Analysis of the position of south Serbia agricultural producers in the fresh food supply chain as a basis for applying a holistic marketing approach

The most important participants in the fresh fruits and vegetables supply chain in Serbia are: large importers and traders of fruits and vegetables; retail chains and their distribution network; packaging companies and their network of suppliers; traders on the wholesale open market who supply smaller markets; buyers / resellers “from trucks”; sellers at the green markets (Živkov, 2010; Lojaničić et al., 2021). The products of a large number of small, mostly disunited producers are collected by aggregators in the service of small number of strong wholesalers. Wholesalers then sell to retailers, who are exclusively oriented towards intermediaries or importers of agricultural products, or sell to exporters. Participants in the upper levels of the existing chain have the greatest impact on the creation of economic policy towards small producers. Small producers realize most of their fruits and vegetables production through short chains. In addition to selling to wholesalers, they sell directly through green and open markets. A small number of producers have direct access to retail chains or processors in the food industry, or export their products. Small producers lack access to major markets for fresh produce, which leaves them vulnerable to market strength, and makes them easy to exploit by domestic buyers (Sexton, 2013).

Fresh food market in the Republic of Serbia is quite chaotic, disorganized and unregulated, and we can say that the market is dominated by aggregators and large buyers. Most fresh products in Serbia are taken directly from producers by intermediaries, i.e. buyers who sell them on the consumer market. Intermediaries between producers and retailers are wholesalers. A large number of buyers are domestic, local or regional wholesalers that have developed retail networks, or are owned by (mostly foreign) trade groups with a developed retail network and variety retail formats. A number of international retail chains present in Serbia and neighboring countries form regional purchasing / distribution centers and aggregate or import fresh fruits and vegetables for the needs of their retail network.

In order to identify the limitations of Serbian producers as a basis for creating a chain model that would improve their market position, the existing business concept of small fruits and vegetables producers and their position in the sector and relationship other participants in the supply chain were analyzed. Based on the obtained results, a model of marketing concept was proposed, that is adapted to the needs of small agricultural producers in order to successfully meet the needs of end consumers.

Materials and methods

The producers' business operations were researched through survey, in order to discover their business behavior and business concepts. The answers of one hundred and twenty surveyed fruit and vegetable producers from Jablanica (95) and Pčinja (25) district in Serbia with an annual production of 40 - 2000 tons of fresh fruits / vegetables were taken for analysis. The survey was conducted at the end of 2019, just before the outbreak of the Covid-19 pandemic. The global pandemic spread disruptions in the supply chain, the so-called ripple effect, and, in just a few months, revealed how vulnerable many global supply chains actually are and how important an efficient way of managing business operations and supply chains is (Mihajlović et al., 2021). Disruption particularly affected long agri-food supply chain, with a large number of participants and intermediaries, which provides a basis for further analysis.

Jablanica and Pčinja districts make up 7.1% of the territory of the Republic of Serbia, and 5.2% of total population, according to 2011. Census of Population, Households and Dwellings in the Republic of Serbia. In the structure of the economically active population of Jablanica district, 21,14% are individual agricultural producers, and 8,04% in Pčinja district, while state average is 9,18%, according to 2011. Census. The share of Agriculture, Forestry and Fisheries in regional GDP in 2019 is 10% in Jablanica district, and 6,88% in Pčinja district, while state average is 7,20%. This shows the high share of agricultural activity in the Jablanica and Pčinja region.

Results

The answers show the existing business orientation of the producers and reveal their views on the direction of business activities in the future.

Table 1. Questions from the survey with the aim, purpose and analysis of the answers.

<table>
<tr><th>No.</th><th>Question</th><th>Aim</th><th>Purpose</th></tr>
<tr><td rowspan="2">1</td><td>Which sales channels you use the most?</td><td>To discover the producers decision on the choice of market for product placement.</td><td>Whether producers opt for the wholesale or retail market.</td></tr>
<tr><td colspan="3">The answers show that fresh fruits and vegetables producers, most opt for the wholesale market.
Producers opt to sell most of their production directly from home to wholesalers and distributors or middlemen, who take over the goods directly from producers, or to sell their goods through wholesale open markets.
This shows that producers are production-oriented.
Sales to the wholesale market show that producers do not contact consumers, but organize their production based on the demand of intermediaries, and choose crops that suit intermediaries.
This limits the development of production and innovation needed to achieve the export competitiveness of domestic agricultural producers.</td></tr>
<tr><td rowspan="2">2</td><td>On what do you base your competitive advantage over other producers?</td><td>To discover how producers differentiate themselves from competitors.</td><td>How business orientation affects the competitiveness of producers.</td></tr>
<tr><td colspan="3">The answers are related to the decisions of producers on the selection of sales channels.
Producers are focused on products and production, and the basic questions they ask are how to produce and achieve quality.
The lack of information is reflected in the lack of interest in innovations in production.
Less than one third of the surveyed producers opt for market research and adapting their production to consumer needs.</td></tr>
<tr><td rowspan="2">3</td><td>In order to expand capacity and increase competitiveness, what would you choose?</td><td>To detect changes in the business concept based on market trends.</td><td>Will producers change their business orientation based on experience.</td></tr>
<tr><td colspan="3">Producers in the largest percentage (43%) opt for increasing the area under crops instead of increasing yields on existing plots due to the introduction of modern techniques and technologies in production (20%).
There is a similar percentage of producers who opt for the introduction of new sales channels (34%) and the establishment of associations with other agricultural producers (39%).
This indicates the presence of marketing orientation in one third of the surveyed producers.</td></tr>
<tr><td rowspan="2">4</td><td>Forming producers association is the right way to reduce buyers' pressure on producers?</td><td>To discover if there is a need for producers to cooperate.</td><td>At what level are producers aware of the impact of the association on their business.</td></tr>
<tr><td colspan="3">There is a high awareness of the need for producers to cooperate.
Over 80% of respondents believe that by associating they can improve their market position.
Compared to developed countries, the lack of association represents a limiting factor in the development of fruit and vegetable production. Therefore, it is necessary to form modern organized producer associations' modeled modern cooperatives in the European Union.</td></tr>
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<table>
<tr><th>No.</th><th>Question</th><th>Aim</th><th>Purpose</th></tr>
<tr><td rowspan="2">5</td><td>What are the reasons to form or be involved in the producers association?</td><td>To discover producers needs imposed by deficiencies in their operations.</td><td>Cooperation indicates the concentration of resources and opportunity for marketing orientation.</td></tr>
<tr><td colspan="3">The main reasons for the cooperation are still focused on improvement of production and products. Nevertheless, components that indicate marketing orientation, such as joint advertising and promotion (30%) and product certification (41%), were identified as reasons for formation of producers association by respondents.</td></tr>
<tr><td rowspan="2">6</td><td>What is the level of producers' associations' impact on pricing?</td><td>To detect whether associated producer have power to affects their market position.</td><td>Associated producers have the ability to dictate prices.</td></tr>
<tr><td colspan="3">Half of the respondents believe that the producers association would increase their influence on product pricing.
In a situation where buyers dictate prices, producers are in a situation to follow the decline in sales by lowering prices.
Associated producers have a greater ability to strategically approach the pricing policy that can be used as an element of the marketing mix. Pricing policies should be aligned with the other elements of the marketing mix, in order to implement the marketing strategy of positioning in the selected market segment.</td></tr>
<tr><td rowspan="2">7</td><td>To what extent does an increase in supply due to association with other producers affect bargaining power?</td><td>To discover if the supply of associated producers brings more power in negotiation.</td><td>Associated producers dictate the terms in the negotiations.</td></tr>
<tr><td colspan="3">More than half of the respondents (56%) believe that by associating they would have a better position when placing products on the market.
Over 30% of respondents are of the opinion that they would have a better position in relation to buyers when negotiating the terms of sale.</td></tr>
<tr><td rowspan="2">8</td><td>Are producers' associations sustainable in the long term?</td><td>To discover if producers believe in the sustainability of the association.</td><td>Sustainability of the association is a prerequisite for the development of relationship marketing.</td></tr>
<tr><td colspan="3">Two-thirds of respondents are positive about the long-term sustainability of producers associations. The answers clearly show that marketing orientation is present with most respondents. Producers increasingly want to be oriented towards the creation of marketing networks with the aim of improving the business concepts in order to properly meet the needs and habits of customers.</td></tr>
<tr><td rowspan="2">9</td><td>Are the contractual arrangements with customers favorable only for customers, but unfavorable for agricultural producers?</td><td>To reveal the existence of long-term purchase contract.</td><td>Contracted production indicates the creation of a marketing network and marketing orientation.</td></tr>
<tr><td colspan="3">Producers are still uncertain about doing business with well-known customers. Despite the fact that there is a long-term cooperation, contractual relations have not yet become the basis for the formation of a long-term business relationship. This is one of the limiting factors for the formation of marketing networks and the development of marketing orientation of agricultural producers.</td></tr>
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<table>
<tr><th>No.</th><th>Question</th><th>Aim</th><th>Purpose</th></tr>
<tr><td rowspan="2">10</td><td>Contracts with customers provide additional security in planning production and sales?</td><td>To discover where the producers activity is concentrated.</td><td>For the marketing orientation, attention should be on the needs of consumers.</td></tr>
<tr><td colspan="3">Producers who have long-term cooperation with well-known customers don’t have a contracted production with them. The surveyed producers opt for contracted production, increased security and development of marketing networks. This shows that producers accept the implementation of relationship marketing.</td></tr>
<tr><td rowspan="2">11</td><td>Working with just one customer ensures good business?</td><td>To reveal the share of producers orientated on production and product.</td><td>Indicates the presence or absence of marketing orientation.</td></tr>
<tr><td colspan="3">Three-quarters of the response show that sales represents main problem for producers.
Doing business with one customer, such as a retail chain, would eliminate a large number of intermediaries who appear when placing products on the market.
Producers believe that in this way they can eliminate uncertainty in production, so they can concentrate on the ordered production and achievement of product quality and safety required by the customer.</td></tr>
<tr><td rowspan="2">12</td><td>Confidence in customers can be obtained even without contractual arrangements?</td><td>To discover whether the contractual arrangements are crucial for building trust between producers and buyers.</td><td>It shows the conditions for the development of relationship marketing.</td></tr>
<tr><td colspan="3">Half of the respondents believe that long-term cooperation with customers’ needs to be ensured through contractual arrangements. In that way, it is possible to produce for a well-known customer and secure sales. This confirms that major problems for producers exist on the sales side compared to production side.</td></tr>
<tr><td rowspan="2">13</td><td>What is your level of trust in customers?</td><td>To discover at what level buyers are using their power in relation to producers.</td><td>Greater customer strength affects the level of development of marketing relationships.</td></tr>
<tr><td colspan="3">Producers are still unsure of their customers. Supply-chain structure, number and variety of customers brings confusion to the market and do not encourage producers to raise the level of trust in customers.</td></tr>
<tr><td rowspan="2">14</td><td>Is it possible to stay loyal to customers, even if something goes wrong?</td><td>To discover if long-term relationships are not threatened by short-term problems.</td><td>Shows the level of development of relationship marketing.</td></tr>
<tr><td colspan="3">Producers are optimistic about long-term cooperation with customers.
They are of the opinion that changes in the market can have an adverse effect on both producers and their customers, and that market fluctuations are short-term and transient, and it is possible to continue cooperation after their completion.
This shows that producers are striving to develop relationship marketing.</td></tr>
<tr><td rowspan="2">15</td><td>Does the increase in supply due to the associating reduce the need for contractual arrangements with customers?</td><td>To discover that producers associations have access to wider markets.</td><td>The increase of producers’ market power affects the development of marketing orientation.</td></tr>
<tr><td colspan="3">Half of the respondents believe that by increasing the supply, it is necessary to ensure safe sales through contracts with customers.
Others believe that with a larger supply they can attract a greater number of buyers with whom they can negotiate terms of sale and prices. This can provide better terms of sale and prices in relation to the contracted sale. In this way, producers can offer products to a wider market and develop a marketing orientation.</td></tr>
</table>

No.	Question	Aim	Purpose
16	What are the possible changes in customer behavior?	To discover how often sellers change buyers.	Frequent changes of buyers represent short-term cooperation and the absence of relationship marketing.
	The answers show that the surveyed producers are mostly devoted to their customers, and that they strive to develop relationship marketing. Only a small percentage (6%) of respondents did not develop strong customer relations. They sell products to customers when they find that they got a good offer, without the need to develop long-term cooperation with the customer.		

Based on the obtained answers, it can be concluded that the surveyed producers are mainly oriented towards production and products, and have not developed marketing orientation in business. They produce a small assortment and mostly small quantities of products that they sell locally, to intermediaries and wholesalers, which push them further towards retail. Producers do not change distribution channels in order to eliminate intermediaries and reduce the number of participants in the chain. They gain a competitive advantage by lowering prices by reducing costs. Producers don't have enough information, they do not research the market in order to expand and adapt to current range of demand. Cooperation with buyers is low, and there is no networking present in order to create stable chains. This makes them uncompetitive and vulnerable to buyers. The strategy of price competitiveness affects the reduction of quantity and quality, without investing in technology and innovation in production.

However, the answers show a great interest for producers associating, and forming marketing networks and long-term cooperation with buyers. The development of relationship marketing aims to build and develop deep and long-lasting relationships with buyers, to the mutual satisfaction, which will enable income and maintaining business. Customers represent the key group of partners in relationship marketing. With the development of relationships marketing, producers focus on long-term customer relations, rather than short-term arrangements and individual sales. In addition to customers, producers can build relationship marketing and strong economic and logistical ties with other producers through producers associations. In this way, marketing networks can be created with the aim of building mutually profitable business relationships. A joint activities in the areas of market research, logistics, sales, finance and other business functions enables the implementation of customer-oriented marketing activities. By producers associating, relationship marketing is accepted and developed, business functions are combined, and resources are created that can enable producers to develop in a market that is becoming increasingly demanding. By building marketing relations, associated producers create two-way communication with all interested parties.

Discussions

Accelerated modernization of local and regional value chains and urbanization of distribution channels and the development of society are factors that influence the development of marketing orientation of agricultural producers through the formation of modern associations of producers (van Dijk, Trienekens, 2012). Producer associations should be developed as functional producer organizations, and growers should be educated to develop skills in management, establishing marketing links and more efficient horizontal links.

From the very beginning of formation, producer organizations need to follow a more offensive marketing strategy. The main elements of their marketing strategy are market research, establishing direct links with major retailers, brand development and promotion, product innovation and differentiation, and high product quality (Bijman, Hendrikse, 2004). The goal is for producer organizations to be recognized as suppliers of top quality products and become the preferred supplier of major retail chains, to be innovative in marketing and in new product development, and to provide wide range of diverse fresh product categories throughout the year (Bijman, Hendrikse, 2003).

A liberalized market system offers small producers the opportunity to come together and rethink their solidarity and generate collective action from their members, to take advantage of economies of scale, reduce transaction costs, and improve their individual productivity and chain positions (Sautier, Bienabe, 2005). The functions of new organizations include standardization, joint planning, forecasting, contracting, order management, and in the long run (Buckley, Mithie, 1996). The result is an increase and improved performance of these associations, recorded through their higher turnover and income for members. Associated and organized small producers can survive competition and establish successful business organizations.

The way of doing business in the fresh food sector in Serbia imposes an urgent need to establish a marketing structure that must be professionally managed and competitive, in order to provide small producers a number of different choices for selling their products. Such a structure should help improve marketing efficiency by promoting the direct connection of a large number of producers into modern marketing organizations. According to Bijman (2002), the aim of establishing this organizations lies is in costs reduction, increasing the volume of work and operations, adding value to the products, improving market orientation and improving coordination in the production and distribution chain, and increasing the efficiency of sales and logistics. These organizations are focused on marketing functions and promotion marketing system through following activities.

First, taking into account the large number and low economic strength of the most of small scale agricultural producers in the fruit and vegetable sector in Serbia, they are unable to connect to customers. Therefore, producer organizations should be organized as rural agro-centers that could take over the function of wholesale on the production side, and enable small agricultural producers to concentrate a larger quantity of products of uniform quality and form a collective offer of a larger number of growers. On the other hand, members of the producer organization can jointly invest in static and mobile capacities for collecting and storing products, which can serve to preserve product quality after harvest (Food and Agriculture Organization of the United Nations, 2017). This can enable the concentration of a larger amount of fruits and vegetables in one place, collected from remote areas, in order to preserve the quality of the product and protect it from decay after harvest. With joint transport capacities, they can deliver their products to larger markets, where higher demand is concentrated.

Second, rural agro-centers do not include only the collection and storage of agricultural products, but also activities that focus on the development of rural areas. The newly formed market-oriented agro-centers must stimulate investments in modern agricultural production, the introduction of quality and food safety standards in production and the implementation of an efficient marketing strategy. The joint use and organization of equipment and capacities used to preserve the quality of products after harvest, as well as the implementation of best marketing practices are key in improving the selling price for producers. Thus, in the region in which they produce, small producers must be aware of the economic and organizational advantages of modern agricultural cooperatives.

Third, an important part of a marketing strategy is to establish a producer organization as a brand. All products should carry a unique logo of the producers' organization, which should stand for quality and expertise. The branding of the organization is initially intended to build an image among wholesalers and retailers, while over time the brand of the organization develops into a consumer brand. (Bijman, Hendrikse, 2004). Branding of producer organization can provide opportunity for marketing of rural area. Rural areas require a marketing strategy to develop products, bring in customers and, possibly, to attract tourists. A regional brand can solve economic problems and give perspective to residents of the region including better quality of all contents of the region and branding of all regional segments as nature, heritage, domestic food and more (Brkljača et al., 2022).

The development of the marketing network can encourage the establishment of new agricultural organizations and associations, which can find a good and long-term partner in companies within agro-centers. Users of the modern agri-food network in Serbia can be small and medium-sized agricultural producers, traders (wholesalers and intermediaries), retail chains, institutional buyers and consumers. In addition, other users will be processors, service providers, transporters, financial organizations. The structure thus formed can meet the specific requirements of all these actors with tailor-made content for each of them. In this marketing network model, the organized agricultural producers jointly control production through more than one phase of production and marketing, and through a certain level of processing. This will inevitably lead to an increase in production with higher quality. Availability of larger quantities of products with certified quality and the presence of efficient logistics that minimizes product and quality loss meet customer interests. Small agricultural producers within association have better infrastructure for storage and handling of products and can establish a transparent and efficient pricing system. Additionally, with more alternatives for selling their products they can realize their production with a higher percentage of participation in the consumer spending.

Conclusion

Producer associations, which represent a business concept long present in agricultural production, are accepting marketing orientation and transforming into modern producer organizations in response to the dominant position of large business concepts in food production and sales. Despite the fact that producer associations in Serbia in the earlier period proved to be a useful form of organizing small agricultural producers, today they represent a business option that producers have abandoned. Therefore, in Serbia, the dominant individual producers, with outdated production, who do business without real and timely information, with a lack of knowledge and experience in other areas crucial for business, are divided and with a lack of financial power and ability to offer products to a wider markets.

The presented results of the survey showed that small and medium producers have chosen the association as a solution that will enable them to join the modern market chain, expand the market for their products and strengthen cooperation with individual customers, retail chains, through contractual relationships. The development of marketing relations in the agri-food supply chain in Serbia is a key factor for the application of a holistic approach to marketing. Through marketing relations producers' organizations are strengthening cooperation with key customers and participants in the chain. The main goal is to develop close, long-term relationships with all participants in the chain that can directly or indirectly affect the success of the producers. However, before forming organizations with other producers, it is necessary to accept the appropriate marketing principles. Only then will they be able to design marketing activities with other participants in the chain and combine them into integrated marketing programs in order to create, communicate and deliver value to consumers, which exceed their expectations.

In order to take advantage of the food supply opportunities of a growing group of consumers, it will be necessary for small producers in Serbia to build capacities to deliver products that retailers will want to put on the shelves. They will have to innovate and reduce costs, and increasingly respond to consumer demands and needs, in terms of food quality and safety. Therefore, a conceptual approach has been offered that can help agricultural producers to be included in the chain. If they do not adapt, they will increasingly feel cut off from the food sector, which is recording great growth in the world. Their scattered products will depress domestic product prices and will further increase the cost-price pressure. The traditional market will continue to meet the demand of the largest part of the domestic population through food delivery and subsequent distribution by various small traders and retailers. These chains are characterized by fragmentation, highly variable standards and poor infrastructure and lack of logistical support. At the same time, a large domestic and international Western-style retail chain delivers goods and services with a global standard to the upper and middle class in all major cities. The involvement of agricultural producers in these chains is possible through the connection of entities through modern forms of association, with the aim of organizing the functional purchase and aggregation of agricultural products. This organized collection of products for a well-known customer, which meet the required standards, is the basic link in the application of a marketing approach that connects supply and demand and which enables the effective application of complex marketing principles.

Limitations to the introduction of new concepts are always present, pressures for short-term results are high, information is lacking, and unexpected events work against the establishment of agro-centers or production zones. Therefore, it must be completely clear to producers what the formation of producer organizations and the establishment of agro-centers mean for their business (in terms of costs, added value, required investments, institutional context, taxes, fees, import and export duties, and so on). If there is no possibility to provide clear information to interested producers, this is the main reason for creating an unwanted delay in the implementation of the new chain concept.

Limitation for further study is the sample size of participants, since pandemic continuous outbreak makes it impossible to gather a large number of agricultural producers in one place, as was the case during the first survey. Second, the COVID 19 pandemic postponed the general population census and the agricultural census in the Republic of Serbia, whose data are of great importance for comparison and further analysis. Given that the COVID 19 crisis has significantly affected the marketing orientation in almost all sectors of the economy, especially in food production, we expect that further analysis based on new data will provide significant information on the change of business concepts' in the sector.

Conflict of interests

The authors declare no conflict of interest.

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APPLICATION OF THE PERT METHOD IN THE AUDIT OF BUSINESS OF AGRICULTURAL ENTERPRISES

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A B S T R A C T

The audit of agribusiness operations is present in companies with significant agricultural potential, which can be accepted as justified in our conditions. The agricultural sector is one of the development sectors in the Republic of Serbia, which necessarily represents a significant economic resource, and therefore the object of business audit. The factors of modern audit-based processes are conditioned by the complexity and subject specificities of the object being audited, which is expressed in the conditions of the agricultural sector. This paper will present the application of a quantitative planning method that is widely used in complex processes, and which can also be applied in the auditing processes of agricultural enterprises.

Introduction

The methodology of modern quantitative systems is designed with the aim of planning large, complex projects where it is impossible to determine precisely the duration of certain activities, but time limits are determined within which the realization of certain or all activities is possible. Almost all research and development projects that are carried out for the first time are discussed here. The most widely applied method of network planning in stochastic conditions is certainly the PERT method.

The possibility of applying the PERT method in the investigation of the audit process of agribusiness operations is particularly evident when it comes to designing a scenario for the eventual creation of an offer for a future potential audit (Majstorović A., 2020). In

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order to set up a network of scenarios, experts from the field of audit of the agricultural sector were interviewed. The scenario concerned the issue of determining future events in the auditing process itself, in the case of obtaining the job of auditing the operations of agricultural enterprises in the territory of the Republic of Serbia in the domain of medium and large enterprises.

Methodology

The PERT[4] (Project Evaluation and Review Technique) method (Plebankiewicz 2015) is one of the two basic methods used to analyze time in a network model, in addition to the CPM method. The difference is in the representation of the mathematical model of the analysis of the time of realization of a project. We use the CPM method when we are able to determine the precise duration of each activity in the project, i.e. when it comes to the deterministic method, while with the PERT method we use the expected duration of the activity, i.e. we are talking about a stochastic model. (Tepavčević, 2021; Backović M., 2020; Pantić et al., 2021; Živković et al., 2019).

From the rules based on graph theory for the construction of the network diagram (Ljiljanić N., 2022), we know that each project activity must start and end with an event (i,j respectively), and for each activity we need an assessment of time intervals:

- *"aij* - an optimistic rating that represents the shortest possible time for the realization of an activity,
- *bij* - a pessimistic rating that represents the longest possible time for the realization of an activity, and
- *mij* - the most probable rating that represents the most likely time for the realization of an activity." (Backović, M., 2020).

If we hypothesize that the durations of the activities in the project are distributed according to the β - distribution, we can determine the expected duration of $t_e(i,j)$ of each activity and the dispersion $\sigma^2_{te(i,j)}$. (Herreri J., M., 2011) Due to simplicity and the widest application, the most commonly used formulas are:

$$t_e(i,j) = \frac{a_{ij} + 4m_{ij} + b_{ij}}{6}$$

$$\sigma^2_{t_{e(i,j)}} = \frac{(b_{ij} - a_{ij})^2}{36}$$

In this way, the stochastic network model is reduced to a deterministic one. (Toljaga-Nikolić, DV, 2014). In the next step, we define the earliest possible time, the latest

4 The method was proposed by the Booz Allen Hamilton company in 1958 for the implementation of the Polaris program for the development of a submarine for the launch of ballistic missiles for the US Department of Defense.

allowed time, the time reserve and the critical path under the assumption that event j is the final event for multiple activities. (Hari Ganesh, A., 2021)

The Earliest Possible Time $T_E(j)$:

$T_E(j) = maxi\{T_E(i) + t_e(i,j)\}$ i $\sigma^2_{T_E}(j) = \sigma^2_{T_E}(i) + \sigma^2_{t_e}(i,j);$

$T_E1 = 0$, (j=2,3,...,n), i < j , (j = 2,3,...,n)

The Latest Allowed Time $T_L(i)$

$T_L(i) = min\{T_L(j) - t_e(i,j)\};$ i $\sigma^2_{T_L(i)} = \sigma^2_{T_L(j)} - \sigma^2_{t_e(i,j)}$

$(T_L)\, n = (T_E)\, n$, (i = n −1, n − 2,...1), i < j

The Time Reserve

$R_i = T_L(i) - T_E(i)$; gde je i = 2, 3, ..., n-1

assuming that the time reserves of the first and last event in the network diagram are equal to zero.

The Critical Path

"The very definition of the critical path as consisting only of critical activities implies that only those events in which the time reserve is equal to zero belong to the critical path." (Stošić, B., 2013).

$$T_L(i) - T_E(i) - t_e(i,j) = 0$$

Since this is a problem with stochastic quantities, it is necessary to calculate the probability with each particular quantity

$$(Z)_i = \frac{T_S(i) - T_E(i)}{\Sigma\sigma^{2^{0,5}}}$$

where Z represents the probability factor, T_S represents the planned deadline for the realization of event *i* and $\Sigma\sigma^2$ the sum of the variances of all activities that precede event *i*.

Results and Discussion

The first step in setting up this network is an exhaustive list of network elements and their connections. (Zhu, Z., 1994).

The second stage in the application of the PERT method is the value presentation of the time course of events, where the label AUDITOR'S REPORT = current time in the form of dates DD/MM/YY, and activities:

A = Determining the materiality level,

B = Assessment of control risk,

C = Review inventory status reports,

D = Confirming the internal control mechanisms,

E = Determining the value and quantity of inventories,

F = Calculate accounts receivable,

G = Obtaining access to the data sources,

H = Audit documentation,

I = Preparation of the auditor's report.

Determining the materiality level - Assessment of the level of materiality/significance in practice is based on the application of appropriate, empirically determined percentages to the value of certain positions from financial statements, most often total income, total assets or financial results. (Edgley C., 2014; Staletović et al., 2021). The IAS 320 does not define materiality, but states the definition given in the Framework for the preparation and presentation of financial statements of the International Accounting Standards Board.

"The level of materiality/significance is assessed for the financial statements as a whole and serves as a criterion for choosing the appropriate opinion in the final stage of the audit." (Milojević, I., 2020). The overall level of materiality is allocated to individual elements/components of the financial statements, most often on the basis of the relative importance or variability of the accounts (standard deviation of processed transactions), or the professional assessment of the audit team. In the planning phase, the auditor assesses the preliminary level of materiality, which, in combination with audit risk, determines the nature, timing and scope of audit procedures. At the same time, materiality and risk are in an inverse relationship. (Houghton, K.A., 2011) An estimated lower level/threshold of materiality requires performing more extensive and varied procedures and obtaining more audit evidence and vice versa. During the duration of the engagement, the initial assessment of materiality may be corrected, if the audit team finds new information that requires such correction.

Assessment of control risk - There is no practical way to reduce audit risk to zero. Therefore, auditors should provide sufficient evidence to reduce the risk to an acceptable level. Depending on the perception of risk and aversion to risk, the auditor carries out audit planning, determines the required time and level of audit evidence (Velte P., 2019). If the auditor estimates that the risk will be high, he will decide to collect more reliable evidence by observing a larger sample and increasing the number of audit procedures. The ultimate goal of risk assessment and determination is that, at the end of the audit process, the total risk is set at a enough low level or that the level of security is high enough so that it can be said that the financial statements do not contain materially significant errors. Audit risk is not a simple quantity, it consists of three elements. These elements are as follows: Inherent risk, Control risk and Detection risk (disclosure risk).

According to the definition, control risk is the risk of misstatements of account balances that, taken individually or cumulatively, can be materially significant, and which the accounting system and the internal control system will not detect, detect and correct in a timely manner. (Coram, P. J., 2021) No internal control system is perfect, in other words, it is difficult to find a control structure that is 100% perfect and that no error can slip through. Therefore, it is up to the auditor to assess whether the internal control system is functioning effectively. If the auditor assesses that the policies and procedures are carefully planned and functioning effectively, then he is able to conclude that the risk of misrepresentation is low and vice versa.

Review Inventory Status Reports - is an auditing procedure which is accepted worldwide, where an auditor states his opinion are the financial records of inventory represent correctly the real inventory and their accordance with the IAS 2 Inventories. (Majstorović A., 2020). Auditing inventory verify besides the amount of inventory also its condition and quality, and compares if the value of the inventory is correctly listed in financial statements. In accordance with IAS 41 “Agriculture inventories comprising agricultural produce that an entity has harvested from its biological assets are measured on initial recognition at their fair value less costs to sell at the point of harvest. This is the cost of the inventories at that date for application of this Standard”.

Confirming the internal control mechanisms - There are several definitions, but they are all similar in that they determine that financial management and control (internal control) include the entire system of financial and other controls, including the organizational structure, methods and procedures, not only financial systems, but also operational and strategic systems of the organization. (Coram, P. J., 2021). Financial management and control represent the entire system of internal controls established by company managers, who are also responsible for that system. These controls, through risk management to a reasonable extent, provide assurance that in achieving the company’s (organization’s) goals, funds are used in a correct, ethical, economical, effective and efficient manner. This includes compliance with laws and other regulations, safeguarding funds against loss, misuse and damage.

The Sarbanes-Oxley Act introduces a model of corporate management that assigns responsibility to management towards stakeholders, especially in relation to financial statements. (Rosati, P., 2022) That model had significant consequences for the internal control system and the organizational structure of the company: namely, by assigning direct responsibility to management responsibility for published economic and financial data and for the ability of the internal control system to ensure the reliability of that data, the aforementioned law carried out the reorganization of the internal control system and the redefinition of the administrative body.

Determining the value and quantity of inventories – Recognition and valuation of inventories of unfinished production and finished products id done in accordance with IAS 2 Inventories and IAS 41 Agroculture. The mentioned accounting regulations requires inventories to be measured at the lower of cost and net realisable value (NRV) and outlines acceptable methods of determining cost, including specific identification (in some cases), first-in first-out (FIFO) and weighted average cost. (Cordery, C. J., 2022). “Given the massive size of some inventories, they may engage in quite a large number of inventory audit procedures before they are comfortable that the valuation you have stated for the inventory asset is reasonable.” (Majstorović A., 2020).

Calculate accounts receivable – IFRS 9 Financial Instruments requires recognision a financial asset, financial liabilities and some contracts to buy or sell non-financial items. (Sultana, N., 2015). Accounts receivable is frequently the largest asset that a company has, so auditors tend to spend a considerable amount of time gaining assurance that the amount of the stated asset is reasonable.

Obtaining access to the data sources - The auditor is obliged to collect sufficient evidence in the audit procedure that enables him to form a competent opinion. (Milojević I., 2021). In the operational sense, the auditor in the audit process collects evidence using the following methods: 1. inspection 2. observation 3. examination 4. confirmation 5. calculation control and 6. analytical procedures. (Rosati, P., 2022)

Audit documentation or the working papers according with ISA 230 provide a documentary basis for forming an opinion and preparing an audit report on the client’s financial statements. (Milojević I., 2020) They are the link between the client’s accounting processes, internal controls and the audit report. There are no standard forms for the presentation of all working papers and they differ between audit firms. Even the physical form of the working papers differs. (Akther T., 2020). The formal form is not particularly important. However, they should be arranged in a logical sequence and indexed to allow easy access to the required information.

Preparation of the auditor’s report – “The audit process ends with an audit report that is submitted to the client’s shareholders’ meeting or the management body that appointed the auditor. The form and content of the audit report differs in nuances.” (Milojević, I., 2021), Since the audit report should express the overall audit findings and opinion in a concise manner, it is naturally sensitive to wording. The sensitivity of audit reports has encouraged audit theorists and auditors to search for the optimal form and content that will enable auditors to express their formed opinion in a concise and decisive manner, while at the same time providing users with clear, reliable and precise information. (Soltani B., 2002). The essence of the audit report is to express the auditor’s opinion on the financial statements, which is done in different ways in the world. ISA 700 - Forming an Opinion and Reporting on Financial Statements requires that an audit reports consist:. Addressee (to whom the report is addressed), Introductory paragraph, Management’s responsibility for financial statements, Auditor’s responsibility, Auditor’s opinion, Date of the auditor’s report and Auditor’s signature. (Goicoechea. 2021)

The above-mentioned elements condition the required time of the auditor’s work to collect the evidence necessary for expressing the auditor’s opinion (Milojević I., 2020). Group of experts (Jasiukiewicz J., 2021). determined that it is most adequate to apply the PERT method - the critical path method, which requires the following activity times to be determined, namely:

- pessimistic,
- medium, and
- optimistic.

Briefly note that the calculation of these items is as follows:

G = variance = (A(I)-(B(I))2/6,

F = expected time = A(I) + 4M(I)B(I))/6

I = 1 do 9 and A(I) <= M(I) <= B(I)

where T - number of elements ie. activities.

A(I) = optimistic time,

B(I) = pessimistic time,

M(I) = most likely time.

Note that the rank values of A(I) and B(I) form a Beta distribution. Probability distribution ie. schedule with the law of probability, as follows

$$f(x) = \frac{1}{B\left(\frac{m}{2}, \frac{n}{2}\right)} x^{\frac{m}{2}-1}(1-x)^{\frac{n}{2}-1}$$

where the random variable varies X varies from 0 to 1, is called a Beta schedule. (Hahn, E. D., 2008).

It is necessary to calculate the critical times of the final events (which will provide information about the optimal offer for the possible engagement of auditors) by giving several alternatives of the limits of pessimistic and optimistic times, as well as in the actual occurrence of events, correct any wrong estimates and then recalculate the critical path (Milojević I., 2021). Thus, in the first assessment, we obtained the data shown in Table 1.

Table 1. Data on the duration of each activity

Activity	TIME				
	Pessimistic	**Optimistic**	**Medium**	**Expected**	**Variance**
A	4(2)	6	5(5)	5	.11
B	6(4)	8	7(6)	7	.11
C	13(11)	15	14(12)	14	.11
D	13(11)	15	14(13)	14	.11
E	9(3)	11	10(5)	10	.11
F	5(3)	7	6(6)	6	.11
G	4(30)	6	5(4)	5	.11
H	5(1)	1.5	1(10)	1	. 027
I	6(3)	8	7(5)	7	.11

Source: Authors' calculations

When it comes to the earliest start by activities and shifts, we get the data shown in Table 2.

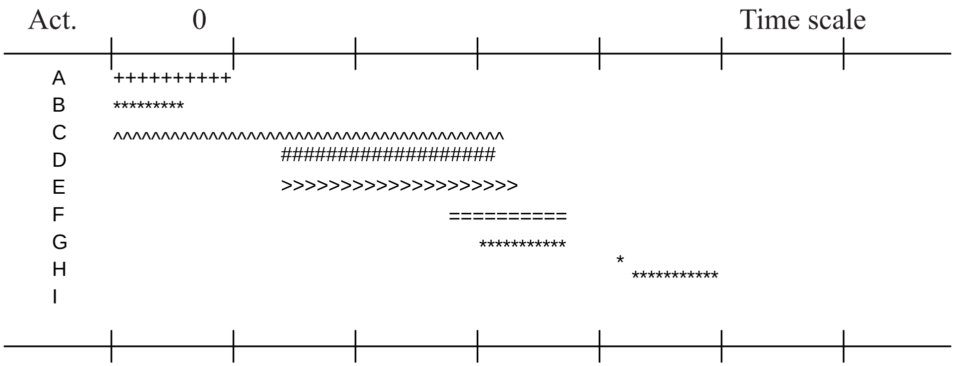
Table 2. The earliest start by activities and shifts

Events	Early start	Shift
A	0	2
B	0	0
C	0	2
D	7	2
E	7	2
F	14	2
G	17	0
H	22	0
I	23	0

Source: Authors' calculations

Critical path, ie. the time of occurrence of events according to the scenario, is 69 time units, as shown in Figure1.

Figure 1. The timing of the event according to the scenario



Source: Authors' calculations

The second case of simulation refers to pessimistic time values, which were changed in several cases (see the next Table in which the values given in parentheses are now taken). In this case, the critical time is 66.95 time units.

Table 3. Data on the duration of each activity

Activity	TIME				
	Pessimistic	Optimistic	Medium	Expected	Variance
A	4(2)	6	5(5)	4.65	.44
B	6(4)	8	7(6)	6	.44
C	13(11)	15	14(12)	12.3	.44
D	13(11)	15	14(13)	13	.44
E	9(3)	11	10(5)	5	.44
F	5(3)	7	6(6)	6	.44

Activity	TIME				
	Pessimistic	Optimistic	Medium	Expected	Variance
G	4(30)	6	5(4)	4	.254
H	5(1)	1.5	1(10)	11	.006
I	6(3)	8	7(5)	5	.694

Source: Authors' calculations

When it comes to the earliest start by activities and shifts, then we get the following table 4.

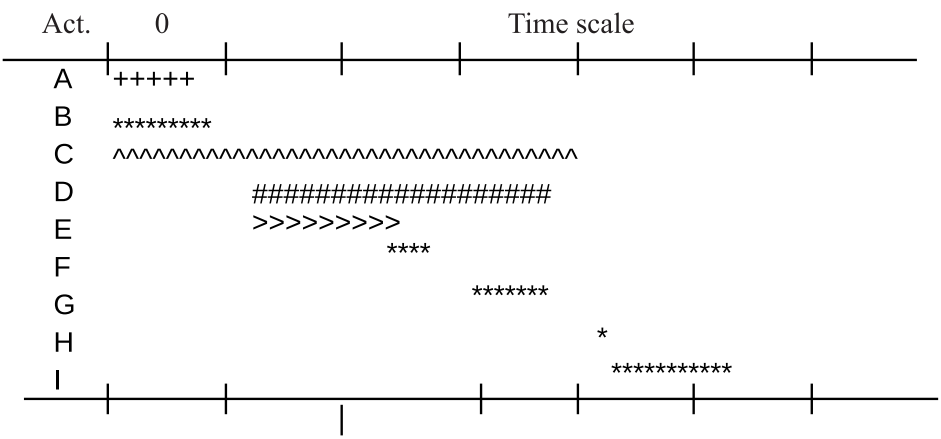
Table 4. The earliest start in terms of activities and shifts

Events	Early start	Shift
A	0	1.4
B	0	.8
C	0	0
D	6	0
E	6	2.8
F	12.3	0
G	11	2.8
H	18	0
I	19.08	0

Source: Authors' calculations

The Figure of this modified scenario is as follows:

Figure 2. The timing of the event according to the scenario



Source: Authors' calculations

Figure 2 shows (marked with asterisks) the critical path, which in this case is drastically smaller and amounts to 19.08 time units. (Weld, S., 1976)

Needless to say, all combinations of varying input data are possible. (Pavlović, M. M., 2021). Essentially, the pre-determination of input data (in our example) is done in two ways:

a) one of the ways is to determine in advance the values for the pessimistic, optimistic and expected time and

b) to programmatically solve the range in which all three times can move, and to calculate the possible combinations.

Conclusion

By applying the PERT method in the preparation of the auditor's offer for agribusinesses, an assumption is created by means of which the auditor's offer can be expressed financially. It can be concluded that the possibilities of applying this method are useful in many ways, primarily because agricultural companies are a specific type of assets that auditors can encounter, that the agricultural sector is one of the most complex sectors in terms of accounting balancing, and that the time component of business does not coincide with calendar year.

In addition to the many limitations of this method, it is clear that it provides a fairly clear representation, especially in cases where some audit activities are associated with a large number of accounting items due to the complexity of the business process.

This method should be understood as an aid to the decision-maker on possible timely and corrective actions in the field of drafting the auditor's offer.

Conflict of interests

The authors declare no conflict of interest.

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AGRICULTURAL ECONOMIC STRUCTURE AND HUMANITY BALANCE IN KÜÇÜNLÜ VILLAGE

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ABSTRACT

Küçünlü Village (KV) is a village located in the Thrace Region of Edirne Province. This region is very important for Turkey's grain and oil sunflower production. In this research, the assumption is set out that "producers in KV cannot do agriculture at the size of an economic enterprise". With this assumption, it has been resolved by considering the size of the land where the communities in the village cultivate agricultural activities between the years 2012-2022. The subject has been discussed with explanatory research and historical structuralist approach model. The finding that the desired increase in the total land assets of the producers still continuing production could not be achieved, that the producers are moving away from the active working age range in agriculture day by day, and that sustainable agriculture cannot be achieved in the future has been obtained through observation, structured personal interviews and survey methods.

Introduction

The purpose of the Law on Soil Conservation and Land Use; to protect and develop the soil, to classify agricultural lands, to determine the minimum agricultural land and agricultural land sizes with sufficient income and to prevent their division, to determine the procedures and principles that will ensure the planned use of agricultural land and agricultural lands with sufficient income in accordance with the principle of environmental priority sustainable development.

According to the subparagraph (h) of the first paragraph of Article 3 of the Soil Conservation and Land Use Law No. 5403, the minimum agricultural land size is: If the production activities and inputs are used rationally and economically, the productivity obtained in an agricultural land will result in more of the agricultural land in question. It

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refers to the smallest agricultural parcel size determined by the Ministry, which cannot be obtained in case of shrinkage. Again, in the Clause (i) of the same Law; Agricultural land size with sufficient income: It refers to the agricultural land sizes with sufficient income determined in the list of provinces and districts, taking into account regional differences. In the aforementioned list, the size of agricultural land with sufficient income for Lalapaşa District of Edirne was determined as 55 decares for irrigated agricultural lands, 135 decares for dry agricultural lands, 10 decares for planted land and 3 decares for greenhouse land (RG, 2014).

Irrigated agriculture is not practiced in KV. For this reason, the research was carried out to cover the lands with sufficient income, which is the lower limit of the agricultural land size of 135 decares, which is engaged in dry farming. The aim of this study; It is to analyze what kind of consequences the size of agricultural land with sufficient income, implemented as a government policy by the Ministry during a 10-year period, causes for producers. "The main thing in scientific knowledge is generalizability. In other words, the more scientific knowledge can be generalized to a large group, the more scientific value that knowledge is (Suğur, 2010). The fact that this study is up-to-date in its field suggests that it will shed light on the resolution of other villages of the Thrace Region over time.

Material and methods

According to the Farmer Registration System (FRS); In 2012, 79 households were engaged in agricultural production activities in Lalapaşa district KV (Anonymous, 2022). The main material of the study consists of 63 producers engaged in herbal production activities in 2022 in KV. In addition, information was collected by semi-structured interview method as well as verbal interviews with the producers living in KV, the village leaders and the headman. This method; A part of the interview consists of questions that allow the response of the respondents, while a part of the pre-planned part of the interview. The questions that allow reaction consist of open-ended questions. It is unpredictable what kind of responses will be received to open-ended questions (Anonymous, 2020). However, open-ended items allow respondents to express themselves freely and measure high-level cognitive skills (Tan & Erdoğan, 2005; Turgut & Baykul, 2015).

It is possible to talk about three groups of approaches focused on rural change and development.

1-System approaches: It focuses on the relationships between environmental, demographic and technological factors and the system.

2- Decision-making approaches: It focuses on resource allocation and farmers' responses to innovations and markets.

3-Historical-structuralist approaches: It focuses on the examination of human relations with the natural environment and production. This approach also includes the relationships between the whole and the part. Examining these relations gives the opportunity to observe the mutual interaction between the whole and the part from a wider perspective. The relationship between the countryside-state-globalized world can be exemplified by the relationship between the part-whole. In general, although the individual is also included in the studies, the social character of the individual is emphasized (Öztürk, 2009). In this context, the change in KV is handled through the change in the total census sample size and the farmer's land assets by considering the crop production activities. In the research area, the data of 2021 was not used on purpose. The reason for this is that due to the pandemic, the law allows people registered with the FRS to go to their villages and the registration requirement for the FRS has been abused since it is at least 2 decares. In other words, the main livelihood activity is the official inclusion of people who do not have farming activities in the system.

Results

The population between the ages of 15-64 is called the working age population (Sertkaya and Bostan, 2019). There are 45 family heads in the working age (15-64 age group) engaged in agricultural production activities in the village, and their ratio to the total family heads is 71.42%. The age of 18 family heads is over 65 years old.

All of the family heads living in the village have a social security; 29 of them are retired. It is observed that all of the retirees are still actively engaged in agricultural activity. The reason for this situation; It can be explained by the desire to benefit from the agricultural supports applied, to ask the family members to consult him in the transactions necessary to receive the supports, and to continue to take an active role in monetary transactions.

The widespread use of machinery in agriculture encourages the use of machinery by the population older than the active working age, and ensures the continuation of the ties of the elderly with agricultural efficiency (Sarıoğlu and Irmak, 2020). In addition, agricultural mechanization provides the opportunity for the young population who does not want to live in the village to participate in plant production activities for processes such as planting, planting, fertilizing, spraying and harvesting, which are considered as agricultural work time.

As reported by Karagül (2013), it should not be denied that the person in the role of entrepreneur taking part in the production process receives a significant share of the resulting income. However, at this point, it should not be overlooked that the "human balance" that should exist between the person who plans the production with "intellectual labor" and the person who actually realizes the production through "knowledge and manual labor" must be preserved. Undoubtedly, it would be an irony to expect human balance from individuals over the age of 65 and even from individuals over the age of 91, as in the case of KV.

Economic situation of the village

According to Boran (1945), a village is a community whose main economic base is agricultural production. The occupation of the peasant is mainly agricultural activity. This is a profession based on the cultivation and collection of animals and plants. This profession has been going on for years between generations.

According to Saint Simon; society is in constant movement and transformation. The main task of sociology is to examine society in motion and transformation and to examine it with scientific techniques used in natural sciences. The social order is determined by the economic structure of that society (Aktaş, 2017). With this point of view, the economic structure of KV consisting of plant and animal production activities has been the subject of a detailed examination. The economic structure of the village is based on agriculture, and plant and animal production is carried out in the village. Within the plant production pattern, barley, wheat, sunflower and canola products are grown. As animal production; cattle breeding, ovine breeding, beekeeping and poultry breeding are carried out. Although the products grown in the village are usually taken to the Edirne Commodity Exchange and sold, they are sometimes sold to the merchants in Edirne and its districts. The use of agricultural technology is common in the village, and each household has tractors and agricultural equipment compatible with their tractors. Plant production activities are carried out using these tools and equipment.

The income obtained from the cultivated lands does not leave enough profit after the expenses made to grow that product are deducted. Agricultural price policies implemented in recent years have led producers to distance themselves from agricultural activity. For this reason, the young population in the village chosen as the research area is considering leaving the village for various reasons. The departure of the young population from the village and the elderly population in the villages cause interruptions in agricultural production and pose a problem for food security. This situation is the result of wrong national agricultural policy. For this reason, considering the high average age of those currently engaged in agricultural activity in the village, it is thought that the number of people who will be engaged in agricultural activity will decrease in the coming years.

According to the agricultural censuses, there has been a general decrease in the average farm scale in Turkey from the 1950s to the 2000s. As a matter of fact, the average enterprise scale, which was 77 decares in 1950, decreased to 61 decares in 2001. As of 2011, the size of the operating land was 68 decares (Anonymous, 2018).

The average land size for agricultural enterprises operating in Edirne, Tekirdağ and Kırklareli provinces was calculated as 117.49 decares (Aydın, 2014).

The average business size of KV in 2022 was calculated as 147,826 decares. Distribution of land size in the KV; 0-50 decares 12 businesses (19.05%), 51-100 decares 19 businesses (30.16%), and 101-200 decares 18 businesses (28.57%), 8 businesses between 201-300 decares (12%, 70), 3 enterprises (4.76%) between 301-400 decares, 2 enterprises (3.17%) between 401-500 decares. Between 7001-800, there is 1 business (1,59%).

Total land assets of KV were 117,936,00 da in 2010 and 147,826,00 da in 2020. While the average land size was 117,936 decares in 2010; In 2020, this average increased and reached 147,826 decares. Between these years, 16 producers have completely abandoned their plant production activity. Considering the number of people engaged in agricultural activities over the years, it is seen that the number has decreased and the amount of cultivated agricultural land per capita has increased on a decare basis. The reason for this change can be explained by borrowing, leasing their land to someone else, or taking over/purchasing or leasing the fields of the producers who gave up on agriculture by other producers.

The economic enterprise size for the producers producing in dry conditions in Lalapaşa has been determined as 135 decares (Aydın, 2014). In this context; It is seen that the enterprise size of 22 producers is over 135 decares. In other words, 65.08% of KV producers cannot meet the economic enterprise size determined by the Ministry. The fact that the size of agricultural holdings is below the economic criterion has a negative effect on agricultural income. Producers who want to get rid of these negativities either do additional work or give up agricultural production.

It is seen that national governments, as well as international organizations, have an important role in the production of agricultural producers for the market instead of their own needs. As a result of the change in the understanding of the nation-state, states' withdrawal of their hands from the economy and starting to implement a "global market economy" adversely affect those engaged in agricultural activity (Öztürk, 2009). Producers should not consider the sale of land as a method to compensate for the serious losses that arise as a result of economic activities, as in KV.

36 out of 63 producers (57.14%) residing in KV and engaged in plant production are also engaged in livestock production. Animal production is a branch of agricultural activity that is concentrated in rural areas. In addition to meeting the protein needs of families such as milk and meat, animal husbandry is also a useful occupation in terms of meeting the urgent cash needs. Families diversify their income by making use of their spare time, other than plant production, with animal husbandry. The use of materials such as straw and straw, which emerge as a result of plant production activity, makes livestock activity attractive in rural areas. On the other hand, the fertilizers obtained from animals are used as fertilizer in the vegetable and fruit gardens established for family needs, especially on the rose plant in front of their houses or in the fields.

In KV, goat breeding is carried out due to animal diversity as well as sheep breeding. Goat milk is not evaluated. It is sold from time to time as a votive or for the food needs of the kids.

Reasons for producers to quit agricultural activity

According to Durman (2002), both the quantity and the efficiency of the factors of production are tried to be increased in order to reach the development goal. Since the factors of production are labor, capital, entrepreneur and natural resources, it is seen that labor and entrepreneur are the "human" elements from these factors. As a result, human has an important place for your production. Because even if the labor, capital and natural resources of the production factors are found to be sufficient in terms of quantity, if the entrepreneurial element is not sufficient or the productivity is low, the desired development will either be delayed or not realized. Likewise, the labor factor has an important place in the development process as an actor who both does the work and uses the capital and technology in the production process.

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As reported by Karagül (2013), labor always maintains its feature of being the basic element of production under all circumstances. What can be said about the sharing of labor and income is not very heartwarming. The contribution of labor, which is one of the four factors of production in traditional economic theory, to production and its share from income constitute one of the weakest aspects of capitalist economic theory that is subject to criticism. Although labor is the most indispensable element of the production process from the past to the present, it can never be said that it receives the share it deserves from the income to the extent of its contribution to production, although it shows relative differences from place to place and over time.

Kurtkan (2011); In an article covering the years 1960-1992, "Agriculture is a branch of activity that does not allow other professionals to infiltrate and become involved. With this character, it is the most similar profession to caste. Farming is handed down from generation to generation. In other words, those who are farmers are those whose fathers were also farmers. Although the cadres of the current branches of activity in the city are generally filled by individuals born in the village, entering the farming profession is more difficult than exiting.

Table 1. Grouping of producers according to the results of the reasons for leaving their agricultural production efficiency

Results	**Reason for leaving agricultural activities**	**Number of People**	**Index (%)**	
Sociological results	Aging and family transfer	6	18,75	59,37
	Migration	1	3,12	
	Death	12	37,50	
Economical results	Transfer to a family member due to debt	3	9,38	40,63
	Quitting farming with land sale	1	3,12	
	Leaving farming by renting out his land	6	18,75	
	Changing profession	3	9,38	
TOTAL		32	100,00	

Kurtkan (2011) found three different conclusions when he examined the producers in the United States from a sociological point of view. These inferences; sociological implications, economic implications, and political implications. The results of the producers in the KV leaving agricultural activities can be quantified in 2 groups as sociological and economic results. According to the sociological results (59.37%) in the village, the reasons for quitting agricultural production seem to be more effective than the economic results (40.63%) (Table-1). Although the political results are not open to full evaluation with qualitative data; It is very effective in KV producers giving up agricultural production. Because the reasons such as the absence of schools and hospitals in the village are directly related to political decisions.

According to Öztürk (2009); The decision-making approach generally focuses on the distribution of resources in the agricultural field and the farmers' responses to innovations and markets. The basic assumption accepted in the studies based on this approach is the decision-making approach of individuals according to changing conditions in their own values and behaviors.

Death (12 people) takes the first place among the reasons for the producers to quit their plant production activities. People over the age of 90 live in KV and death is inevitable for people who have reached this age. The rate of abandonment of plant production activity due to death in the village is 37.50%. The desire to withdraw from agricultural activity by renting out the land (6 people) and the reason for withdrawing from agricultural activity by aging and transferring the land to a member of the family (6 people) are in the second place (18.75%). The lands were mostly inherited by the producers, who see agricultural lands only as a source of income from year to year. The reason why those who transferred their lands to a family member by not selling them think this way; their belief that the land should not be sold. Despite this, the producers are moving away from farming due to reasons such as the fact that agricultural activity does not bring enough profit, old age, agriculture is a profession that requires constant effort, risk and uncertainty in agriculture are high, there are no factors that make life easier in the village, there are no institutions such as hospitals and schools.

The results such as the producer's inability to make sufficient profit from agricultural activities, their continuous borrowing and the exponential increase in these debts from year to year make it necessary to withdraw from agricultural activity. In order to solve this problem, the young producer has changed his profession (9.38%) or tried to pay his debts by selling and transferring his land (12.50%).

As reported by Durman (2002), low per capita income prevents the formation of savings that will finance the investments necessary to increase capital accumulation. A low income level causes the marginal propensity to consume to be high and the marginal propensity to save to be low. The most important feature of underdeveloped countries is that they are deprived of the capital accumulation necessary for production. However, capital is one of the most important factors used in production.

It has been determined that 13 of 16 people newly registered to the FRS between 2010 and 2020 have inherited agricultural land, and these people are already engaged in agriculture and reside in the village. It was determined that 2 people in the village had to transfer their fields to a person they trust due to debt, and 1 person retired and started to deal with farming in the village.

Discussion

Mandatory retirement age in Turkey is 65, but; Even if those engaged in agricultural activity gain the right to retirement, they continue their agricultural activities. He specializes in those who have been engaged in agricultural activities for many years. Producers who cannot transfer the knowledge in their field of expertise to the younger generations cause the agricultural memory to disappear. Agricultural activity is an applied science, and climate, geography and natural conditions have an effect on agricultural efficiency. Subjects such as knowledge, skills, experience and expertise are important in agricultural efficiency and are gained over many years. The increasing use of technology in agriculture is increasing the age of those engaged in agricultural activities. However, as in the KV example, 28.57% of the producers are over 65 years old. It is a question mark to what extent the producers of this age can manage their agricultural enterprises profitably.

When agriculture is considered as an economic activity; The aging of the producers from year to year and their inability to increase their capital due to the inability to profit from field agriculture prevent them from investing in the agricultural sector in the future. The land size of 65.08% of the producers in KV is less than the land size (135 decares) determined by the Ministry. This economic result forces the producer to transfer, lease or sell his field. Although there is an increase in the land, which is considered as a natural resource, on paper (the average land size was 117,936 decares in 2010; this average increased to 147,826 decares in 2020). is out of the question. The solution to these problems should be determined as the lower limit (18 years) and the upper age limit (such as 65 years) for applying to agriculture through official means. Compared to other sectors, agriculture is a sector in which family business continues its existence intensively. In this way, the authority of the "father", who is the patriarchal decision-making authority of traditional agriculture, can be broken to some extent. In particular, producers who are below the economic enterprise size should do vegetable-fruit cultivation as well as field agriculture. The surplus of these products produced for family subsistence will be able to eliminate the cash shortage in the short term. In addition, the economic enterprise size, which can be considered low for field crops, is large for fruit and vegetable cultivation.

Conclusion

Rose was used quite frequently in Edirne as an ornamental plant during the Ottoman Empire. It is an advantage that KV is suitable for rose cultivation and that the producers have knowledge about its cultivation. KV is an opportunity to meet the rose needs of cookies and patisseries, which continue their activities as medium-sized businesses, in the production of rose jam and Turkish delight with roses.

Although sheep and goat breeding are carried out in the village, it is not possible to evaluate the milk of these farm animals. It is also a negative situation that almost every woman over the age of 50 in the village does not milk, although she knows how to make cheese from milk. It is necessary to carry out a series of studies that will encourage village products and encourage women to produce. As a result, it should not be forgotten that each product produced can also contribute to the country's economy.

The rate of producers who left their production efficiency due to aging and consequences such as transfer to a family member, migration, death is 59.37%. The rate of quitting production due to economic consequences such as transferring to a family member due to debt, giving up production by selling land, giving up production by renting out the land, changing profession is 40.63%. The inability of producers to earn enough profit from agricultural activity cannot be explained only by human capital. This result is also a result of wrong government policies. The fact that villages and rural areas are being emptied, as revealed by our research and similar studies, may make it difficult to meet the food production needs of healthy generations in today's years and in the future. It is necessary to develop policies that prevent the emptying of villages and provide financial support to producers. In addition, social and economic policies should be established to encourage living in the village. Services such as natural gas that facilitate village life should be brought to the village as soon as possible.

Conflict of interests

The authors declare no conflict of interest.

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COVID-19 PANDEMIC AND THE ECONOMIC RESULTS OF AGRICULTURE IN THE EUROPEAN UNION

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A B S T R A C T

The Covid-19 pandemic has brought numerous economic challenges to countries around the world. The specificities of certain economy sectors determined the character and intensity of the impact of this health crisis on their results. The purpose of the paper is to analyse the impact that the Covid-19 pandemic has had on the economic results of agriculture in the European Union countries. Comparative analysis and cluster analysis are used in the research. The general conclusion of the paper is that the Covid-19 pandemic did not change the economic importance and role of agriculture in the individual European Union countries. In addition, the European Union countries differ significantly according to the impact of the Covid-19 pandemic on the contribution of agriculture to gross domestic product, while a significant difference between the countries has not been determined according to the impact of the pandemic on the contribution of agriculture to employment.

Introduction

The Covid-19 pandemic has put the whole world in front of a big challenge. In order to limit the spread of this infectious disease, governments have introduced restrictions on movement, both domestic and international. Thus, the health crisis turned into a global economic crisis, causing high unemployment and decline in gross domestic product

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(GDP). The global GDP growth rate decreased from 2.61 in 2019 to -3.27 in 2020, while the unemployment rate increased from 5.36 in 2019 to 6.57 in 2020 (The World Bank, 2022). All aspects of the economy suffered heavy losses, especially the travel industry, with a double-digit decrease in the number of flights and a drastic decrease in tourist traffic, while the price of oil fell to a level not seen in the last two decades (Luković & Stojković, 2020; Beckman & Countryman, 2021). Even though agriculture was not at the center of attention for the negative impact of Covid-19 at the beginning of the pandemic, the closure of hotels, restaurants and schools led to the disruption of supply chains and the inability of agricultural producers to reach the buyers. Movement restrictions and lockdowns had far-reaching consequences on employment in agriculture, due to the inability of workers to reach their farms, as well as the loss of seasonal labor, which is mostly migrant. Agriculture employees large numbers of daily wage earners, who "suddenly found themselves without a source of income and unable to continue their work from home" (Gupta et al., 2021, p. 467). In addition, restrictions on the export of agricultural products have been introduced or such measures have been considered in some countries in order to ensure sufficient food supplies for the population (Popescu & Andrei, 2011; Botezatu, & Andrei, 2012; Štreimikienė et al., 2020). As a result, agricultural employment and the income of agricultural producers decreased and poverty became more pronounced.

Agricultural production is a very important sector in all economies of the world, because it provides the population with a sufficient amount of healthy and safe food for survival. This fact became very important during the Covid-19 pandemic, because there was a global concern regarding food security, that is, the ability of the system to provide the population with a timely, reliable and nutritionally adequate food supply. The contribution of agriculture to key macroeconomic indicators, such as GDP and employment, is significant, especially in developing countries, which emphasizes the negative effects of the crisis even more. When it comes to employment, a significant drop in the contribution of agriculture to total employment caused by the negative consequences of the crisis can be noticed. However, as far as the contribution of agriculture to GDP is concerned, it cannot be unequivocally claimed that this participation has decreased. Some countries even show an increase in the contribution of agriculture to GDP in 2020 compared to 2019. This can be explained by the fact that food production is a sector that is necessary for the population's life and that agriculture had to provide a sufficient amount of food for normal functioning, regardless of the imposed restrictions and problems (Nakat & Bou-Mitri, 2021). In addition, during the pandemic period, a decrease in demand for luxury goods (such as cars, travel) was noted, while the demand for food, due to fear of shortages and uncertainty, increased.

There is a significant number of papers that analyse the changes that the Covid-19 pandemic has brought to agriculture. However, most of these papers for the subject of research have food security, export restrictions, and disruptions in supply chains in pandemic conditions (Adhikari et al., 2021; Ceballos et al., 2020; Cortignani et al., 2020; Cranfield, 2020; Kalogiannidis & Melfou, 2020; Lauren et al., 2020). There isn't still a sufficient number of papers that analyse the impacts of the Covid-19 crisis on the economic effects of agriculture, nor have significant efforts been made to perform a comparative analysis between countries. Therefore, with this paper, the authors attempt to fill a gap in the literature. The subject of the paper is the review of changes in the economic results of agriculture in the European Union (EU) countries in the period of the Covid-19 pandemic. The economic results are measured by the contribution of agriculture to GDP and by the contribution of agriculture to employment. The aim of the paper is to determine the effect of the pandemic on the importance of agriculture for the economic performance of EU countries, as well as the heterogeneity, that is, the homogeneity of EU countries regarding the effect of the Covid-19 pandemic on the contribution of agriculture to economic growth and employment. The paper is structured from several parts. First of all, a brief review of the literature regarding the effect of the Covid-19 pandemic on agriculture is conducted. After that, methods section is given. Finally, the last segment of the paper refers to the research results and the discussion, within which two parts can be distinguished. First, a cross-country comparison is made according to the share of agriculture in GDP and the share of agriculture in employment for a two-year period (2019 and 2020), but also according to the intensity of the impact that the pandemic had on the economic results of agriculture in 2020 compared to 2019. Second, the results of the cluster analysis are presented.

Literature review

The global health crisis caused by the Covid-19 pandemic has spread very quickly to the economic sphere and affected almost all sectors of the economy. Strict blockade measures and lockdown have stopped the main economic activities. This situation has led to enormous uncertainties, not only regarding the economic growth and people's livelihoods, but also regarding the very future of capitalist development in its current form (Ramakumar, 2021). Given that the lockdown meant disruption of production and delivery of adequate quantities of goods, it was expected that such a pandemic had a negative impact on the agricultural sector as well. Travel restrictions have caused numerous problems for agricultural producers, from purchasing inputs, sowing and labor availability, to harvesting, marketing and processing, difficulty in movement of goods and stock increase in warehouses caused by problems in supply chains (Kalogiannidis & Melfou, 2020). Agricultural income in Europe decreased during the first wave of the pandemic in many European countries, while labor shortages in the harvest season were evident and resulted in the production decrease globally (Sharma et al., 2020). The Covid-19 pandemic has highlighted the importance of maintaining resilient food supply chains. Since there have been no concerns about food shortages, the EU agricultural sector has so far responded exceptionally well to the challenges of this crisis. Due to sustained food demand, the EU agriculture was relatively less affected compared to rest of the economy that has suffered significantly stronger blow by isolation measures. However, certain agricultural sectors were hit harder than others (European Commission, 2020b). The negative impact of the Covid-19 pandemic on agriculture is reflected in the reduction of labor availability, the loss of jobs in various agricultural value chains, increased production costs, and the increase in prices of agricultural products (Ceballos et al., 2020; Cranfield, 2020).

The Covid-19 pandemic has negatively affected the agricultural employees, particularly the seasonal agricultural worker group. Quarantine measures reduced the availability of labor for important agricultural activities, such as planting vegetables and picking fruits, resulting in harvest delays and increased food losses, most affecting perishable goods (Adhikari et al., 2021; Cortignani et al., 2020). In addition, the lockdown and restrictions on the "mobility of workers across borders have contributed to labor shortages, mainly in countries that rely on seasonal workers" (Bochtis et al., 2020, p. 2). Consequently, the majority of migrant, informal, seasonal agricultural employees lost their jobs, which has contributed to an increase in agricultural unemployment (Poudel et al., 2020). These challenges are compounded by the fact that agricultural production requires many people to work together in close proximity at the same time, which makes physical distancing difficult and the risk of infection particularly problematic (Ridley & Devadoss, 2020; Cho et al., 2020). Bochtis et al. (2020) proved that about "50% of the agricultural workforce is at moderate to high risk of contracting a disease at their workplace" (p. 1). Also, many domestic workers became infected or look after a sick family members or children, due to school closures, which further affected the availability of seasonal staff (Martin, 2020). Therefore, it can be concluded that the Covid-19 pandemic has increased unemployment in agriculture, not only as a result of the closure of companies and the impossibility of working from home, but also due to the workers' fear of a high possibility of infection.

Some authors noted that coronavirus pandemic has increased the need of people to strengthen immunity. As a consequence, "larger purchases and creation of stocks were noticeable, which led to an increase in demand for agricultural and food products" (Marković et al., 2022, p. 228). The lockdown measures adopted by most member states have led to "stock piling behavior at household level and short-lived spikes in retail sales" (European Commission, 2020b, p. 4), and the food that has benefited the most from this situation is a staple food. Although the pandemic has caused a surge in food demand due to fears of shortages and stockpiling, lockdown resulted in major supply chain disruptions. The food-away-from-home sector, such as hotels, restaurants, catering and outdoor markets, has suffered a global decline in demand. Short-term lockdown measures and the closure of sectors such as hospitality, tourism or travel have required a shift in supply from food services to direct purchases by consumers confined at home, with further challenges caused by different consumption habits and packaging (Garnett et al., 2020; Vuković & Ružičić Mosurović, 2020). Namely, a large increase in demand for electronic commerce and direct sales from farmers to consumers were noted (European Commission, 2020b).

Food-away-from-home (eating in restaurants or hotels) is a very important aspect of agriculture, therefore it is important to perceive the effects of Covid-19 on agriculture through this prism as well. Restaurants and hotels, that are key source of agricultural product consumption, were closed due to the lockdown, and visits to restaurants were significantly reduced due to guests' fear of the pandemic infection (Gajić et al., 2022; Pulubuhu et al., 2020). Given that the food-away-from-home sector provides employment for many workers, the macroeconomic impacts of this consumption reduction generate a significant loss of GDP and an increase in unemployment. Beckman and Countryman (2021) proved that the effect of agriculture plays a significant role in the economy disruptions caused by the Covid-19 pandemic. Countries with high food-away-from-home spending, such as the United States, suffered the largest decline in agriculture-related GDP. The results showed that, "the impact from agriculture is still only one-third of the total economy shock, although this amount is higher than the 5.4% share of agriculture in the United States national economy" (Beckman & Countryman, 2021, p. 1597).

Materials and methods

The information base of the research consists of data on the economic results of agriculture in the European Union countries. Namely, data on the share of agriculture in GDP and the share of agriculture in employment in the European Union countries for 2019 and 2020 are used in the research. The authors also follow the percentage change in the mentioned indicators in 2020 as a crisis year compared to 2019 as a year of regular circumstances. The data is provided from the Eurostat database.

The methods used in the paper include comparative analysis and cluster analysis. The purpose of applying the comparative analysis is to identify the European Union countries in which there is a relatively greater economic importance of agriculture (measured by the share of agriculture in GDP and employment). The purpose of applying cluster analysis is to classify the European Union countries into certain groups according to the intensity of the impact of Covid-19 pandemic on the economic results of agriculture.

In accordance with the defined subject and aim of the research, the following hypotheses will be tested in the paper:

H_1: The Covid-19 pandemic has not changed the role and importance of agriculture for the macroeconomic performance of the individual European Union countries.

H_2: The European Union countries are not homogeneous when it comes to the effects of Covid-19 pandemic on the economic results of agriculture.

Results and discussion

In order to understand the role and importance of agriculture for the macroeconomic results of the countries of the European Union, Table 1 shows data on the percentage share of agriculture in GDP and the percentage share of agriculture in employment. Data are shown for 2019 and 2020. The percentage change of the analysed variables in 2020 compared to 2019 is also considered.

Table 1. The share of agriculture in GDP and employment in the European Union countries (2019 and 2020)

Country	Share in GDP			Share in employment		
	2019 (% of total GDP)	2020 (%)	20/19 (%)	2019 (% of total employment)	2020 (%)	20/19 (%)
Austria	1.1	1.1	0	3.32	3.58	7.89
Belgium	0.7	0.8	14.29	0.85	0.83	-1.85
Bulgaria	3.2	3.5	9.38	6.49	6.42	-0.99
Croatia	2.9	3.2	10.34	5.56	6.07	9.15
Cyprus	1.8	1.9	5.56	2.06	2.2	6.88
Czechia	1.9	2.0	5.26	2.62	2.57	-1.97
Denmark	1.3	1.4	7.69	2.03	1.93	-5.12
Estonia	2.4	2.1	-12.50	3.32	3.06	-7.96
Finland	2.3	2.5	8.70	3.35	3.2	-4.71
France	1.5	1.6	6.67	2.39	2.25	-5.98
Germany	0.8	0.8	0	1.13	1.14	1.12
Greece	3.8	4.2	10.53	10.97	9.98	-8.96
Hungary	3.3	3.4	3.03	4.66	4.68	0.49
Ireland	0.9	0.9	0	3.61	3.57	-1.07
Italy	1.9	2.0	5.26	3.72	3.79	2.01
Latvia	4.2	4.3	2.38	7.34	7.25	-1.23
Lithuania	3.1	3.5	12.90	6.24	5.52	-11.64
Luxembourg	0.2	0.2	0	0.63	0.69	10.08
Malta	0.5	0.4	-20.0	0.92	1.02	10.30
Netherlands	1.6	1.6	0	1.78	1.75	-1.78
Poland	2.4	2.6	8.33	8.99	9.43	4.89
Portugal	2.1	2.2	4.76	3.41	3.23	-5.37
Romania	4.4	4.2	-4.55	19.06	18.53	-2.77
Slovakia	1.7	1.7	0	2.78	2.56	-7.97
Slovenia	2.0	2.1	5.0	3.69	3.51	-4.82
Spain	2.5	2.9	16.0	3.99	3.94	-1.26
Sweden	1.4	1.3	-7.14	1.33	1.29	-2.92
Average	*2.07*	*2.16*	-	*4.31*	*4.22*	-

Legend: Countries with the higher share of agriculture in GDP and employment than the average share in the European Union

Source: Eurostat, 2022

The countries where the participation of agriculture in GDP and the participation of agriculture in employment are higher compared to the European Union average are marked in the Table 1. If the insight is carried out by year, it can be concluded that 11 countries in 2019 and 10 countries in 2020 had the share of agriculture in GDP above the EU average. Only Estonia's share was slightly lower than the EU average in 2020 and it was higher in 2019. Therefore, the Covid-19 pandemic has not significantly changed the structure of European Union countries in which agriculture has relatively greater importance for GDP. According to the second observation criterion, i.e., the participation of agriculture in employment, the eight countries that had a higher participation than the average for the European Union as a whole in 2019 are also the countries with an above-average participation in 2020. Therefore, the Covid-19 pandemic did not change the structure of countries where the importance of agriculture for employment is relatively higher. Based on the above mentioned, the first starting hypothesis of the research has been confirmed.

Table 1 also provides insight into the intensity of the impact of the Covid-19 pandemic on the economic results of agriculture in the European Union countries. Analysis of the percentage change in the share of agriculture in both GDP and employment in the observed years points to a couple of interesting facts. First of all, there are few countries in which the contribution of agriculture to GDP in 2020 decreased compared to 2019. The decrease occurred in only four countries: Estonia, Malta, Romania and Sweden. The share of agriculture in GDP remained unchanged in the following countries: Austria, Germany, Ireland, Slovakia and Luxembourg. In all other countries, the share of agriculture in GDP increased in 2020 compared to 2019. The analysis of the percentage change in the share of agriculture in employment indicates slightly different results. Namely, the negative effect of the Covid-19 pandemic is more pronounced here. There was a decrease in the percentage share of agriculture in employment in 2020 compared to 2019 in even 18 out of 27 observed countries. The results could be explained by the fact that, regardless of the imposed restrictions and problems in food supply chains, agricultural sector is obliged to provide enough food for the normal functioning of the population. In addition, Covid-19 pandemic increased demand for food, because of fear of uncertainty and shortages, and decreased demand for luxury goods, such as travel and cars. However, quarantine measures made it impossible for workers, who are often seasonal and migrant, to reach their farms, resulting in increased unemployment.

In order to group the countries of the European Union, whereby the classification criterion was the intensity of the impact of Covid-19 crisis on the economic results of agriculture, the cluster analysis is used in the paper, as a method of classifying variables into homogeneous groups. The Final Cluster Centers according to the selected variables are shown in Table 2. The type of cluster analysis that is applied in order to reach the Final Cluster Centers and divide the countries is the K-Means Cluster analysis.

Table 2. Final Cluster Centres

Variables	**Cluster**		
	1	2	3
Share in GDP [20/19(%)]	-11.05	8.43	3.17
Share in employment [20/19(%)]	-0.84	-5.05	3.49

Source: Authors' research

The Final Cluster Centers shown in Table 2 indicate certain specificities of the effect of the crisis on the contribution of agriculture to GDP and the contribution of agriculture to employment in the European Union countries. Namely, it is not possible to clearly single out the clusters with the worst and best performances, taking into account both criteria together (that is, the percentage change in the share of agriculture in GDP and the percentage change in the share of agriculture in employment in the observed period). Cluster 1 can conditionally be rated as the cluster of the worst performance, in which the negative effect of the Covid-19 pandemic on the economic results of agriculture is the greatest, due to the negative values of both variables. Cluster 2 is a very specific cluster and according to the information in Table 2, it consists of the countries with the largest positive contribution of agriculture to GDP and the largest negative contribution of agriculture to employment. Cluster 3 can conditionally be rated as the cluster of the best performance, in which there is no negative effect of the pandemic on the economic results of agriculture or it is negligible, due to the positive values of both variables.

Table 3 shows the results of Multiple Comparisons, i.e., Post Hoc Test. The intention of applying this methodological procedure was to test the statistical significance of the difference among the defined clusters of European Union countries.

Table 3. Multiple Comparisons (Post Hoc Test)

Variables	(I) Cluster	(J) Cluster	Mean Difference (I-J)	Std. Error	Sig.
Share in GDP [20/19 (%)]	1.00	2.00	-19.47917*	2.65034	0.000
		3.00	-14.22023*	2.68029	0.000
	2.00	1.00	19.47917*	2.65034	0.000
		3.00	5.25894*	1.91619	0.029
	3.00	1.00	14.22023*	2.68029	0.000
		2.00	-5.25894*	1.91619	0.029
Share in employment [20/19 (%)]	1.00	2.00	4.21583	2.62924	0.264
		3.00	-4.33114	2.65895	0.253
	2.00	1.00	-4.21583	2.62924	0.264
		3.00	-8.54697*	1.90094	0.000
	3.00	1.00	4.33114	2.65895	0.253
		2.00	8.54697*	1.90094	0.000

*Legend: * The mean difference is significant at the 0.05 level*

Source: Authors' research

The data shown in Table 3 indicate that there is a statistically significant difference between the defined clusters in terms of the percentage change in the share of agriculture in GDP in 2020 compared to 2019. This is valid for the comparison of all three clusters. If the percentage change in the share of agriculture in employment in 2020 compared to 2019 is observed, the statistical significance of the difference is confirmed only between cluster 2 and cluster 3. The statistical significance of the difference between cluster 1 and cluster 2 and between cluster 1 and cluster 3 is not confirmed. However, such findings indicate that the second hypothesis is only partially confirmed. The countries of the European Union are heterogeneous in terms of the impact of the Covid-19 pandemic on the contribution of agriculture to GDP. On the other hand, there are no significant oscillations regarding the impact of the Covid-19 pandemic on the contribution of agriculture to employment between countries in cluster 1 in relation to those in cluster 2, or in relation to those in cluster 3. Table 4 shows the structure of the cluster, i.e. which countries make up cluster 1, 2 or 3, as well as the number of countries in each cluster.

Table 4. Membership of countries in clusters

Cluster	Number of countries in cluster	Countries
1	4	Estonia, Malta, Romania, Sweden
2	12	Belgium, Bulgaria, Czechia, Denmark, Finland, France, Greece, Lithuania, Portugal, Slovakia, Slovenia, Spain
3	11	Austria, Croatia, Cyprus, Germany, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland

Source: Authors' research

According to the intensity and direction of the impact of the pandemic on the economic results of agriculture in the European Union countries, i.e., the intensity and direction of changes in the percentage share of agriculture in GDP and the intensity and direction of changes in the percentage share of agriculture in employment, the countries of the European Union are grouped into three clusters whose structure is as follows:

- Cluster 1 - Estonia, Malta, Romania, Sweden: this cluster consists of countries with the greatest negative effect of the Covid-19 pandemic on the contribution of agriculture to GDP and with a relatively moderate negative impact of the crisis on the contribution of agriculture to employment;
- Cluster 2 - Belgium, Bulgaria, Czechia, Denmark, Finland, France, Greece, Lithuania, Portugal, Slovakia, Slovenia, Spain: this cluster is characterized as a specific cluster and consists of countries with the largest positive changes in the contribution of agriculture to GDP in 2020 compared to 2019 and with the largest negative effect of the Covid-19 pandemic on the contribution of agriculture to employment;
- Cluster 3 - Austria, Croatia, Cyprus, Germany, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland: this cluster consists of countries where the negative effect of the Covid-19 pandemic on the contribution of agriculture to GDP and employment was not registered, or countries where this negative impact was very moderate.

The simultaneous analysis of the data shown in Table 1 and the defined clusters did not show any connection between the importance of agriculture for the economic performance of individual countries and the intensity of the impact of pandemic on the economic results of agriculture in the European Union member states. It could have been expected that those EU countries in which the importance of agriculture for economic performance is greater supported this sector with stronger measures in order to mitigate the negative effects of the crisis. However, the data on the contribution and change in the contribution of agriculture to GDP, as well as on the contribution and change in the contribution of agriculture to employment do not confirm this at all. The reasons for a greater or lesser negative impact or the absence of a negative impact in individual countries should be sought in other factors, such as the incentive policy of agricultural production or the policy of reducing the number of employees as a response to the crisis. Namely, the European Commission adopted few packages of measures to support agricultural sector of the EU. Some of these measures included exceptional derogation from EU competition rules, private storage aid, higher advances of payments and flexibility in the use of financial instruments in order to increase the cash flow of farmers (European Commission, 2020a). The measures were aimed at increasing the cash flow of farmers in order to preserve the business of agricultural plants and farms and maintain agricultural employment at the pre-crisis level.

Conclusions

The health crisis caused by the Covid-19 pandemic turned into an economic crisis and dealt a strong blow to almost all sectors of the economy. Agriculture, as one of the most insecure and unpredictable sectors, has been significantly affected by this crisis. Agricultural workforce, as well as the whole society, was faced with measures of social distancing, travel restrictions, closures and self-isolation, in order to curb the spread of the virus. Movement restrictions of farm workers, especially seasonal ones, who are often migrants, resulted in harvest delays and increased food losses, with the greatest consequences for perishable goods. As a consequence, there was a decrease in the share of agriculture in total employment. The closure of countries and the restriction of exports have led to the disruption of supply chains. Nevertheless, despite the mentioned negative consequences for agriculture, the crisis caused by the Covid-19 pandemic did not reduce the contribution of agriculture to GDP, which may be a consequence of the increased demand for agricultural products caused by the fear of uncertainty and stockpiling.

The subject of analysis in the paper was the effect of the Covid-19 pandemic on the economic results of agriculture in the EU countries. The results of the research indicated that the Covid-19 pandemic has not changed the importance of agriculture for the economic performance of individual countries. Namely, those EU countries in which the participation of agriculture in GDP and employment was higher than the EU average before the crisis are countries with participation above the average in 2020 as well. The direction of the impact of the Covid-19 pandemic on the economic results of agriculture in the EU countries was further analysed. The research results indicated that the Covid-19 pandemic in most of the EU countries did not have a negative impact on the contribution of agriculture to GDP. While certain sectors, like tourism, suffered a huge shock, it seems that this is not valid for agriculture as well. In addition, the increase in the contribution of agriculture to GDP certainly came at the expense of a decrease in the contribution of some other, more crisis-affected sectors. On the other hand, employment in the agricultural sector was also sensitive to the impact of the Covid-19 pandemic in many countries of the European Union. At the same time, the largest percentage decrease in the participation of agriculture in employment was recorded in countries where the importance of agriculture for total employment is relatively higher (such as Greece and Lithuania). It can be concluded that these countries also sought a way out of the crisis by reducing the number of employees, among others, in the agricultural sector. Cluster analysis did not confirm the heterogeneity of EU countries when it comes to the effect of the pandemic on the economic results of agriculture based on both observed criteria. Namely, while the heterogeneity of countries can be discussed when it comes to the impact of the pandemic on the contribution of agriculture to GDP, the same cannot be said for the impact of the pandemic on the contribution of agriculture to employment.

The contribution of the paper, in a theoretical sense, is reflected in the attempt to resolve the debate about the effect of the Covid-19 pandemic on agriculture, especially about the contribution of agriculture in the creation of GDP and total employment. In a practical sense, the paper can contribute to the policy creators for agricultural recovery after the crisis, especially when it comes to employment, pointing to those countries where the decline in the contribution of agriculture to total employment was higher. The restriction of the research to the European Union countries can be considered as a limitation, considering that the role of agriculture in total economy declines with the country development. A more comprehensive analysis for future research would include all countries of the world, with special emphasis on the less developed countries that base their economic development on agriculture and which could have suffered a more significant blow of the pandemic crisis.

Conflict of interests

The authors declare no conflict of interest.

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THE INFLUENCE OF THE SUPPLY CHAIN ON THE COMPETITIVE ADVANTAGES OF COMPANIES IN AGRIBUSINESS

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ABSTRACT

Changes in the market, caused by globalization, have led to the fact that many companies needed to adapt their operations. In response to these changes, the concept of supply chain was developed to help companies from procurement to sales of products. This paper examines the effects of supply chains on competitiveness using the example of agro-food companies from the Republic of Croatia. The research was conducted through a questionnaire which included 188 agribusiness companies. The responses were systematized and statistically processed using descriptive statistics, correlation analysis and multivariate regression analysis. The results showed that the effects of supply chains play a major role in determining the competitiveness of agro-food companies. Therefore, it is necessary to improve the effects of the supply chain in these companies in order to improve competitiveness and achieve better results of these companies on the market.

Introduction

Increasing globalization affects the operation of companies. In the 1980s, more and more attention began to be paid to logistics, that is, to the supply chain. The first task of the supply chain was to deliver goods at the lowest possible cost, i.e. to reduce transportation costs (Puška et al., 2018). However, as time passed, supply chain tasks became more complex and more extensive (Manavalan and Jayakrishna, 2019). Today, in the time of an integral approach, the supply chain includes all operations that connect suppliers on the one hand and customers on the other (Kozarević and Puška, 2015). In the case of agribusiness companies, the aim is to reduce business costs through the

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supply chain (Pamučar, et al., 2021). The focus of applying supply chains is to reduce all unnecessary costs in the commodity flow (Aldrighetti et al., 2019) and thus ensure that the company is more competitive in the existing market.

Achieving and strengthening competitiveness is important for all companies (Badi and Pamucar, 2020). That is why the aspiration is to achieve the competitiveness of companies by means of business improvement, through the improvement of the supply chain (Vesković, et al., 2018). In addition, it is necessary to make the supply chain sustainable in order to improve the competitiveness of companies (Zulqarnain, et al, 2021). This paper aims to examine how the effects of the supply chain affect competitiveness when it comes to companies working in the agribusiness sector on the example of the Republic of Croatia.

Theoretical framework of the research

Supply chain management is linked exclusively to the company's procurement system (Van den Brink et al., 2019). However, the concept of supply chains has changed so much over time that it cannot be tied exclusively to the procurement system (Taghikhah et al., 2019). The supply chain represents an integrated approach to connecting suppliers and customers through the satisfaction of customer needs. A supply chain integrates the flows of products, information and financial resources between participants in the supply chain. (Šapić et al., 2018; Novais et al, 2019) There is no universal definition of the term supply chain. The supply chain represents an integrated approach whose goal is to fulfil the needs of customers, and as such it should not be viewed separately from other processes in the company. The main goal of every company should be customer orientation, while taking into account all the activities that are carried out to satisfy the needs of customers. The supply chain includes all participants and processes from the producer of raw materials to the final consumer (Litke et al., 2019). The supply chain changed under the influence of changes in the market, especially when it comes to the supply chain of agribusiness companies (Puška, et al., 2022).

Christopher (2011) explains supply chain management through: Responsiveness, Reliability, Resilience and Relationships. Hugos (2011) starts from the customer's point of view, and explains the supply chain through: efficiency, reliability, flexibility and innovation. Lee Hau (2004) concluded in his paper that the best supply chain is not only fast and cost-effective, but also agile and adaptive, and in order to maintain the interests of companies, it must also be coordinated. This concept is called "Triple A" and it includes: Agility, Adaptability and Alignment.

Based on the above, it can be said that the supply chain should be multidimensional in order to contribute to the business of the company itself. In order to measure the application of supply chains, five dimensions of the supply chain will be observed: agility, flexibility, efficiency, stability and responsibility. It should be noted that there are other dimensions of the application of the supply chain, but in practice these dimensions are given the most importance (Puška, et al., 2020). The task of every supply chain is to be as fast (agile), flexible, economical and efficient as possible. The supply chain should be made more stable, responsible and sustainable in order to respond to all environmental demands and thus help the company to increase its competitiveness. (Kozarević and Puška, 2015).

After the published paper "The Competitive Advantage of Nations" (Porter, 1990), more and more attention has been paid to the study of competitiveness. It was only in the 1980s that competitiveness gained importance when the American economic dominance was threatened by European and Asian states (Bhawsar and Chattopadhyay, 2015). Two reasons have increased the importance of competitiveness: globalization and business competition (Ozbekler and Ozturkoglu, 2020).

According to Zhao et al., (2019) competitiveness is the basis that determines the success or failure of a company. It also determines the appropriateness of the company's activities that contribute to its performance, such as innovation, cohesive organizational culture or good implementation. Competitive strategy is the search for an advantageous competitive position within the industry, the fundamental environment in which competition occurs (Muñoz and Kimmitt, 2019). Competitive strategy is aimed at establishing a profitable and sustainable position despite the forces that determine industrial competition (Porter, 2008).

The foundation of an above-average business in the long run is a sustainable competitive advantage. Although a company can have many strengths and weaknesses compared to its competitors, there are two basic types of competitive advantages that a company can possess, namely differentiation and low costs. (Anwar et al., 2018). The operations of every company in a global environment are affected by micro-competitiveness, which is defined as the relative efficiency of a company to sell its products and services in a market where international competition is present.

In this paper, the competitive advantage will be observed through four variables: application of innovation and technology in business, employee development, adaptation to customer and market requirements, and price and cost competition. Based on all of this, the basic hypothesis of this research is:

- The effects of the supply chain affect the competitiveness of companies from the agro-food industry in the Republic of Croatia.

Since five effects of the supply chain were used, five auxiliary hypotheses were also set, namely:

- The agility of the supply chain affects the competitiveness of companies from the agro-food industry in the Republic of Croatia.
- The flexibility of the supply chain affects the competitiveness of companies from the agro-food industry in the Republic of Croatia.
- The efficiency of the supply chain affects the competitiveness of companies from the agro-food industry in the Republic of Croatia.

- The stability of the supply chain affects the competitiveness of companies from the agro-food industry in the Republic of Croatia.
- The responsibility of the supply chain affects the competitiveness of companies from the agro-food industry in the Republic of Croatia

Materials and methods

In order to examine the impact of the supply chain on the competitiveness of agri-food companies in the Republic of Croatia, a questionnaire survey was used. The questionnaire consisted of two parts, the first part intended for general information about the companies, while the second part of the questionnaire examined research variables. The variables in the research are divided into an independent variable and a dependent variable. The independent variable in this research is focused on the effects of the supply chain, while the dependent variable focuses on the competitiveness of the companies.

The total number of companies from the field of agro-industry is 19,413. However, it was difficult to find all the data on these companies, so the research was focused only on the 2,000 most successful companies according to the business results. Those companies were contacted and a response was received from 188 companies that represent the sample of this research. Of that number of companies, 25 companies are large companies (13.29%), 48 companies are medium-sized companies (25.53%), while 115 companies are small companies (61.17%). According to the total number of employees, there are 105 companies with up to 20 employees (55.85), 43 companies with 20 to 50 employees (22.87), while 40 companies have more than 50 employees (21.28). Majority of the companies are privately owned and that is 98.58% of the companies, while the rest of them are in mixed ownership.

Table 1. Claims for measuring research variables

Variables	**Claims**
Agility	Our supply chain is fast, agile and easy to implement
Flexibility	Our supply chain is adaptable and rapidly changing
Efficiency	Our supply chain strives to provide maximum impact with minimal cost
Stability	Our supply chain enables continuous procurement and sales
Responsibility	Our supply chain is reliable and trustworthy
Innovations and technologies in business	Innovations and modern technologies are applied in our business
Employee development	In our business, we are working on the development and continuous learning of our employees
Adaptation to customer and market requirements	Our business adapts to the new demands of customers and the market
Price and cost competitiveness	Our business is focused on cost reduction and competitive product prices

Source: Authors

In order to determine the effects of the supply chain and the competitiveness of the companies, statements were formed to which the companies had to answer using: “completely disagree” to “completely agree”scale. A value scale of 7 levels was used for this purpose. For each of the set variables, the companies had to answer to certain statements, which are shown below in Table 1.

Measuring the impact of the effects of supply chains on the competitiveness of companies was carried out using multivariate regression analysis (MRA). MRA is a statistical method for analysing the influence of independent variables on dependent variables. The regression model is expressed in the form of a stochastic equation that includes at least one dependent and several independent variables (predictors). (Rath et al., 2020). The goal of this analysis is the prediction of the dependent variable as a reaction to changes in the independent variables. This goal is achieved by applying the least squares method, which is the most widely used linear regression model estimation because it provides the following desirable parameter estimates: unbiased estimate, efficient estimate, and consistent estimate. (Ahmad and Aslam, 2022). The task of MRA is the inclusion of several factors in the analysis, where the influence of the independent variable factor on the dependent variable is assessed.

In addition, correlation analysis will be used to examine the relationship between these research variables. Correlation analysis is interpreted as a connection, link, association or measure of covariation between phenomena. Studying the connection between phenomena is reduced to determining the direction, strength and form of the connection. Correlation analysis deals with the research of mutual relations between phenomena, but not the cause-and-effect relations between them (Tariq and Shujaa Safdar Gardezi, 2023). Correlation analysis shows how much the results of one variable explain the results of another variable, that is, how much the results of two variables vary in accordance (Fida et al., 2020).

When determining the correlation, the most important thing is the direction of change of interrelated variables. If the increase in the value of the results of one variable is associated with the increase in the value of the results of another variable, it is said to be a positive correlation (Bae et al., 2021). When the increase in the value of the result of one variable is associated with the decrease in the value of the result of another variable, it is said to be a negative correlation. Negative and positive correlation is determined by the result of correlation analysis. When explaining correlation analysis, it is important to determine a value that ranges from minus one to one. In practice, there is no single defined explanation of correlation analysis results. Therefore, in this research, the explanation of correlation analysis values will be used (Fazlović, 2013):

- Od 0.00 do ±0.20: slight correlation
- Od ±0.20 do ±0.40: low correlation
- Od ±0.40 do ±0.70: moderate correlation
- Od ±0.70 do ±0.90: high correlation
- Od ±0.90 do ±1.00: very high correlation

MRA values and correlation analysis were calculated using program Statistica 14.

Results and discussion

Before examining the research hypotheses, the following table 2 will present a descriptive analysis of the research data collected. For all research variables, the minimum value is one (1), while the maximum value is seven (7). When looking at the mean value, the variable stability has the highest value (mean = 3.4278), while the variable employee development has the minimum value (mean = 2.7766). Observing the dispersion of responses, the variable flexibility has the highest dispersion (SD = 1.2812), while the variable employee development has the lowest dispersion in responses. (SD = 1.0306).

Table 2. Descriptive analysis of research results

Variables	Min	Max	Mean	Standard deviation
Agility	1	7	3.3085	1.2412
Flexibility	1	7	3.1277	1.2812
Efficiency	1	7	3.3245	1.1909
Stability	1	7	3.4278	1.2043
Responsibility	1	7	3.0160	1.1722
Innovations and technologies in business	1	7	3.0426	1.2185
Employee development	1	7	2.7766	1.0306
Adaptation to customer and market requirements	1	7	3.1649	1.2536
Price and cost competitiveness	1	7	3.1330	1.0639

Source: Authors

When examining the impact of supply chain effects on the competitiveness of companies, it is necessary to first examine the degree of correlation between the observed variables using correlation analysis. If these correlation analysis values are greater than 0.7, then there is no need to do MRA (Puška et.al., 2015) since there is a high correlation between the variables.

The results of the correlation analysis in the following table 3 show that the highest value of the correlation between these variables is seen in the sub-variables responsibility and market and customers (r = 0.547), while the lowest correlation is between the variables stability and price and costs (r = 0.336). These results show that all values are less than 0.7, so all these variables are retained in further analysis.

Table 3. Connection of supply chain application parameters

	Innovation and technology	Market and customers	Development and learning	Price and costs
Agile	.341**	.409**	.338**	.382**
Flexible	.408**	.496**	.376**	.388**
Efficient	.359**	.412**	.401**	.358**
Stable	.479**	.416**	.478**	.336**
Responsible	.419**	.547**	.464**	.393**

** level of significance from 0,01

Source: Authors' calculation

When examining the impact of individual supply chain effects, auxiliary research hypotheses will also be examined. The first auxiliary hypothesis will be examined first. The obtained results of the research show that there is a significant impact on the competitiveness of agri-food companies in the Republic of Croatia (F-test = 11.855; $p < 0.000$), thus the first auxiliary hypothesis is accepted. The results show that there is a moderate correlation between the observed variables (R = 0.454), while this model explains a total of 20.6% of the dependent variable, which shows the coefficient of determination ($R^2 = 0.206$).

When looking at the individual impact of supply chain agility on the competitiveness of companies, it can be seen from the following table 4 that there is a significant impact on two dependent variables: Market and customers (T-test = 1.989, p = 0.048) and Price and costs (T- test = 2.567, p = .011). For other dependent variables, there is no significant influence of supply chain agility. It should be emphasized that all dependent variables have a positive influence on the direction of the regression function.

Table 4. The influence of supply chain agility on the competitiveness of companies

Summative regression model: R = 0.454; $R^2 = 0.206$; Adapted $R^2 = 0.188$; F-test = 11.855; $p < 0.000$; the standard error of the estimate = 1.118				
Model	**Non-standard coefficients**		**T-test**	**Significance**
	B	Standard error		
(Model constant)	**1.480**	**.282**	**5.246**	**.000**
Innovations and technologies	.090	.095	.945	.346
Market and customers	**.260**	**.131**	**1.989**	**.048**
Development and learning	.021	.097	.212	.832
Price and costs	**.245**	**.096**	**2.567**	**.011**

Source: Authors' calculation

The results obtained by examining the impact of supply chain flexibility on the competitiveness of companies presented in the following table 5 show that there is a significant impact (F-test = 16.890; $p < 0.000$), thus accepting the second auxiliary hypothesis. There is a moderate correlation between the observed variables (R = 0.519), and this model explains 27.0% of the dependent variables. ($R^2 = 0.270$). By observing the individual impact of flexibility on the competitiveness of the company, it can be seen that there is a significant impact on the Market and the customer (T-test = 3.282, p = .001), while there is no significant impact on the other variables. With the dependent variable Development and learning, there is a negative influence on the direction of the regression function (B = -.017), which shows that this variable has a negative influence on this model. However, this influence is weak since the value of the B coefficient is close to zero (0).

Table 5. The influence of supply chain flexibility on the competitiveness of companies

Summative regression model: R = 0.519; R^2 = 0.270; Adapted R^2 = 0.254; F-test = 16.890; p < 0.000; the standard error of the estimate = 1.107				
Model	**Non-standard coefficients**		**T-test**	**Significance**
	B	Standard error		
(Model constant)	**1.054**	**.279**	**3.777**	**.000**
Innovations and technologies	.123	.094	1.305	.194
Market and customers	**.425**	**.129**	**3.282**	**.001**
Development and learning	-.017	.096	-.180	.857
Price and costs	.184	.095	1.942	.054

Source: Authors' calculation

In the following table 6, we observe the results of testing the third auxiliary hypothesis, which show that there is a significant influence of the efficiency of supply chains on the competitiveness of companies (F-test = 12.368; p < 0.000), which is why this auxiliary hypothesis is accepted. There is a moderate correlation between the observed variables (R = 0.461), and this model explains 21.3% of the dependent variables. (R^2 = 0.213). When looking at the individual impact of supply chain efficiency on the dependent variable, it can be concluded that there is no significant individual impact. In addition, all dependent variables have a positive influence on the direction of the regression function.

Table 6. The influence of supply chain efficiency on the competitiveness of companies

Summative regression model: R = 0.461; R^2 = 0.213; Adapted R^2 = 0.196; F-test = 12.368; p < 0.000; the standard error of the estimate = 1.107				
Model	**Non-standard coefficients**		**T-test**	**Significance**
	B	Standard error		
(Model constant)	**1.564**	**.269**	**5.805**	**.000**
Innovations and technologies	.090	.091	.995	.321
Market and customers	.179	.125	1.431	.154
Development and learning	.150	.093	1.614	.108
Price and costs	.165	.091	1.803	.073

Source: Authors' calculation

The examination of the fourth auxiliary hypothesis shows that there is a significant influence of the stability of the supply chain on the competitiveness of companies (F-test = 18.505; p < 0.000), which is why this research hypothesis is accepted. There is a moderate correlation between the observed variables in this model (R = 0.537), and this model explains 28.8% of the dependent variables. (R^2 = 0.288). Observing the individual impact of supply chain stability on two dependent variables, there is a significant impact on innovations and technologies (T-test = 3.336, p = .001) and development and learning (T-test = 2.963, p = .003). It should be mentioned that the variable market and customers has a negative influence on the direction of the regression function (B = -.025); however, this influence is weak because the value of the B coefficient is close to zero. (0). (Table 7)

Table 7. The influence of supply chain stability on the competitiveness of companies

Summative regression model: R = 0.537; R^2 = 0.288; Adapted R^2 = 0.272; F-test = 18.505; p < 0.000; the standard error of the estimate = 1.028				
Model	**Non-standard coefficients**		**T-test**	**Significance**
	B	Standard error		
(Model constant)	**1.509**	**.259**	**5.815**	**.000**
Innovations and technologies	**.291**	**.087**	**3.336**	**.001**
Market and customers	-.025	.120	-.204	.839
Development and learning	**.265**	**.089**	**2.963**	**.003**
Price and costs	.082	.088	.928	.355

Source: Authors' calculation

The results of the examination of the fifth auxiliary hypothesis in the following table 8 show that there is a significant influence of supply chain responsibility on the competitiveness of companies (F-test = 21.417; p < 0.000), which confirms this research hypothesis. The correlation between the observed variables is moderate (R = 0.565), and this model explains 31.9% of the dependent variables (R2 = 0.319). For one dependent variable, there is a significant individual influence of supply chain responsibility, namely for the variable market and customers (T-test = 3.765, p = .000). With other dependent variables, there is no significant statistical influence, and there is no negative influence on the direction of the regression function either. All values of the B coefficient are positive.

Table 8. The impact of supply chain responsibility on the competitiveness of companies

Summative regression model: R = 0.565; R^2 = 0.319; Adapted R^2 = 0.304; F-test = 21.417; p < 0.000; the standard error of the estimate = 0.978				
Model	**Non-standard coefficients**		**T-test**	**Significance**
	B	Standard error		
(Model constant)	**1.005**	**.247**	**4.072**	**.000**
Innovations and technologies	.044	.083	.528	.598
Market and customers	**.431**	**.114**	**3.765**	**.000**
Development and learning	.109	.085	1.287	.200
Price and costs	.107	.084	1.285	.200

Source: Authors' calculation

By examining auxiliary hypotheses, the main hypothesis of this research was also examined. Since the results showed that there is a significant influence of individual independent variables, it can be concluded that the independent variable supply chain effects have a significant impact on the competitiveness of companies, thus accepting the main hypothesis of this research.

In addition, the results showed that different effects of the supply chain have a greater impact on certain segments of companies' competitiveness. Therefore, it is necessary to take into account all the effects of the supply chain. Thus, if one wants to achieve better innovation, it is necessary to improve the stability of supply chainsIf customers are to be more satisfied, it is necessary to develop a more responsible supply chain. Also, it is necessary for companies to work on all the effects of supply chains and not just on some effects. The supply chain is a powerful weapon for improving business and developing competitiveness (Riaz, et al., 2021).

Conclusions

The results of the research showed that the sub-variable stability of the supply chain received the highest average value, while the sub-variable employee development received the lowest average value, with the slightest deviation from the average value of the sub-variables. After that, the correlation between the observed sub-variables of the research was determined. This analysis yielded results that showed that the supply chain and markets and customers are responsible for the sub-variables, while the weakest connection is seen between the sub-variables: the stability of the supply chain, and prices and costs. Also, the results of this analysis showed that all sub-variables have a significant impact on the competitiveness of companies, and all auxiliary hypotheses were accepted. Based on that, the main hypothesis of this paper was accepted. This paper thus proved that the effects of the supply chain have a great impact on the competitiveness of companies. Based on this, it is necessary to develop the supply chain in order to improve competitiveness. In future research, it is necessary to include other variables to see if some other variable has a greater impact on competitiveness and which variable it was.

Conflict of interests

The authors declare no conflict of interest.

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THE EFFECT OF A COUNTRY NAME ON CONSUMERS' PERCEPTION AND ASSESSMENT OF AGRICULTURAL PRODUCTS WITH PROTECTED DESIGNATION OF ORIGIN

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A B S T R A C T

The aim of the paper was to show that Serbia has favorable natural conditions (land and climate) for diverse agricultural production (plant- and animal-based), experienced manufacturers, experts and scientists, as well as world-famous selections of numerous plant cultures. Serbia's major agricultural products are corn, wheat (flour), sunflower (oil and pellets), sugar beet (sugar), soybean (oil and protein products), potatoes, raspberries, apples, plums, sour cherries, grapes, pork, beef and poultry, as well as milk.

Introduction

Studies of the effect of the name of the country of origin have been conducted for a variety of short-lived and long-lasting consumer products, from cars and technical products to food. The name of the country of origin becomes an integral part of a set of external characteristics when evaluating a product on the basis of price, brand, packaging, and service, as opposed to studying the role of aspects of actual product quality, such as material, design, style, etc. Manipulation with product origin affects consumer perception and behavior, even when they are given the opportunity to observe, touch, feel or taste another identical product.

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Designations of origin – the “made in …” effect, is one of the most exploited concepts, whereby value is added to or detracted from a product depending on its place of origin, resulting from opinions regarding the country, its inhabitants, and other factors. Names of countries have long played the role of brands, helping consumers evaluate products and make purchasing decision. Names prompt associations that can enhance or diminish existing product perceived value. Empirical evidence supports the hypothesis that consumers prefer purchasing goods from developed industrial countries to those from less developed ones, because they equate the product with its country of origin. The product label becomes a mark of quality depending on the reputation of the country of origin, which may boost consumer trust or raise doubts. Regardless of globalization and changes in competitive environment, the place of manufacture still affects consumer decisions concerning certain categories of products.

Few countries in the world can manufacture all the products needed by its citizens, and small countries particularly are compelled to make their agricultural production specialized, directing it towards those products and services offering the greatest potential competitive advantage. Agriculture is one of the pillars of economic development of Serbia, and its importance for national economy, besides economic and social, has an ecological component, too. However, despite huge agricultural potential, which is the result of favorable climatic conditions, soil properties and available water resources, it is not optimally utilised (Mihailović et al., 2013). According to SEEDEV (2017) Serbia has the most competitive advantage when it comes to fruit production, mainly of red fruit: raspberries, strawberries, sour cherries. The country is relatively competitive when it comes to the production of cereals, especially corn, but also wheat, as well as industrial crops: sugar beet, soy and sunflower. Serbia is the largest producer of agricultural and food products in the region, although it is not that significant on the European, let alone world market. In the CEFTA region, Serbia provides for a half or even more of the regional production of the two thirds of different products. Its strongest field is the production of fruit, where 80% of raspberries, apricots and pears, and more than 60% of plums, sour cherries and strawberries are produced in Serbia.

The beginning of the 21st century was marked by the liberalization of export, removal of barriers, and establishment of economic relations, albeit at a lower level, with the former Yugoslav states, as well as the process of privatization which regrettably failed to produce the anticipated results, and despite periodic advances, agricultural production, domestic enterprises in particular, has been dealing with substantial quantity and quality decline. In a situation of uneven development of individual sectors and branches of agriculture, it is impossible to observe the attitude toward domestic and foreign products, ethnocentrism, and the views and behavior of consumers in general only on the macro level. Analysis and observation should be brought down to the level of specific agricultural products with protected designation of origin. Sustainable resource management and environmental protection in the field of agriculture production ensure long-term food security and contribute to the stability and quality of local production in conditions of growing risk on the global food market. The specific character of agricultural production, reflected in its high dependency on the extent and quality of natural resources, which are finite and objectively existing, indicates that the state should employ its authority to create conditions that will contribute to preserving their vitality for future generations (Strategija poljoprivrede i ruralnog razvoja Republike Srbije za period 2014 – 2024).

The effect of the country of origin also depends to a large extent on the type of product involved, e.g. consumers want to know where a car was made but this is not the case with motor oil. Some countries enjoy a positive reputation for certain products: the US is known for innovation in the high-tech industry, non-alcoholic drinks, games, jeans, and cigarettes, France is known for wine, perfume, and luxury items, Japan for cars and small household appliances, etc. The Ministry of Trade, Tourism and Services (2005) conducted an interesting study about the perception of product quality according to origin, which showed that 84% of survey participants thought local food products were of better quality than imported produce, while other product categories lagged behind considerably.

A country's overall image influences people's decisions about buying, investing, making changes, choosing their place of residence, or travel destination. Ideas about a country are formed on the basis of its history, geographic location, culture, celebrity engagement, and other distinguishing traits. The entertainment industry and the media play an important role in forming opinions about a country. However, the perceived image of a country is not only shaped by the popularity of its finished products but also by social problems, epidemics, violation of human rights, natural disasters, various conflicts, economic upheaval, famine, poverty, crime, etc. Each of these categories is continually and strongly associated with a country's name. Countries are experienced through social cognition models and the psychological notions that their inhabitants present to the world.

Now the food increasing production, competitiveness and accelerated development and introduction of agrarian policy instruments allow dynamic restructuring of the agricultural sector (Zakić et al., 2017). In presenting itself to the world, each country should provide precise and credible information, which may be short-term, based on exceptions rather than standard patterns, or on impressions rather than facts, but in any case it must be convincing.

In many countries regulatory requirements for product labeling impose the obligation of stating the origin of the product. Geographic indications or designation of origin are common names for different forms of stating geographic origin. They are used when a product has the attributes or the reputation indicating a specific origin and is at the same time affected by such origin. According to Nikola Radovanović, quality control and control of specific characteristics of agricultural and food products is performed by duly accredited certification bodies. These bodies issue a certificate of compliance verifying the quality and other aspects of products (Radovanović, 2014). The authorized user of the indication of geographical origin or applicant for recognition of status of authorized user of indication of geographical origin may file an application for international registration in accordance with an international agreement binding on the Republic of Serbia (Law on Indications of Geographical Origin).

Commercial production is typical, in the sense that it is oriented toward achieving maximum yield. Nevertheless, certain types of products, such as organic products or those bearing a designation of origin really are specific. They are usually described as products with added value, as a result of which people are willing to pay more for them. Protection of geographical origin is particularly developed in the European Union. There are currently more than 10,000 protected Geographical origin or GIs in the world with an estimated trade value of more than US$ 50 billion. Many are well-known names such as Darjeeling tea, Bordeaux wine, Parmigiano Reggiano cheese, and Idaho potatoes. Yet many more are less known and often unprotected (Giovannucci, 2009). Furthermore, in its strategic documents, the European Union particularly stresses the need for environment protection, regardless of the area of human activity (Počuča et al., 2018).

The legislation of the Republic of Serbia defines that the indication of geographical origin shall also be a name that is not a geographical name of a country, region or locality but where such name has become well-known through long-standing use in trade as the traditional name of a product originating from such area, or a historical name of such area, provided the requirements are met for such indication of origin and geographical indication (Law on Indications of Geographical Origin) (Official Gazette). Agricultural and food products with geographical origin, certified in 2020 are: Arilje raspberries, Futog cabbage, Homolje honey, homemade Leskovac ajvar, Djerdap honey, Oblačinka sour cherry from Oblačina, Pirot yellow cow's milk cheese, Srem kulen, and linden honey from Fruška gora. According to SEEDEV (2017), raspberry is still among the most competitive Serbian agricultural products, while this sector undergoes significant changes. The production in Serbia is stagnating, and when compared to the global growth, it is 10 percentage points behind. Simultaneously, Serbia's main rival in the EU market, Poland, is growing faster than the global average. Serbia is still the biggest exporter of the frozen raspberry, and in 2015, it achieved the record export of USD 309 million. When it comes to the actual production, after 40 years, there are finally some innovations in the sector, which may prove to be its salvation.

Materials and methods

The study was conducted in the territory of the Republic of Serbia and involved more than 200 participants. The aim of the survey and the study was to show the untapped potential of our country and to try to bring home the need for raising awareness of end consumers regarding agricultural goods with protected geographical origin. Some researchers believe the "made in…" effect can only be understood if correlated with ethnocentrism. Insight into the effect of ethnocentrism was broadened by studies about the negative impact animosity toward other nations can have on purchasing certain products. Studies show that animosity and ethnocentrism have different implications on perceptions of product quality. Animosity is a construction specifically related to a country, while ethnocentrism is described as a people's belief in the superiority of their own ethnic group and rejection of anything foreign and unfamiliar. In some countries national awareness is positively channeled toward local agricultural products (the Netherlands, France, Spain, etc.). French people will only buy and consume world-renowned cheese and high-quality wine produced in France because they wish to contribute to their own country's budget and not because of any ignorance about food produced in other countries, particularly where this concerns traveling. Serbia is traditionally a wine-growing region and it is slowly approaching those countries that have benefitted from the development of this type of tourism (Stojković and Milićević 2020).

Geographical origin has evidently become a powerful instrument of competition, especially in terms of agricultural products, food, handcrafted goods, and traditional art. Thus, the regulations of the Republic of Serbia states that the "appellation of origin shall be the geographical name of a region, locality, or country used to designate a product originating therein, the quality and specific characteristics of which are due exclusively or essentially to the geographical environment, including natural and human factors, and which product is produced, processed and prepared entirely within a specific geographical area (Law on Indications of Geographical Origin).

Protected products with geographical indications primarily benefit small-scale producers who can provide quality goods but lack the resources necessary to invest in their brand. Many empirical studies indicate that the image of the country of origin affects the attitudes toward foreign products. In many countries, marketing experts and organizations engaged in promoting exports are aware their country's reputation is an important factor requiring careful management. Furthermore, information regarding geographical origin of products and a country's image does not only affect foreign consumers but also members of the local population, who will associate products with the place of their birth or their youth or one to which they are otherwise emotionally bound.

Results

Some studies indicate that national stereotypes hold sway over the relationship between producers and foreign clients. Others suggest that information regarding or labels designating the country of origin would carry less weight if other indicators of quality were present. A global brand could mitigate the negative impression created by the country of origin or, alternately, the negative reputation of the country of origin could make consumers more reserved about a famous world brand.

Discussions

The marketing survey involved 201 consumers of Serbian food products. The process of data collection lasted until 2021. Defined parameters can clearly determine the current but also the future position of certain recognizable Serbian agricultural products with protected origin, which definitely represent an attractive, agricultural, and gastronomic "identity card" of the Republic of Serbia.

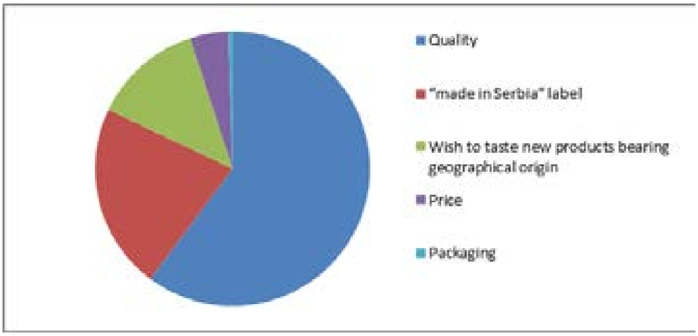
Survey results show that out of 201 participants, most (31,3%) were aged between 35 and 44 years, followed by those between 18 and 24 (26,9%), then by those between 25 and 34 (24,9%), while the remainder of the participants were aged 55 to 64, and over 65.

Participants were asked to indicate their level of education, ranging from primary school to a doctoral degree. Out of 201 participants, the majority, 55,7%, were either junior college or university graduates. The following group, 21.9%, were high school graduates, while 19.9% held Master's degrees. The number of participants with doctoral degrees was negligible.

An analysis of answers to the question "How would you rate your trust in Serbian agricultural products?" showed that 90 participants (44,8%) rated their trust with grade 4, which is high considering the rating scale was from 1, as the lowest, to 5, as the highest level of trust. 52 participants (25,9%) rated their trust with grade 3. There were 49 (24,4%) participants with the highest faith in Serbian agricultural products, who rated their trust with grade 5. Only 10 (1,5%) out of the 201 participants indicated low trust of Serbian agricultural products with grade 1, and 2 (3,5%) rated their trust with grade 2.

When it comes to the key reasons for buying Serbian agricultural products with geographical origin, the majority of the survey respondents found that the most important parameter regarding food is quality. As many as 60,2% participants answered that their preference for these products was mainly due to quality. 12,9% participants indicated that their choice was primarily guided by the "made in Serbia" label, while 21,9% responded that in choosing these products they were primarily led by the wish to taste new products bearing geographical origin. Out of the total number of participants, 5% indicated price or packaging as the chief reasons for choosing a certain product.

Figure 1. key reasons for buying Serbian agricultural products with geographical origin



Source: Authors' calculations

The analysis of intensity or frequency of buying agricultural products with geographical origin pointed to three parameters. The first, and highest ranked, response selected by 47,8% participants, was that they bought these products more than twice a month. The second in number group of participants (36,8%) responded that they bought the products once a month, while participants who bought products with geographical origin twice a month formed the third group.

That the reputation of the country of origin influenced their choice of agricultural products with geographical origin was indicated by 68 (33.8%) participants, who chose the grade 5 on a scale from 1 (no influence) to 5 (high influence). Close behind, 64 (31.8%) participants said this factor had considerable influence. 47 (23.4%) were unsure of the extent to which the image of the country of origin affected their choice of agricultural products with geographical origin. A country's reputation is not an important parameter in the choice of product for 14 (7%) participants who selected grade 2, and 8 (4%) participants chose grade 1.

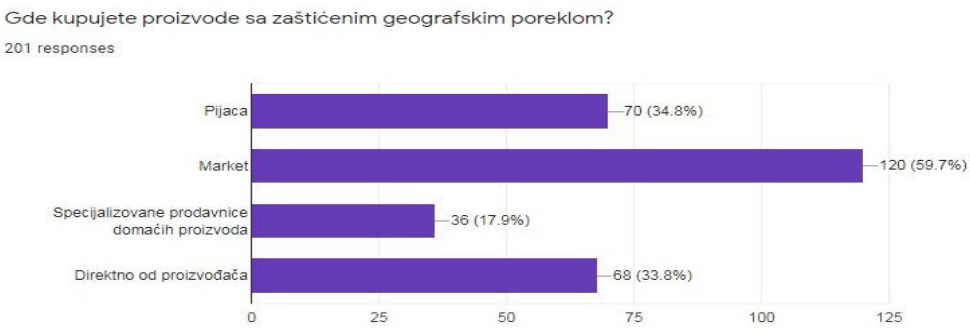
Figure 2. to what extent the image of the state influences the choice of agricultural products

Source: Authors' calculations

Participants indicated Arilje raspberries, Srem kulen, Leskovac homemade ajvar, Pirot yellow cow's milk cheese, Homolje honey, Futog cabbage and sauerkraut, linden honey from Fruška gora, Đerdap honey, and Oblačinka sour cherry from Oblačina as the best-known and perhaps most readily available agricultural products with geographical origin.

The response given by 120 participants to the question "Where do you buy products with geographical origin?" was that they buy the products in supermarkets, 70 of them do their grocery shopping at marketplaces, 68 buy directly from manufacturers, while only 36 participants opt for specialized shops selling local produce.

Figure 3. Where do you buy products with geographical origin?



Source: Authors' calculations

In this research, out of all respondents, 86 participants responded they were satisfied with the quality of consumed agricultural products with geographical origin, 82 participants rated their satisfaction with grade 4, 26 participants indicated average satisfaction, while 7 participants responded they were not satisfied with the quality of the products.

Another important parameter is price. 7,5% of the participants answered they were not happy about the price of agricultural products they purchase. 28,4% indicated average satisfaction with the price of produce, while 64,2% answered they thought the price of the products they bought was appropriate.

In addition to the analysis of participants' opinions about the price of certain products with geographical origin, an analysis was done of parameters concerning the promotion of these products. As opposed to the majority of previous analyses, this graph shows that most participants are "so-so" satisfied with the type and number of advertisements for these products. This is the response given by 87 participants, which accounts for 43.4% of the total number involved in the survey. The least numerous are dissatisfied participants, who selected grade 1 and who think the advertising is insufficient and inadequate, 15 (7,5%) of the participants think the advertising is adequate, and 17 (8,5%) think it is sufficient in volume (grade 5). 44 participants thought marketing of these products is not good/sufficient and selected grade 2.

In Serbia, the advertising of agricultural products with geographical origin is mostly done by individual retail chain marketing campaigns, each creating a specific image through the use of traditional national symbols. The lack of uniformity in advertising sends mixed messages creating a situation in which participation of the state would be very beneficial.

Information similar to that concerning advertising was obtained by analyzing the data regarding distribution of products with geographical origin. Importance of the delivery charge is especially emphasized. This is explained by the fact that the cost of food delivery in Serbia is relatively high compared to the price paid for organic food, so it represents a criterion that is important for the consumer when deciding whether to buy organic food online (Ćirić et al., 2021). 43,7% participants rated their satisfaction level with grade 3, 22,9% with grade 2, and 18.9% with grade 4. Only 8,5% participants rated their satisfaction level with product delivery with grade 5 (highest), while 7,5% participants thought product delivery was extremely poor, selecting grade 1 (lowest).

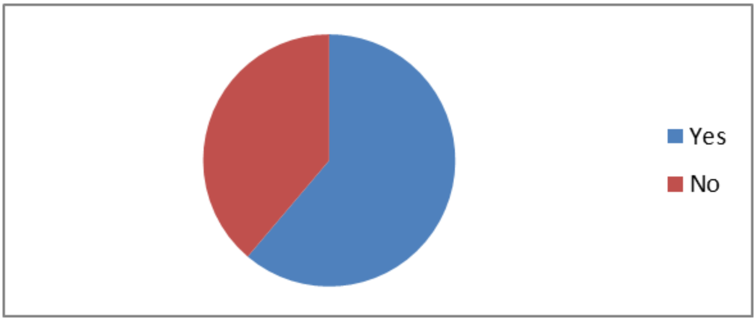
The majority of participants, 88 of them, answered that they were very satisfied with the appearance of the packaging of agricultural products with geographical origin. 44 participants were satisfied with the appearance of the packaging, 40 were extremely satisfied, 12 were dissatisfied, and 7 participants were extremely dissatisfied with the packaging.

Figure 4. To what extent are you satisfied with the appearance of the packaging of consumed Serbian agricultural products with protected geographical origin

Source: Authors' calculations

According to the results of the research, 66.2% participants responded that the label of geographical origin on the packaging had a major effect on the average consumer's choice of Serbian agricultural products with geographical origin, while 38.8% of them thought the label not a vital factor in their decision whether or not to buy or consume the product.

Figure 5. Does a trademark with geographical origin affect the priority choice of Serbian agricultural products with protected geographical origin



Source: Authors' calculations

On the basis of the results of the last graph, the conclusion was drawn that the label or mark of geographical origin was a vital factor affecting most consumer's decision to buy or consume products. This prompted the question whether buyers or consumers recognized that label or mark.70,6% of the participants affirmed that they recognized the label, while 29,4% answered that they do not recognize or know the label.

Conclusions

Taking into consideration all of the above, we may conclude that the time of raising awareness among consumers of agricultural products with geographical origin is yet to come. If consumers are unable to make the connection between a product and its country of origin, then in appraising the product and, later, in deciding whether or not to buy it, the consumer might choose a different brand than he or she would have, had they been aware of the country of origin. It is evident that geographical origin has become a powerful instrument of competition, especially where agricultural products and food are concerned, and that this "national umbrella brand" particularly benefits small, quality-oriented producers, who would not have to invest in their brand as much as they are compelled to because they are producing specific products protected by indications of geographic origin.

The skills that the man has mastered allow growing and cultivating of different foods depending on the environment in which they are consumed. Techniques, recipes, technologies, standards and raw materials for food preparation are changing due to cultural, social, global and economic factors (Burešová et al., 2020).

Adjusting to changes and the willingness to introduce changes for the sake of achieving quality, modernization, market development, and approaching the modern, ever more demanding consumer is a costly, complex and long process. Without it, however, agricultural growth would not be possible.

The responsibility is twofold, on the one side it rests with the state in terms of investments, a strategic approach to national branding, and strengthening the country brand, and on the other hand, on all participants in agriculture, who after all have the most to benefit from this cooperation.

The question remains whether we are ready to invest in our arable land, pastures and, ultimately, in our people who "bring" certain produce to our table or will we continue to reserve our praise for countries that have had the privilege or the fortune to have citizens with a high level of awareness. That level of awareness would make us stop bargaining over a kilogram of quality raspberries and realize that through deceit we are not harming someone who will buy that produce in Russia but the country under whose flag, coat of arms, and hymn we are competing in a competition harsher than the Olympic Games.

Conflict of interests

The authors declare no conflict of interest.

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STRATEGIC LAND USE MANAGEMENT: ENVIRONMENTAL TRADE-OFFS FOR THE PURPOSE OF ENSURING THE SUSTAINABILITY OF AGRICULTURAL ENTERPRISES

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A B S T R A C T

An important condition for the formation of sustainability of agriculture is the ability to achieve environmental trade-offs in the process of land use. The purpose of research is development of methodical approaches to formation of strategy of rational land use by means of improvement of administrative activity at microlevel. Authors have formulated concept of strategy of rational use of land, basic principles, elements and sequence of its construction. The structural mechanism of realization of strategy of maintenance of readiness of the personnel to rational use of land, and also bringing material and technical, financial and land resources in strategic conformity for achievement of ecological compromises in the course of conducting agricultural activity is offered. The authors developed a conceptual model of a strategic map of rational land use on the basis of a balanced system of economic and environmental indicators, and proposed directions for its implementation.

Introduction

The need to form a system of sustainable development in today's reality is an objective necessity and one of the key objectives of agricultural development. The concept of sustainable development was first substantiated in the report of the UN Special Commission

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in 1987 as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission, 1987). The recommendations and principles outlined in the document were supported by the international community at the UN Conference on Environment and Development in 1992 in Rio de Janeiro (Report of the UN, 1993) and adopted by a number of countries as official state development doctrines, with stabilization of the environmental situation and improvement of the environment identified as its most important tasks.

The Sustainable Development Goals, adopted at the level of the UN, are largely related to agriculture. These are the goals of food security, poverty alleviation, climate risks, halting land degradation and loss of biodiversity (The Sustainable Development Goals Report, 2020). Many of these goals are reflected in the Convention to Combat Desertification (UNCCD, 1994), Paris Agreement on Climate (Paris Agreement, 2015), The European Green Deal (European Commission, 2019), EU Biodiversity Strategy for 2030 (BDS, 2030).

The need for sustainable agricultural development has been confirmed by many scientific studies (Foley et al., 2011; Dessart et al., 2019; Gliessman, 2020; Kuzicheva et al., 2022). Land resources are a key element in shaping the sustainability of socio-economic development (Montanarella & Panagos, 2021), their use must ensure the economic efficiency of production, subject to the preservation of its natural potential (Komov & Sharipov, 2018). Many studies provide evidence that scientific and technological development in conjunction with the built system of biological production contribute to the achievement of certain criteria of rational land use.

The basic principles of sustainable soil management are clearly defined by the Food and Agricultural Organisation (FAO, 2017). The bottom line is to ensure that soil is used in a way that does not compromise either soil function or biodiversity. FAO has made a number of technical recommendations to facilitate the transition to sustainable land use: limiting wind and water erosion, preventing humus loss, maintaining nutrient and acidity balance, preventing soil contamination, compaction, and reducing soil biodiversity (FAO, 2017). Technologies of their implementation are based on a wide use of agrotechnical methods of cultivation of crops, favorable for the ecological state of soils. All of them are sufficiently well developed in the process of numerous scientific studies and have been confirmed in practice (Barreiro-Hurlé et al., 2010; Power, 2010; Orgiazzi et al., 2016; La Canne & Lundgren, 2018; Bengochea et al., 2020). For example, limiting erosion can be achieved through appropriate crop selection, the use of agro-landscapes, and agronomic techniques such as contouring or minimum tillage, mulching, and others. The balance of humus, nutrients and soil acidity can be ensured through a balanced use of organic and mineral fertilizers, mandatory allocation of land for pastures and hayfields, use of crop rotations, use of green and cover crops, etc. The application of minimum tillage and combination of technological operations can help to prevent soil compaction, and the creation of favorable conditions for microflora development (including the plowing of crop residues, limiting the use of chemical plant protection products and a number of others) will have a positive impact on biodiversity.

However, all these developments face problems of implementation, as evidenced by the practical experience of farming. This is evidenced by the ongoing processes of land degradation, i.e. reduction of the ability of soils to perform their functions (FAO, 2022). The main manifestations of degradation are water and wind erosion, loss of organic matter, compaction, desertification, biological degradation, etc. Land degradation leads to a decrease in natural fertility, which limits the growth of gross yields and crop yields and aggravates the problems of food supply of the population. According to the FAO report, one-third of the world's soil resources are degraded due to unsustainable management practices (SWSR, 2015). Over the period of agricultural use, arable land has lost 20% to 60% of its total organic carbon content (IPCC Special Report, 2020).

Land degradation is largely a consequence of appropriate agricultural practices focused on achieving economic results by increasing the intensity of land use (Tilman et al., 2002; Foley et al., 2011). In the process of economic use, land resources are often perceived as a source of economic benefits in the short term, without regard to the need to preserve the natural potential of land in the long term. At the same time, large enterprises and small farmers do not pay enough attention to the environmental issues of agricultural land use. As a result, production technologies are optimized in the direction of weakening the protection of agricultural land from degradation and saving the cost of fertility reproduction (Karamesouti et al., 2015; Zharnikov et al., 2019), which has especially negative consequences against the background of serious climatic changes in recent years (Esfandiari et al., 2020; Dubovitski et al., 2021).

Systemic problems that hinder the formation of sustainability and exist over a long period of time, as well as the complexity of bio-economic processes in the agricultural sector, necessitate the search for effective methods of land use management.

Literature review

Strategic management can be considered as one of the key areas contributing to the formation of land use sustainability. The need to use the techniques of strategic management of economic systems for many researchers is obvious. Thus, A. Chandler in 1962 revealed the importance of business strategy in the formation of the mechanism of management of the organization. He summarized the experience of successful American business corporations and presented strategy as «the process of setting goals, objectives, an action plan, and the allocation of necessary resources» (Chandler, 1962).

In 1965 I. Ansoff formulated his vision of strategy as a set of organizational rules for making decisions within the framework of its activities. He proposed a model of strategic planning as a set of organizational actions and management approaches used to achieve the goals and objectives of the organization. In addition, I. Ansoff identified two groups of factors influencing the formation of strategy (internal and external) and justified that the structure of their interaction depends on the object of management (Ansoff, 1965).

M. Porter analyzed the various management tools used to ensure the operational efficiency of companies, and proved the importance of strategy for sustainability in the long term (Porter, 1996). C. Kaplan and D. Norton substantiated the model of building a strategy based on a systematic approach to the definition of goals and indicators. They determined that the ability to ensure the effectiveness of the company and its long-term sustainability depends on five basic principles of management:

- transfer of the strategy to the operational level;
- creation of strategic compliance of the organization;
- strategy as the daily work of each employee;
- strategy as a continuous process;
- activation of changes as a result of active leadership of top managers (Kaplan & Norton, 2004, p. 19-24).

Strategic management in the agricultural sector of the economy is recognized as a promising tool to ensure economic, environmental and social stability. This has been proven in a number of works in the 1990s, including the works of Pichón (1996), Matson et al. (1997), Reenberg & Paarup-Laursen (1997). Later, this approach was even more widespread in research on improving the use of land resources in order to improve the sustainability of agricultural production and reduce externalities (Peng & Wang, 2002; Koo et al., 2020; Liu et al. 2021; Galleguillos et al., 2021; Siptits et al., 2022).

There is growing interest in eco-economic outcome-oriented agro-ecological strategies. Their advantage is that they promote the use of environmentally neutral farming methods that enable production without harming humans or natural systems. They are based on extensive use of soil-friendly agronomic practices of biological or organic farming (Juerges & Hansjürgens, 2018; Atieno et al., 2020; Walkup et al., 2020), especially in areas where there are serious environmental problems (Fan et al., 2021). Most often in scientific publications, strategic management is considered from the territorial, sectoral and problematic points of view, which is due to the systemic specificity and interrelation and functional combination of agriculture and natural conditions. From the position of the territorial-sectoral approach, strategic management is considered in relation to the sustainable development of territories. Thus, a number of authors, including Brabec & Smith (2002), Peng & Wang (2002), Siptits et al. (2022), Koo et al. (2020) direct their attention to solving regional problems through strategic management of rational land use in certain natural zones.

From the «problem» point of view, one of the most important elements of strategic development of the agrarian sphere is considered the solution of certain (specific and certain) problems in the sphere of land use, affecting the ecological stability. For example, Liu et al. (2021) consider biodiversity conservation strategies, Fan et al., (2021) consider drought mitigation strategies, Ojima et al. (2009) consider integrated carbon management strategies to address global environmental issues.

There is an increase in the amount of available information on strategies focused on a positive environmental result, but they give priority to the presentation of ready-made solutions. Most authors propose ready-made schemes for solving a particular problem, oriented to achieve a certain result for the formation of a sustainable agriculture. They are the main policy tool currently available in many countries and the importance of these studies can hardly be overestimated.

However, achieving agricultural sustainability goals depends heavily on voluntary efforts by farmers to conserve land (Claassen et al., 2013; Reimer, 2015), whether or not it is supported by the state (Espenshade et al., 2022). The decision to adopt new technologies and conservation practices by farmers is their own due to certain objective and subjective factors (Dessart et al., 2019). Moreover, even agricultural enterprises and farms located in the same natural-economic zone may have different soil resources, relief features, soil cover, field configuration, etc.

Therefore, agribusiness must have the tools to independently develop strategies to ensure sustainable land use, solving specific environmental problems within certain landscape conditions and natural areas. Currently, there is no review of this approach in the literature. The purpose of this article was to substantiate methodological approaches to the formation of a strategy of rational land use through the improvement of management activities at the micro level.

Materials and methods

During the preparation of this article, the authors referred to the results of scientific research over the past 25 years in the field of rational land use management and the formation of a sustainable agricultural economy. The authors understand agricultural land use as the process of economic use of land in order to produce agricultural products. In terms of economic use of land, land users are all economic entities that use land as a means of production in agriculture. In this case, rational land use can be defined as the use of land resources that provides economic efficiency under the condition of preservation of soil fertility, prevention of soil degradation and the absence of any environmental externalities.

The authors focus on the management of rational land use through the introduction of environmentally sustainable methods of management. Examples of such sustainable methods are soil-protective agrotechnical measures, crop rotations, use of organic fertilizers and biological techniques of soil fertility reproduction, reduction of pesticide and fungicide use, alternation of vegetation cover type and landscape conservation (FAO, 2017). The main objective of this study is to provide land users with methodological tools for the development and implementation of strategies for sustainable land use in agriculture.

The authors used the principles of strategic mapping by S. Kaplan and D. Norton (Kaplan & Norton, 2004) and methods of solving problems of land management system development by P. Demidov (Demidov et al., 2018) to substantiate the methodology of forming a strategy of rational land use. To describe the strategy the authors used the system of indicators of economic evaluation of the ecological consequences of land use, justified by them earlier (Dubovitski & Klimentova, 2020). Its essence is reduced to the economic assessment of the physical deterioration of land in the process of agricultural use. In particular, the assessment of the allowed decrease in soil fertility was assessed on the basis of the balance method, which allows to trace the dynamics of the elements of soil fertility and determine the physical deterioration and the necessary costs for its compensation.

Results

The relevance of environmental priorities in the process of land management in agriculture is due, above all, to the need for practical implementation of the concept of sustainable development in the sphere of land use on the basis of land conservation in the long term. From this position, the use of land resources in agriculture should provide the necessary economic results and, at least, the simple reproduction of their natural potential. In other words, agrarian land use should not be accompanied by deterioration of the qualitative condition of lands (decrease in fertility, degradation or pollution of soils). In this case we are talking about the so-called rational use of land. Its components are formed in the process of rational interaction of natural conditions and factors of production and economic order.

In addition, farming systems focused on the implementation of ecological priorities have lower economic efficiency in the short term, although in the long term they can provide greater sustainability of ecological-economic systems. In practice, sustainable land management must strike a compromise between:

- the realization of economic interests and emerging environmental constraints; and

- the pursuit of short-term results and long-term sustainable development goals.

The process of management of land resources directly in farms is a set of actions on formation of the purposes, planning, organization of use and control. The effective combination of all these elements in a single process is possible on the basis of the use of techniques of strategic management.

The main objective of strategic management is to introduce in practice technical solutions that contribute to the implementation of the priorities of rational land use with a set of control actions on the parameters of the internal environment of the enterprise.

Building an effective management system is possible based on the use of behavioral factors (Dessart et al., 2019; Espenshade et al., 2022). The choice by land users of specific economic practices for use in their activities is based on the subjective understanding of owners and farm management of their comparative advantage and the potential benefits they can bring (Prokopy et al. 2019; Ranjan et al. 2019; Thiombiano & Ouoba, 2021).

Our own research confirms this fact and testifies to the importance of subjective factors for improvement of land use. In the process of realization of professional activity on management of an enterprise, decisions for formation of sustainable systems of land use are accepted from a condition of readiness for biologicalization (which is shown as system of professionally important qualities and properties of the person necessary and sufficient for effective professional activity in the field of ecologization of land use). It is about emotional, cognitive, motivational, personal, and organizational readiness (Dubovitski & Klimentova, 2022).

These provisions serve as the basis for the fact that it is the readiness of personnel to make changes to management practices that should become the cornerstone of the improvement of the land use management system. It is the readiness of personnel for environmental protection activities that can ensure the improvement of all internal management processes along the way of forming the sustainability of the agricultural economy. This is the basis for the fact that the training and development of personnel should be the basis for the development of any land use management strategy.

Emotional readiness is characterized by the presence of interest in their professional activity, initiative, responsibility. Its low level may indicate an insufficient interest in introducing new technologies, mastering new ways to perform their professional duties.

Cognitive readiness is formed by the knowledge, skills and abilities necessary to implement the elements of biological land use and soil fertility reproduction in accordance with the principles of sustainable development.

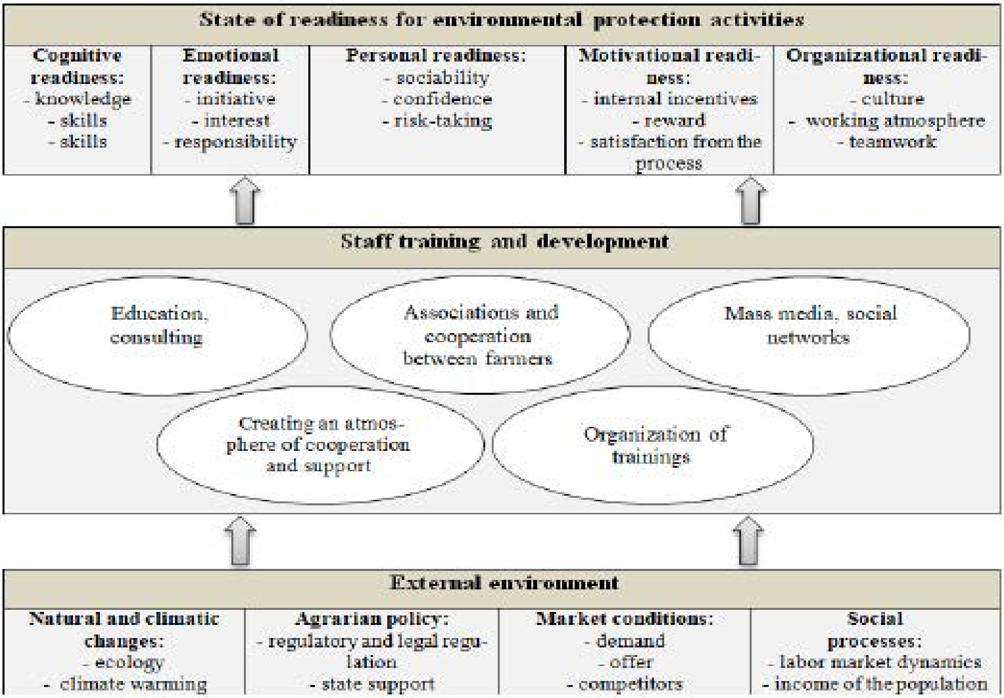
Motivational readiness is determined by the presence of internal incentives to improve the performance of labor activity and getting satisfaction from the process of realization of their own abilities. Its relatively low level may indicate a lack of understanding of the possible positive effects of biologization on the economic results of agricultural production and the ecological state of the land.

Professionally important features of personality (communication skills, organizational skills, self-confidence, a moderate tendency to risk) form the level of personal readiness.

Organizational readiness is determined by the peculiarities of work organization at the enterprise, the created mechanism of technology improvement, corporate culture, etc. Its low level can be associated with dissatisfaction with the conditions created in the organization, lack of opportunities for effective management of biological processes.

Land users can switch to another system of farming, such as conservation, only if they are ready. Therefore, the construction of any strategy must be based on increasing environmental readiness by building a system of training and human capital development (Figure 1).

Figure 1. Formation of the state of readiness of personnel for activities through training and development



Source: compiled by the authors

Emotional and personality readiness are a reflection of the psychological factors underlying human behavior (American Psychological Association, 2018). These elements of readiness are the most difficult in terms of the possibility to correct them. Increasing emotional and personal readiness can be helped by various personal growth trainings, taking various measures to support and assist personnel, as well as organizational efforts to create an atmosphere of cooperation and support in the company.

Influence on the level of cognitive readiness is carried out in the process of training, professional development and professional skill trainings by providing the necessary competencies, skills and abilities to implement the goals of environmental improvement of agro-economy. A great role in the provision of professional competence has a timely receipt of relevant information (Karpunina et al., 2021). This can be facilitated by cooperation and exchange of experience among land users, interaction with scientific organizations, communication through social networks and the media.

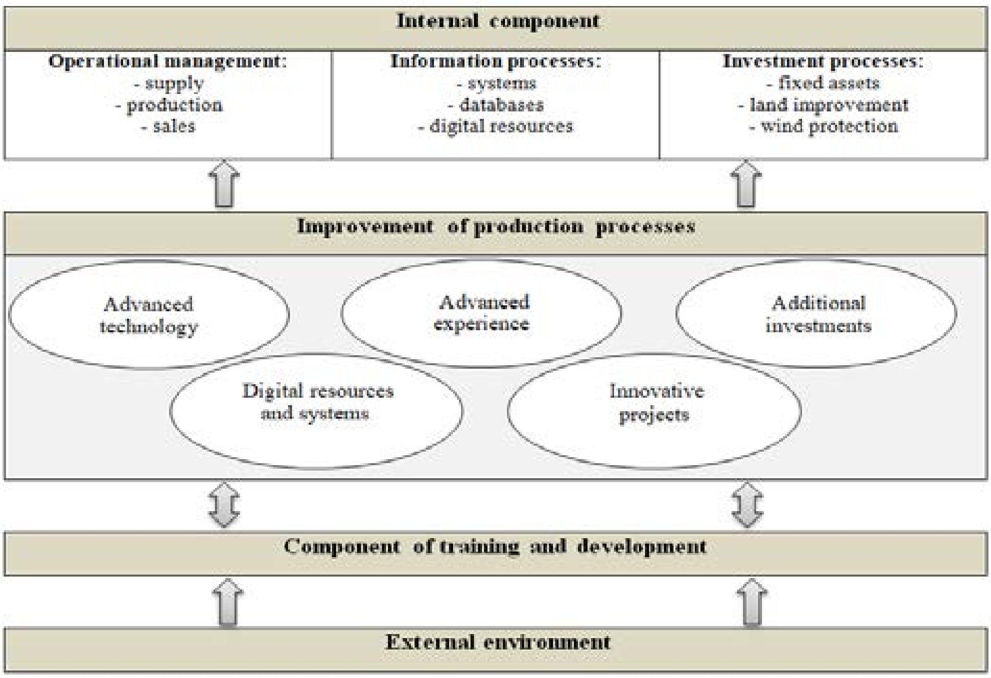
Motivational and organizational readiness is a direct consequence of development of business structures. Their level is determined by the ability to align the system of moral and material remuneration with the results, to provide a working atmosphere in the team, safety (to eliminate the possibility of discrimination on any grounds), to form a corporate culture and technological culture of production.

The optimal state of staff training and readiness, which contributes to the maximum achievement of the goals is expressed in the fact that all employees of the company understand the importance, interest and focus their efforts on the process of continuous improvement of technological processes.

The development of human capital and the formation of readiness does not occur in isolation, but in a certain external environment, which differs even among enterprises located in close proximity to each other. The main factors of the external environment that should be taken into account when planning the activities of agrarian business are natural and climatic conditions, parameters of the agrarian policy conducted by the state, market conditions and social processes in rural areas.

The readiness of the personnel for the activity serves, on the one hand, as a starting point for the development of internal processes of functioning of the enterprise, and on the other hand, in many respects, is subject to the opposite influence. If the staff of the enterprise has a certain degree of readiness for environmental activities (including specific knowledge and skills, motivations) and the farm has organizational conditions for such activities, in this case it is possible to ensure the effective use of productive potential in the achievement of environmental and economic goals. Conversely, the practical implementation of personnel's initiatives to achieve the goals set depends on the financial and economic capabilities of the farm, its provision with necessary equipment, access to promising technologies and resources (Fig. 2).

Figure 2. Formation of the internal component of the functioning of the enterprise



Source: compiled by the authors

The internal component is a set of operational management, information and investment processes. Their improvement allows ensuring the movement on the path of environmental improvement of the agricultural economy. This goal can be achieved by controlling the most important factors of the internal environment. In this case, we are talking about the introduction of advanced technologies (including soil-protective farming techniques), best practices in the organization of land use, development and implementation of various innovative programs in land use (including, increasing the provision of fixed assets of environmental orientation, agroforestry, etc.), improving the information support of business processes.

The first element of internal processes - production management - provides the optimal and comprehensive organization of three main processes: supply, production, sales of products. Strategic management should be aimed at the formation of an optimal supply of resources, introduction of resource-saving production technologies, improvement of labor organization in order to achieve ecological trade-offs. The main task of management is to organize wide use of effective practices and methods of crops cultivation, favorable for ecological state of soils. The first element is organically interconnected with the presence of the second structural element, that is, the information and digital component.

Information and digital processes play an increasing role in the technological transformation of modern land use. Such approaches aim to minimize impacts by maximizing control over processes and the environment (Muller et al., 2017). A promising direction for their practical implementation is precision farming, aimed at providing spatially differentiated and specific type of arable land tillage. The purpose of precision farming is to take into account the differences within the field, its advantage is to treat the soil, apply fertilizers and pesticides in accordance with the needs of plants. Its result is an increase of economic efficiency while reducing the negative impact on the soil (pollution, soil compaction, etc.). An example of technologies used in precision agriculture are drones. They help to monitor hard-to-reach areas of the field, recognize and control weeds, which leads to a reduction in soil compaction, minimizing the use of heavy machinery (Malveaux et al., 2014). This component of land management could get a lot of traction with the focus of agribusiness on increasing sustainability. It needs to be given more attention due to the possible positive effects both economically and ecologically.

The third element is investment processes. Agriculture is often an unattractive sector for investment, which is largely determined by its high dependence on natural and climatic conditions. However, in the context of the ongoing processes of land degradation and the associated aggravation of the problems of food supply to the population (SWSR, 2015; IPCC Special Report, 2020), the importance of investments in agriculture, including the nature conservation orientation, increases significantly. Improving the cultivation of agricultural crops, including through the introduction of agrotechnical techniques favorable for the ecological state of soils, requires additional investment costs for the acquisition of necessary fixed assets, increasing fertility and land reclamation, planting green spaces for wind protection, etc.

The use of specific areas to improve the internal system of functioning in enterprises is individual. Hundreds of processes occur simultaneously in agriculture, affecting the level of performance and parameters of land use. The strategy can be implemented in several directions that are the most important to ensure the rational use of land. For example, one enterprise may increase current expenditures on improvement of production technologies in systems of conservation agriculture or on development of soil-protecting measures and various methods of biologicalization. Another enterprise decides to increase investment in the purchase of modern machinery to increase productivity and reduce pressure on the soil during cultivation, or in the planting of windbreaks. A third enterprise will consider the development of information processes and digital technologies to create conditions for generating positive, economic and ecological effects in production.

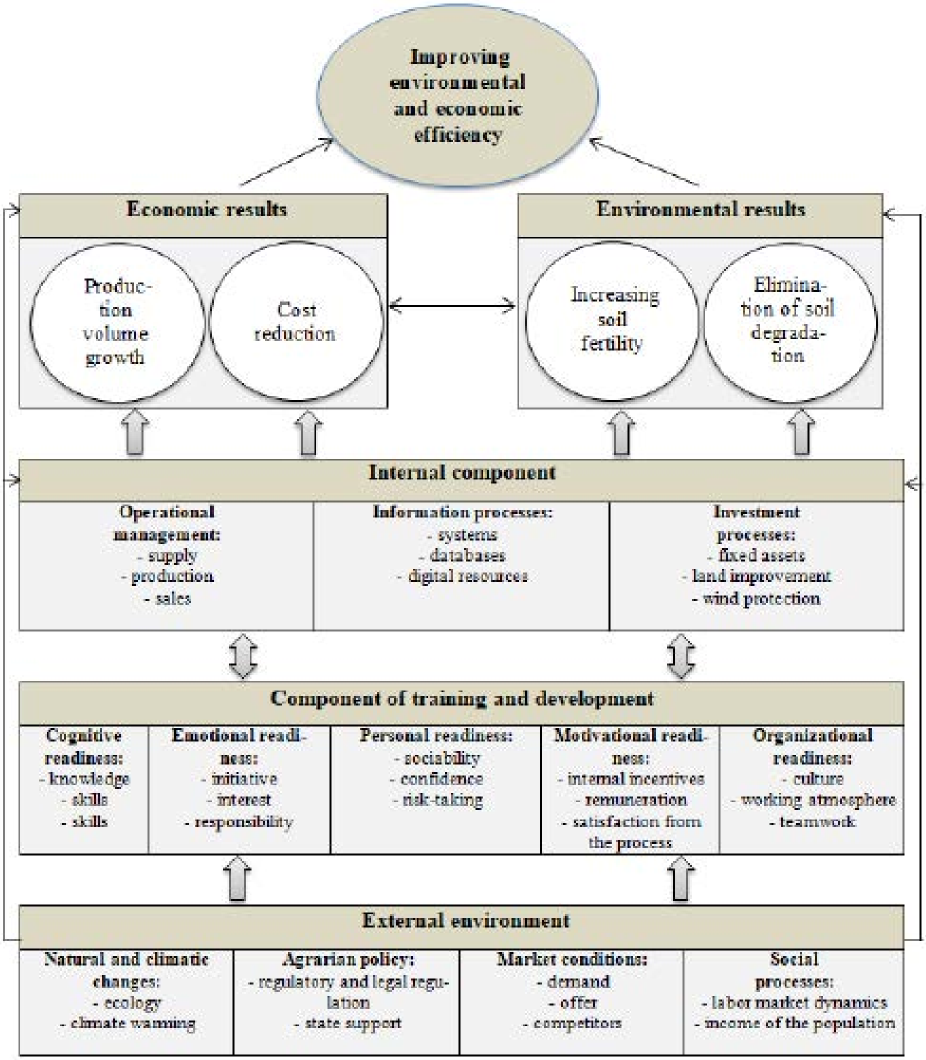
Any component of internal business processes is linked to the target benchmarks and can be decisive in the implementation of the strategy. It is possible to achieve growth in economic performance through the implementation of any of these strategic directions. However, the achievement of sustainability of ecological-economic systems is ensured if a balance is formed between two contradictory tasks - growth of production volumes and care about the qualitative state of land resources. From the point of view of specific land users, restoration of fertility is not a priority task from the position of achieving financial success. The need to ensure profitability makes economic results preferable to environmental ones. The formation of a land-use strategy is inevitably accompanied by such a conflict. The main goal should be to ensure the rational use of land resources as part of the formation of the sustainability of the agricultural economy.

The most important tool for the formulation and implementation of the strategy is a balanced system of indicators (Kaplan & Norton, 2004), which describe it not as a set of independent parameters, but as a balanced set of its individual components, based on causal relationships. In this case, the target indicator of the strategy of rational land use can become the indicator of environmental and economic efficiency. The technique of its calculation provides integration of size of economic efficiency and cost estimation of ecological influence of production on ecological systems, including land resources. For this purpose ecological influence of land use at first is estimated by means of natural indicators on the basis of system of balance constructions by formalization of volumes and structure of streams of movement of elements of soil fertility (Dubovitski & Klimentova, 2020). Then the change of natural indicators in the dynamics (their increase or decrease) can be estimated in monetary terms. In this case we are talking about the monetary evaluation of the obtained ecological effect and ecological damage. Accordingly, the strategy must have both economic and environmental results.

Economic results are expressed by one of two indicators (income growth or cost reduction), they do not contradict each other, but are interrelated. Cost reduction implies the mandatory use of advanced technologies of production with optimal use of inputs in due time and quality of all agricultural practices. This, in turn, provides an increase in crop yields at the optimal level of costs and increased profitability of industries and enterprises as a whole.

The ecological component provides, on the one hand, increase of soil fertility, and, on the other hand, reduction of negative environmental impact (damage). This can be achieved only under condition of maximum level of expenses for prevention of ecological-economic damage, which is determined by timely carrying out of cultural-technical measures (maintenance of bio-logical balance, application of organic and mineral fertilizers in optimal quantity and optimal terms, timely struggle with various kinds of erosion). Consequently, the improvement of soil fertility can be ensured by avoiding or minimizing the negative environmental impact (Fig. 3).

Figure 3. Structural diagram of the strategic map of rational land use



Source: compiled by the authors according to Dubovitski and Klimentova (2021)

The balancing of these conflicting goals is the organizational model of the strategy of rational land use. Working out of strategy of development of any system is a substantiation of its future state with representation of the desired result and definition of the basic steps on its achievement. This allows us to consider the strategy of rational land use as a process of achieving sustainability of agro-farm, which is formed in certain parameters of the external environment and consists of a set of controlling influences on the parameters of the internal environment and the system of human capital development.

The sequence of developing a sustainable land management strategy can be represented by several key steps: 1) study of external environment parameters and forecasting the dynamics of their changes; 2) diagnosis of the state of land resources and identification of economic and environmental problems of their use; 3) justification of the goal and formulation of objectives in terms of time, quality and performance; 4) determination of strategic directions for improving internal environment processes; 5) ensuring strategic alignment of internal environment parameters and human resources; 6) detailed and visual presentation of the strategy in the form of strategic maps.

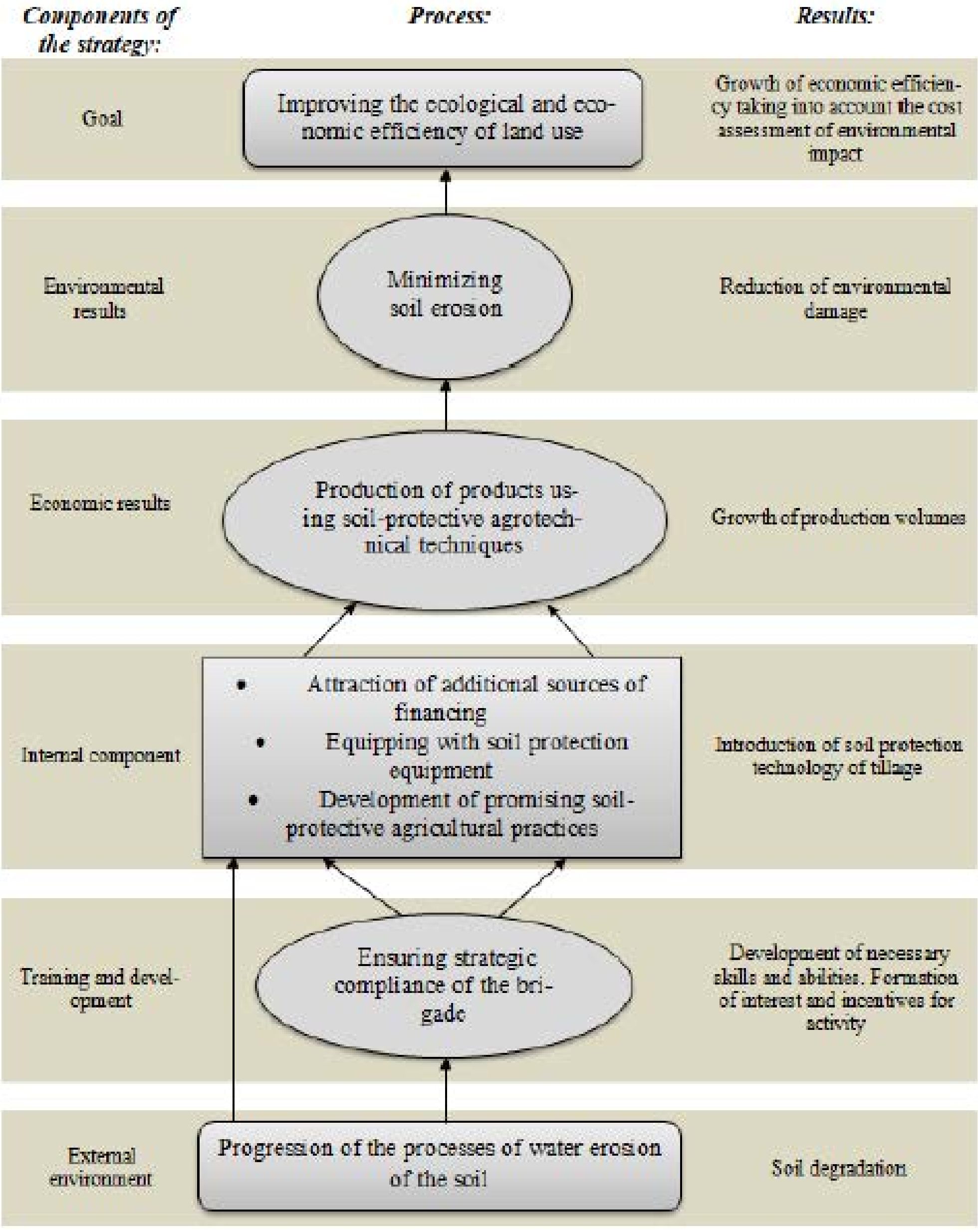
Structural description of goals and mechanism of their achievement in the form of strategic maps is aimed at better understanding of the staff of the whole process of formation of rational land use, optimal distribution of responsibility and increase of possibility to control the implementation of individual stages and the strategy as a whole.

In order to achieve the goals set, it is necessary to implement a set of programs. Each program should be provided with material-technical and labor resources. For example, the task of minimizing water erosion manifested in soil washing out can be achieved through the implementation of a set of agrotechnical measures (Fig. 4).

In this case, the implementation of the strategic direction to combat soil erosion is built as a set of measures for technological improvement of tillage, investments in the purchase of special agricultural equipment, as well as the implementation of staff training. The basis of the strategy is a compromise of economic and environmental components for the sake of agricultural sustainability.

The implementation of the proposed strategy of rational land use is impossible in the absence of at least one of the components. They must be implemented comprehensively, the role of each depends on the actual state of human resources and enterprise as a whole. As of today the ecological constituent is decisive in many problematic territories because it is necessary to restore what has been taken away for so long without compensation for the lost properties of lands. Later it will be possible to return to the parity of economic and ecological components, but we should not forget that agriculture is not the industry which brings income to the state in the first place, but the industry which provides healthy foodstuffs, and the land is the basis of mankind existence.

Figure 4. Strategic direction of combating soil erosion through agrotechnical measures



Source: compiled by the authors

The proposed model for the formation of a rational land use strategy is basic, in each agri-business entity it will be unique with a certain set of strategic directions. For regions with pronounced water erosion, these will be programs to prevent soil flushing, for regions with wind erosion – programs to protect against wind erosion, etc.

In addition, the formation and implementation of the strategy at the enterprise certainly requires maximum detail of the processes of the internal component and the system of training and development of personnel with a description of the desired results. Each of the intermediate results should be reflected by a specific indicator, the achievement of which can be monitored. The strategy should include a list of additional equipment requiring the development of elements of soil protection technologies, personnel training measures necessary for the development of new equipment and promising agricultural practices, as well as a motivation system for maximum interest in the qualitative and responsible implementation of the planned activities.

Discussions

In recent decades, the negative impact of agriculture on land resources has been growing rapidly around the world. This negatively affects the state of soil fertility, soil resistance to degradation in the conditions of ongoing climatic changes. The results of these processes are well known to politicians, the scientific community and specialists. The solution of environmental problems arising in land use is an important factor that should be taken into account when it comes to achieving the sustainability of agricultural farms.

From our point of view, the more active implementation of practices that are favorable for the ecological state of lands is hindered by shortcomings in the management of land resources of farms and enterprises. The use of strategic approaches to land management based on the formation of staff readiness to make changes in management practices has great potential for improving land use. It is the readiness of personnel for environmental protection activities that can ensure the improvement of all internal management processes. Therefore, the training and development of personnel should be the basis for the development of any land use management strategy.

In our article, we did not aim to offer specific land users ready-made solutions for the application of environmental practices of land use, or to calculate their expected economic efficiency. Perhaps this could be the goal of additional research in this direction. New studies conducted taking into account the environmental specifics of specific regions can contribute to the adaptation of the proposed conceptual model of the strategy to environmentally friendly farming methods that are more acceptable to local conditions and are encouraged as a result of various policy measures to support land users.

We offer only a tool using which land users in specific economic conditions would be able to independently formulate goals and ensure their implementation in practice through the improvement of the parameters of the internal environment and personnel development available to them. The achievement of the stated sustainable development goals ultimately depends on the effective activity of each farmer, each agricultural enterprise in this direction. In our opinion, the proposed approach to improving land use management based on ensuring the readiness of personnel for environmental protection activities can become the element through which it will be possible to significantly advance along the path of increasing the sustainability of agricultural farms.

Conclusions

The implementation of a strategic approach to the management of rational land use should become the basis for solving the problems of ensuring the sustainability of agricultural enterprises. The conceptual model of the strategy developed by us clearly describes the process of ensuring rational land use in agriculture. The proposed strategy is aimed at improving the ecological and economic efficiency of the use of land resources through an optimal combination of economic and environmental components. The main methodological idea of strategy formation is to ensure the readiness of personnel for rational land use and to bring material, technical, financial and land resources into strategic alignment with the goals of achieving environmental compromises in the process of agricultural activity. It describes how the management of internal processes in certain environmental conditions contributes to ensuring the rational use of land resources in agriculture. The correct presentation of the models of functioning of agricultural systems necessitates their presentation in the form of strategic maps that allow for visibility in the decision-making system, focus on the key tasks and resources needed for their implementation. The possibilities of the most effective implementation of the strategy depend on the understanding of its essence by all participants of the ecological and economic system, including individual land users, owners and management of agricultural enterprises. The basis of this understanding is the realization that the environmental and economic components not only do not contradict each other, but are mutually related factors, complementary sides of the same process.

Conflict of interests

The authors declare no conflict of interest.

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INCREASING SUSTAINABILITY OF FOOD PRODUCTION AND ENSURING HUMAN HEALTH THROUGH AGRICULTURE DIGITALIZATION

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A R T I C L E I N F O

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A B S T R A C T

Ensuring safe food for a growing population is a challenge for agriculture. The current systems of intensive agriculture are based on important allocations of factors of production per unit area, like chemical fertilizers and pesticides, allocated in order to stimulate production. In doing so, food security is ensured, by obtaining high yields per hectare, but chemical residues may remain in food and human health is jeopardised. The aim of this research is to identify the role of digitalization in agriculture in balancing the binomial food security-organic farming, starting from the premise that smart agriculture has a significantly lower negative impact on the environment and human health compared to the conventional agricultural system. The relevance of research lies in raising awareness of the importance of smart agriculture in providing agricultural products obtained in accordance with the principles of sustainable development and moreover integrating it into policies and actions at all levels: individual, local, national and global.

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Introduction

Worldwide, population growth is putting pressure on food resources, and ensuring food security for 7.8 billion persons (UN, 2022) is becoming a challenge for agriculture, which needs to identify new solutions and technologies for providing sufficient, quantitative, and safe food for human health. On the one hand, the current models of intensive agriculture provide large quantities of food necessary to ensure food security, but they are criticized from the point of view of food safety, because large quantities of chemicals are used to obtain the output. However, yields need to continue to rise, given that the population will increase to 9.7 billion people (UN, 2021) by the end of 2050, requiring a 70% increase in agricultural production, according to FAO estimates (2009), to ensure food security. On the other hand, the current models of intensive agriculture contribute with 21% to greenhouse gas emissions, as indicated by FAO studies (2016). Other reports (IPCC, 2007) show that agriculture contributed with 13.5% and forestry with 17.4% to greenhouse gas emissions. In addition, methods of increasing production per hectare and combating diseases and pests are based on chemicals, pesticides and fertilizers, medicines and other synthetic products that can determine contamination of water, soil and food, causing disease among people (Lang et al., 2021).

Such “results” run counter to the strategic directions of the European Green Deal, which aims to transform the European Union into a modern, competitive and resource-efficient economy (European Commission, 2021). This strategy paper sets out actions such as investments in green technologies and support for innovation. Organic farming subscribes to these actions and has development potential in Romania, as shown by Stoian and Caprita (2019), due to the existence of favourable natural conditions: a large area occupied by pastures and hayfields, the use of a quantity of pesticides and chemical fertilizers much smaller compared to other countries, the existence of areas that were not collectivized and, consequently, the agriculture practiced was less industrial than in collectivized areas and so on.

One type of agriculture that subscribes to ecological principles is smart agriculture. The digitalization of agriculture has transformed the agricultural sector, both quantitatively and qualitatively, and can be a solution for the quantitative provision of the population with safe food. This category also comprises organic and traditional agro-food products, included in the model of the economy towards which the principles set out in the European Green Deal tend.

This piece of research aims to identify the role of digitalization in agriculture in balancing the binomial food security - organic farming, starting from the premise that smart farming is a model of agriculture in which agricultural work and the administration of chemicals, being controlled, have a significantly lower negative impact on the environment and human health than intensive agriculture and provide cleaner agricultural products, which can later be certified as organic.

As Namani and Gonen (2020) show, the Internet of Things, a revolutionary technology that foreshadows the future of informatics and communications, penetrates all economic and social fields - agriculture, industry, services. Thus, the use of new technologies has many advantages, being able to monitor with the help of phones or computers agricultural work, costs and performance, using satellite and aerial images, sensors that provide information such as temperature, humidity, soil pH, amount of nutrients in the soil, water level and so on (Mekala and Viswanathan, 2017). The Internet of Things (IoT) is a concept that defines a world in which all objects (cars, appliances, lighting systems, mobile devices, laptops) are connected to each other via the Internet (Ilie, 2018). The Internet of Things does not just rely on computers to exist; every object, even the human body, can become part of the Internet of Things, if it is equipped with certain electronic components. The objects certainly vary, but, besides their nature, they must accomplish two requests: the object must be able to capture data, usually through sensors; the object must be able to transmit this data via the Internet. A sensor and a connection, therefore, are the two primary electronic parts of an object included in the Internet of Things (Savu et al., 2017).

Smart agriculture aims to optimize and improve agricultural processes to ensure optimal yields, providing farmers with information on ongoing production scenarios in growing areas (Kour and Arora, 2020). These practices have low energy consumption and generally consist of climate monitoring (Ma et al., 2020), data analysis (Daissaoui et al., 2020), early detection of diseases (Puengsungwan and Jirasereeamornkul, 2020), intelligent irrigation (Al-Ali et al., 2019) and so on. By implementing the Internet of Things in agriculture, field conditions can be monitored remotely at regular intervals, without any human intervention, and, after analysing the data, farmers can make favourable and efficient decisions, which will help both the environment and producers and consumers, supplying the market with agricultural products for which smaller amounts of chemicals are administered and only when necessary (Kour and Arora, 2020).

The hypothesis from which starts our research is that smart agriculture, compared to conventional agriculture, has a significantly lower negative impact on the environment and human health and can provide certified organic products, contributing to the sustainable development of agriculture. The research aims to formulate answers on the extent to which digitalization in agriculture can be expanded so that the agricultural system provides products obtained with lower amounts of chemicals and subsequently certified as organic.

The paper is structured in six parts. After the introduction, the methods used to verify the hypothesis are presented. The section three reviews the literature and discusses the main results found in numerous papers related to smart agriculture and organic food products. The section four presents an overview of the organic farming in Romania, while the section five bases the economic, ecological and social approaches to smart agriculture, discussing the theoretical findings and empirical data. Finally, the conclusions of the research are drawn.

Methodology

This article presents a conceptual framework of the smart agriculture in relation to organic farming, presenting how digitalization is used in agriculture and describing its effects in sustainable development approach – economic, social and ecologic. For this attempt, two bibliographic analyses have been developed, one for smart agriculture and one for organic agro-food products, inquiring Web of Science database. The results have been analysed by year and by clusters, identifying the main topics linked to smart agriculture. The linkages have been discussed considering the results of numerous researchers who studied the topics related to the keyword smart agriculture.

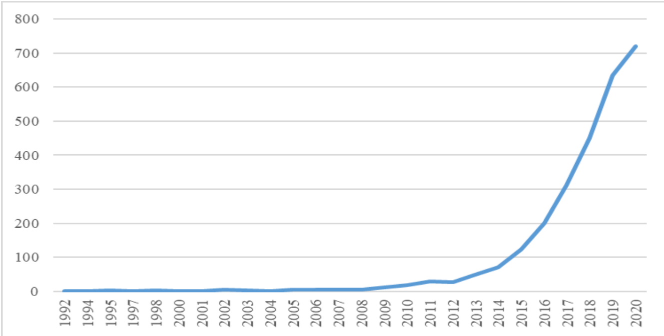
In order to support the claim that smart agriculture has a significantly lower negative impact on the environment and human health compared to the conventional agricultural system, statistical data have been analysed and empirical evidence has been provided from previous studies.

Review of the scientific literature

Starting with the digitization of a significant number of processes and activities taking place in economy and society, the scientific world has begun to be concerned with research into smart agriculture and its role in the sustainable development of the agricultural sector.

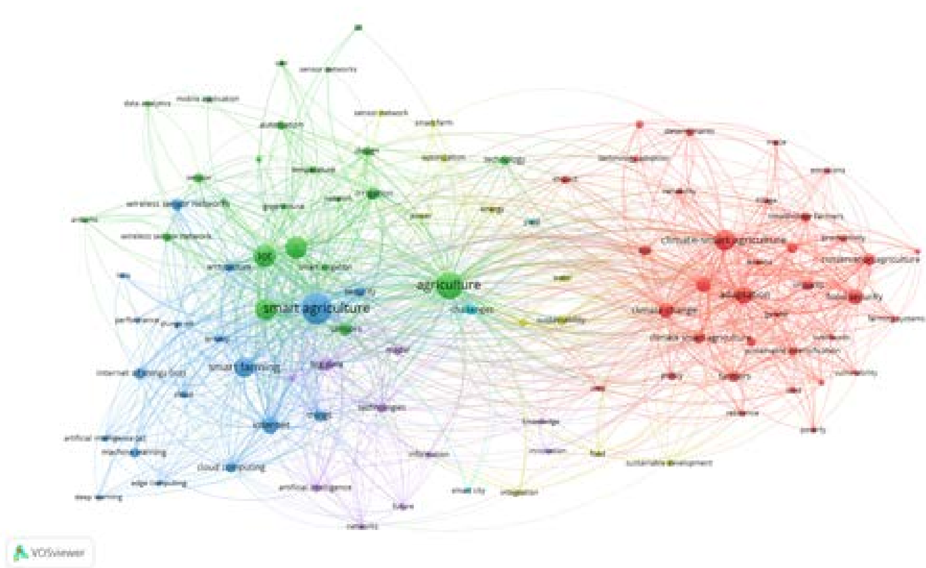
The integration of the Web of Science database on the subject of smart agriculture reported 3093 publications, in the period 1991-2021. Their dynamics can be seen in figure 1: scientific concerns on smart agriculture began in the 1990s, at that time 1-2 articles were published per year; interest in this topic increased in 2011, when the number of articles reached 29; since 2015, their number has increased significantly, reaching a maximum of 720 publications in 2020. Out of the publications reported after inquiring the Web of Science database, 12 focus on smart agriculture in Romania or the countries of the Southeast European Union, the authors presenting the results of scientific research in areas such as: biotechnology (Dettenhofer et al., 2019); creative economy (Mazilu et al., 2020); the Internet of Things applied in agro meteorology (Suciu et al., 2016); intelligent systems for maize production (Croitoru et al., 2020); the social economy and its development directions, including the intelligent one (Virlanuta, 2015); intelligent animal husbandry systems using artificial intelligence (Micle et al., 2021); sustainable development of agriculture (Panait and Cucu, 2020); intelligent systems applied in forestry (Dinca and Dinca, 2020); agriculture precision versus digital agriculture (Fertu et al., 2019); digitization of the agricultural sector (Florea et al., 2019).

Figure 1. Dynamics of the number of publications on smart agriculture



Source: authors' processing based on WoS data

Figure 2. Links between smart agriculture and other related notions



Source: authors' processing WoS results using VOSviewer

Using the VOS viewer program, the analysis of the results of the Web of Science database inquiry on smart agriculture continued with the identification of the connections between the terms with which this topic was associated in the written articles, resulting in the map in figure 2. Thus, five different clusters have been identified, with the most common topics related to smart agriculture being: agriculture; climate; the Internet of Things; precision agriculture; adaptation; food security; climate change; conservation; farmers; technology; impact; changes; sensors; irrigation; architecture; system; soil; sustainability; artificial intelligence; cloud; temperature; resilience; agro-ecology; block chain; food and so on.

Given the links between smart agriculture and sustainability, our research aims to identify the role of smart agriculture in the sustainable development of the agricultural sector in general and the market for organic agro-food products in particular. In fact, Mekala and Viswanathan (2017) call the model of agriculture that uses the Internet of Things "sustainable smart farming", thus associating the meaning of the notion of "sustainable" with smart agriculture.

The query of the Web of Science database on the topic of organic agro-food products reported 46,458 publications, in the period 1991-2021, of which, in the first 1,000 ordered by relevance, 16 refer to Romania. Petrescu (et al., 2016) makes a profile of the Romanian consumer of organic agro-food products and shows that the main reasons for buying them are related to health and taste. In another study, the same authors demonstrate, through the results of a survey, that the motivation for consuming organic food is related to consumer care for environmental protection (Petrescu and Petrescu, 2015). Oroian (et al., 2017) indicates the link between the consumption of organic food and sustainable development, identifying three types of consumers: gourmets, concerned about the environment, concerned about health. Bobe (et al., 2016) shows that Romanians are not fully aware of the benefits of organic food and production methods and also that they do not understand the cost-price relationship. Barna (et al., 2010) pays special attention to organic farming, considering that it is a sector with many business opportunities in Romania, given that organic farming has been practiced continuously, due to long-standing and well-preserved food traditions, in despite any cultural, economic or political influence. Moreover, the results of the survey show that Romanians are very attached to traditional agriculture and associate organic products with the traditional way of cultivating the land, which is for them a certification that the products are organic. Last but not least, Romanian authors (Istudor et al., 2014) show the links between food security and sustainability, through organic food, which can be considered a direction for the development of a sustainable agricultural economy.

Organic agriculture in Romania

The activities specific to intensive agriculture need industrial capitalization to the detriment of maintaining the ecological potential, which generates, over time, the need to recover it from economic sources, with effects on reducing economic efficiency. It is true that intensive agriculture increases production by 50-60% compared to organic farming, but at some point, according to marginalism theory, any additional allocation of factors of production in the form of chemicals leads to a decrease in marginal output, which does not justify making additional expenditures with these factors. The result of applying additional chemical substances is the decrease of the total production, the assurance of food security from domestic sources being affected. By default, the negative effects of the administration of chemicals are found in the environment and food safety. Counteracting these effects in the chain is done by practicing organic farming, a system in which the permission to use chemicals is limited. This demonstrates the complexity of the economy-environment relationship, Commoner's (1980) statement being suggestive in this respect: "no economic system can be considered stable if its functioning seriously violates ecological principles."

The distinctive elements of organic farming as a niche of agriculture are of a technological, economic and social nature. The activities specific to the technological process of obtaining ecological products: maintenance of plant residues on the land surface, crop rotation and alternation, allocation of natural (organic) fertilizers, application of irrigation water avoiding polluted waters, control of diseases and pests by biological processes, land conversion are the independent variables from which positive results on the environment and human health are expected.

From an economic point of view, organic farming assumes larger volumes of variable expenditures, especially with seeds, fertilizers (organic, high cost generators), as compared to intensive agriculture. The average production per unit area (in the case of vegetable farms) is lower, but the high selling price has a strong effect on the profitability relative to the resources consumed. Moreover, the selling price stimulates farmers to practice this type of agriculture and increases the value of the product.

From a social point of view, organic food has beneficial effects on human health, and those obtained in intensive agricultural systems are criticized for the content of chemicals from pesticides and fertilizers. According to the definition proposed by the World Health Organization, pesticides are chemicals or mixtures of biocidal chemicals intended to eradicate potential pests such as insects, rodents, fungi or other microorganisms, and are widely used in agriculture (WHO, 2008). The major disadvantage of pesticides, namely the negative impact on human health and the environment, has made them a subject of intensive research in scientific literature. The main classes of pesticides considered to influence public health are represented by organochlorines, organophosphates, carbamates and neonicotinoids, among others. Exposure to pesticides can occur through direct contact with the skin, ingestion or inhalation. The determinants of the possible health impact of pesticides are the type of pesticide, the duration of exposure and the route of exposure; to these is added the individual health status. For example, the presence of nutritional deficiencies or the integrity of the skin barrier are elements that can promote the adverse health effects of pesticides. Therefore, dermatological, gastrointestinal, neurological, respiratory, endocrine toxicity and even the induction of carcinogenesis and reproductive disorders may be seen (Nicolopoulou-Stamati et al., 2016). Furthermore, acute occupational, accidental or intentional exposure may result in hospitalization or, in severe cases, even death (WHO, 1990). Consequently, at the present moment, there is an imperative need for the development and implementation of innovative strategies in the field of agriculture, strategies that may ensure product quality, while being as harmless as possible to the human body and the environment.

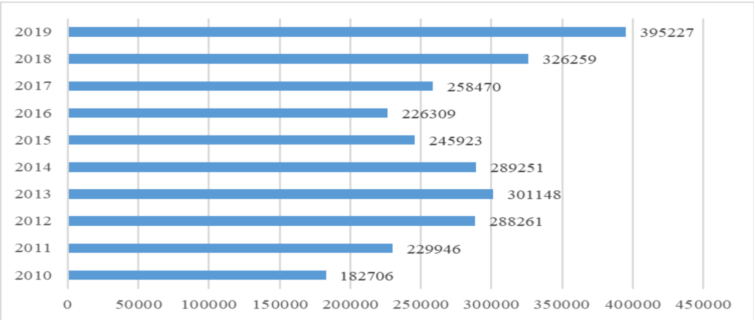
The combined technological, economic and social aspects have a direct impact on production and economic results and, indirectly, on the environment and human health.

The presented considerations make necessary the analysis of the stage in which the ecological agriculture is in Romania, as surface and number of operators, either producers or processors.

In 2018, at European level, an area of 12,980,789 ha was cultivated based on the principles of organic farming, representing 8% of the total EU agricultural area. On the first place as organically cultivated area of the total agricultural area is Austria, with a percentage of 24.1%, at the other extreme is Malta, with a value below 1%, Romania being the penultimate country in this ranking, with a share of 2.4%. In absolute values, Romania cultivated in 2018 an area of 326,260 ha, while Austria reported an area of 639,097 ha (European Commission, 2018).

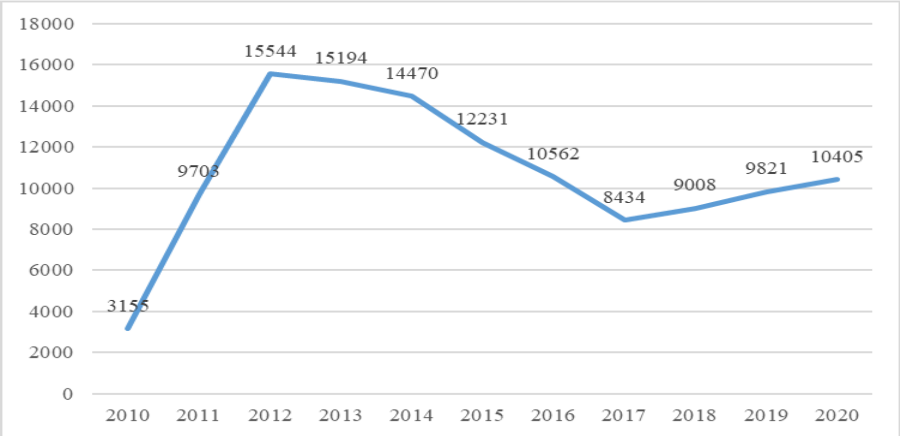
In 2020, the official data (County and Bucharest Agriculture Directorates) show that the total agricultural area registered in organic farming was 471,927.8 ha (certified and in conversion), with different distributions by counties and development regions (figure 3). Significantly larger cultivated and organic certified areas are in Constanta 6.9%, Galati 5.05%, Gorj 2.59%, Teleorman 2.25%, Timis 11.84%, and Tulcea 12.79%. There are, therefore, “exponents” from each development region, which demonstrates the ecological potential of agriculture in Romania.

Figure 3. Total area in organic farming in Romania (ha)



Source: Ministry of Agriculture and Rural Development, 2021

Figure 4. Number of certified operators in organic farming



Source: Ministry of Agriculture and Rural Development, 2021

In those regarding the trend of the number of operators managing organic agricultural activities, it manifests into two directions: increasing, in the periods 2010-2013 and 2017-2020, and decreasing from 2013 to 2017, respectively (figure 4).

By counties and, implicitly, development regions, the number of operators is different. The total number of operators in organic farming registered in agricultural statistics is 10,405 individuals and legal entities, the least being in Ialomita (38), Dambovita (49), Calarasi (41), Teleorman (96), Ilfov (57), Giurgiu (27). The large areas favourable for vegetable production found in these counties represent a strong potential for the development of organic agriculture, especially since the production structure is an extremely permissive landmark from an economic point of view (vegetables, cereals, legumes). If we add to these the introduction of digitization elements in the processes of irrigation, fertilization and harvesting, we can confirm the role of organic farming in sustainable development.

In this context, in order to achieve the target proposed by the European Green Deal, respectively a percentage of at least 25% of the organically cultivated agricultural area, a very consistent financial allocation from the European Union is needed. Romania has a very high potential for the development of the ecological sector (Ilie, 2021a), but the deadline, 2030, may be quite short. The elements previously presented and analysed call for the need to apply public policies as attractive as possible for farmers who benefit from competitive advantages for the conversion of cultivated areas to organic production.

Sustainable approaches to smart agriculture

Agriculture must take active and reactive measures to prevent and identify environmental damages, to ensure food security and a certain level of economic performance for farmers; these efforts are found in the general and specific objectives of the sustainable development of agriculture, namely, the maintenance of agriculture as a support for long-term economic, ecological and social activities. Smart agriculture, which is in line with the principles of the European Union's Green Deal, is based on these arguments.

Considering the results of previous research and the links between smart agriculture and sustainability, food security, organic farming, organic food, human health, smart agriculture converges to achieve the goals of sustainable development of agro-food sector.

In Romania, smart agriculture is developing according as technological discoveries increase and farmers' willingness to use smart technologies grows. Identifying the degree of farmers' perception regarding the digitalization of agricultural activities is a topic of concern in the field. Thus, a case study was conducted on a sample of 52 farms in Romania, of different types, physical and economic dimensions and various production activity (Dobre et al., 2021). The preponderance of the units participating in the survey is given by the type (societies and physical persons), with areas between 11 and 50 hectares and over 50 hectares (40.4%, respectively 44.2%), with specialized activity in cereal production. When asked about the farmers' willingness to use smart technologies, 92.3% of respondents show a growing interest in digitization and implementation of new technologies in the field in which they operate. Of all those concerned with this direction of agricultural development, 82.4% support the benefits of smart agriculture as a necessary step in order to increase the economic performance of the activities they manage. It should be mentioned that 53.8% of the respondents are in the age group 18-30 years, which is not to be neglected in the perspective of the agriculture development through innovation.

Other research has identified the agricultural methods and practices used by farmers and thus established the size of smart agriculture. A study conducted by VitalFields (2018) shows that the use of digital applications on the computer and, especially, the phone is made daily by a significant percentage of farmers, generally entrepreneurs with economic or technical training. This reveals the role of digitalization in increasing trend of the farms' conversion to commercial units.

The computerization of the economic activity must be approached in two ways: inside the farm and outside the farm. In the first case, the entire activity (production obtained, expenses incurred, income generated) is to be "managed" by computer, so the producer has the opportunity to verify, at any time, the results of the farm he runs. In the second case, monitoring can be done through computerized accounting networks at the county level, which take over the data from each farm (Dobre et al., 2021).

Smart agriculture utilizes specific satellite remote sensing services using drones, geolocation (GPS), climate analysis and weather forecasting, IoT (Internet of Things), integrated farm management services, soil analysis, foliar analysis and online input purchasing. The digitization of activities also aims to monitor the soil, weather conditions, workflow in the field, diesel consumption on each machine and in each soil on which a particular agricultural work is performed, fertilization and irrigation systems, soil work and so on.

The effects of digitalization of agricultural activities envisage all three approaches of sustainability – economic, ecological and social; they are interdependent and synergic. Some of these were identified by a study evaluating the use of digital agriculture services in Romania (Amazag, 2021). The main economic, social and environmental effects refer to the visible improvement of the degree of profitability of economic activities and management; optimization of the production structure, starting from the ecological factors; reduction in diesel and other inputs, which generates cost savings; reduction of costs due to the application of a personalized fertilization plan and more efficient distribution of fertilizers; reducing soil compaction through less use of mechanical works; reducing overlaps in the processes of sowing, fertilizing and applying treatments, by using tractor guidance systems using GPS; incorporation of plants' waste through surface soil mobilization; maintaining soil quality and maintaining the level of acidity so as to ensure high productivity; increasing the production and reducing the consumption of seeds, through the uniform emergence of cereal crops; reducing the consumption of chemicals, applied according to the need for nutrients in the soil, which leads to positive effects on the environment and human health.

All these effects demonstrate that smart agriculture, through its production methods, is close to organic farming, having a significant role in applying the principles of sustainability in the agricultural sector.

Conclusions

The research revealed the links between the digitization processes specific to the agricultural sector and organic farming, demonstrating the importance of smart agriculture for sustainable development, implicitly generating beneficial effects on the environment and human health. This validates the hypothesis that smart agriculture, compared to conventional one, has a significantly lower negative impact on the environment and human health and has the potential to supply organic products.

Withal, the research revealed the effects of intensive agriculture, mainly from the perspective of pollution of different types and the growth in the incidence of diseases, due to increased use of chemicals and excessive mechanization. Although intensive agriculture models ensure food security due to high yields, they do not subscribe to the principles and strategic directions of sustainable development. The organic farming model, although it achieves lower yields per hectare than intensive agriculture, provides products that are beneficial to the environment and human health, ensuring safe food for population.

We conclude that smart agriculture, through the methods used, which are less invasive on the environment and human health, compared to intensive agriculture, is closest to organic farming, and digitalization is the compromise between conventional agriculture, whose main function is to ensure food security, and organic farming, which provides food beneficial to the environment and human health.

Conflict of interests

The authors declare no conflict of interest.

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DIGITAL TOKEN IN THE BUSINESS FUNCTION OF COOPERATIVES

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A B S T R A C T

Cooperatives represent relevant and significant economic subjects of associations that promote the interests of their members and work affirmatively to improve their position. Since the digital economy is developing expansively, and new forms of digital technology are changing economic and other interactions every day, cooperatives must keep up with such processes. The authors of the paper analyze the legislative framework for issuing digital tokens in the Republic of Serbia, especially from the aspect of the legal subjectivity of the issuer of this form of digital property. The purpose of the research is to indicate the legislative framework and economic possibilities of issuing digital tokens by cooperatives in the Republic of Serbia. The methodological approach is based on the theoretical analysis of nationally relevant regulations that enable cooperatives to be issuers of digital tokens, while the empirical research shows and analyzes the current practice of issuing digital tokens.

Introduction

Contemporary society is characterized by the dynamic and frequent use of various forms of digital technology in everyday interactions. Today's society is the society of the digital age, based on the intensive, daily and varied scope of using different forms of digital technology. A digital society is a society that accepts and uses digital technology on the basis of its social interactions. The scope and character of the implementation of digital technology directly

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depends on the degree of economic development of the specific society, and on the basis of the emergence and development of the digital society, significant changes have occurred in the domain of the economy. The digital economy is developing, as an economy based on the implementation of various forms of digital technology, especially information and communication technologies (ICT). The digital economy represents a segment of the digital society, making current and future development dynamically progressive depending on the scope of application of digital and technological solutions in the daily operations of business entities (Dukić Mijatović, Mirković, 2022). As a result, global economic trends are moving in the direction of more expansive use of new forms of digital technology in all aspects of business operations of economic entities.

The guarantee of development, but also of survival on the market, today is predominantly found in a high degree of inclusion of digital technology in the business of an economic entity, unrelated to its business activity. One form of digital technology that greatly changes the way certain business activities are performed, and generally influences and changes the foundations of the understanding of business and economic activity, is digital assets. The legal system of the Republic of Serbia is one of the first national legal systems that regulates the matter of digital property at the legal level. Digital property, in the conceptual framework out of which a special place belongs to digital or virtual currencies and digital tokens, represents a new economic reality that is available to subjects of economic association to use in accordance with their legal status, activities and goals of existence. Economic association, especially its role and importance in the economic system of a society, is an interesting and important issue. Cooperatives and cooperative associations represent economic communities of interest of their members who promote cooperative values and achieve the goals and tasks which they were founded for. Cooperatives represent autonomous associations of persons voluntarily associated with the goal of meeting common economic, social and cultural needs and aspirations, through a jointly owned and democratically controlled enterprise. Of particular importance for its smooth functioning is the availability of capital that will serve the purpose of the operation of the cooperative and its members.

The basic goal of the defined research is based on the premise that digital tokens, as a form of digital property, can be used to attract capital as a significant segment of cooperative operations. Functional research tasks are based on defining the legislative possibility of issuing digital tokens in accordance with the provisions of the Law on Digital Assets and the Law on Cooperatives. There are valid assumptions that by issuing digital tokens, cooperatives could find new sources of capital that will be functionally used for the realization of the activities of the cooperative and its members. The verification of the given possibility is empirically verified in relation to relevant data on the volume and nature of issued digital tokens in the Republic of Serbia by legal entities.

Research methods

The methodological approach to research is determined in accordance with the previously defined research goal and consists of a theoretical and empirical segment.

The theoretical part of the research includes a normative analysis of the provisions of the Law on Digital Property and the Law on Cooperatives. First of all, the authors, through a normative analysis of the provisions of the Law on Digital Assets, determine the relevant legal regime of the digital token issuance procedure, with special reference to the legal subjectivity of persons who can be found in the role of digital token issuers. Then, through a normative analysis of the provisions of the Law on Cooperatives, this regulation is screened in the domain of how the legislator defines the legal status of cooperatives, considering their specific legal position in the national legal framework, as well as whether it enables cooperatives to be digital token issuers in accordance with the provisions of the Digital Property Act. The goal of the theoretical part of the research is to determine the legal status of cooperatives according to the provisions of the Law on Cooperatives and whether such legal status allows cooperatives to appear as digital token issuers according to the provisions of the Law on Digital Assets.

The empirical part of the research includes the analysis of relevant and available data on the issuance of digital tokens in the Republic of Serbia by legal entities. The analysis aims to identify the issues of digital tokens issued so far (with or without white paper), with the presentation of relevant data of the realized issues in the context of the total monetary value of the issue, the character or purpose of the funds collected in this way, as well as the legal status of the token issuer. The empirical part of the research includes the collection and analysis of data on issued tokens that have been approved by the Securities Commission, as well as those token issues that do not require the commission’s consent in accordance with the special conditions stipulated by the Digital Assets Act.

Results

The normative analysis of the provisions of the Law on Digital Assets established that the legal status of the digital token issuer is clearly specified. The legal system of the Republic of Serbia legislatively innovated a new concept of the legal understanding of property, by introducing digital property as a special form of property. As a consequence of the development and implementation of ICT, an informal conceptual solution of a property nature - the digital property became the subject of legislative regulation at the level of a special law. In order to provide relevant entities with a certain degree of legal security and certainty, global legislative trends have profiled a new direction in the development of the form of a new institute - digital property. By adopting the Law on Digital Assets, the Republic of Serbia systematically and legislatively innovatively regulated issues in the domain of issuing digital assets, its secondary trading, provision of services related to digital assets, lien and fiduciary rights on digital assets, as well as the issue of jurisdiction over these institutes of a property nature by the Securities Commission, i.e. the National Bank of Serbia. According to the normative analysis of Article 2, Point 1 of the Law on Digital Assets, it is prescribed that "digital asset, i.e. virtual asset, means a digital record of value that can be digitally bought, sold, exchanged or transferred and that can be used as a means of exchange or for the purpose of investments, whereby digital assets do not include digital records of currencies that are legal tender and other financial assets that are regulated by other laws, except when otherwise regulated by this law". An interesting question of the defined research is the way in which the legislator determined the concept of a digital token and the legal status of the issuer of the token. When it comes to the standardization of the concept of a digital token, it is important to note that the legislator legislatively determined only two forms of digital property - virtual currency and digital token. This does not imply the impossibility of creating other forms of digital property, in accordance with the law, but only these two forms were identified as particularly important and sufficiently legally specific at the time of the adoption of this law to legally define their term. It was established that a digital token is "a form of digital property and as such means any intangible property right that represents one or more other property rights in digital form, which may include the right of the user of the digital token to be provided with a certain service", which is especially important in the context of the possible purpose of issuing a digital token by cooperatives for the purpose of being able to use its services in order to attract an alternative source of capital that does not come from cooperative members.

The normative analysis of the provisions of the Law on Digital Assets concluded that legal entities, companies and natural persons can be found in the role of issuers of digital assets. The legal status of the issuer of digital assets is a significant issue from the aspect of the subject of research, and accordingly, the conducted research determined that in accordance with Article 2, point 13 of the Law on Digital Assets, the issuer of digital assets can be a domestic or foreign natural person, an entrepreneur or a legal entity.

The normative analysis of the provisions of the Law on Cooperatives established that the legal position of cooperatives is clearly determined by legislation. A cooperative is a legal entity, and as such it represents a special form of organization of natural persons (cooperative members) who realize their economic, social, cultural and other interests by operating on cooperative principles and who manage and control the operations of the cooperative (Article 2. Law on Cooperatives). Further analysis of this law established that the legal status of cooperatives is additionally specified in Article 5 of the same regulation, which stipulates that “a cooperative acquires the status of a legal entity by entering into the register maintained by the authority responsible for the registration of business entities”, while it is clearly determined that “a cooperative cannot be organized as a commercial company in the sense of the law governing commercial companies or as another form of organization” (Article 5, paragraph 1 and 2, Law on Cooperatives). The authors of the paper determined that the legal subjectivity of the cooperative was clearly and precisely determined in accordance with the previous statements.

Based on the conducted theoretical research based on the application of the normative method of analysis of two regulations, the Law on Digital Assets and the Law on Cooperatives, the authors of the paper concluded that cooperatives as special legal entities can appear in the role of issuers of digital tokens without legislative restrictions in the analysed regulations.

The empirical part of the research included the analysis of relevant and available data on issues of digital tokens issued in the Republic of Serbia by legal entities. The procedure for issuing a digital token is precisely regulated by the provisions of the Law on Digital Assets. With the entry into force of this regulation, the procedure for issuing digital assets, including digital tokens, and legislative solutions has been implemented in practice. By analyzing the aforementioned law, the authors concluded that the entire process of issuing a digital token is clearly regulated by legislation. The central function of supervision over this procedure is entrusted to the Securities Commission, depending on the economic character of the value of the specific digital token issue. Based on the available data collected by the authors of the paper by looking at the website of the Securities Commission, one successfully implemented issue of a digital token with an approved white paper was recorded. The first digital token issue in the Republic of Serbia was approved by the Securities Commission to the legal entity Finspot (date of issue: May 26, 2022). The individual value of the first issue of the digital token - finspot factoring token (FIN) was determined by the issuer in the amount of RSD 1,000.00 per token. An individual buyer had to buy at least 10 digital tokens. The total value of the initial offer was RSD 32,250,000.00. The issue was realized through the issuance of a white paper that enabled investors to view all relevant data (Republic of Serbia Securities Commission, n.d.). When it comes to the issue of this digital token, by analyzing the content of the white paper, the authors of the paper obtained relevant data about the nature and purpose of this issue. The issuer predicted that this digital token is “a security token that represents a quasi-financial instrument, which to the greatest extent resembles financial instruments, and the users of that digital token have the right to participate in the profit, that is, the interest that the company that issued the token will pay them” (RTS, 2022). It is therefore a digital token that has an asset value and has a certain degree of similarity with debt financial instruments.

The second recorded digital token issue was realized by the sports club, Basketball Club Partizan NIS. The authors of the paper concluded that the issuance of a digital token offers various possibilities regarding the purpose of token issuance, which gives the right to the token issuer to provide certain services, i.e. benefits, to the buyers of the given token. The issuer of the digital token has decided to provide a number of benefits and services of a non-property nature for its fans-customers. The research established that no white paper was issued or approved for the issuance of this token, but all relevant information was provided directly by the issuer itself. Since the provisions of the Law on Digital Assets provide for the possibility of issuing a digital token with or without white paper, the issuing procedure was carried out in accordance with the law. In this case, it was not necessary to seek the approval of the Commission for Securities, bearing in mind that the total value of the offer is legally limited in accordance with the provisions of Article 17, Paragraphs 3 and 4 of the Law on Digital Assets - the total value of digital assets that during a period of 12 months issued by one issuer is less than EUR 100,000 in dinar equivalent value. The value of one token is set by the issuer at RSD 120.00, while token buyers are classified into three categories of users, depending on the number of purchased tokens. The issuer of the token has decided to provide certain benefits and services to token buyers that arise from the domain of the sphere of interest of its business. In this case, token buyers are provided with a range of different benefits when buying tickets, the opportunity for their favourite player to record a short personalized video message, a meeting with their favourite player, a signed jersey of the first team and the like. Basically, the issuer of the digital token has opted for the non-property character of the token it issues, that is, for it to be of a specific service character for its customer. The issuer’s premise is “that by selling these tokens, support for the club is expressed and various benefits are realized that are known in advance", while at the same time a new source of capital is generated that was previously not legally possible, i.e. regulated. In addition, the token issuer decided to issue a special type of non-fungible token - NFT, which represents a unique token that can be an image, video, gif, text and the like. It is a kind of certificate that digital work is unique, and it is related to the issuer of the token itself. By analyzing the available data, it was determined that the token purchase process itself was carried out directly through the official application of the issuer, the Partizan NIS Basketball Club.

Discussion

By adopting the Law on Digital Property, the Republic of Serbia created an adequate legislative framework that addresses the issue of a new type of property that arose as a result of the development and use of digital technology. New Property Institute - Digital Assets provides a wide range of capital investment opportunities in the domain of digital currencies and digital tokens in a legally secure manner. Also, in this way, economic entities are enabled to use the possibilities of a new form of property in the market in order to attract capital. The digital technology of the distributed ledger (which is the literal translation of the name of this technology in English - distributed ledger technology - DLT) is undoubtedly one of the forms of modern technologies that can have a very wide field of application, and therefore it becomes the subject of study in various fields of science, but and more and more current and frequent discussions whose participants are business people, political leaders, regulatory agencies, legislators and the like (Mihajlović, 2021). The possibilities of application are very wide, especially from the aspect of raising capital. Nevertheless, digital property, as a special type of thing, is considered one of the biggest challenges of modern real law (Jovanić, 2021), and therefore by adopting the law, the legislative system of the Republic of Serbia provides a high degree of legal security and predictability, both for the issuer of digital property, as well as for their customers. At the moment, the European Union is nearing the end of the adoption process of the Regulation on crypto-assets, the aim of which is, among other things, the harmonization of the regulations of the member states in this area, especially bearing in mind that in most of the member states services related to crypto-assets are provided outside the regulatory framework. The solutions adopted by the Law on Digital Assets are mostly following the proposal of this Regulation, although there are certain deviations (Pejkić, 2021). The scope of application of digital assets in practice is shown to be unlimited, especially in legal systems that provide a clear legislative framework. Some lawyers even believe that the emergence and development of this technology represent at the same time the beginning of a new phase of the technological revolution, equating its importance with the emergence and use of the Internet (Goforth, 2021). Based on the above, it is obvious that the application of digital technology in the domain of creating digital assets can be an economically qualitative resource. Generally speaking, the process of issuing digital assets, virtual currency and digital tokens resembles the process of an initial public offering (IPO), including the publication of a prospectus, even when it is not regulated by regulations. By analyzing the provisions of the Law on Digital Assets, it can be concluded that this model was applied. Also, the influence of the Proposal of the EU Regulation on crypto-currencies is noticeable, given the similarity of the rules between the two regulations (Pejkić, 2021). By issuing digital assets, especially digital tokens, the issuer offers potential customers a property right to income on the achieved business results, which basically makes them similar to financial instruments. Still, the purpose of issuing tokens can also be directed to the non-property domain, leaving the customer's rights or benefits of a service nature to which the issuer of the token is obliged, which was the initial premise of creating this research from the aspect of possible application in the business of cooperatives. In this context, within the scientific community, it is clearly indicated that every form of digital property was originally created in the form of a process of primary emission of digital property, followed by secondary trade. Each issuer of digital assets defines the purpose of the asset that is the subject of issuance, on the basis of which the method of use, exchange and evaluation is further determined (Trklja, 2021). The advantages of digital tokens, in contrast to digital currencies, are precisely the different economic properties of the issued tokens in the context of whether they represent a property or some other right that can be drawn on. The first group consists of exchange tokens, which is actually another name for cryptocurrencies. They are based on distributed ledger technology and are generally not supported by a recognized central authority, although this is not the case when it comes to legislative regulation of digital assets in the Republic of Serbia. In this sense, they represent decentralized instruments for buying and selling goods and services without traditional intermediaries. The second group, value tokens (security tokens), analogous to the above-mentioned investment tokens, imply the acquisition of certain rights and obligations and have the functions of ownership or debt financial instruments that can be transferred. This type of token was issued by the Finspot issuer in the Republic of Serbia. Utility tokens provide the right to current or future services or products, but not the powers that users of value tokens have (Jovanić, 2020). This type of token was issued by the Partizan NIS Basketball Club. In this form, a digital token is a form of digital property that implies the existence of property rights in a special, digital form, which may include the right to certain services for the holder or token buyer (Trklja, 2021). In this way, the digital token issuer within its domain of business activities, which primarily refers to business entities, can provide token buyers with a specific range of services that are otherwise unavailable or difficult to access, while the motivating factor for the buyer is precisely based on the possibility of obtaining certain benefits, that is, a service that has a certain value for him and for which he is ready to pay. In this way, issuing a digital token can serve to attract new sources of capital, which is clearly empirically confirmed by the conducted research. As part of the empirical research, it was determined that according to the available data in the world at the time of writing this paper, there were over 10,000 individual forms of digital assets, which includes over thousands of tokens (https://www.statista.com/statistics/863917/number- crypto-coins-tokens/), which supports the fact that this form of digital property is increasingly becoming significant on the global world market, while the scope of application depends to a significant extent on the context and general regulatory policy of each individual country. The possibilities of using digital tokens are gaining importance, and in the future, we can expect an increase in the number and value of individual issues in the Republic of Serbia.

The initialization of the use of digital technology in the business of economic entities represents the beginning of the emergence of the digital economy. In such a process, economic entities must adapt to technological changes that significantly affect their operations and the realization of economic results. The possibility of issuing digital assets by legal entities represents a new type of capital attraction without legislative restrictions. Realizing that cooperatives represent specific economic subjects, the question of attracting new sources of capital is very significant, understanding global trends in this domain. Cooperatives represent an interest association of its members and are established in accordance with the Law on Cooperatives, based on cooperative principles. In their operations, cooperatives primarily play the role of affirming cooperative principles that serve the interests of their members - cooperative members. It is emphasized that cooperatives are traditionally the most significant form of association and business organization of natural and/or legal persons, i.e. cooperative members, with the aim of their economic, sociological, cultural and ecological sustainability (Mitrović, 2019). Through the affirmation of the cooperative principles, the cooperative realizes a wide range of activities in accordance with the spheres of interest of the cooperative members. Since they represent an interest association, the importance of cooperatives and cooperatives in the world and in our country is great. Namely, almost half of the world's population provides funds through cooperatives. It is pointed out that there are three times more cooperative members than shareholders in the world (Mićović, 2017). The role of the state is to affirm the establishment of cooperatives through active legislative activity in this field. Previous cooperative legislation did not regulate the issue of the concept of a cooperative member but indirectly prescribed that the status of a cooperative member is acquired by the founders of the cooperative, i.e. natural persons by establishing a cooperative, as well as those natural persons who meet the conditions prescribed for the establishment of a certain type of cooperative (Knežević, 2021). In this context, the significant reform of cooperatives in the world took place in the domain of a clear legislative framework that regulates this area, most often through systemic laws. It is emphasized that modern cooperatives have undergone major changes so that cooperatives in developed countries are increasingly organized as capital companies. This trend creates problems for the economies of countries in transition, which means also for Serbian cooperatives because cooperatives in the Republic of Serbia are organized as private companies. In fact, a cooperative that has been recognized as a special business company is placed in an unequal position on the market compared to other non-cooperative companies (Mitrović, 2020). For the stated reason, cooperatives need to create new ways of attracting capital that will be a function of their business, which was identified by the author of the paper as a valid research question.

When it comes to capital, the basic capital of a cooperative consists of cooperative members' contributions, or membership fees - if cooperatives are founded without cooperative members' contributions. Namely, stakes do not have to be equal, and on the other hand, they can be monetary or non-monetary. A cooperative member can have only one stake in the cooperative and the cooperative's stake cannot be transferred by legal deed (Nikolić, Zakić, Tasić, 2018). Limitations in this domain have been validly investigated by the professional and scientific public, especially from the aspect of the legal position of cooperatives, which as such determines the way of performing their business activities. In particular, the fact that a cooperative is an exclusive legal form of association of cooperative members, which in our law is characterized by a high degree of personification and closed business, is an expression of its self-help function (Vitez, 2018). The negative context of the above is in the high degree of closure of cooperatives as economic entities towards third parties, which significantly hinders and limits cooperatives from attracting external capital beyond that which the cooperative members themselves invest. As a result, the economic position of cooperatives proves to be difficult to sustain, since it is generally based on capital investment by the cooperative members themselves, while profitability itself is very difficult to achieve due to a significant degree of closure to third parties. For this reason, efforts are being made today, through adequate legislation, or state incentives, to transform the cooperative, which has long been viewed as a historically outdated form of production, into a competitive business entity. It is stated that cooperative business in today's conditions of economic survival should respond to the requirements of the modern economy through economic integration and consolidation of production, as well as the attraction of capital to cooperatives by third parties as a reproduction of external economic activity (Knežević, 2021). In the field of business organization, the necessity of functional changes in the business model is indicated. The previous way of organizing the work of cooperatives was primarily focused on the cooperatives, neglecting the interests of the cooperative itself as a separate economic entity. Thus, it is emphasized that the cooperative member, as a member of the cooperative, in whole or in part, operates through the cooperative using its services (Bataveljić, 2016). However, such a concept of functional business puts in the background the interests of the cooperative as a legal and economic entity. It is emphasized that, although cooperatives primarily serve the interests of the members themselves, the cooperative also has its own interests, which it realizes through its organs and instrumentalizes them through legal transactions concluded by the cooperative management in legal transactions with the cooperative members, but also with third parties (Vitez, M. 2018). New opportunities to attract capital are precisely identified in the interests of the cooperative itself as a legal entity and the need for this legal entity to be "economically distinct" and independent in a certain domain from the cooperative members themselves, which is done in dealings with third parties who do not necessarily have to be directly related by interest with the cooperative members themselves. It is validly asserted that every economic organization, including a cooperative, must make a profit in order to survive and develop. In other words, the cooperative must not operate at a loss, because its assets would decrease (Mitrović, 2017). In the context of attracting capital, cooperatives must operate more like classic economic entities. This includes diversified financing models that are not exclusively related to the founding roles of the members of the cooperative. In this context, the cooperative must commercialize its business, and offer its service functions and activities related to cooperatives on the market and to other economic entities, where issuing a digital token can be one of the ways to achieve this.

Conclusion

Cooperatives as economic entities must observe the external environment and find ways to, in accordance with their legal position and cooperative principles, commercialize their cooperative activities and offer them to third parties as services or benefits that will serve to attract new business, and consequently new sources of capital. Legislative standardization of digital property institutes enables economic entities a new way of collecting capital. This especially refers to the possibility of issuing a digital token, taking into account the previously defined phenomenological aspect of the possibility of its use. A cooperative as a legal entity can be the bearer or holder of rights to digital assets. Issuing a digital token can be a valid alternative, but also a new way for cooperatives as economic entities to get new sources of capital. The initial idea is that cooperatives, through the process of issuing a digital token, whether it is an issue for which a white paper has been approved or not, offer a range of different services from the domain of the cooperative's activities to third parties, generating new business and sources of capital outside of what the cooperatives bring in. The cooperative must no longer be viewed solely from the aspect of the interests of its members but go in the direction of externalizing its business with third parties, taking into account the interest of the cooperative itself as a separate economic entity. The global trend in the domain of the way cooperatives operate is towards "their greater commercialization" as economic entities, and less as associations that work exclusively in the interest of their members. By issuing a digital token, cooperatives can "commercialize" their activities, so that third parties can also use some of the benefits of cooperatives in an economically acceptable way. The research concluded that the current legislative framework allows cooperatives to be digital token issuers, promoting a new property institute in the function of cooperative operations.

Conflict of interests

The authors declare no conflict of interests.

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Acknowledgements

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The authors declare no conflict of interest.

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4. Stošić, L., & Stošić, I. (2013). Diffusion of innovation in modern school. *International Journal Of Cognitive Research In Science, Engineering And Education (IJCRSEE)*, 1(1), 12-24.

5. Domanović, V., Vujičić, M., & Ristić, L. (2018), Profitability of food industry companies in the Republic of Serbia, *Economic of Agriculture*, 65(1), 11-32. doi:10.5937/ekoPolj1801011D
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Example:

Table 1. The distribution cost of packaged goods from Subotica to retail-store objects

Indicators	Period			Total
	Month 1	Month 2	Month 3	
Distance crossed (km)	12.926	11.295	13.208	37.429
Fuel consumption (litre)	3.231	2.823	3.302	9.356
Value of fuel consumption (RSD)	242.378	211.790	247.653	701.821
Total time spend on touring (hour)	314	266	417	997
Value of total time spend on touring (RSD)	47.048	39.890	62.570	149.508
Number of tours	98	77	102	277
Toll value (RSD)	0	0	0	0
Number of pallets transported (piece)	1.179	976	1358	3.513
Total weight transported (kg)	602.600	429.225	711.116	1.742.941
Vehicle maintenance costs (RSD)	203.858	164.970	224.806	593.634
Lease costs (RSD)	480.938	454.214	565.784	1.500.936
Total sum (RSD)	974.222	870.864	1.100.813	2.945.899

Source: Petrović, 2012

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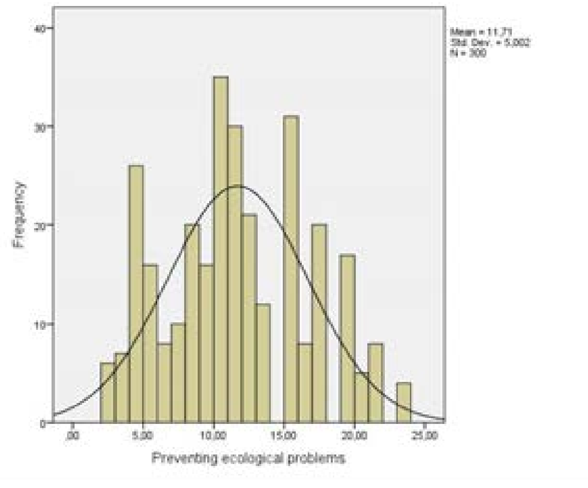
Figure 1. Agriculture, value added (% of GDP)



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