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INDICATORS OF AGRICULTURAL AND RURAL DEVELOPMENT IN THE EAST CENTRAL AND SOUTH-EAST EUROPEAN COUNTRIES

SUMMARY

Rural development is largely determined by the available resources and competitiveness of agriculture. The results achieved in agriculture are a significant factor that affects the improvement of the life quality in rural areas and the efficiency of the rural economy. Hence the indicators of agriculture and rural development are common and inseparable. The main purpose of the paper is systemic analysis of indicators of agriculture and rural development in the East Central and South-East European countries. The heterogeneous structure of the analysed group of countries enables their further division into the European Union (EU) Member States and non-EU countries and consideration of differences in the results achieved in these two subgroups. The methods applied in the paper are descriptive statistics, analysis of variance, cluster analysis and correlation analysis. The results of the research enable evaluation of the relative position of the countries according to the analysed indicators, identification of the countries with relatively better performance, but also the direction and intensity of the link between selected indicators of agricultural and rural development in the analysed group of countries.

Keywords: agriculture; rural development; results; indicators.

INTRODUCTION

Rural areas have a great natural, demographic, economic and cultural potential (Despotović et al., 2017; Dimitrovski et al., 2019; Filipović, 2018), so the rational utilization of that wealth can potentially provide diversified development, full employment, and high living standards and quality of life for the rural population (Erokhin et al., 2014; Podovac et al., 2019). Nevertheless, most of the world's poorest people live in rural areas and this situation is not expected to change for some years. In the past few decades rural areas have experienced major economic and social changes: agriculture and forestry

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(traditionally strong primary industries) have decreased dramatically in many countries (Saarinen, 2007). But still, 77% of the area of the EU member countries are dominated by agriculture and forestry (Piorr, 2003).

The production system such as agriculture is crucially dependent on the environment and impact on it. The environmental impact of agriculture is directly dependent on the land use (Spalevic et al., 2017a), and the land use also reflects the development trends of agriculture and the overall vitality of rural areas (Yli-Viikari et al., 2002). At the same time rural areas are often economically backward (Trišić, 2019), so economic revitalization of rural areas is a priority of national development (Mickovic et al., 2020; Spalević et al., 2017b; Zekić et al., 2017). For this reason, sustainability of rural areas in general terms means the retention of rural inhabitants in their traditional environment by means of the provision of sustainable employment and income (Kiseleva et al., 2013).

In the context of the efforts of countries in modern conditions to define and implement an adequate rural development strategy and ensure the well-being of the rural population, it is important to monitor indicators and measure the achieved level of rural development. Agriculture, which provides socio-economic development of rural areas, plays important role in this process (Despotović et al., 2016; Katić et al., 2011, Gajić et al., 2017). Many indicators and variables are used for examining the agricultural and rural development level in a particular community or country. Indicators are an area of growing interest. They help to transform the raw data into a form that facilitates the decision-making and the managing the complex issues such is rural development. The UN Commission on Sustainable Development (CSD), European Centre for Nature Conservation (ECNC), World Bank, Food and Agriculture Organization (FAO) and several single nations have contributed to development of the agri-environmental and rural indicators (Bryden 2001; Bryden et al., 2000; FAO, 1998; Ilić et al., 2017; MAFF, 2000; McRae et al., 2000; Wascher, 2000; World Bank, 2000; WWF, 2000). There are several studies that are based on the analyses with some of these indicators. The study of Pierangeli et al. (2008) describes the functions of rural development for the EU-25 using indicators and their results show the difference between Southern and Northern European countries. Research of Hossain et al. (2015) shows the significance of rural development multidimensionality, actually an integrated approach when choosing variables. Ciutacu et al. (2015) show the difference in agriculture development between Western and Eastern European countries, where agricultural production was structured on the principles of collective ownership. Agricultural and rural development indicators prescribed by the World Bank are the subject of analysis in this paper.

The main focus of the paper is on the analysis of selected indicators of agricultural and rural development in the East Central and South-East European countries. The group of the East Central and South-East European countries consists of countries that differ not only in economic strength and potential for agricultural and rural development, but also from countries with different policies and strategies of this development. Some of them have recently redefined their

attitude towards agriculture and rural development and understand their importance in modern conditions. In others, rural development is still overshadowed by agricultural development. There are countries in this group in which agriculture is one of the most important economic activities or the population is predominantly rural. Some of the countries, not all, are members of the EU. All above mentioned allows the analysis of indicators of agricultural and rural development of the East Central and South-East European countries in order to draw conclusions about the results of the group as a whole, but also to identify subgroups and individual countries that achieve relatively better performance.

The results of the research are divided into several segments. Primarily, a cross-country comparison of selected indicators in the analysed group of countries is presented, within which the minimum, maximum and mean values are also determined, as well as the variability of indicator values by subgroups of countries (EU and non-EU countries) within the analysed group. After that, the countries are classified into two clusters according to the achieved performance in agricultural and rural development. Finally, the direction of the relationship between the selected indicators in the East Central and South-East European countries is examined. This structuring of research results is in the function of realizing the defined goals of the research, i.e., comparing the performance of subgroups of countries, examining the homogeneity of countries according to the analysed indicators within the defined subgroups and examining the interdependence of analysed indicators.

In accordance with the defined research objectives, the following initial hypotheses are tested: a) East Central and South-East European countries that are not members of the EU record relatively better results (relative values of agricultural and rural development indicators) compared to a subgroup of EU countries; b) there is homogeneity of countries according to the analysed indicators within the defined subgroups of East Central and South-East European countries (EU and non-EU countries) and c) there is a statistically significant relationship between the analysed indicators of agricultural and rural development in East Central and South-East European countries.

MATERIAL AND METHODS

The information basis of the research represent indicators of agricultural and rural development of the World Bank. In order to ensure comparability of data, indicators given in relative values, i.e., indices, are selected. Also, in order to uniformise the data, the data from 2016 are analysed, since this is the last year in which data on all selected indicators are available. The following indicators are included in the analysis: ″Agricultural land (% of land area), Arable land (% of land area), Forest area (% of land area), Agriculture, forestry, and fishing, value added (% of GDP), Food production index (2004-2006 = 100), Livestock production index (2004-2006 = 100), Crop production index (2004-2006 = 100), Rural population (% of total population), Employment in agriculture (% of total

employment), Employment in agriculture, female (% of female employment) and Employment in agriculture, male (% of male employment)" (World Bank, 2020).

The data for the group of East Central and South-East Europe Countries, according to the classification of the United Nations Group of Experts on Geographical Names (UNGEGN) are analysed in the paper. According to this classification, group of the East Central and South-East Europe Division Countries includes the following countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Georgia, Greece, Hungary, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia, Slovenia and Ukraine (UNGEGN, 2020). The heterogeneous group of countries enabled their further division into two subgroups: EU countries and non-EU countries, which is used in certain segments of the analysis. The methods applied in the paper are: descriptive statistics, analysis of variance, cluster analysis and correlation analysis. Descriptive statistics are used to answer the question of whether better relative results are recorded in the subgroup of the non-EU countries compared to the subgroup of the EU countries. Analysis of variance is used to examine the significance of the difference in the analysed indicators between the defined subgroups of countries. The homogeneity of countries within the defined subgroups according to indicators of agricultural and rural development is examined using cluster analysis. Correlation analysis is used to examine the interdependence of selected indicators of agricultural and rural development in the East Central and South-East Europe Countries.

RESULTS AND DISCUSSION

The results of the research are divided into three segments:
1. Cross-country comparison,
2. Examination of homogeneity of countries within defined subgroups according to indicators of agricultural and rural development, and
3. Examination of the interdependence of agricultural and rural development indicators in the East Central and South-East Europe Countries.

Cross-country comparison

Selected indicators of agricultural and rural development in the East Central and South-East European countries are shown in Table 1. For the purpose of further analysis, the results for the subgroup of EU countries and the subgroup of non-EU countries are presented separately.

When it comes to "Agricultural land (% of land area)", the highest percentage share is recorded in Ukraine, followed by Romania, Hungary and Northern Macedonia as countries where more than half of the land area is agricultural land. Montenegro and Cyprus are the countries with the lowest relative value of this indicator.

According to "Arable land (% of land area)", in addition to Ukraine, countries with a high percentage share are Hungary, Poland and Romania, while the lowest are recorded in Montenegro, Cyprus and Slovenia.

Table 1. Selected indicators of agricultural and rural development in the East Central and South-East European countries

	Agricultural land (% of land area)	Arable land (% of land area)	Forest area (% of land area)	Agriculture, forestry, and fishing, value added (% of GDP)	Food production index (2004-2006 = 100)	Livestock production index (2004-2006 = 100)	Crop production index (2004-2006 = 100)	Rural population (% of total population)	Employment in agriculture (% of total employment)	Employment in agriculture, female (% of female employment)	Employment in agriculture, male (% of male employment)
EU countries											
Bulgaria	46.25	32.20	35.37	4.05	129.9	84.39	128.1	25.67	6.75	4.25	8.94
Croatia	27.59	15.58	34.35	3.14	128.2	94.02	133.2	43.59	7.60	5.55	9.35
Cyprus	12.16	9.16	18.69	3.14	79.14	88.86	64.25	33.12	3.64	1.64	5.35
Czech Republic	45.18	32.30	34.56	2.21	102.5	87.62	115.2	26.43	2.90	1.72	3.83
Greece	47.60	16.60	31.69	3.46	95.1	91.91	92.9	21.61	12.37	11.75	12.82
Hungary	58.36	47.76	22.91	3.72	87.2	81.9	90.45	29.22	5.04	2.84	6.89
Poland	46.94	35.29	30.88	2.38	117.6	109.9	118.6	39.82	10.58	9.39	11.55
Romania	58.77	37.30	30.12	4.06	112.9	84.73	101.3	46.10	23.10	22.62	23.47
Slovak Republic	39.23	28.02	40.35	3.32	101.8	76.9	118.8	46.19	2.89	1.41	4.09
Slovenia	30.66	9.13	61.97	1.88	88.7	89.62	86.33	45.98	5.02	4.16	5.76
non-EU countries											
Albania	43.13	22.64	28.12	19.91	150.9	113.1	182.1	41.58	39.76	45.16	35.89
Bosnia and Herzegovina	43.14	20.04	42.68	6.37	125.4	119.7	118.3	52.48	17.96	17.77	18.07
Georgia	34.45	4.95	40.62	7.73	71.48	69.22	77.54	42.16	43.81	45.65	42.18
Montenegro	18.96	0.67	61.49	7.47	63.25	71.44	54.13	33.86	7.74	7.40	8.02
North Macedonia	50.16	16.49	39.57	9.17	125.3	113	124.4	42.44	16.63	15.76	17.19
Serbia	39.33	29.71	31.12	6.49	98.59	100.9	106.5	44.19	18.61	16.17	20.52
Ukraine	71.67	56.58	16.71	11.73	169.1	97.46	192.2	30.85	15.6	13.17	17.85

Source: World Bank (2020)

In contrast, "Forest area (% of land area)" is most represented in Slovenia and Montenegro, and least in Ukraine. When it comes to one of the analysed macroeconomic indicators of agricultural development, "Agriculture, forestry, and fishing, value added (% of GDP)", Albania is the country with the highest share, while Slovenia is the country with the lowest share. Ukraine and Albania are the countries with the highest value of the food production index and crop production index in relation to the selected base period, while Montenegro records the lowest values of these indices. When it comes to the livestock

production index, the highest base index is recorded in Bosnia and Herzegovina, and the lowest in Georgia. Bosnia and Herzegovina is also the country with the highest share of rural population in the total, while this share is the lowest in Greece. Georgia stands out as the country with the largest share of employment in agriculture (total, female and male), while the Slovak Republic, the Czech Republic and Cyprus can stand out as the countries with the lowest percentages of these indicators.

Table 2. Descriptive statistics

Indicators	Countries	Minimum	Maximum	Mean	Std. Deviation	Variation Coefficient
Agricultural land (% of land area)	EU countries	12.16	58.77	41.27	14.38322	0.35
	non-EU countries	18.96	71.67	42.98	16.00917	0.37
Arable land (% of land area)	EU countries	9.13	47.76	26.33	13.05418	0.50
	non-EU countries	0.67	56.58	21.58	18.41324	0.85
Forest area (% of land area)	EU countries	18.69	61.97	34.09	11.60645	0.34
	non-EU countries	16.71	61.49	37.19	14.00357	0.38
Agriculture, forestry, and fishing, value added (% of GDP)	EU countries	1.88	4.06	3.14	0.75833	0.24
	non-EU countries	6.37	19.91	9.84	4.80899	0.49
Food production index (2004-2006 = 100)	EU countries	79.14	129.90	104.30	17.44944	0.17
	non-EU countries	63.25	169.10	114.86	39.30876	0.34
Livestock production index (2004-2006 = 100)	EU countries	76.90	109.90	88.99	8.87625	0.10
	non-EU countries	69.22	119.70	97.83	20.27365	0.21
Crop production index (2004-2006 = 100)	EU countries	64.25	133.20	104.91	21.57454	0.21
	non-EU countries	54.13	192.20	122.17	50.63362	0.41
Rural population (% of total population)	EU countries	21.61	46.19	35.77	9.64227	0.27
	non-EU countries	30.85	52.48	41.08	7.06729	0.17
Employment in agriculture (% of total employment)	EU countries	2.89	23.10	7.99	6.18473	0.77
	non-EU countries	7.74	43.81	22.87	13.45808	0.59
Employment in agriculture, female (% of female employment)	EU countries	1.41	22.62	6.53	6.60783	1.01
	non-EU countries	7.40	45.65	23.01	15.65511	0.68
Employment in agriculture, male (% of male employment)	EU countries	3.83	23.47	9.21	5.86222	0.64
	non-EU countries	8.02	42.18	22.82	11.89485	0.52

Source: Authors' calculation (SPSS Statistics 23)

Descriptive statistics of the analysed indicators are shown in Table 2. For comparison, the results of descriptive statistics are presented separately for the EU and non-EU countries.

Table 3. Results of One-way ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
(% of land area) Agricultural land	Between Groups	11.944	1	11.944	0.053	0.822
	Within Groups	3399.653	15	226.644		
	Total	3411.597	16			
Arable land (% of land area)	Between Groups	92.949	1	92.949	0.391	0.541
	Within Groups	3567.991	15	237.866		
	Total	3660.940	16			
Forest area (% of land area)	Between Groups	39.523	1	39.523	0.248	0.626
	Within Groups	2388.986	15	159.266		
	Total	2428.509	16			
Agriculture, forestry, and fishing, value added (% of GDP)	Between Groups	184.983	1	184.983	19.278	0.001
	Within Groups	143.934	15	9.596		
	Total	328.917	16			
Food production index (2004-2006 = 100)	Between Groups	458.826	1	458.826	0.573	0.461
	Within Groups	12011.419	15	800.761		
	Total	12470.245	16			
Livestock production index (2004-2006 = 100)	Between Groups	322.244	1	322.244	1.522	0.236
	Within Groups	3175.214	15	211.681		
	Total	3497.459	16			
Crop production index (2004-2006 = 100)	Between Groups	1225.846	1	1225.846	0.940	0.348
	Within Groups	19571.731	15	1304.782		
	Total	20797.577	16			
Rural population (% of total population)	Between Groups	115.970	1	115.970	1.531	0.235
	Within Groups	1136.440	15	75.763		
	Total	1252.410	16			
Employment in agriculture (% of total employment)	Between Groups	912.179	1	912.179	9.562	0.007
	Within Groups	1430.977	15	95.398		
	Total	2343.156	16			
Employment in agriculture, female (% of female employment)	Between Groups	1118.100	1	1118.100	9.000	0.009
	Within Groups	1863.466	15	124.231		
	Total	2981.566	16			
Employment in agriculture, male (% of male employment)	Between Groups	762.961	1	762.961	9.881	0.007
	Within Groups	1158.216	15	77.214		
	Total	1921.176	16			

Source: Authors' calculation (SPSS Statistics 23)

The minimum values of six of total eleven analysed indicators are recorded in the East Central and South-East Europe Countries that are members of the EU (minimum percentage share of agricultural land, value added as a percentage of GDP, share of rural population and all types of employment). On the other hand,

the maximum values of almost all analysed indicators (except the share of forest area in land area) are recorded in the East Central and South-East Europe Countries that are not members of the EU. Also, the mean values of almost all analysed indicators (except the share of arable land in the land area) are higher in the subgroup of non-EU countries. There is slightly higher variability between countries within the subgroup of non-EU countries according to seven of the eleven observed indicators (higher variability within the subgroup of EU countries is recorded only in the participation of the rural population in total and participation of all types of employment (total, female and male) in total employment.

Difference in mean values of the analysed indicators between defined subgroups of countries is tested by using analysis of variance (One-way ANOVA). The results are shown in Table 3.

The results presented in Table 3 show that the defined subgroups of the East Central and South-East Europe Countries (EU and non-EU countries) differ significantly according to "Agriculture, forestry, and fishing, value added (% of GDP)", "Employment in agriculture (% of total employment)", "Employment in agriculture, female (% of female employment)" and "Employment in agriculture, male (% of male employment)". On the other hand, variations in other analysed indicators between defined subgroups of countries are not statistically significant.

Examination of homogeneity of countries within defined subgroups according to indicators of agricultural and rural development

The previous segment of the analysis leads to the conclusion that the East Central and South-East Europe Countries that are not EU members generally record higher relative values of the analysed indicators compared to those that are EU members. Consequently, it can be concluded that non-EU countries in their overall development rely more on agriculture and rural development than those East Central and South-East Europe Countries that are members of the EU. The question is whether such a conclusion is valid for each country within the analysed subgroups. In order to answer this question, the analysed East Central and South-East Europe Countries are divided into two clusters by respecting and combining the values of all analysed indicators.

Final Cluster Centers shown in Table 4 indicate that the first cluster is a cluster with better performance, i.e., that the first cluster includes countries with greater reliance on agricultural and rural development. On the other hand, the second cluster includes countries with lower performance, if all the analysed indicators of agricultural and rural development are taken into account. The distribution of analysed countries by clusters is shown in Table 5.

Cluster 1 includes seven countries, of which three are EU members (Bulgaria, Croatia and Poland) and four non-EU countries (Albania, Bosnia and Herzegovina, North Macedonia and Ukraine). Cluster 2 includes ten countries, of which seven are EU members (Cyprus, Czech Republic, Greece, Hungary, Romania, Slovak Republic and Slovenia) and three non-EU countries (Georgia, Montenegro and Serbia).

Table 4. Final Cluster Centers

Variables	Cluster	
	1	2
Agricultural land (% of land area)	46.98	38.47
Arable land (% of land area)	28.40	21.56
Forest area (% of land area)	32.53	37.35
Agriculture, forestry, and fishing, value added (% of GDP)	8.11	4.35
Food production index (2004-2006 = 100)	135.20	90.07
Livestock production index (2004-2006 = 100)	104.51	84.31
Crop production index (2004-2006 = 100)	142.41	90.74
Rural population (% of total population)	39.49	36.89
Employment in agriculture (% of total employment)	16.41	12.51
Employment in agriculture, female (% of female employment)	15.86	11.54
Employment in agriculture, male (% of male employment)	16.98	13.29

Source: Authors' calculation (SPSS Statistics 23)

Table 5. Cluster Membership

Case Number	Cluster	Distance
Albania	1	62.189
Bosnia and Herzegovina	1	35.708
Bulgaria	1	34.075
Croatia	1	32.733
Cyprus	2	47.869
Czech Republic	2	36.390
Georgia	2	63.774
Greece	2	21.499
Hungary	2	39.196
North Macedonia	1	26.574
Montenegro	2	60.920
Poland	1	33.081
Romania	2	42.056
Serbia	2	29.514
Slovak Republic	2	37.399
Slovenia	2	33.573
Ukraine	1	73.672

Source: Authors' calculation (SPSS Statistics 23)

Examination of the interdependence of agricultural and rural development indicators in the East Central and South-East Europe Countries

This segment of the analysis is based on the group (East Central and South-East Europe Countries) level data. In order to examine the interdependence of the analysed indicators of agricultural and rural development, Spearman's rank Correlation Coefficients are calculated.

The values of coefficients (ρ) and corresponding levels of significance (p-values) are shown in Table 6. The scale used in interpreting the values of correlation coefficients is the following: "the values of correlation coefficients which are ≤ 0.35 are considered to represent low or weak correlation, from 0.36 to 0.67 represent modest or moderate correlation and from 0.68 to 1 represent strong or high correlation, where the values ≥ 0.9 indicate very high correlation" (Taylor, 1990). The focus in the interpretation is on the coefficients at which the existence of statistical significance is determined.

When it comes to the ″Agricultural land (% of land area)″ indicator, high positive statistically significant correlation between this indicator and the ″Arable land (% of land area)" indicator is recorded (ρ = 0.787). In addition, the statistically significant moderate correlation between ″Arable land (% of land area)" indicator and ″Forest area (% of land area)" indicator (ρ = -0.618), as well as ″Arable land (% of land area)" indicator and ″Food production index (2004-2006 = 100)" indicator (ρ = 0.485) is determined. In the first case, the direction of the link is negative, and in the second positive, which was expected. There is a high statistically significant correlation between ″Agriculture, forestry, and fishing, value added (% of GDP)" indicator and the following indicators: ″Employment in agriculture (% of total employment)" (ρ = 0.746), ″Employment in agriculture, female (% of female employment)" (ρ = 0.720) and ″Employment in agriculture, male (% of male employment)" (ρ = 0.727). ″Food production index (2004-2006 = 100)" indicator is moderately positively correlated with the ″Livestock production index (2004-2006 = 100)" (ρ = 0.623) and highly positively correlated with ″Crop production index (2004-2006 = 100)" (ρ = 0.949).

Very high positive correlation is recorded between: ″Employment in agriculture (% of total employment)" and ″Employment in agriculture, female (% of female employment)" (ρ = 0.993), ″Employment in agriculture (% of total employment)" and ″Employment in agriculture, male (% of male employment)" (ρ = 0.988), as well as ″Employment in agriculture, female (% of female employment)" and ″Employment in agriculture, male (% of male employment)" (ρ = 0.978). All other correlation coefficients shown in the Table 6 indicate a low to moderate correlation between certain indicators that is not statistically significant.

Table 6. Correlation matrix

	Agricultural land (% of land area)	Arable land (% of land area)	Forest area (% of land area)	Agriculture, forestry, and fishing, value added (% of GDP)	Food production index (2004-2006=100)	Livestock production index (2004-2006=100)	Crop production index (2004-2006=100)	Rural population (% of total population)	Employment in agriculture (% of total employment)	Employment in agriculture, female (% of female employment)	Employment in agriculture, male (% of male employment)
Agricultural land (% of land area)	1.000										
Arable land (% of land area)	**0.787** (**)	1.000									
Forest area (% of land area)	-0.434 (0.082)	**-0.618** (**)	1.000								
Agriculture, forestry, and fishing, value added (% of GDP)	0.255 (0.323)	0.013 (0.959)	-0.119 (0.649)	1.000							
Food production index (2004-2006=100)	0.451 (0.069)	**0.485** (*)	-0.275 (0.286)	0.256 (0.321)	1.000						
Livestock production index (2004-2006=100)	0.225 (0.384)	0.145 (0.580)	-0.223 (0.390)	0.173 (0.507)	**0.623** (**)	1.000					
Crop production index (2004-2006=100)	0.395 (0.117)	0.466 (0.060)	-0.257 (0.319)	0.256 (0.321)	**0.949** (**)	**0.537** (*)	1.000				
Rural population (% of total population)	-0.252 (0.328)	-0.201 (0.439)	0.380 (0.133)	0.056 (0.830)	0.059 (0.823)	0.213 (0.411)	0.049 (0.852)	1.000			
Employment in agriculture (% of total employment)	0.262 (0.309)	-0.015 (0.955)	-0.096 (0.715)	**0.746** (**)	0.223 (0.390)	0.360 (0.155)	0.130 (0.619)	0.250 (0.333)	1.000		
Employment in agriculture, female (% of female employment)	0.262 (0.309)	-0.032 (0.903)	-0.022 (0.933)	**0.720** (**)	0.255 (0.323)	0.380 (0.133)	0.150 (0.567)	0.277 (0.282)	**0.993** (**)	1.000	
Employment in agriculture, male (% of male employment)	0.284 (0.269)	0.042 (0.874)	-0.145 (0.580)	**0.727** (**)	0.299 (0.244)	0.373 (0.141)	0.213 (0.411)	0.267 (0.300)	**0.988** (**)	**0.978** (**)	1.000

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Source: Authors' calculation (SPSS Statistics 23)

CONCLUSIONS

Indicators of agricultural and rural development in the East Central and South-East European countries were the subject of the analysis in the paper. The heterogeneity of this group of countries enabled their further division into EU and non-EU countries, which is used in certain segments of research in order to provide answers to research questions, i.e., hypotheses. In this regard, the results of descriptive statistics given separately for EU and non-EU countries from the group of the East Central and South-East European countries showed that the maximum values of almost all analysed indicators (except ″Forest area (% of land area)″), as well as the higher mean values of almost all analysed indicators (except ″Arable land (% of land area)″), have been observed in one of the non-EU countries. Based on this, the first initial assumption of the research was confirmed. Namely, East Central and South-East European countries that are not members of the EU record relatively better results (relative values of indicators of agricultural and rural development) compared to a subgroup of EU countries. The importance of agricultural and rural development for the overall development is higher in the non-EU countries of the analysed group. The analysis of variance found that a statistically significant difference between the defined subgroups of countries exists when it comes to ″Agriculture, forestry, and fishing, value added (% of GDP)″, ″Employment in agriculture (% of total employment)″, ″Employment in agriculture, female (% of female employment)″ and ″Employment in agriculture, male (% of male employment)″, hence, macroeconomic indicators of agricultural and rural development.

The first segment of the analysis was the basis for examining the homogeneity of countries within defined subgroups. Two groups of countries were singled out by cluster analysis, cluster 1, as a cluster with better performance according to the analysed indicators and cluster 2, as a cluster with weaker performance, taking into account the values of all analysed indicators. It was expected that the distribution of countries by clusters would coincide with the previous division into non-EU and EU countries, i.e., that the structure of countries in cluster 1 would correspond to the structure of countries in the subgroup of non-EU countries, and in cluster 2 to the structure of countries in the EU subgroup. However, that did not happen. In this way, the second assumption of the research was rejected. Three non-EU countries (Georgia, Montenegro and Serbia) belong to the second cluster, i.e., the cluster with weaker performance. Also, three EU countries (Bulgaria, Croatia and Poland) belong to cluster 1, a cluster with better performance.

The research assumption tested by correlation analysis was that there is a statistically significant relationship between all analysed indicators of agricultural and rural development in East Central and South-East European countries. As a statistically significant relationship was found between a relatively small number of analysed indicators, it can be concluded that this assumption is not valid for the observed group of countries.

The main limitation of the research is reflected in the static approach and analysis of the data from one year. The analysis of selected indicators of agricultural and rural development in East Central and South-East European countries in the dynamics of time may be the subject of future research. In this way, it would be possible to more accurately identify countries of good practice, but also to systemize critical indicators by the analysed countries that require improvement in the coming period and greater attention of agricultural and rural development policy makers.

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