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ECONOMICS OF AGRICULTURE

CONTENT

PRODUCTION EFFICIENCY IN AGRICULTURE IN NIGERIA: DO MIGRANT REMITTANCES MATTER?

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A B S T R A C T

This paper investigates how remittances flow to Nigeria from household migrants affect farm production efficiency of the left behind in rural areas. We used the Living Standard Measurement Survey data set and applied production frontier models to generate production efficiency scores for migrant and non-migrant farm households. Using simple ANOVA and stochastic dominance analysis we test the hypothesis of a negative migrant remittances effect on production efficiency. The mean production efficiency for migrants was higher and statistically significant at $p<0.05$. We also find a higher technical efficiency across all percentiles for migrant households. Though access to remittances played an important role in the improvement of farmer's production efficiency, it may not be sufficient as there were observed crosses at some points of the stochastic dominance efficiency curves for migrant and non-migrant households that suggests some possible trade-offs.

Introduction

Despite the importance of agriculture in Nigeria's economic development, a number of factors remain a drawback to agricultural productivity. Climate change, inappropriate economic policies, low adoption of improved agricultural technologies, violent conflict and production inefficiency. These factors are posited by literature to contribute to the existing low agricultural productivity in Nigeria. Raising agricultural productivity requires that farmers take decisions regarding use of modern farm inputs, innovations and efficient use of these inputs such as fertilizer and hybrid seeds. The notion of efficiency is core in agriculture defined as the ability of farms to utilize the best available technology and to allocate resources productively" (Chavas et al., 2005). Farms that are

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more efficient would have a higher efficiency ratio. Ever since Kalirajan and Shand, (1990), production efficiency is directly related to the technical know-how and the socio-economic characteristics of farmers. Variation in socioeconomic characteristics tends to cause differences in production efficiency amongst farmers, which then lead to variations in total output. Although, farmer-specific variables such as age, education, access to extension, credit (Parikh and Shah, 1994; Llewelyn and Williams, 1996 Amaza and Olayemi (2002); Amaza et al., (2006)) have been examined. There is limited empirical information on the role of migrant remittances on the production efficiency of Nigerian farmers[4].

Remittance is that portion of migrants' income sent home either in cash or in kind; within and across borders (Quartey 2006, Chukwuone 2007). Together with other nonfarm income, the share ranges from 30 to 40 per cent to more recent findings of 60 to 80 per cent (Ellis, 1998, Bryceson (1999), Bah et al., 2010)). The Bureau of National Statistics estimates the number of recipients at eight million, eight hundred and seventy two thousand, six hundred and fifty nine (8,872,659) persons. When disaggregated by location, rural recipients are believed to be more (6,056,240 persons) compared to urban recipients (2,816,419 persons). Also there are more male recipients (4,758,244 persons) than female (4,101,028 persons). Estimates by Central Bank of Nigeria puts workers remittances and other transfers in kind at N2715.1 billion in 2009 and increasing to N2943.4 billion in 2010. The same trend continued by increasing to 3145.8 billion in 2011.

Although there is no common point of view on the relationship between remittances and economic growth[5], remittances can affect positively the economy in the following ways: improvement of financial intermediation managing remittances e.g. by banks; extension

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4   More recent empirical attempts have also been made on linking productivity in the agricultural sector with some covariates at both the microeconomic and macroeconomic scales. In the case of the microeconomic evidence, for instance, Akudugu (2016) investigated the association among agricultural productivity, access to credit and farm size in Ghana using quantitative and qualitative methods of data collection. The results show that there is significant relationship between credit from formal and informal sources and agricultural productivity. In Fiji, Xing (2018) undertook a micro-based empirical analysis of the nexus between remittances from agricultural activities and local level development. The results from the household survey data analysed suggest a contradiction of the widely held belief that remittances are mostly used for food consumption amongst households in Fiji. Rather, remittances functioned as a driver of both pro-poor agricultural production and diversification of the Fijian economy.

5   On the macroeconomic side, Makhlouf (2019) examined the role of remittances in influencing total factor productivity growth in Morocco. Using a threshold vector autoregression model for the period 1975–2014, it was found that the response of total factor productivity to shocks in remittances is positive and stronger when those remittances exceed the value of about 5 per cent of GDP with the reverse effect when they are lower than this threshold value. Also, Duric et. al. (2017) looked at the impact of food and agricultural exports on economic growth in Serbia. They found that the agricultural and food sectors can significantly contribute to reduction of the trade deficit and boost the export activities of the national economy.

of investment credit allowed by the increase in the liquidity of banks from remittance deposits; investment in human capital in the form of spending on certain consumption items e.g. education, health; purchase of more investment goods. In addition, smoothing income inequality in the short term; diversification; growth of investment as a result of the multiplier effects of spending on consumption.(Glytsos, Nicholas P A(2002) Stratana and Chistrugaa(2012)). "Migrants play the role of financial intermediaries, enabling rural households to overcome credit and risk constraints on their ability to achieve the transition from familial to commercial production" (Stark, 1991). Farmers rely on migration activity as an alternative source of agricultural financing. The availability of liquidity in the form of remittances can help households to better respond to farm management imperatives in terms of the level and timing in the use of labour, herbicide, pesticide, fertilizer and seed. Nonetheless, the disincentive problem of migration on the production efficiency of sending households has been noted in literature. Wouterse, (2010) finds that while intercontinental migration provides households with the required liquidity, technical efficiency did not improve in Burkina Faso. Hyden et al. (1993) conclude that many African households experience diminished agricultural production and display inadequate land improvements, primarily due to the absence of male labour, but also point to large regional variations in impacts. That is remittances compete with other household activities for scarce family resources, including time and reduce the supply of household labour.

This raises the hypothesis of a negative migrant remittances effect on production efficiency and hence the research question of the effect of migrant remittances on farmers production efficiency. While current studies in Nigeria have addressed the economic consequences of migrant remittances in relation to poverty and inequality, there is limited empirical knowledge on this issue. This study compares the technical efficiency between migrant and non-migrant farm households using simple analytics of stochastic dominance and ANOVA. It is argued that if household labour shortage is offset by credit availability in the form of remittances, then migrant farm households would be able to purchase modern farm inputs at the right level and timing. Thus rejecting the null hypothesis. The overall structure of this paper is organised in the following manner. Following the introduction is section two which gives a review on relevant literature, section three discusses the methodology that includes the theoretical framework, model specification and data. Section four discusses the results while section five concludes.

Materials and methods

Analytical framework

The economic consequences of migration and remittances can be approached from three broad perspectives: the migrant, the sending households and the inhabitants in the destination countries (Lucas, 2006). This study is approached from the perspective of sending households. That is what happens to agricultural production efficiency in sending rural households. The relationship between migration activity and agricultural

production can be modelled within the farm household theoretical framework. This framework underlies the many studies that have looked at off-farm activities and agricultural productivity and production risk. Production efficiency is often investigated as technical efficiency (TE) or cost efficiency (AE) or in a holistic manner as economic efficiency (EE). Kumbhakar (2002), Chang and Wen (2011) and Picazo-Tadeo and Wall (2011) presents a production function model in which households are endowed with aggregate time endowment ($\bar{E}$) allocated among farm production (L), leisure (l) and migration work (Lm). Total income generated is used to purchase farm inputs for the production function specified as $F(L) = f(L)$. Given a well behave household utility function that depends on consumption (C) and leisure (L), household utility is maximized subject to the time endowment and cash income constraints.

$$\max_{L,L_m} = EU\{\{P * [f(L)] + w * L_m\}, \{\bar{E} - L - L_m\}\} \qquad (1)$$

Where $EU(.)$ is the expected utility of each farm, and P and w represent respectively price of output produced and equilibrium migration work wage rate. Solving the model yields the first-order necessary Kuhn-Tucker conditions for the optimal allocation of time to farm production and migration work. This is expressed in the equations below.

$$\frac{\partial EU(.)}{\partial L} = \frac{\partial EU(.)}{\partial C} * P * (fL) - \frac{\partial EU(.)}{\delta l} = 0; \qquad (2)$$

$$\frac{\partial EU(.)}{\partial L_m} = \frac{\partial EU(.)}{\partial C} * w - \frac{\partial EU(.)}{\partial l} \leq 0; \; L_m \geq 0; \qquad (3)$$

$$\frac{\partial EU(.)}{\partial L_m} * L_m = 0 \qquad (4)$$

Solving equations two and three above simultaneously yields two possible optimal labour allocations: $(L_1^* L_m^*)$ for households that participate in migration work and $(L_0^*, 0)$ for households that do not engage in migration work. Estimation requires randomised data or panel data set to measure differences in output between migrant and non-migrant households. The use of cross sectional data presents the problem of simultaneity. Migrant earnings are generally not randomly allocated across households. Observed relationship between remittances and farm production outcomes may simply reflect the influence of unobserved third factors. For example, households with greater unobserved entrepreneurial ability could have more migrants, receive larger remittances and also have higher investment levels (Yang, 2011). Correcting for simultaneity is possible econometrically using instrumental variables. This is, however, limited by the difficulty of finding appropriate instruments in cross sectional data. Using invalid instruments can lead to worse estimates when compared to the case where there is no correction for self-selection bias (Wooldridge, 2002).Although Heckman's method can be used to correct for simultaneity, Chang and Wen (2011) points out that deriving the symbolic forms of the correction terms is not obvious

in a stochastic production frame work, because of the composited error term. Secondly, the use of Heckman to control for sample selection bias is inappropriate for models that are not linear, such as Probit and Tobit. To circumvent these intricacies we estimate two separate production models for migrant and non-migrant households using the frontier estimation approach. The production frontier reflects the maximum output obtainable from a set of available resources and inputs. Hence the notion of farm efficiency can be seen as tied to farm management input use decisions. Efficiency differential in this sense is attributed to management decisions in terms of level and timing in the application of inputs such as labour, capital, herbicide, pesticide, fertilizer and seed.

Data and variables

The study used the data set from the National Bureau of Statistics of the federal government of Nigeria. Relevant to this study is the module: General Household Survey with panel component (GHS-Panel) for 2010. It forms part of a regional project, Living Standards Measurement Study-integrated Surveys on Agriculture (LSMS_ISA) in Sub-Saharan Africa by World Bank. The survey covered three sets of data corresponding to household, agriculture and community questions. To answer our objective, the agricultural module was used. It was designed to gather responses on farm household production system such as technology and inputs used and output obtained. Of the 5,000 households covered 3000 are agricultural but 2683 were found useful after merging with relevant household files. Analysis was done at the farm household level. Key to this analysis is the question on whether farm households received remittances. This variable was used to disaggregate total households into migrant and non-migrant. 527(20%) are migrant households while 2143(80) are non-migrant households. Another key variable is output per plot. From the data set, 69% of the respondents measured yield per plot in kg, 3% measured in bunches, 11% in pieces and 15% unclassified. Since households using unconventional measures are few, we dropped some households to allow the measure of output in Kg per plot. One important input variable is plot area allocated for crop cultivation. In the data set farmers were asked to quantify the total area planted on their plots with crops. Use of this variable is made difficult by the different measures of plot area planted. About 80% of farmers used unconventional measures such as heaps, ridges and stands while less than 25% use conventional measures such as plots, acres, hectares and square meters. Converting unconventional to conventional measures is problematic because of differences in landscape and pattern of ridge making in Nigeria. For this reason we used plot size as measured by GPS in meters square and finally converted to acres. All other variables are listed and defined in table 1 of the appendix. Production inputs include measures of land, fertilizer and seeds, extension services, and labour supply measured in hours spent on crop production. In addition, we included tenure security variables which reflect farmers' ability to secure or make improvements upon land as well as crop indicators aggregated at the household level. Community-level indicators include agro ecological zones and rural dummy. The various variables and their definitions are presented in appendix table

Econometric model and estimation

The model is specified as:

$$\ln(y_i) = \alpha_0 + \alpha_1 \ln(farmsize_i) + \alpha_2 \ln(labour_i) + \alpha_3 \ln(capital_i) +$$
$$\alpha_4 \ln(herb_i) + \alpha_5 \ln(pesti_i) + \alpha_6 \ln(ferti_i) + \alpha_7 \ln(seed_i) + v_i - u_i \qquad (5)$$

y_i is the logarithm of the quantity of food crop produced and α the vector of parameters that characterize the production frontier. The error term is composite and consists of (v_i) error term representing those factors that cannot be controlled by farmers as well as measurement error in the dependent variable, and omitted explanatory variables.

The component (u_i) is a nonnegative error term representing the shortfall of output from the production frontier due to technical inefficiency. To account for the presence of technical inefficiency, it is assumed that the random component v_i is distributed as $N(0, \sigma_{v_i}^2)$ while the production inefficiency effect u_i is distributed as $|N(0, \sigma_{u_i}^2)|$. Both components are also assumed to be independent and identically distributed $(i.i.d.)$ across observations. The composite error term $(v_i - u_i)$ is assumed to be asymmetric. When $(u_i = 0)$, the composite error term is said to be symmetric and defines the absence of technical inefficiency. In which case stochastic regression approach becomes inapplicable. To derive the deterministic parameters of the frontier function and the production efficiency of each farmer we used maximum likelihood estimation utilizing the frontier statistics in STATA 11 package. Analysis was carried out at the sample mean. To determine whether the output- input data support stochastic frontier, we used the OLS estimates of equation 4 above to estimate a residual upon which the presence of technical inefficiency was assessed. A negative sign of the third moment and the skewness of the OLS residuals imply presence of inefficiency (Rahman, 2011). We observed negatively skewed OLS residuals in which case we estimated equation 4 using frontier regression. We used the Cobb–Douglas functional form based on its property of quasi-concavity and monotonicity. It is also the most common specification used for estimating agricultural production function (Lio and Liu, 2006). The likelihood function was used to generate the variance parameters. Lambda λ, indicates a good fit and correctness of the specified distributional assumption. If it exceeds one in value, the one sided error term U is said to dominate the symmetry error V. We derived gamma γ from lamda using the formular $\gamma = \frac{\lambda^2}{[1+\lambda^2]}$. Gamma has a value between zero and one and defines the total variation of output from the frontier. The closer the estimated value of γ is to one, the higher is the probability that technical inefficiency is significant in explaining output variability among sample participants. Also generated from the maximum likelihood estimation is a vector of coefficients of the inputs included in equation 5.

Production efficiency index

From the error term we disentangle the production efficiency u_i for each farmer calculated as $TE_i = E[\exp(-u_i)|\hat{\varepsilon}_i]$. We used this parameter to rank the aggregate efficiency of migrant farm households and non-migrant households using the Lorenz dominance and inferential statistics as applied in Bishop et al (1992). Lorenz dominance is said to exist if the Lorenz curve for one distribution dominates that for another. The two distributions are the technical efficiencies for migrant and non-migrant households denoted as $TE^{MIGRANT}$ and $TE^{NONMIGRANT}$ respectively. The efficiency estimates (TE_i) range between 0 and 1, with 0 indicating the least efficient and 1 $(u_i = 0)$ the most efficient. Both distributions were assumed to be independent with finite mean and variance. Households were assumed identical except in terms of their technical efficiencies. From the distribution of technical efficiencies we generate an empirical Lorenz curves $L^{MIGRANT}$, $L^{nonmigrant}$ using the DASP[6]programme in STATA 11 package.

Results and Discussion

Summary statistics

Table 1 shows the summary statistics of the selected variables for migrant and non-migrant households. Mean production yield was significantly higher for households with migrants (32389.81kg/acre) than for households without migrants (8854.08kg/acre). The t-test presented in the last column of the table suggests statistical significance. Farm revenue was also statistically higher for migrant households than non-migrant households. The average age of migrant household head was significantly higher than non-migrant. Also the proportion of migrant household heads with no formal education was significantly lower than for non-migrant household head. The proportion of migrant household head with secondary and tertiary education was significantly higher than for non-migrant household head. However, household size was significantly larger for non-migrant households. Among the input used, own animal traction per day, herbicides and pesticides in liters per acre were significantly higher for migrant households. However, the number of days of labour in hours, fertilizer input and seeds were significantly lower for the migrant households. Migrant households had smaller land size; used less of labour hours and fertilize.

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6   Distributive analysis stata package version 2.2 by Abdelkrim Araar and Jean-Yves Duclos(2012)

Table 1. Summary statistics

Variables	Migrant households		Non-migrant households		T-ratio
Socio economic characteristics					
	Mean	SD	Mean	SD	T-ratio
Age	57.01	16.33	48.99	14.14	10.32*
age2	3516.59	1846.08	2600.59	1482.79	11.02*
No formal education	0.13	0.33	0.20	0.40	3.26*
No education	0.06	0.24	0.06	0.24	-0.34
Primary education	0.63	0.48	0.62	0.48	-0.43
Secondary education	0.15	0.36	0.11	0.32	-2.13*
Tertiary education	0.02	0.16	0.01	0.09	-2.70*
Household size	5.44	3.44	6.45	3.28	-5.75*
Female headed	0.35	0.39	0.18	0.28	-6.42*
Production output/Input					
Yield in Kg	32389.81	332609.2	8854.08	90592.86	-2.56*
Farm size in acres	1.95	4.54	3.16	10.39	2.38*
Fertilizer kg/year	91.34	131.24	124.69	147.75	2.84*
Pesticide in litres/year	25. 59	73.13	21.59	86.22	-0.34
Herbicide in liters	40.88	273.66	10.23	43.19	-2.32*
Seeds in kg	37.16	88.17	38.02	92.83	0.12
Own animal traction used(days)	2.91	4.48	2.68	3.59	-0.51
Hired animal traction(days)	1.3	1.51	1.24	2.25	-0.26
Labour in hrs	95.67	73.72	114.48	87.57	4.16*
Prices and profit					
Land worth(N)	984798	3065057	925702	4516672	-0.2607
Land price(N)	5875.81	36863.57	13675.15	149875.2	1.08
Farm revenue(N)	22863.67	78576.61	18436.1	67239.44	-1.20
Remittances received (N)	24754.94	52718	0	0	-19.91

Source: underlying data: GHS-Panel (Post planting, 2010)

Migrant and Non-Migrant Deterministic frontier results

Table 2 presents the results of the stochastic production frontier model. The estimated parameters along with their corresponding standard errors and t values are reported for migrant and non-migrant households. Also reported are the variance parameters, derivatives from the variance parameters and log-likelihood ratio test. The test statistics of the likelihood ratio test are 190 and 1000 for migrant and non-migrant households respectively. This suggests appropriateness of the empirical specification of the inefficiency function. Therefore, the hypothesis that the effect of the exogenous determinants of production efficiency is statistically equal to zero ($H0$: $\alpha = 0$) was rejected. The high

Gamma (γ) value of 0.95 also supports the structural appropriateness of the model specification since it defines the total variation of output from the frontier. That is the included inputs together explain the variation of the observed output from the frontier.

The sigma squared (σ^2) is 1.296 and 1.832 respectively. The values are statistically

significant and indicate the goodness of fit and correctness of the distributional form assumed for the composite error term. This study assumes the exponential functional form. Lambda λ is 4.3566 which exceed one in value suggesting that the one sided error term U dominates the symmetry error V. This indicates a good fit and correctness of the specified distributional assumption. The variables shown in the table are all significantly different from zero at the 5% level. The coefficients are all positive and range between one and zero. However, differential input-output elasticity is observed between the two groups of farmers. The results indicate that while the output response for migrant households is higher than non-migrant households in terms of farm size (0.084vs 0.002), capital (0.039 vs. 0.014) and seed (0.893vs 0.342), in terms of labour, herbicide, pesticide and fertilizer, the output response is lower for migrant households.

Table 2. Deterministic frontier results

MIGRANT HOUSEHOLDS DETERMINISTIC FRONTIER FUNCTION			
VARIABLES	**Coefficient**	**Standard error**	**T- Statistics**
Ln_farrm_size $\alpha 1$	0.08	0.02	3.60
Ln_labour α2	0.73	0.12	6,13
Ln_capital α_3	0.04	0.01	7.74
Ln_pesticides α4	0.41	0.08	5.20
Ln_herbicides α5	0.65	0.33	1.97
Ln_Fertilizer α6	0.34	0.17	2.06
Ln_seeds α7	0.89	0.24	3.66
Constant α0	9.99	0.58	17.18
lambda	4.36	0.10	43.57
Sigma squared	1.30	0.15	8.34
Gamma	0.95		
Log likelihood	-494.51		
Log likelihood test			190
Wald ($\chi^2 9,95$)			222
NON-MIGRANT HOUSEHOLD DETERMINISTIC FRONTIER FUNCTION			
Ln_farrm_size α1	0.002	0.005	3.90
Ln_labour α2	1.97	0.07	27.25
Ln_capital α3	0.01	0.004	3.12
Ln_pesticides α4	0.65	0.05	13.53
Ln_herbicides α5	0.68	0.09	7.19
Ln_Fertilizer α6	0.64	0.07	8.47
Ln_seeds α7	0.34	0.05	6.99
Constant α0	12.3	0.30	41.01
lambda	21.05	0.04	5612
Sigma squared	1.83	0.09	19.402
Gamma	1.00		
Log likelihood	-2187.24		
Log likelihood test			1000
Wald(χ^2 9,95)			2146.90

Source: underlying data: GHS-Panel (Post planting, 2010)

Aggregate migrant and non-migrant production efficiency index: Test of dominance

Do the estimated production efficiencies between migrant and non-migrant households presented in table 3 give any clear indication of differences? The easiest way is to examine the values visually and apply the t-statistics. As shown in the table, the mean production efficiency for migrant and non-migrant households amounted to 0.48 and 0.42 respectively. Across all percentiles, technical efficiencies for migrant households were higher. The t-test suggests statistical significance at $p<0.05$. Thus the null hypothesis that there is no significant difference in production efficiency between the two categories of households was rejected. Observed differences can be attributed to differences in the amount of timely consumption of inputs and available income between the two category of households. However, to what extent can allocation of labour to migration activities be relied for higher production efficiency?

Table 3. Percentile distribution of migrant and non-migrant production efficiency index

	Migrant households		Non-migrant households		Difference	T-statistics
Mean	0.483		0.417		0.066	4.28
SD	0.256		0.274			
Deciles	Group mean	SD	Group mean	SD	Difference	T – statistics
1	0.045	0.029	0.020	0.016	0.025	0.118
2	0.140	0.041	0.080	0.019	0.059	0.244
3	0.252	0.033	0.156	0.025	0.096	0.398
4	0.372	0.041	0.242	0.025	0.129	0.504
5	0.515	0.041	0.350	0.040	0.165	0.579
6	0.603	0.017	0.487	0.042	0.116	0.478
7	0.659	0.016	0.611	0.025	0.048	0.235
8	0.701	0.009	0.683	0.017	0.018	0.110
9	0.741	0.015	0.736	0.015	0.005	0.030
10	0.817	0.042	0.811	0.038	0.007	0.024

Source: underlying data: GHS-Panel (Post planting, 2010)

To understand this issue, we carried out a robustness check using the Lorenz and the generalized dominance test. Figure 1 presents the Lorenz and generalized Lorenz curves for migrant and non-migrant. The Lorenz chart reflects dominance of migrant household production efficiency over non-migrant household. The same pattern is observed for the generalized curve chat. However, observed crosses of Lorenz curves at the extremes of the distribution suggest ambiguous conclusion on the effect of remittances on crop production. Therefore it can be said that the flow of domestic remittances to migrant households for increased consumption and investment might not be enough to countervail the loss of labour for agricultural production in some segments of the population. Since migration entails loss of labour, in an economy where markets for labour is missing, migrant households might fall short of labour stock during planting and harvesting seasons particularly for domestic migration.

Figure 1. Lorenz and generalized Lorenz curves
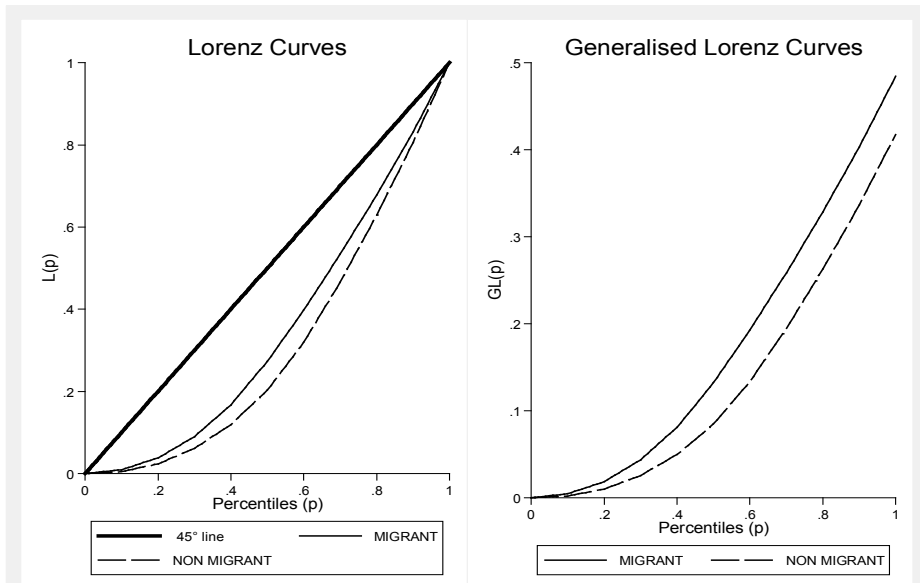
Conclusions

This study used a nation-wide household survey data collected in 2010 to estimate a deterministic production frontier from which production efficiency index was estimated and used to examine the production efficiency of migrant and non-migrant farm households. We used the Lorenz dominance approach to rank distributions of the estimated technical efficiency for the two groups. Empirical results showed that across all percentiles, migrant households had a higher aggregate technical efficiency values relative to non-migrant households. The T-statistics revealed that mean technical efficiency index for migrant households was significantly higher than for non-migrant households at 5% significant level. However the much we know about the role of remittances in development means that polices that will enhance labour mobility and remittances flow will go a long way to enhance production efficiency. But this has to be complemented with agricultural policies that promote cost effective labour saving farm implements. Since economic development and growth are known to associate with agrarian transformation. Therefore there is the need to advance and promote labour saving technologies in agriculture. Further studies in this area are recommended through the use of panel data, experimental data and case studies to map out the role of migrant remittances in agriculture.

Conflict of interests

The authors declare no conflict of interest.

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CORPORATE SOCIAL RESPONSIBILITY AND NEW TECHNOLOGIES IN FOOD INDUSTRY, THE PUBLIC PERCEPTION - CASE STUDY OF VOJVODINA

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A R T I C L E   I N F O

A B S T R A C T

During the past few decades many types of research have been studied Corporate Social Responsibility (CSR) but the most of these researches were focused on CSR effect on enterprise performance, but less attention has been given to the public perception of CSR and their opinions towards using new technologies, especially in food production. The purpose of this research was to investigate the public perception of CSR and their opinions regard the effect of new technologies in food production, with emphasize on genetically modified food (GMF). Empirical research was conducted in Vojvodina, as the region of Serbia, where food production is a dominant industry. The results showed that respondents mostly identify CSR with company's responsibility and moral obligation to society, especially for food production companies and recognize GMF as not offering benefits and unsafe. The trust in key actors is missing. In this regard, CSR awareness campaigns needs to be strengthened.

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Introduction

Corporate Social Responsibility (CSR) is the concept which interests the scientist, business people, and public for over 50 years. The first concept emphasized CSR through environmental protection, but today it is obvious that CSR concept is a multidisciplinary, various and very complex.

The issues linked to CSR have become an important driver of public opinion from the beginning of the 90th years of 20 century. According to Pfau et al. (2008, p. 145), CSR "campaigns enhanced people's perceptions of sponsors' image, reputation, and credibility". However, a smaller number of empirical research has focused especially on the influence of CSR campaigns on public opinion, especially in the agribusiness sector. At the same time, CSR is of high relevance for food companies as this sector has a strong influence on society.

New technologies are taking over the world, and food industry is not immune to this. The use of new technologies in food production is not publicly well understand and accepted, but rather considered as a source of potential risk. Furthermore, producers are focused on the new food technologies (especially GMO), because GMO is important in food production.

The purpose of this research was to investigate the public perception of CSR and their opinions regard the effect and use of new technologies in food production, with emphasize on GM food in the region of Vojvodina. Vojvodina is the region in Serbia of mainly food production developed branches. Therefore, the aim of the paper was to present CSR towards using new technologies in food production from the point of view perception of the public - case study of Vojvodina.

Theoretical Framework

CSR is a multidimensional, multilevel, interdisciplinary, integrative approach. According to Broomhill (2007, p. 6-7), three approaches about SCR can be found in the literature: neoliberal, neo-Keynesian and radical political economy. According to neoliberal approach fundamentally is to create and adopt the set of policies, codes, guidelines in the corporation. This approach considers Fridman's view, gaining the profit and stay within the defined rules. The neo-Keynesian approach is more complex than neoliberal approach. It recognizes the active role of the corporation's stakeholders and state. This approach put much more attention on corporate behaviors and state role in developing the CSR regulations and practice. Nevertheless, this CSR approach involves voluntariness without external regulation (see: EC, 2001). The radical political economy approach emphasizes the presence of three level with a great interaction of CSR. Those levels are global, national and local economies. It also considers the efficiency of CSR regarding its voluntary, no obligation form. In this regard, radical political analysts are "concerned that self-regulatory and voluntary CSR policies are frequently deliberately designed by corporations" to legitimate some "activities that are socially and environmentally destructive" (Broomhill, 2007, p. 8). This approaches

open the question about the "what is the precise definition of CSR?" This question is also arises by Carroll (1998). Carroll (1998, p. 2) considers that significant approach about CSR raised at the end 90th years of XX century when profit-making activities extended also to the performances such as four faces of good corporate citizens are: "Be profitable (carry their own weight or fulfill their economic responsibilities); Obey the law (fulfill their legal responsibilities); Engage in ethical behavior (be responsive to their ethical responsibilities); Give back through philanthropy (engage in corporate contributions)." In this regard, organizations should contribute to the wellbeing of the society (Pfau et al., 2008).

Aguinis and Glavas (2012) wrote the article also inquiring the meaning of CSR. The article was based on author's literature review of 588 journal articles and 102 books. The intent was to create the theoretical framework of different definitions, approaches, measures, variables etc. of CSR. Their conclusions are as follows: interest in CSR is rising, organizations are increasingly involved in CSR, an audience interested in CSR is very wide, it is integrative and complex scientific and practice concept, CSR has a multilevel approach.

Besides, CSR importance is notable as the concept with the great concern in international institutions such as United Nations (UN), European Union (EU) etc. UN Global compact launched in 2000, emphasizes the ten universal principles in the area of human rights, environment, labor and anti-corruption as the main goal in business activities (United Nations Global Compact, 2017). European Commission in Green Paper – "Promoting a European framework for CSR 2001" (EU, 2017) and in "A renewed EU strategy for CSR" (EUR Lex, 2011) emphasizes that the importance of CSR today is greater than ever. It is clear how CSR is important in today's business environment, especially in agribusiness.

At the same time, CSR in agribusiness is facing a lot of challenges and conflicts. Agriculture is one of the economic branches with arising innovation in production, especially food production. Perception of those new technologies are various, from expectancy to not just refusal, but the strong campaign against it. Producers are defending the new food technologies (primarily considering GMO), the scientist is confronted, and the public is confused. But as the most common problem can be defined as the lack of information and not understandings the new technologies in food production, so the choice can be made. Besides, according to Heyder and Theuvsen (2009), consumers have no trust in the food industry, despite all the certifications, standards and etc. Also, public opinion is mostly neglected, the supply chain is not transparent, general social issues are not considered, in one word there is too much not understanding (justified or not justified). In this regard, Heyder and Theuvsen see the CSR as the response to mentioned problems and emphasized the Carroll model of four faces CSR (1988). However, research of Heyder and Theuvsen (2009, p. 10) shows that "altruistic firms" accepted the CSR concept are small and specialized in organic production; "Strategist" is focused on increasing the market share and not regarding public pressure; "Criticized firms" implementing CSR based on pressure. The findings by Luhmann and Theuvsen (2017, p. 241) reveal that "Carroll's model, which was developed from a U.S. point of

view, cannot be confirmed for German agribusiness." Thus, the areas of responsibility are: economic, internal and external (Luhmann, Theuvsen, 2017).

Many previous studies are focused on examining the link between CSR and financial performance (see: Pfau et al., 2008, p. 145; Omidi et al., 2018) as well as between CSR and corporate identity (Salleh et al., 2013). Besides, CSR is an important issue in the marketing literature which is focused on different topics such as: consumer's attitudes to CSR and Green marketing (Čerkasov et al., 2017); relationship between CSR practices, corporate identity and purchase intention (Prabu et al., 2005); the influence of CSR on customer loyalty (Iglesias et al., 2018); CSR and consumer buying behavior (Brown, Dacin, 1997; Chai et al., 2015; Civero et al., 2017; Webster, 1975); perception of CSR and purchase intention of consumers (Mohr, Webb, 2005); consumers' perception of CSR, e.g. consumer survey in France, Germany, the U.S. (Maignan, 2001), and in China (Tian et al., 2011); consumers' perception of the impact of CSR in fast-food restaurants, Hong Kong (Tong et al., 2019); consumer responses to CSR (Sankar, Bhattacharya, 2001); public perception of CSR (Chai et al., 2015); influence of CSR campaigns on public opinion (Pfau et al., 2008); CSR and public opinion (Vallentin, 2004).

According to Luhmann and Theuvsen (2016, p. 673), "The spotlight of public attention has only recently come to focus on agribusiness-related aspects of CSR." In this regard, some studies are focused on public opinion toward GMO (Rzymski, Królczyk, 2016), public opinion toward agricultural biotechnology (Malyska et al., 2016), public opinion of GMO and biotechnology (Bevanda et al., 2017), CSR and consumer attitudes or public perceptions toward GMF - genetically modified foods (Cui, Shoemaker, 2018; Pino et al., 2016), etc. In this regard, the findings of empirical research on CSR in agribusiness (Germany) show that the enterprises perceived high public pressure, especially towards GMOs i.e. the public opinion is high considering this production as a potential health risk, environmental externalities of production processes, harmful, contaminate (Heyder, Theuvsen 2009, p. 9). Less attention has been given to the public perceptions of CSR in agribusiness and their opinions towards using new technologies, especially in food production such as GMO.

Research Methodology

The empirical research was conducted using a questionnaire as an instrument in the Vojvodina. Survey was conducted exclusively with the aim of obtaining relevant public opinion information regarding knowledge about CSR, development and using of a new technologies in food production and GMO-related considerations. Similar research was carried out in the EU countries in 2010 by the European Commission (EC, 2010). Most of the questions from the survey questionnaire were taken from the above research (EC, 2010) and marked * in order to be able to compare the obtained results (Vojvodina, the Republic of Serbia – EU27) and to make relevant conclusions on the matching and deviations in the public opinion regarding the given topic.

To evaluate the public perception a questionnaire was made. The first part of the

questionnaire is a demographics survey (see: Table 1).

The second part of the questionnaire investigates the public perception of CSR. It contains a series of close-ended questions: Do you know what CSR is? Whether CSR relates solely to advertising spots and humanitarian actions of companies? Whether the company that produces GM foods and does not visually mark its products with a special label (but instead use small letters), is considered socially responsible? The following answers are offered: 1 – "yes", 2 – "no", 3 – "maybe". In addition, the questionnaire contains two open-ended questions: "Try to define what is CSR for you?" as well as "Try to define what is CSR for food companies?"

The third part of the questionnaire investigates public attitudes towards new technologies with special emphasis on using new technologies in food production and GM food, whether their attitudes are positive, negative, or neutral. As a new technologies, solar energy, computers and IT, biotechnology and genetic engineering, space exploration, nuclear energy, nanotechnology, wind energy and brain and cognitive enhancement were observed. According to the similar research conducting in the EU (EC, 2010), these technologies are considered as 'sensitive' technologies because public opinions toward their using could awake various emotions in spite of their technical characteristics and economic implications. For these eight technologies, it was investigated what respondents think about their influence on lives, whether they have positive, negative or no effect. At the same time, the evaluation of public attitudes towards new technologies in food production and GM food was based on Likert-type scale. Questions (according to EC, 2010) provided the answers for GM benefits, un/fairness, understanding the GM technology, risks and worries. Besides, every scientific and technological innovation include some kind of risk and uncertainty. That is why thrust in key actors play an important role in accepting new technologies. In this regard, the third part of the survey included questions (according EC, 2010) related to the trust in key actors, whether they are doing or not doing a good job for society? The statement "doing a good job for society" was used as a measure of trust and confidence as it expressed the view that the actor is both competent and behaves in a socially responsible way.

The methods used were descriptive statistics and correlation analysis (adopted to Chai et al., 2015) as well as comparative analysis.

The data were collected through personally survey. The survey was conducted from May until December 2014 in the regions of Vojvodina. Random sampling was adopted. At the same time, the survey limits the age of research objects not to be less than 18 years old. At last, the total sample included 172 respondents. The results of the sample structure are shown in Table 1 (the first part of the questionnaire).

Table 1. The sample structure

Variable	Attribute		(%)
Gender	Male		31
	Female		69
		Σ	100
Highest education	Elementary school		2
	High school		79
	Bachelor degree		8
	University degree		11
		Σ	100
Regions	Backa		68
	Srem		12
	Banat		20
		Σ	100
Religious or atheist	Religious		87
	Atheist		13
		Σ	100
Occupation	Student		54
	Retiree		7
	Lawyer/economist		12
	Doctor / Pharm./Biolog./ Ecolog.		2
	Engineer		1
	Other		24
		Σ	100

Results and discussions

The results of the second part (investigates the public perception of CSR) were presented in Table 2, Table 3 and Table 4.

When asked "Do you know what CSR is?", 73% of respondents answered "yes", compared to 25% who answered "no" (2% of respondents answered "maybe"). Among those who answered "yes", 71% of them defined CSR as a company's responsibility towards society, while 25% answered that the term refers to environmental protection (4% answered that the term refers to philanthropy and similary. Also, 36% of respondents identified CSR of the food production companies with a moral obligation to society, health and the environment, and 35% of them with consumer protection, individual and healthy foods. Furthermore, the results have shown that education, occupation, and religion did not have a significant influence on public awareness of CSR, while gender had (Table 2).

Table 2. Public awareness of CSR – the influence of demographic variables

Question	Corr/Variable	Gender	Education	Occupation	Religion
Do you know what CSR is?	Pearson Correl.	,228**	,027	,053	,056
	Sig.	,003	,727	,488	,467
	N	172	172	172	172
** Correlation is significant at the 0.01 level (2-tailed).					

Source: Authors' calculations

Female respondents had the higher CSR awareness (61%) than male respondents (39%) in Vojvodina. For example, female respondents (consumers in Chine) knew less about CSR than male respondents. However, the satisfaction degree with the enterprise undertaking of CSR of female consumers was higher than male respondents (Chai et al., 2015). At the same time, possible reasons for "negative correlation between the satisfaction degree of enterprise undertaking of CSR and education background may be as follows: the higher the education level of the consumers, the more attention will be paid on the knowledge accumulation and updating, which reflects on the more attention to the enterprise undertaking of CSR" (Chai et al., 2015). It means that a lack of information leads to an inadequate understanding CSR of enterprise.

According to Table 3, respondents were aware that CSR is not related solely to advertising spots and humanitarian actions of companies and that the company that produces GM foods, and does not visually mark its products with a special label, is not considered socially responsible.

Table 3. Public opinion toward CSR - Descriptive statistics

Questions	Min.	Max.	Mean	St. Dev.
Whether CSR relates solely to advertising spots and humanitarian actions of companies?	1	3	2,21	,595
Whether the company that produces GM foods and does not visually mark its products with a special label (but instead use small letters), is considered socially responsible?	1	3	1,80	,573
1-yes, 2-no, 3-maybe				

Source: Authors' calculations

Public opinion toward CSR – the influence of demographic variables was presented in Table 4.

Table 4. Public opinion toward CSR – the influence of demographic variables

Questions	Corr/Variable	Gender	Education	Occupation	Religion
Whether CSR relates solely to advert. spots and humanit. actions of comp.?	Pearson Correl.	-,015	-,206**	,037	,063
	Sig. (2-tailed)	,848	,007	,632	,412
	N	172	172	172	172
Whether the company that produces GM foods and does not visually mark its products with a special label (but instead use small letters), is considered socially responsible?	Pearson Correl.	,158*	,092	-,149	-,009
	Sig. (2-tailed)	,039	,229	,052	,909
	N	172	172	172	172
* Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed)					

Source: Authors' calculations

Results also revealed that respondents with higher education level tend to recognize CSR through advertising spots and humanitarian actions of companies more often than those with lower education level (the correlation is negative). Furthermore, gender had a significant impact on respondents' attitudes about labeling GM foods and CSR of producer of GM foods (Table 4).

The first results of the third part (investigates public attitudes towards new technologies with special emphasis on using new technologies in food production and GM food) are represented in Table 5 and Figure 1.

Table 5.*Opinions of new technology - Descriptive statistics

New technologies	Mean	Std. Deviation
Solar energy	1,36**	,891
Computers and IT	1,52**	,921
Biotechnology and genetic engineering	2,19	1,171
Space exploration	2,15	1,260
Nuclear energy	2,22	,960
Nanotechnology	2,55	1,356
Wind energy	1,51**	1,006
Brain and cognitive enhancement	1,66**	1,141
1-Positive effect**, 2-No effect, 3-Negative effect		

Source: Authors' calculations

Figure 1.*Optimism and pessimism regarding eight technologies in Vojvodina
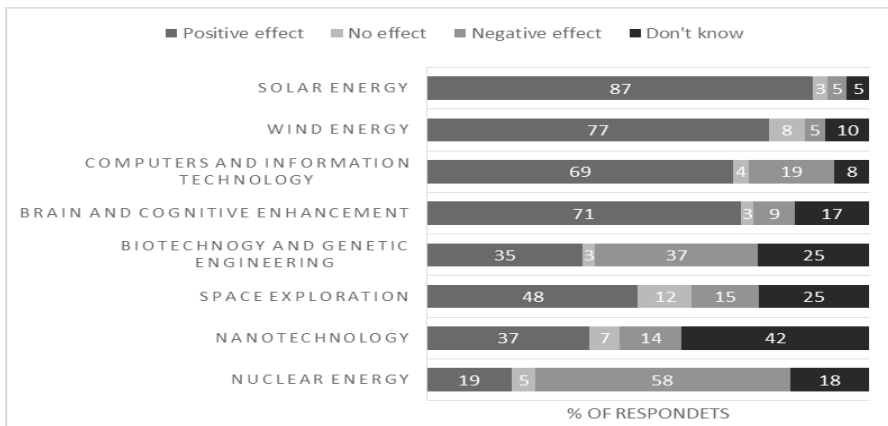
Source: Authors' calculations

According to the results represented in Table 4 and Figure 1 have shown that for four out of the eight technologies optimists outnumbered pessimists (positive effect vs. negative effect). Exceptions are biotechnology and genetic engineering and nuclear power. While positive and negative expectations about biotechnology and genetic engineering are nearly equal, expectations regarding nuclear energy are the expectations with an obvious pessimism. For nanotechnology, as new once, the percentage of 'don't know'

responses was high. Biotechnology, space exploration, nuclear energy, and brain and cognitive enhancement were probably relatively unfamiliar to many of the public (see: 'don't know' response). Yet the idea of this technology seems to engender widespread optimism, with optimists outnumbering pessimists by a ratio of 7 to 1. Nuclear power had the most negative opinions. The percentage of Europeans saying 'it will improve our way of life' was 39% (Figure 2) comparing to 19% in Vojvodina (Figure 1).

Europeans had a similar attitude towards the effect of biotechnology, computers, and nanotechnology. The main difference results in attitude towards nuclear energy as percentages of optimists and pessimists Europeans are equal (Figure 2).

Figure 2.*Optimism and pessimism regarding eight technologies in EU27
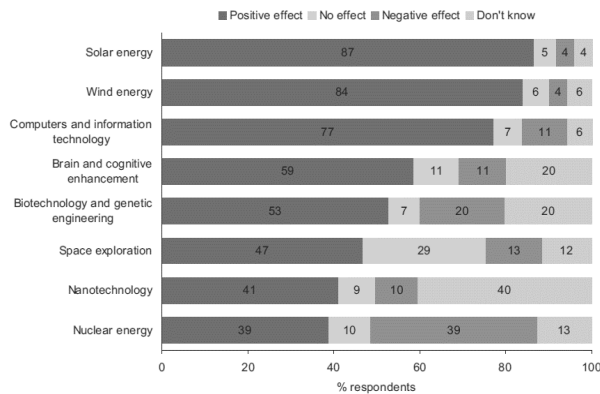
Source: EC (2010, p.16)

Comparing to Europeans attitudes (Figure 2), respondents in Vojvodina (Figure 1) were more optimistic regarding brain and cognitive technologies, but less optimistic regarding computers and information technologies and wind energy, and had equal optimism regarding the use of solar energy and space exploration. Overall optimism and pessimism in Vojvodina and EU regarding the eight technologies are shown in Figure 3. Europeans are more optimistic and less pessimistic than respondents in Vojvodina.

Figure 3. * Optimism and pessimism regarding eight technologies in EU27 and Vojvodina
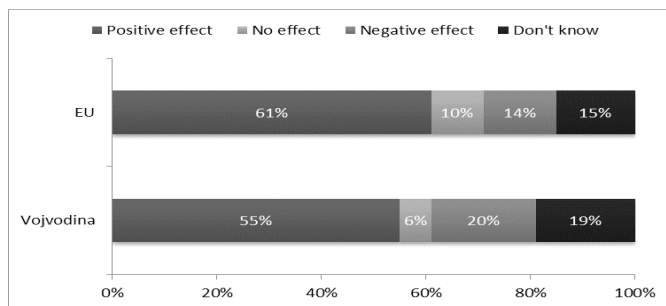
Source: Authors' calculations; EC (2010, p. 16, adopting to Figure 2)

The second results of the third part (about GM food) are represented in Figure 4, Figure 5, Table 6 and Figure 6. Figure 4 and Figure 5 show awareness of GM food in Vojvodina and EU27. The majority of respondents in Vojvodina and in EU27 were familiar with GM food. It is clear that public attention of GM in Vojvodina was higher than in EU 27.

Figure 4.* Awareness of GM food in Vojvodina
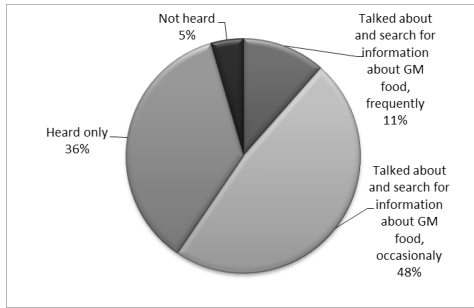
Figure 5.* *Awareness of GM food in EU27*

Source: Authors' calculations
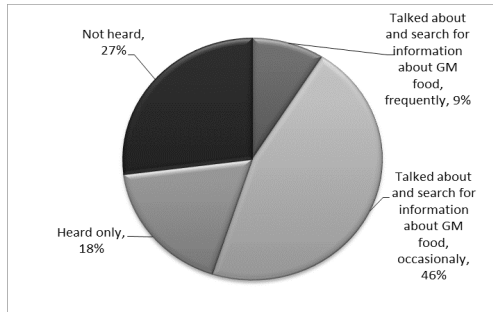
Source: EC (2010, p. 37, according to Figure 12)

The results of this survey (respondent attitudes regards GM food**)** are presented in Table 6. To explore what influencing on public attitudes regards GM food, a five Likert-type survey was created.

Table 6.*Respondents attitudes regards GM food - Descriptive statistics

Questions (according to EC, 2010, p. 113)	Mean	Std. Deviat.
GM food is good for the (nationality) economy	3,80	,809
GM food is not good for you and your family	3,71	,947
GM food helps people in developing countries	3,69	,969
GM food is safe for future generations	2,97	1,661
GM food benefits some people but puts others at risk	2,26	1,449
GM food is fundamentally unnatural	3,41	1,363
GM food makes you feel uneasy	1,81	,854
GM food is safe for your health and your family's health	3,58	1,134
GM food does no harm to the environment	2,19	1,369
GM food should be encouraged	3,37	1,200
1-totally agree, 2-tend to agree, 3-tend to disagree, 4-totally disagree		

Source: Authors' calculations

The results have shown that the respondents in Vojvodina saw GM food as a solution that is not good for economy nor it could help people in developing countries. Besides, GM food was recognized as an unnatural and not healthy food that can be harmful to future generations as well as for our environment (Table 6). This finding is consistent with the finding of Heyder and Theuvsen (2009, p. 9). Similarly, the survey by Cui and Shoemaker (2018) showed that 41.4% of respondents in China had a neutral view on GM food while 46.7% of them had a negative view on GM food. Thus, a minority of

respondents had a positive view. Combining 'totally agree' and 'tend to agree', percent in support for GM food in Vojvodina was almost equal to the percentage in EU (Figure 6). Furthermore, the greater percent of respondent in Vojvodina and in EU 27 was not willing to support GM food.

Figure 6.*Support for GM food in EU and Vojvodina
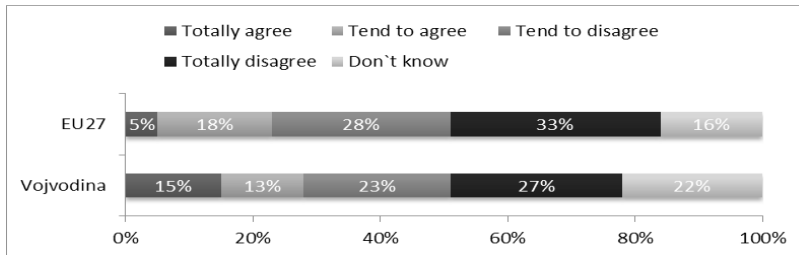
Source: Authors' calculations; EC (2010, p. 37, according to Figure 13)

The results of the third part of the survey - questions related to the trust in key actors are represented in Table 7. Newspapers and magazines, university scientists, environmental groups and consumer organizations attracted the confidence between 50% and 65% of respondents from Vojvodina. All others attracted confidence below 50%. Contrary that, all actors attracted confidence above 50% of respondents from EU. For all actors, except newspapers and magazines, the percentage of 'do not know' responses in Vojvodina was higher than in the EU.

Table 7.*Trust in key actors

Key actors	EU27			Vojvodina		
	Doing a good job for society	Not doing a good job	Don't know	Doing a good job for society	Not doing a good job	Don't know
Medical doctors keeping an eye on the health implications of biotech.	78%	8%	14%	39%	23%	38%
University scientists doing research in biotech.	74%	8%	18%	59%	14%	27%
Consumer organizations checking products of biotech.	70%	11%	19%	51%	23%	26%
Newspapers and magazines reporting on biotech.	62%	20%	18%	63%	22%	15%
Industry developing new products with biotech.	56%	19%	25%	29%	33%	38%
Environmental groups campaigning against biotech.	63%	15%	22%	55%	17%	28%
Our government in making regulations on biotech.	54%	20%	26%	45%	24%	31%
Shops making sure our food is safe	59%	22%	19%	12%	66%	22%

Source: Authors' calculations; EC (2010, p. 76, according to Table 9)

Conclusions

In the previous studies, less attention has been given to the public perceptions of CSR in agribusiness and their opinions towards using new technologies, especially in food production such as GMO. In this regard, the survey was conducted in Vojvodina as the region in Serbia of mainly food production developed branches. The research can be significant in terms of information and scientific observations in the creation of future frameworks in the issues of CSR and GMO in Vojvodina (the Republic of Serbia).

The results of the empirical research have shown that: (1) the majority of respondents know what CSR is (2) they mostly define CSR as a company's responsibility to society, and CSR of food companies as a moral obligation of company. Generally, respondents are aware that CSR is more than advertising and philanthropy as well as that GM foods should be marked with a special label. If the company does not visually mark its GM foods with a special label is not socially responsible. In this regard, it is necessary to strengthen awareness campaigns about link between CSR of food companies with a healthy product without GM.

Besides, the results have shown: (1) gender has a significant influence on public awareness of CSR and on labeling of GM foods as an obligation of company (2) education has a significant influence on recognize CSR through advertising spots and humanitarian actions. According to the results, awareness campaigns of CSR and labeling of GM foods need to be strengthened, especially for males, as well as campaigns to recognize CSR through advertising spots and humanitarian actions of companies, especially for respondents with lower education.

Regarding the new technologies, the results have shown: (1) the respondents in Vojvodina are more pessimistic and less optimistic than Europeans (2) expectations regarding nuclear energy are the expectations with an obvious pessimism (3) many new technologies are relatively unfamiliar to many of the public, especially nanotechnology and biotechnology. According to the results, it needs to strengthen awareness campaigns about that nuclear power may improve our way of life and the campaigns aimed at informing and education about nanotechnology and biotechnology, benefits and potential negative effects.

Besides, the results have shown: (1) the majority of respondents in Vojvodina and EU are familiar with GM food (2) the respondents in Vojvodina saw GM food as not offering benefits, as unsafe, as inequitable and as worrying (3) the comparison between Vojvodina and EU has shown no substantial difference in the public perception of GM food (the dimension that most differentiates supporters and opponents is the issue of safety and benefit and worry). In this regard, it is necessary to increase a level of the knowledge in the public of GM food.

Key actors play an important role in accepting new technologies, however, comparing to Europeans: (1) respondents in Vojvodina are more pessimist and they do not have confidence in the key actors (2) lack of trust in key actors may be the reason why

respondents in Vojvodina in the great majority think that it is up to people to seek out the benefits from new technologies themselves. The great problem is a lack of information and not understanding the new technologies in food production. The government should take responsibility to ensure that new technologies benefit everyone.

The research can be significant in terms of information and observations in the creation of future frameworks in the issues of CSR and GMO in the Republic of Serbia. We recommend to repeat the research but after the EU conduct the new research in this area so we can compare the new results.

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Conflict of interests

The authors declare no conflict of interest.

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THE ROLE OF THE POPULATION'S ACCESS TO BASIC NEEDS IN BUILDING RESILIENCE AND ENSURING FOOD SECURITY. CASE STUDY OF ROMANIA

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ABSTRACT

Water scarcity, climate change, price volatility, agricultural output variability, and geo-political instability have determined new stressors and situations of risks that exert pressure on agro-ecological systems, farmers, people's food security, and generally affect the well-being of the population. In recent times, resilience is seen as providing a new approach on how to analyse the effects of shocks and stressors that threaten people's well-being. The question is whether there is a relationship between the inadequate access to basic services, as stressor of people's physical access to food and food availability on the market, and food security, as an outcome of people's well-being. Statistical data have been analysed with simple regression model. The case study of Romania is discussed, using twenty-two observations. The main findings show that access to essential services, such as water and sanitation, are important in explaining household's resilience capacity. Other stressors, such as rail lines density and road density, which determine the physical access to markets, have a less significant influence on food security. The relevance of the results lies in their capacity to emphasize the role of people's access to basic needs in strengthening the resilience of individuals, families and regions, and to ensure, as a consequence, food security.

Introduction

Viewed as a strategic way to deal with stressors and a wide range of unpredictable risks that undermine well-being, resilience has emerged as a key concept for policy, program and strategy development. Resilience is a promising concept for understanding how individuals, households, and regions cope with shocks and stressors, therefore, a steady flow of scientific papers and reports has been released. Many of them focused

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on resilience concept, stressors and shocks, but fewer on resilience measurement. There is an abundant literature on resilience pursued in a variety of fields, such as ecology (Gunderson et al., 2010), including the agro-ecological systems, engineering (Hollnagel et al., 2006), psychology (Cicchetti, 2010), and geography (Adger, 2000; Pike et al., 2010).

Referring to agro-ecological system, Milestad (et al. 2009) argued that farmers face dynamics and disturbances at the farm, induced by local, regional, national or global trends, seasonality or shocks. Under these circumstances, farmers need the ability to cope with, adapt to and shape change without losing options for future adaptability (Folke et al., 2003). It is about what is called resilience in the literature, meaning that farmers need to build farm resilience. Resilience thinking offers a framework for understanding the dynamics of complex systems (Bennet et al., 2005). Derived from system theory as being the ability of a system to bounce back or return to equilibrium following disturbance (Holling, 1973), when referring to as 'engineering resilience', the concept then evolved to a more complex approach. Resilience of systems is not simply about resistance to change and conservation of existing structures (Folke, 2006), while Berkes (et al.2003) recognize that the ability to adapt and transform are at the origin of resilience.

As regards food security, resilience has been considered in terms of international development (Bene et al. 2016; Pelletier et al. 2016, Suweis et al. 2015; Constantin, 1999), and of maintaining agricultural production under climate change (Altieri et al. 2015). Bullock (et al. 2017) provided an original view of how food production might become more resilient and implemented a definition of resilience in terms of food security as: maintaining production of sufficient and nutritious food in the face of chronic and acute environmental perturbations. The food system resilience has been studied by Tendall (et al. 2015), who argued that it has a high potential to help cope with the shocks, complexity and uncertainty facing food systems, by using the concepts of continuous learning, flexibility and "back-up" capacity.

Many attempts at assessing resilience have been proposed over the years. The Food and Agriculture Organization (FAO) of the United Nations recorded long experience in this, being the first organization which adopted the concept of resilience in a food security context (Pingali et al., 2005). In 2008, it issued a system of indicators for resilience assessment, the RIMA, proposed by Alinovi (et al., 2008), who argued that the ability of a household to adapt to new situations depends on the options available to that household to make a living: access to assets, income-generating activities, public services, formal and informal social safety nets, institutional environment and resistance capacity.

Nowadays, other authors proposed alternative systems to measure resilience. Vaitla (et al., 2012) considered natural resources, physical assets, financial assets and human and social capital as the fundamental elements of resilience, which enable households to react to stressors and to a shock, after interaction. Frankenberger (et al., 2012) focused on the causes that determine the vulnerability and seeks to understand how long-term

factors (e.g. climate change, economic, socio-political and environment factors) affect livelihood security and exposure to risk. Ignat (2019) measured resilience from the entrepreneurship point of view.

RIMA-II, as system of indicators for assessing resilience, has its roots in FAO's analytical framework (FAO, 2012). Its fundamental pillars of resilience are: access to basic services, assets, social safety nets, sensitivity, and adaptive capacity. This paper analysis the pillar access to basic needs. It measures the ability of a household to meet basic needs, by accessing and effectively using basic services, such as sending children to school, accessing water, electricity and sanitation.

The RM-TWG (2014) has defined resilience as a capacity that prevents individuals, households, communities, and regions from falling below a normatively defined level for a given development outcome (e.g., food security, poverty level, wellbeing). The cited report outlined the necessity of establishing an outcome of interest as the result of a series of interactions among the conditions, attributes and processes, and disturbances that affect well-being, in the development of resilience measurement.

Therefore, the pillar of resilience, namely access to basic needs, is analysed in connection to food security, as an outcome of interest, the objective of this paper consisting in identifying the direction and the intensity of the relationship between access to basic needs and food security. While resilience is perceived as a stand-alone outcome, the end-goal of building and measuring resilience is viewed in terms of a particular outcome, such as food security.

In the attempt to establish whether there is a relationship between the access to basic services, as pillar of resilience, and food security, as a development outcome, this piece of research answers the question what are the direction and intensity of this relationship? In pursuing this, the indicators corresponding to the variable access to basic needs (access to improved water source, access to improve sanitation, road density and rail lines density) and the indicators of food security (food supply per person) are analysed using simple regression models.

The research starts from the assumption that there is a direct relationship between access to basic services and food security, the hypothesis tested within this paper is H1: The availability or non-availability of basic services play a role in determining the risk level of households' exposure to shocks and stressors and determine the level of households' food supply.

This paper analysis the resilience as a response to stressors, such as people difficult access to services, in relation to food security. Following this first introductory section, the paper is organized into two main sections, followed by a section on conclusions. The data and methodology of assessing resilience are presented in section 2, outlining a set of general technical issues that are broadly applicable to the measurement. Section 3 presents and discusses the results of the regression models, whereas, the final section summarizes the main points of this first paper, draws the conclusions, and validates the hypotheses.

Materials and methods

Resilience comprises two parts, one direct (or descriptive) and one indirect (or inferential). The direct approach measures the Resilience Capacity Index and the Resilience Structure Matrix. The indirect approach looks at the determinants of food security loss and recovery (FAO, 2016). Within this paper, the indirect approach is used to assess resilience.

Some authors proposed the Resilience in a Dynamic Context as a predictor of household food security (Ciani, 2011). The latter is measured both by the change in food expenditure between two time periods and a dummy variable describing food poverty status at time t+1. The resilience capacity at time t is expected to positively contribute to household's food security at time t+1. But this assumption is not easily replicable if resilience is estimated through RIMA-II, because it employs food security variables as indicators of the measurement model. Therefore, FAO (2016) proposed two possible options. The first is to estimate the Resilience in a Dynamic Context through RIMA-II using survey variables. The second is to use an indirect measurement of resilience which implies the use of the food security indicators (food expenditures or food consumption scores) for performing a dynamic analysis. If the purpose of resilience analysis is to establish the main drivers of a recovery from a shock, regression analysis is needed rather than survey. Therefore, the indirect approach, analysing food security indicators in relation to its determinants, is used in this paper.

The RM-TWG (2014) expressed the relationship among resilience, vulnerability, and shocks in connection with food security such as: Food security = f (vulnerability, resilience capacity, shocks). Stressors can be added to this approach, bearing in mind that they are long-term pressures that undermine the stability of a system and increase vulnerability within it (Bujones et al., 2013), as compared to shocks, which are short-term pressures (Zseleczky and Yosef, 2014). Therefore, the relation becomes: Food security = f (vulnerability, resilience capacity, shocks, stressors).

This equation reveals the dependent variable, food security, and the independent variable, resilience capacity, with its shocks and stressors. Within this piece of research, the independent variable is access to basic services, as pillar of resilience, and the dependent variable is food security, viewed as an outcome of people's well-being.

The indicators corresponding to access to basic services are access to improved water sources, access to improved sanitation, access to proper road and rail lines (FAO food security indicators, FAO, 2016). The indicators access to water and sanitation have been used in previous research (Catacora Vargas, 2017, Jacobi et al., 2018, Mutea, 2018), for assessing the resilience dimension of buffer capacity. The latter refers to the capacity of a system and its properties to cushion against stresses and shocks.

The indicators corresponding to food security is food supply expressed in calories per person per day. They have been used in previous research in FAO reports (RM-TWG, 2014). Food quantity, in terms of absolute amount of production or food calories, is the usual metric of food security and thus resilience, as reported by Bullock (et al. 2017).

Access to an improved water source consists in the percentage of people with reasonable access to an adequate amount of water from an improved source: a household connection, public standpipe, borehole, protected well or spring, and rainwater collection (food security indicators databases explained, FAO, 2019). Reasonable access refers to the availability of at least 20 litters for a person per day from a source within one kilometre of the dwelling. As seen in Table 1, 98% of the Romanian population have access to improved drinking water sources in recent times, as compared to 73.9% in 1990.

Access to improved sanitation facilities represents the percentage of people with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta (food security indicators databases explained, FAO, 2019). As data in Table 1 show, 77.9% of the Romanian population have access to sanitation facilities in recent times, higher than 70.4% in 1990.

Road density refers to the number of kilometres of road per 100 square kilometres of land and rail lines density refers to the number of kilometres per 100 square km of land area. Both of them correspond to the physical access of people to food. There are 46.8 km of road per 100 square km of land area in Romania in 2011, decreasing from 64.2 in 1990 (Table 1). As regards the rail line density, there are 4.5 km per 100 square km of land area in Romania in 2001, down from 4.8 in 1990.

The indicators corresponding to the resilience capacity measure can be indexed to food security, poverty or any other well-being concept that represents a development outcome of interest (RM-TWG, 2014). Usually, food expenditure, Food Consumption Score, and caloric intake are adopted as indicators of food security. In this paper, the caloric intake (food supply expressed in kcal per person per day) is considered for analysing the relationship between access to basic needs and food security.

The food supply in Romania is, on average, 3339 kcal per person per day, higher than its level of 3127 in 1990. This value is higher compared to FAO and WHO recommendations, meaning that, on average, food security is ensured in Romania. This assumption is sustained by the value of the indicator Average dietary energy supply adequacy, which is 135% (FAO databases, 2019), higher than 100%, meaning that the supply exceeds the requirements by 35%. Although food security is ensured, on average, in Romania, previous research (Ion, 2018; Anica Popa et al. 2008) found that not all people have proper access to food, since 15.3% live on less than $2.9 a day, while the average food consumption fits into a budget of $3.28 a day. Thus, people earning less than $2.9 a day have limited dietary choices.

Table 1. People access to basic services and food supply in Romania, 1990-2011

Year	Percentage of population with access to improved drinking water sources (%)	Percentage of population with access to sanitation facilities (%)	Road density (km of road per 100 square km of land area)	Rail lines density (km per 100 square km of land area)	Food supply (kcal/cap/day)
1990	73.9	70.4	64.2	4.8	3127
1991	75.4	71.0	64.2	4.8	2922
1992	76.6	71.4	64.2	4.8	2835
1993	77.7	71.7	64.2	4.8	3000
1994	78.8	72.0	64.2	4.8	2931
1995	79.8	72.3	64.3	4.8	3027
1996	80.9	72.6	81.0	4.8	3056
1997	82.0	72.9	81.0	4.8	3046
1998	83.1	73.2	81.1	4.8	3068
1999	84.2	73.5	81.1	4.8	3081
2000	85.3	73.8	42.4	4.8	3141
2001	86.5	74.1	42.5	4.8	3239
2002	87.6	74.4	42.7	4.8	3319
2003	88.8	74.8	43.0	4.6	3365
2004	90.0	75.2	43.8	4.5	3354
2005	91.1	75.6	44.3	4.5	3396
2006	92.3	75.9	44.5	4.5	3430
2007	93.5	76.3	44.9	4.5	3375
2008	94.6	76.7	45.3	4.5	3402
2009	95.8	77.1	45.4	4.5	3379
2010	96.9	77.5	45.9	5.7	3325
2011	98.0	77.9	46.8	4.5	3339

Source: FAO, 2019

Results and discussions

Before rendering the models, the variables are tested using E-Views program. Firstly, the variables have been tested for normality (Figure 1a). The variable food supply reported the value 0.326 for the probability, higher than 0.05, meaning that the distribution is normal. Kurtosis value is 1.763 indicating a normal distribution and the Skewness value is negative, showing a tendency towards left, and its value is closed to -0.5, signalizing, anew, that the distribution is normal.

The variable access to improved drinking water (Figure 1b) reported the value 0.444 for the probability, higher than 0.05, meaning that the distribution is normal. Kurtosis value is 1.754

indicating a normal distribution and the Skewness value is negative, showing a tendency towards left, and its value is not between -0.5 and +0.5, signalizing a limit of the research.

The variable access to improved sanitation (Figure 1c) reported the value 0.486 for the probability, higher than 0.05, meaning that the distribution is normal. Kurtosis value is 1.846 indicating a normal distribution and the Skewness value is positive, showing a tendency towards right, and its value is between -0.5 and +0.5, signalizing, anew, that the distribution is normal.

Figure 1. Normality test for food supply (a), access to improved drinking water (b), and access to improved sanitation (c)

(a)

Series: FOOD_SUPPLY__KCAL_CAP_DA	
Sample 1990 2014	
Observations 24	
Mean	3202.333
Median	3279.000
Maximum	3430.000
Minimum	2835.000
Std. Dev.	184.0032
Skewness	-0.421441
Kurtosis	1.763715
Jarque-Bera	2.238849
Probability	0.326468

(b)

Series: PERCENTAGE_OF_POPULATION	
Sample 1990 2014	
Observations 25	
Mean	87.67200
Median	87.60000
Maximum	100.0000
Minimum	73.90000
Std. Dev.	8.248663
Skewness	-0.025122
Kurtosis	1.754139
Jarque-Bera	1.619474
Probability	0.444975

(c)

Series: PERCENTAGE_OF_POPULAT01	
Sample 1990 2014	
Observations 25	
Mean	74.64800
Median	74.40000
Maximum	79.00000
Minimum	70.40000
Std. Dev.	2.559479
Skewness	0.115308
Kurtosis	1.846790
Jarque-Bera	1.440705
Probability	0.486581

Source: Results of the tests

The graphical rendering is tested, in order to have a better perspective over the variables. The graph for the variables food supply and access to improved water sources is presented in Figure 2. It can be noticed that the two variables have registered a likely trajectory. The current dataset has a positive trend, indicating a direct influence of access to improved water sources over the food supply.

The graphs for the variables food supply and access to improved sanitation is presented in Figure 3. It can be noticed that the two variables have registered a likely trajectory. The current dataset has a positive trend, indicating a direct influence of access to improved sanitation over the food supply.

Figure 2. Correlations between food supply and access to improved drinking water
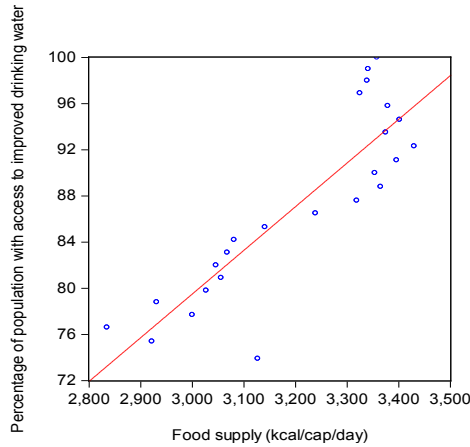
Source: Results of the tests

Figure 3. Correlations between food supply and access to improved sanitation
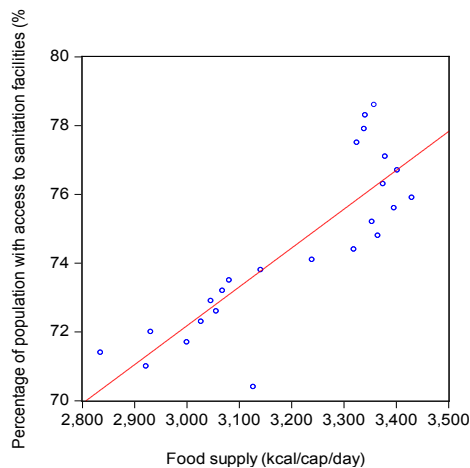
Source: Results of the tests

Then, the stationarity of variables using Dickey-Fuller test and the causality between variables using the Granger Test have been tested. The results show that the data are stationary and there is not any pre-existent causality between variables.

The following step is to set up the linear model of simple regression. The model explaining the relationship between food security and access to improved water sources is: food_supply=0.882 x access_to_improved_water_sources, showing that 1 unit change in the level of access to improved water sources will lead to 0.882 changes in the level of food supply. The model explaining the relationship between food security and access to improved sanitation is: food_supply=0.866 x access_to_improved_sanitation, showing that 1 unit change in the level of access to improved sanitation will lead to 0.866 changes in the level of food supply.

The models are valid since the values of Sig are below 0.05 (Table 2). The values of R Square are 0.779 and 0.750, showing that the relationship between food supply and its determinants, access to improved water sources and access to improved sanitation, are strong and direct, the variables being positively correlated.

Table 2. The influence of access to improved water sources and access to improved sanitation upon food security

Variable	R Square	Coefficients of regression function	Sig.
Access to improved water sources	0.779	0.882	0.000
Access to improved sanitation	0.750	0.866	0.000

Source: Results of the regression models

The same results have been reported by other authors arguing that the best way to help farmers and improve their resilience is by maintaining good access to human capital, natural resources, infrastructure and financial resources (Atkociniene et al. 2015; Kwasek and Cvijanovic, 2013), and by safeguarding their access to markets and credit (Ashkenazy et al. 2018). Hecht (et al. 2018) observed that infrastructure and location, and service providers are among of the 10 factors that may contribute to organization-level resilience. The results are similar to those found by Alinovi (et al., 2008), arguing that resilience, viewed as the ability of a household to adapt to new situations, depends on the options available to that household to make a living, including access to assets, capital etc.

The variables road density and rail lines density reported invalid results. Otherwise, only observing the primary data presented in Table 1, the contradictory trends of these indicators and food supply can be noticed. While food supply values increased over the period under analysis, the values of road density and rail lines density decreased, signalizing lower physical access of people to transportation and markets, both for producers to sell their products and for consumers to buy agro-food stuff. Considering this trends, the relationship between food supply, as an outcome of well-being, and inadequate access to roads and rail lines, as stressors and features of resilience capacity, has not been analysed.

Conclusions

This paper investigated the relationship between food security, as an outcome of people's well-being, and access to basic needs, as a pillar of resilience. The main findings show that access to essential services, such as water and sanitation, are important in explaining household's resilience capacity. Moreover, the availability or non-availability of such services play a role in determining the risk level of households' exposure to shocks and stressors, validating, as such, the hypothesis established.

The results are similar to those found by FAO (2018), arguing that access to essential services, such as water and sanitation, is an important determinant of households' resilience capacity.

The results are important to understand how farmers face dynamics and disturbances at the farm, induced shocks and stressors and how they cope with, adapt to and shape changes. The findings show that stressors such as people's access to basic needs, water and sanitation, are important in understanding the farmers' resilience capacity, because their availability determines the risk level of households' exposure to shocks and stressors.

The research has its limitations. The indicators access to roads and rail line revealed less significant influence on food security, although they correspond to basic services. This can be justified by the fact that there are two general approaches, one based on a theoretical understanding of relationships and one based on statistical relationships (Adger et al., 2004). Therefore, the indicators could theoretically be valid, but be statistically irrelevant or not usable. Likewise, the indicators showing people access to roads and rail lines, theoretically, they are valid and influence food supply availability and access, but they are statistically irrelevant.

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Conflict of interests

The author declares no conflict of interest.

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THE IMPACT OF CUSTOMER CONTACT AS PART OF THE AGRICULTURAL PRODUCTS DISTRIBUTION CHANNEL ON THE INCREASE OF THE COMPETITIVENESS OF AGRICULTURAL HOLDINGS

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A B S T R A C T

The main objective of this paper stems from the need to provide new insights into the competitiveness of the agricultural products distribution system in the Republic of Serbia, through determining the impact of customer contact as part of the agricultural distribution channel on the competitiveness of agricultural holdings. The survey was conducted on a sample of 126 farms from the territory of the Republic of Serbia through a closed-type survey (12 claims related to customer contact and 15 claims related to the competitiveness of the agricultural products distribution system; five-stage Likert scale), which was distributed electronically. The contribution of the paper is reflected in the results which showed that the level of customer contact (as part of the distribution channel) influences the level of competitiveness of the agricultural products distribution system (in the Republic of Serbia). The results also form the basis for further research in this field.

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Introduction

Competitiveness can be defined in different ways. It can be "the fact of being able to compete successfully with other companies, countries, organizations, etc.," or "the fact of a person wanting very much to win or be more successful than other people" (Cambridge Dictionary), or "the ability of a country (region, location) to deliver the

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beyond GDP goals for its citizens" (Aiginger et al., 2013, p. 1). Competitiveness is, therefore, an indicator of the position that an analyzed entity occupies on a particular market, its ability to cope with direct or indirect competitors in the right way, but also a key source of creating opportunities for business improvement and long-term success.

Competitiveness is pursued in all spheres of economic life as well as in the field of agriculture, all in accordance with the main trends that dominate in this field, such as (1) technological advancement, (2) production, price and market directions, (3) changes in consumer habits and (4) climate change (SEEDEV, 2017, pp. 9-130). "The distribution of competitiveness in the world is increasingly pronounced. However, there is no country in the world that does not cultivate or export agricultural products" (SEEDEV, 2017, p. 7).

Regarding the state of the agricultural sector of the Republic of Serbia, Serbia's competitive advantages in the field of agriculture can be divided into the following: Farmers, Regional specialization, Free land, Trade contracts, European Union, IPARD Fund, Quality, the Danube, the Domestic market (SEEDEV, 2017, pp 21-23). According to Aničić et al. (2018) "serious efforts are necessary for structural reforms in the sector of agriculture and rural areas, with the aim of strengthening" (p. 198), thus highlighting the significant role of economic policy impact.

The distribution of agricultural products should certainly be mentioned as one of the important elements of competitiveness in agriculture. The term distribution is a multifaceted term denoting the division of a whole into parts, division, supply, delivery, delivery (of goods, electricity and the like), distribution of objects by class, category, supply and distribution of something to someone or somewhere. Distribution generally means the dispersion, that is, the flow of tangible and intangible goods between producers and consumers, i.e. producers and users, regardless of the spatial and temporal dimensions (mega, global, macro and microdimensions), the type and complexity of distribution channels, physical distribution and logistical distribution (Segetlija, 2006, p. 96).

Physical distribution and distribution channels, as the two basic elements of the distribution system, play a significant role in activities related to agricultural products. Obviously, the distribution characteristics of agricultural products are determined by the characteristics of the products themselves.

Accordingly, some of the characteristics of agricultural product distribution are as follows, according to Lu et al. (2004): "(1) The dispersion characteristic of produce distribution link, (2) The regional characteristic of circulation distribution link, (3) The specified distribution facilities, (4) Integrative characteristic of delivering and trade (the trading process accomplished by distribution)" (p. 171).

According to Kotler and Keller (2006), marketing channels are one of the key concepts in marketing (p. 26). They state that "a marketer uses distribution channels to display, sell or deliver a physical product to a customer or user" (Kotler, Keller, 2006, p. 26). "They

include distributors, wholesalers, retailers and agents" (Kotler, Keller, 2006, p. 26). According to Lamb et al. (2011), "formally, a marketing channel (also called a channel of distribution) is a business structure of interdependent organizations that are involved in the process of making a product or service available for use or consumption by end customers or business users. Marketing channels facilitate the physical movement of goods from location to location, thus representing "place" or "distribution" in the marketing mix (product, price, promotion, and place) and encompassing the processes involved in getting the right product to the right place at the right time" (p. 417).

Direct access to the target market is usually associated with the traditional view of customer contact as part of the distribution channel in the field of agricultural products. In regards to potential sales of farm products (at home), it is important to answer the following questions: Where is the producer (farm) located?, How far away is the farm from the customer market?, How long does it take for buyers to arrive from their place of residence to the farm?, How can one get to the farm?, What are the travel costs?, Is the farm sufficiently prepared and 'representative' enough to receive customers?, etc.

Farmers can possess facilities in the immediate vicinity of the farm or in slightly more remote locations to allow buyers to more easily reach the desired product, significantly eliminating the disadvantages of selling on the farm itself.

Tourism plays an increasingly important role in the distribution of agricultural products. For example, wine tourism is increasingly relevant not only in practice but also in scientific research. This is confirmed by the research by Anđelić et al. (2019), where is concluded that in journals which names refer directly to the tourism/tourist (from Journal Citation Report – JCR with Impact Factor – IF) the greatest number of papers about wine and wine tourism was published in the 21st century (94.51%), especially in its second decade (57.14%) (p. 1081).

Agritourism, which is largely farm based, is a form of contact with customers and more widely the potential form of agricultural products distribution. Agritourism has received increasing academic attention in recent decades. The above is confirmed by Dimitrovski et al. (2019) who conducted a bibliometric analysis of Crossref agritourism literature indexed in Web of Science (keyword analysis results: 21 papers in 9 journals), finding that agritourism is also related to other forms of tourism (rural tourism, farm tourism) but also with entrepreneurship, authenticity and rural areas (pp. 28-31).

The market is one of the traditional places where direct contact is made between sellers and buyers of agricultural products. Although this form of sales/communication has existed since ancient times, markets are still very popular in agricultural trade today. This is supported by the fact that almost every town in Serbia has its own market area, and market days, in most places, are still the main days of the week for trading agricultural products. According to Duvnjak (2013), the strengths of the market industry in Serbia are the following: "a variety of offer, good market locations, quality, tradition, direct contact of buyer and manufacturer (seller), model of sales from field to table, positive customer opinion, better (organic, domestic) food, flexibility and the ability to

adapt to change, to apply the experiences of developing and European Union countries, a joining of administrations in joint projects, standardization of services" (p. 27). According to Duvnjak (2013), the weaknesses relate to the following: "a lack of clear vision of development, a deterioration of the market position, infrastructural equipment, market equipment, influence of local governments/policies, frequent changes of top management, undefined legal regulations, inconsistency in their implementation, an absence of promotional activities" (p. 28).

The results of the study by Zarić et al. (2016) in the Republic of Serbia (Zeleni Venac Market and New Belgrade Market in Block 45) relating to the ways of advertising goods in direct marketing and the marketing channels used (p. 64) can be seen in the following figure (*Figure 1.*).

Figure 1. Advertising of goods in direct marketing (left) and marketing channels (right)
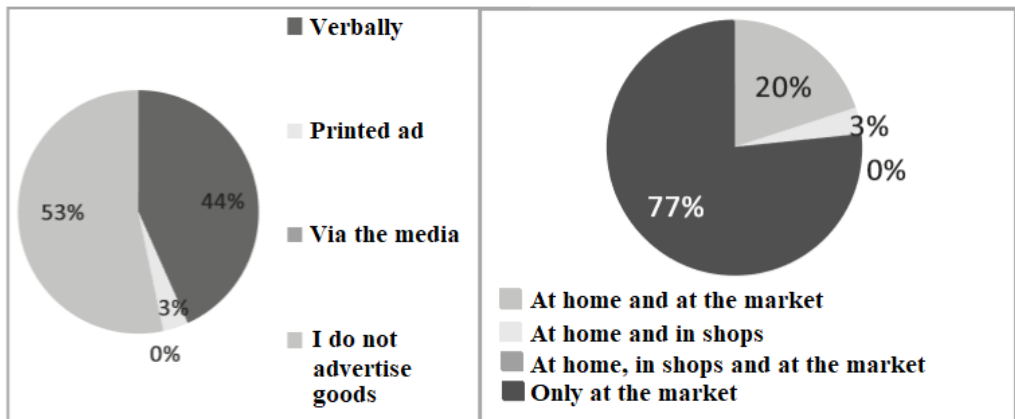
Source: Adapted according to Zarić et al. (2016, pp. 69-70)

Of course, in addition to direct customer contact, there are indirect ways of communicating with customers, whereupon there are one or more intermediaries between the manufacturer and the buyer. It is these intermediaries (primarily wholesale and retail) that can have a significant impact on the relationship of customers with the product.

The importance of food placement media can be seen in the fact that, according to a survey conducted in Nišava district (Serbia), „60% of the respondents who participated in the survey had trust in information about organic products which is published in the media" (Ilić, 2016, p. 175). According to Gajdić et al. (2018) the main distribution channels for organic food products (in Croatia) are direct sales to consumers (60.6%), sales via mediators (wholesale, retail) (13.6%), equally market directly or via mediators (19.7%), and Internet sales (6.0%) (p. 1473).

A study conducted by Zakić et al. (2017) showed that innovation should not be tied solely to the technology sector, since companies from the agricultural and food sectors are also prone to innovation. Zakić et al. (2017) "conclude that the food sector (31.38%) tend to be

more open to innovation in relation to agricultural one (23.86%). The reasons for this may lie in the traditionally more conservative nature of the participants in agriculture compared to those in the industry, but also somewhat different processes that occurred in these two sectors during the process of transition to a market economy" (p. 69). The role of the Internet is also important in making contact with customers. Becić et al. (2018) highlight the role of marketing and social networks in enhancing business effectiveness, stating that "absolutely necessary for the managers and marketers to fully comprehend and understand the importance and possibilities and daner of using 21st century technologies, and to turn the flow in their advance" (p. 83). Accordingly, Ćirić et al. (2018) conducted a survey (2016; Autonomous Province of Vojvodina; 125 respondents; questionnaire) (p. 248), which found that most farmers use the Internet every day (53.60%; 23.20% are not Internet users), while the highest percentage of respondents never use the analyzed social media (Twitter – 90.40%; Instagram – 76.00%; Facebook – 49.60%; YouTube – 32.00%) (p. 250). This clearly shows that a greater use of the potential of new technologies in the field of agriculture is necessary.

The **subject** of this paper is to analyze the connection between customer contact (as part of the agricultural distribution channel) and the competitiveness of the agricultural distribution system. The main **objective** of this paper stems from the need to provide new insights into the competitiveness of the agricultural products distribution system in the Republic of Serbia, through determining the impact of customer contact as part of the agricultural distribution channel on the competitiveness of agricultural holdings. The above mentioned object and purpose of the paper leads to the following **hypothesis**: The level of customer contact influences the level of competitiveness of the agricultural products distribution system.

In accordance with the subject, purpose and hypothesis of the paper, a research was conducted related to customer contact as part of the distribution channel of agricultural products in the Republic of Serbia (12 claims) and the competitiveness of the agricultural products distribution system (15 claims).

The contribution of this paper is reflected in the importance of increasing the competitiveness of the agricultural distribution system, especially from the point of view of contact with customers as part of the distribution channel of agricultural products in the territory of the Republic of Serbia (in which agriculture has a significant place in the total economic activities). The research results also form the basis for further research in this field, both in agriculture and in other fields of economy.

Materials and methods

A survey was conducted on 126 respondents (agricultural holdings) from the territory of the Republic of Serbia. In the realization of the research, the survey method was used based on the developed questionnaire, which was distributed electronically. The survey questionnaire consisted of 12 customer contact claims (hereinafter: CC) as part of the agricultural distribution channel. The paper also makes 15 claims regarding the competitiveness of the agricultural products distribution system (hereinafter: CAPDS).

The questionnaire included claims with which the respondents gave their opinion based on a five-level Likert scale: 1 – strongly disagree, 2 – disagree, 3 – neither agree nor disagree, 4 – agree and 5 – strongly agree.

Results and Discussions

The results of the research will be presented below in three parts: (1) Descriptive statistics of claims related to Customer contact (CC1-CC12), (2) Descriptive statistics of claims related to the competitiveness of the agricultural products distribution system (CAPDS1-CAPDS15), (3) Correlation and regression analysis.

1) Descriptive statistics of customer contact claims

Claim 1 (CC1 – Direct customer contact is helpful) has a mean rating of 3.9761905 and a standard deviation of 1.1625096. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 56 out of 126 respondents (44.44%).

Claim 2 (CC2 – Markets are a useful place to contact customers) has a mean score of 3.8253968 and a standard deviation of 1.200529. The frequencies of attitude representation are shown in the chart. Ratings 4 (strongly agree) and 5 (strongly agree) are most represented - 44 out of 126 respondents (34.92% each).

Claim 3 (CC3 – Retail is a significant source of information on customer preferences) has a mean rating of 3.6825397 and a standard deviation of 1.0855472. The frequencies of attitude representation are shown in the chart. The most represented rating is 4 (I agree) – 44 out of 126 respondents (34.92%).

Claim 4 (CC4 – Wholesale stores are increasingly important places for customer contact) has a mean score of 4.015873 and a standard deviation of 1.1592006. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 56 out of 126 respondents (44.44%).

Claim 5 (CC5 – Markets are important for meeting customer wants and needs) has a mean rating of 4.0952381 and a standard deviation of 1.1058287. The frequencies of attitude representation are shown in the chart. The most represented grade is 5 (strongly agree) – 59 out of 126 respondents (46.82%).

Claim 6 (CC6 – Higher agricultural product quality leads to binding customers to the product) has a mean score of 3.88888889 and a standard deviation of 1.1539305. The frequencies of attitude representation are shown in the chart. The most represented rating is 5 (strongly agree) – 50 out of 126 respondents (39.68%).

Claim 7 (CC7 – Farm name or brand affect customer loyalty) has a mean score of 3.9603175 and a standard deviation of 1.0150925. The frequencies of attitude representation are shown in the chart. The most represented rating is 4 (agree) – 63 out of 126 respondents (50.00%).

Claim 8 (CC8 – A larger range of agricultural products leads to customer attachment) has a mean score of 3.7619048 and a standard deviation of 1.1553602. The frequencies of attitude representation are shown in the chart. The most represented rating is 4 (agree) – 54 out of 126 respondents (42.85%).

Claim 9 (CC9 – A faithful buyer is significant for the long-term survival of the farm) has a mean score of 3.9603175 and a standard deviation of 1.551678. The frequencies of attitude representation are shown in the chart. The most represented rating is 4 (I agree) – 50 out of 126 respondents (39.68%).

Claim 10 (CC10 – Frequent buyers lead to profit increase) has a mean score of 4.1031746 and a standard deviation of 1.1442333. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 63 out of 126 respondents (50.00%).

Claim 11 (CC11 – Good customer relations are important for long-term planning for a distribution strategy) has a mean rating of 4.2222222 and a standard deviation of 1.1585431. The frequencies of attitude representation are shown in the chart. The most represented rating is 5 (strongly agree) – 75 out of 126 respondents (59.52%).

Claim 12 (CC12 – Loyal customers significantly impact the planning of a distribution strategy) has a mean rating of 4.0634921 and a standard deviation of 1.1781072. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 63 out of 126 respondents (50.00%).

The table (*Table 1.*) shows the basic descriptive statistics for the above claims (CC1-CC12).

Table 1. Descriptive statistics for CAPDS1-CAPDS15 claims

	Mean	Std Dev	Std Err Mean	Upper 95% Mean	Lower 95% Mean	N
CC1	3.9761905	1.1625096	0.1035646	4.1811576	3.7712233	126
CC2	3.8253968	1.200529	0.1069516	4.0370674	3.6137263	126
CC3	3.6825397	1.0855472	0.0967082	3.8739373	3.4911421	126
CC4	4.015873	1.1592006	0.1032698	4.2202568	3.8114893	126
CC5	4.0952381	1.1058287	0.0985151	4.2902116	3.9002646	126
CC6	3.8888889	1.1539305	0.1028003	4.0923434	3.6854343	126
CC7	3.9603175	1.0150925	0.0904316	4.1392929	3.7813421	126
CC8	3.7619048	1.1553602	0.1029277	3.9656114	3.5581981	126
CC9	3.9603175	1.1551678	0.1029105	4.1639902	3.7566448	126
CC10	4.1031746	1.1442333	0.1019364	4.3049194	3.9014298	126
CC11	4.2222222	1.1585431	0.1032112	4.42649	4.0179544	126
CC12	4.0634921	1.1781072	0.1049541	4.2712093	3.8557748	126

Source: Authors' research

The figure (*Figure 2.*) shows the frequency of the respondent responses to the analyzed claims (CC1-CC12).

Figure 2. Frequency of respondent responses to CC1-CC12 claims
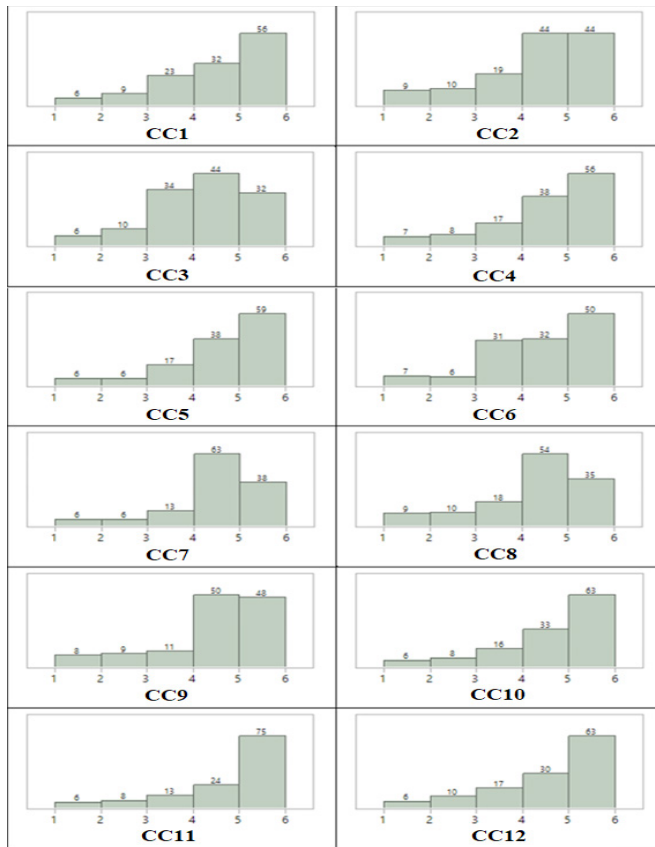
Source: Authors' research

Based on the tables and in accordance with the average rating of the claims analyzed, the order of significance of the asserted claims is as follows: CC11 (4.222222), CC10 (4.103175), CC5 (4.095238), CC12 (4.063492), CC4 (4.015873), CC1 (3.976191s), CC7 (3.960318), CC9 (3.960318), CC6 (3.888889), CC2 (3.825397), CC8 (3.761905) and CC3 (3.68254).

2) Descriptive statistics of claims regarding the Competitiveness of the agricultural products distribution system

Claim 1 (CAPDS1 – Investments affect the competitiveness of the agricultural products distribution system) has a mean score of 3.9444444 and a standard deviation of 1.1545081. The frequencies of attitude representation are shown in the chart. The most represented rating is 4 (agree) – 50 out of 126 respondents (39.68%).

Claim 2 (CAPDS2 – The application of modern technologies increases the competitiveness of the agricultural products distribution system) has a mean score of 3.8253968 and a standard

deviation of 1.200529. The frequencies of attitude representation are shown in the chart. The most represented ratings are 4 and 5 (agree and strongly agree) – 44 out of 126 respondents (34.92% each).

Claim 3 (CAPDS3 – Warehouse modernization leads to an increased competitiveness of the agricultural products distribution system) has a mean score of 4.0952381 and a standard deviation of 1.0985705. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 57 out of 126 respondents (45.23%).

Claim 4 (CAPDS4 – Transportation management significantly affects the competitiveness of the agricultural products distribution system) has a mean score of 4.1031746 and a standard deviation of 1.0941983. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 58 out of 126 respondents (46.03%).

Claim 5 (CAPDS5 – Adequate commodity handling contributes to greater competitiveness of the agricultural products distribution system) has a mean score of 4.031746 and a standard deviation of 1.1309218. The frequencies of attitude representation are shown in the chart. The most represented rating is 5 (strongly agree) – 56 out of 126 respondents (44.44%).

Claim 6 (CAPDS6 – Order processing has a significant impact on the competitiveness of the agricultural products distribution system) has a mean score of 3.8650794 and a standard deviation of 1.0980213. The frequencies of attitude representation are shown in the chart. The most represented rating is 5 (strongly agree) – 44 out of 126 respondents (34.92%).

Claim 7 (CAPDS7 – Inventory management affects the competitiveness of the agricultural products distribution system) has a mean score of 4.015873 and a standard deviation of 1.1098405. The frequencies of attitude representation are shown in the chart. The most represented rating is 5 (strongly agree) – 51 out of 126 respondents (40.47%).

Claim 8 (CAPDS8 – The point of sale has an impact on increasing the competitiveness of the agricultural products distribution system) has a mean score of 4.0793651 and a standard deviation of 1.1496307. The frequencies of attitude representation are shown in the chart. The most represented rating is 5 (strongly agree) – 61 out of 126 respondents (48.41%).

Claim 9 (CAPDS9 – Direct customer contact has a significant impact on competitiveness) has a mean rating of 3.9884127 and a standard deviation of 1.1522786. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 50 out of 126 respondents (39.68%).

Claim 10 (CAPDS10 – Linking related farms leads to an increase of the competitiveness of the agricultural products distribution systems) has a mean score of 3.7142857 and a standard deviation of 1.1232606. The frequencies of attitude representation are shown in chart 97. The highest rating is 4 (agree) – 57 out of 126 respondents (45.23%).

Claim 11 (CAPDS11 – Familiarity of the farm with the functioning of the market leads to strengthentening of the competitive position) has a mean of 4.2301587 and a standard deviation of 1.0819442. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 67 out of 126 respondents (53.17%).

Claim 12 (CAPDS12 – Introducing innovation in all elements of physical distribution leads to increasing the competitiveness of the agricultural products distribution systems) has a mean score of 4.1666667 and a standard deviation of 1.1366618. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 68 out of 126 respondents (53.96%).

Claim 13 (CAPDS13 – A good distributor relationship affects competitiveness) has a mean score of 4.1349206 and a standard deviation of 1.1052831. The frequencies of attitude representation are shown in the chart. The most represented grade is 5 (strongly agree) – 62 out of 126 respondents (49.20%).

Claim 14 (CAPDS14 – A good selection of distribution channels significantly increases the competitiveness of the agricultural products distribution system) has a mean score of 4.0634921 and a standard deviation of 1.1436505. The frequencies of attitude representation are shown in the chart. The most represented rating is 5 (strongly agree) – 60 out of 126 respondents (47.61%).

Claim 15 (CAPDS15 – Lower transportation costs, fast and accurate delivery of goods affect the competitiveness of the agricultural products distribution system) has a mean score of 3.9126984 and a standard deviation of 1.1244187. The frequencies of attitude representation are shown in the chart. The highest rating is 5 (strongly agree) – 50 out of 126 respondents (39.68%).

The table (*Table 2.*) shows the basic descriptive statistics for the above statements (CAPDS1-CAPDS15).

Table 2. Descriptive statistics for CAPDS1-CAPDS15 claims

	Mean	Std Dev	Std Err Mean	Upper 95% Mean	Lower 95% Mean	N
CAPDS1	3.9444444	1.1545081	0.1028518	4.1480008	3.7408881	126
CAPDS2	3.8253968	1.200529	0.1069516	4.0370674	3.6137263	126
CAPDS3	4.0952381	1.0985705	0.0978684	4.2889319	3.9015443	126
CAPDS4	4.1031746	1.0941983	0.0974789	4.2960975	3.9102517	126
CAPDS5	4.031746	1.1309218	0.1007505	4.2311438	3.8323482	126
CAPDS6	3.8650794	1.0980213	0.0978195	4.0586763	3.6714824	126
CAPDS7	4.015873	1.1098405	0.0988725	4.2115539	3.8201922	126
CAPDS8	4.0793651	1.1496307	0.1024172	4.2820615	3.8766686	126
CAPDS9	3.984127	1.1522786	0.1026531	4.1872903	3.7809637	126
CAPDS10	3.7142857	1.1232606	0.100068	3.9123327	3.5162387	126
CAPDS11	4.2301587	1.0819442	0.0963872	4.4209211	4.0393964	126
CAPDS12	4.1666667	1.1366618	0.1012619	4.3670765	3.9662568	126
CAPDS13	4.1349206	1.1052831	0.0984664	4.329798	3.9400433	126
CAPDS14	4.0634921	1.1436505	0.1018845	4.2651341	3.86185	126
CAPDS15	3.9126984	1.1244187	0.1001712	4.1109496	3.7144472	126

Source: Authors' research

The figure (*Figure 3.*) shows the frequency of respondent responses to the analyzed claims (CAPDS1-CAPDS15).

Figure 3. Frequency of respondent responses to CAPDS1-CAPDS15 claims
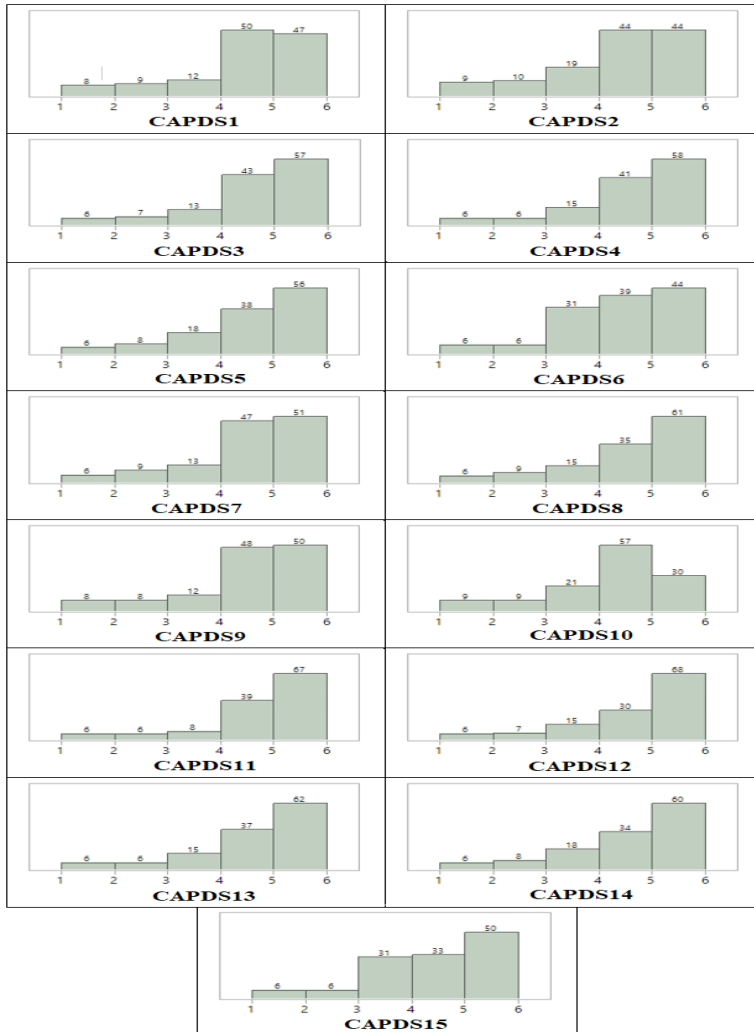
Source: Authors' research

Based on the table, and in accordance with the average rating of the analyzed claims, the order of significance of the asserted claims is as follows: CAPDS11 (4.2301587), CAPDS12 (4.1666667), CAPDS13 (4.1349206), CAPDS4 (4.1031746), CAPDS3 (4.0952381), CAPDS8 (4.0793651), CAPDS14 (4.0634921), CAPDS5 (4.031746), CAPDS7 (4.015873), CAPDS9 (3.984127), CAPDS1 (3.9444444), CAPDS15 (3.9126984), CAPDS6 (3.8650794), CAPDS2 (3.8253968), CAPDS10 (3.7142857).

3) Correlation and regression analysis

The paper makes available a correlation and regression analysis related to the impact of the independent variable "Contact with customers" (hereinafter: CC) on the dependent variable "The competitiveness of the agricultural products distribution system" (hereinafter: CAPDS).

Table (*Table 3.*) provides descriptive statistics for the developed system model.

Table 3. Descriptive statistics for the variables of Customer Contact (CC) and the Competitiveness of the Agricultural Products Distribution System (CAPDS)

	CC	CAPDS
Mean	3.962963	4.0111111
Std Dev	1.1048155	1.0974799
Std Err Mean	0.0984248	0.0977713
Upper 95% Mean	4.1577578	4.2046126
Lower 95% Mean	3.7681681	3.8176096
N	126	126

Source: Authors' research

Figure (*Figure 4.*) presents the Pearson correlation values for the independent variable Customer Contact (CC) and the dependent variable Competitiveness of the Agricultural Products Distribution System (CAPDS). The correlation coefficient between the mentioned variables (CC and CAPDS) is strong (0.9975).

Figure 4. Correlation coefficient for the CC and CAPDS variables
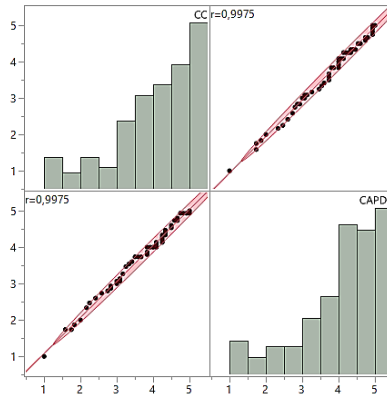
Source: Authors' research

A basic model evaluation was carried out in table (*Table 4.*). The coefficient of determination is 0.995079, which means that with 99.50% of the variability of the dependent variable, CAPDS can be explained by the independent variable CC.

Table 4. Model evaluation for the CC and CAPDS variables

Rsquare	0.995079
RSquare Adj	0.99504
Root Mean Square Error	0.077296
Mean of Response	4.011111
Observations (or Sum Wgts)	126

Source: Authors' research

The statistical significance score is given in table (*Table 5.*) and it is [F (1.124) = 25075.35, p <0.0001].

Table 5. ANOVA for the CC and CAPDS variables

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	149.81692	149.817	25075.35
Error	124	0.74086	0.005975	Prob > F
C. Total	125	150.55778		<0.0001*

Source: Authors' research

Table (*Table 6.*) determines the contribution of the independent variable CC to dependent variable CAPDS. On the basis of these data, the following hypothesis can be confirmed: "The level of customer contact influences the level of competitiveness of the agricultural products distribution system."

Table 6. Contribution coefficients for the CC and CAPDS variables

Term	Estimate	Std Error	t Ratio	Prob>|t|	Std Beta	VIF
Intercept	0.0841583	0.025737	3.27	0.0014*	0	.
GH	0.9909133	0.006258	158.35	<0.0001*	0.997537	1

Source: Authors' research

Based on the data in the previous table, a regression equation can be formed, which reads as follows:

$$y = 0.0841583 + 0.99909133 \cdot x$$

or

$$CAPDS = 0.0841583 + 0.99909133 \cdot CC$$

Figure (*Figure 5.*) shows a diagram of the regression equation for the CC and CAPDS variables.

Figure 5. Regression equation for CC and CAPDS variables
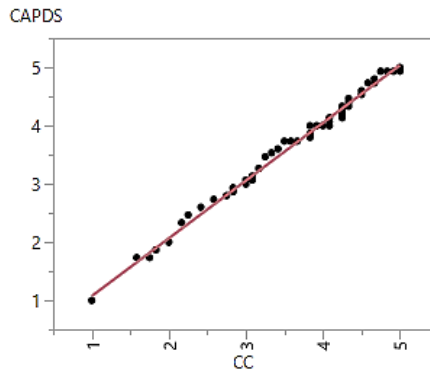
Source: Authors' research

Conclusions

The competitiveness of agricultural products is a complex phenomenon, though a phenomenon for which there is an attempt to find an explanation in as much detail as possible while clearly defining it. Accordingly, this paper highlights customer contact as part of the agricultural distribution channel and its impact on the competitiveness of agricultural holdings in Serbia.

The results of the empirical study show that all analyzed claims related to customer contact (CC) were rated with an average greater than 3.5, indicating that respondents agree with the claims made. In regards to the frequency of the responses, from 8 out of 12 statements (2/3, i.e. 66.67%), individually the most represented rating was 5 – completely agree (including one statement in which it shares the first place by the number of answers). The average highest rated claims (average> 4; 5 claims, i.e. 41.67%) were as follows: CC11 – Good customer relations are important for long-term planning for a distribution strategy, CC10 – Frequent buyers lead to profit increase, CC5 – Markets are important for meeting customer wants and needs, CC12 – Loyal customers significantly impact the planning of a distribution strategy, CC4 – Wholesale stores are increasingly important places to create customer contact.

The results of the empirical study also showed that all the analyzed claims regarding the competitiveness of the agricultural products distribution system (CAPDS) were evaluated with an average higher than 3.5 (minimum 3.7142857), which indicates that the respondents agree with the stated claims. When it comes to the response frequency of 13 out of 15 claims (86.67%) individually, the most prevalent rating was 5 – completely agree (including one claim which shares the first place by the number of answers). The average best-rated claims (average> 4; 5 claims, i.e. 41.67%) were as follows: CAPDS11 – Familiarization of the farm with the way the market functions leads to a stronger competitive position, CAPDS12 – Introducing innovation

in all elements of physical distribution leads to increasing the competitiveness of the agricultural products distribution system, CAPDS13 – A good distributor relationship affects competitiveness, CAPDS4 – Transportation management significantly affects the competitiveness of the agricultural products distribution system, CAPDS3 – Warehouse modernization leads to an increased competitiveness of the agricultural products distribution system, CAPDS8 – The point of sale has an impact on increasing the competitiveness of the agricultural products distribution system, CAPDS14 – A good selection of distribution channels significantly increases the competitiveness of the agricultural products distribution system, CAPDS5 – Adequate commodity handling contributes to greater competitiveness of the agricultural products distribution system, and CAPDS7 – Inventory management affects the competitiveness of the agricultural products distribution system.

The correlation coefficient between the analyzed variables CC and CAPDS is strong (0.9975). Also, the coefficient of determination is 0.995079, which means that with 99.50% of the variability of the dependent variable, CAPDS can be explained by the independent variable CC. On the basis of all the above, it can be concluded that the object and purpose of the paper have been realized, and that the hypothesis of this paper "The level of customer contact influences the level of competitiveness of the agricultural products distribution system" has been proven, based on the conducted research and statistical calculations.

The contribution of this paper is reflected in the importance of increasing the competitiveness of the agricultural products distribution system, especially from the point of view of customer contact as part of the distribution channel of agricultural products in the territory of the Republic of Serbia (in which agriculture has a significant place in total economic activities). The research results also form the basis for further research in this field, both in the field of agriculture and in other fields of economy.

Conflict of interests

The authors declare no conflict of interest.

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THE IMPACT OF COMPLEMENTARY MEDICINE ON SUSTAINABLE TOURISM DEVELOPMENT THROUGH EVENT AND NATURE-BASED TOURISM

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A B S T R A C T

The subject of this research is to look at the attitudes of spa tourists towards complementary medicine and the possibilities of its application within spa services. The aim of the research is to identify certain scientific results that can contribute to the creation of an adequate tourism product. In the research, a prospective study is used and it was done by applying a standardized questionnaire. Testing the correlation of the answers given was examined and shown by the Analysis The Pearson Correlation method. The obtained results confirmed the hypotheses: complementary medicine is a significant component of the sustainable development of health tourism in spa destinations in Serbia, and that the organization of an adequate complementary medicine tourism event can increase tourists' motivation for visits and their significant relation to nature-based tourism, which would significantly affect on sustainable tourism development of spa tourism. The intensification of the growth of awareness among the respondents about the importance of complementary medicine in tourism planning and development is evident, and by providing socio-cultural, economic and environmental benefits, the basic postulates of sustainable tourism development are directly fulfilled.

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Introduction

Health tourism, as one of the most widespread types of travel, is influenced by many factors (Tucki & Hadzik, 2013). Some of these are new products and technologies in contemporary rehabilitation and prevention treatments that can be implemented within the health tourism destination (Hadzik, 2009). The use of medicinal herbs for health purposes is a significant form of complementary medicine dating back to the early stages of human development. In addition to nature-based tourism, complementary medicine can be promoted through various ethno-social events (Yoo, Lee & Lee, 2015; Wisnom & Gallagher, 2018). Nature-based tourism makes a significant link in health tourism, because the ways of access to medicinal plant raw materials and the relation to nature sometimes represent the traditions of a particular people and a model for the realization of tourism needs in nature (Wardle et al., 2018).

Within the global health tourism, wellness tourism has specific opportunities for growth (Global Wellness Institute, 2015). Medical and health tourism are forms of tourism that comprise the therapeutic and wellness segment (Smith & Puczkó, 2015; Pan et al., 2019), linked to the movement of tourists on their own initiative (Connell, 2013) to special resorts that have all the necessary resources (Suess, Baloglu & Busser, 2018). The main motive of these trips is, at the same time, any form of health promotion combined with recreation and entertainment (Vetitnev & Kuskov, 2010). Wellness tourism (as an example of innovation) has the largest share in medical tourism, and is characterized by the largest increase in value in recent years (Euromonitor International, 2012). These motives to go to spas influence the choice of leisure activities and forms, and are an inspiration for creating a new concept of health tourism products, meeting the needs of tourists (Dryglas, 2009). On the other hand, they are constantly increasing competition, changing markets and technologies, forcing companies and health resorts to implement innovations, especially product innovations. A new approach to life that includes health, based on the "wellness" paradigm, results in visible changes in health tourism in spas (Kim et al., 2019). It is focused on "extending life while maintaining health, physical and mental abilities, youthful appearance, well-being and social activity" (Sallmann, 2010).

Different events represent a significant model for promoting this form of tourism. Whether it is local herbal fairs and its application in wellness and spa tourism, or are events of an international nature, health and nature-based forms of tourism can initiate various tourism activities (Whittle, Stewart & Fisher, 2015; Doran, Hanss & Larsen, 2017). The common link between these forms of tourism is nature, and the right attitude of man towards it. Properly integrated into the tourism offer, health, events and nature-based forms of tourism can contribute to significant tourism revenue. With proper planning and development, these forms of tourism can contribute to increasing socio-cultural, economic (Cvijanović, Pantić & Ignjatijević, 2020) and environmental benefits in tourist destinations (Kostić, Ratković & Forlani, 2019).

Achieving these positive results is also the basic postulate of sustainable tourism development (Trisić, Štetić & Krstić, 2018). Innovations in spa health tourism primarily

relate to offers connected to health services. Innovations in spa health tourism are recognized in dimensions as: functional (as they relate to others), useful (as value carrier - patient benefit), technical (as a process in the process of diagnosis and therapy), and relational (as a specific recipient-donor dialogue) service) (Sawicki, 2014). Innovations play a key role in tourism (Aldebert et al., 2011), one of the essential elements of consumer satisfaction with the tourism service that enables the producer to differentiate himself from the competition (Živković, 2009). The modern tourist, a man of today, in order to recover, rest, recover energy, rejuvenate, or heal, visits spa complexes relatively frequently (Manić, 2018). His motives can be classified as "rejuvenation", "socialization", "hedonism", "obsession with health and beauty", "relaxation" and "escape from routine". Tourism offers products and services designed to improve the quality of life (Dimitrovski & Todorović, 2015). Event tourism allows tourists to relax, enhance relatives or other social relationships, experience something unusual and have fun (Senić & Senić, 2016). Visitors can attend the event either for substantially primary reasons, that is, their primary reason for visiting the destination, or for incidental reasons (Getz & Page, 2016). Event management goes through a number of stages: initiation, planning, implementation, event and closure (Event Management Body of Knowledge, 1999). With changes in consumer preferences in the tourism market towards adherence to sustainability criteria, the process of adapting tourism destinations in terms of competitive advantage and sustainable development will last (Popesku, 2011), which entails three pillars of sustainability: economic, socio-cultural and environmental (Vujović, Cvijanović, & Štetić, 2012; Golob et al., 2015). Events are crucial in promoting the destination and attracting visitors who will spend their money in the destination (Getz & Page, 2016) and contribute to the huge profits of the destination (Giampiccoli et al., 2015). Event tourism plays an important role in the modern economy and can have a significant impact, where sustainability-oriented tourism has become an important component of tourism destination development and planning (Golob et al., 2015; Vujović, Ćurčić, & Miletić, 2016; Cvijanović, Simić & Vukotić, 2018).

The subject of this research is to look at the attitudes of spa tourists towards complementary medicine and the possibilities of its application within spa services. The hypotheses of the research are: complementary medicine is a significant component of the sustainable development of health tourism in spa destinations in Serbia (H_1) and the organization of an adequate complementary medicine tourism event would increase tourists' motivation for visits and their significant relation to nature-based tourism (through traditional plant picking and nature stay), which would have a significant impact on the sustainable tourism development of spa tourism (H_2).

The aim of the research in this paper is to identify certain scientific results that can contribute to the creation of an adequate tourism product. This significant tourism product would integrate complementary medicine with events and nature-based forms of tourism into a single unity, thus meeting the expressed needs of spa tourists. In addition to directly meeting the need to improve and upgrade their health status, tourists also expressed interest in learning about the available herbal medicinal resources of Vrnjačka Banja and its natural environment. Organizing an adequate tourism event in

the field of complementary medicine would increase tourists' motivation to visit, which would significantly influence the sustainable development of spa tourism.

The expected results of the research are that complementary medicine is a significant component of health tourism, and that in addition to nature-based tourism and events, it can contribute to the sustainable tourism development of Serbia.

Materials and methods

A prospective study was conducted using a questionnaire containing four groups of variables: demographic characteristics, knowledge of properties and use of medicinal herbs, initiation of treatment, and respondents' attitudes toward phytotherapy and complementary (traditional) medicine. Within this paper, three groups of variables are presented: demographic characteristics, treatment initiation, and respondents' attitudes toward phytotherapy and complementary medicine. The research instrument is a standardized questionnaire, prepared according to WHO guidelines for assessing the availability, use, coordination and comprehensiveness of health care used in the WHO survey in the Republic of Serbia in 2009, which is thematically tailored to the research needs. The survey of 62 Vrnjačka Banja tourists was conducted in the period July – September 2019. Respondents were selected by random selection method and completed questionnaires in the presence of interviewers. Respondents were asked a total of 15 questions, of which 13 questions were used for research and analysis. The questions were assigned numbers n_1, n_2, n_3, n_4, n_5, n_6, n_7 ... n_{13}. The questionnaire was prepared using a structured interview method, composed of two parts. In the first part, consisting of questions 1 and 2, the respondents presented their answers by writing the answer that is related to a certain offered number (1, 2, 3 or 4), depending on its meaning and truthfulness. In the second part of the questionnaire, from the third question, three-level Likert scale answers were given: Yes - I agree (number 1 offered); Partially agree (2) and Disagree (3). The Likert scale allows respondents to adequately express their level of agreement with certain statements in the questionnaire (Joshi et al., 2015). The data were described by descriptive statistical methods and analyzed by appropriate statistical-analytical method using SPSS (Statistical Package for the Social Sciences) software. Testing the correlation of the answers given was examined and shown by the Analysis The Pearson Correlation method, to determine whether the model of differences obtained was relevant to the analysis of the results. The number of 62 randomly selected respondents represents a small but significant sample for analyzing the current state of the spa and event tourism market in Vrnjačka Banja, which is a significant tourist destination in the Republic of Serbia and in the region. Analyzing the answers from the questionnaire can contribute to the construction of scientific conclusions regarding sustainable tourism development, ie whether events, spa and nature-based tourism can be significant for sustainable tourism development. The results may also point to further research related to these areas of tourism planning and development.

Results and Discussions

The sample consisted of 62 respondents, 59.7% female and 40.3% male. The observed difference in gender distribution is not at the level of statistical significance. The average age of the respondents was 55.48 ± 15.18 years, with the average age of the female being 8 years. Half of the respondents have a high school diploma and a third have a college/faculty diploma. Every tenth respondent evaluates his financial status as very good. Of the total number of respondents, 43.5% live in the city, 32.3% in the suburbs and 24.2% in the village. The largest number of respondents came from Central Serbia, 43.5%, and the smallest from Eastern Serbia, 11.3%. The analysis by gender shows that there is no statistically significant difference in the level of education, the assessment of the material situation, the part of Serbia where the respondents come from and the places of residence between the male and female persons. The structure of the respondents can be summarized in Table 1.

Table 1. Structure of respondents

Gender	Frequency	Percent	Mean	Std. dev.
Male	25	40.3		
Female	37	59.7	1.4	.495
Total	62	100		
Education	frequency	Percent	Mean	Std. dev.
Unfinished school	2	3.2		
primary education	6	9.7		
secondary education	35	56.5	3.15	.721
Tertiary and faculty education	19	30.6		
Total	62	100		
age structure	N	Min	Max	Mean	Std. dev.
	62	18	82	55.48	15.178
The environment you come from	frequency	Percent	mean	Std. dev.
City	27	43.5		
Suburb	20	32.3	1.81	.807
Rural environment	15	24.2		
Total	62	100		
The region you come from	Frequency	Percent	Mean	Std. dev.
Vojvodina	9	14.5		
Western Serbia Srbija	11	17.7		
Central Srbija	27	43.5	2.90	1.183
Eastern Srbija	7	11.3		
Foreign country	8	12.9		
Total	62	100		

Source: Author research

The level of education has an impact on how treatment is started, so that people with secondary education, as well as those with tertiary /faculty education, most often start treatment with the use of medicinal herbs. Respondents who evaluate their financial

status as good most often start treatment with medicinal plants, while those with mediocre financial status most often visit a doctor first.

Persons coming from Vojvodina usually start treatment with medicinal herbs, while respondents from Western, Central, Eastern and Southern Serbia first consult a doctor.

To the question n_1 - Do you use herbs, and n_2 - Do the family members of the respondents use herbs, the respondents gave their answers in the following relation (Table 2).

Table 2. Respondents' answers to questions n_1 and n_2

Questions	n_1		n_2	
Valid	Frequency	Percent	Frequency	Percent
Daily	14	22.6	6	9.7
Occasionally, when I'm healthy	27	43.5	29	46.8
Only in case of illness	21	33.9	27	43.5
Total	62	100	62	100
t	22.216		28.268	
Sig. (2-tailed)	.000		.000	
df	61		61	
Mean Difference	2.113		2.339	
Std. Error Mean	.095		.083	

Source: Author research

Analyzing the answers, presented in Table 2, it is concluded that the majority of respondents use herbs occasionally, or when their current health needs to be improved. Likewise, the respondent's family, in the largest number of responses, occasionally uses herbs or, when ill. It is concluded that the respondents are competent to provide answers regarding the role of complementary medicine in sustainable tourism development through events, nature-based and spa forms of tourism, since they make significant use of medicinal herbs.

The second part of the questionnaire deals with the respondents' agreement with the offered options (they agree completely, partially agree, or disagree). The structure of questions 3 through 13 from the questionnaire is shown in Table 3.

Table 3. Question structure of the second part of the questionnaire

Questions	
n_3	Serbia is rich in medicinal plants that grow freely in nature
n_4	Vrnjačka Banja is rich in medicinal plants important for the development of events and nature-based forms of tourism
n_5	Medicinal plants are good for health
n_6	Medicinal plants should be harvested for their function and tradition
n_7	I would love to collect herbs while staying at the spa
n_8	In many countries, traditional medicines are used in medical treatment besides medical
n_9	In many countries, physicians and experts in traditional (complementary) medicine also participate in treatment

	Questions
n_{10}	I think that the same treatment principles should be applied to us through the spa form of tourism as a significant tourist offer
n_{11}	If the same treatment principles were applied in the spa, the treatment would be more effective
n_{12}	If traditional (complementary) medicine were part of spa tourism, as the initiator of events and nature based forms of tourism, I would visit the spa more often
n_{13}	If the same treatment principles were applied in the spa, more tourists would be staying in the spa

Source: Author research

Respondents' answers to the questions asked can be presented and analyzed structurally in Table 4.

Table 4. Respondents' answers to the second group of questions

Statistics								
n	I agree	Percent	Partially agree	Percent	Disagree	Pecent	Mean	Std. Deviation
n_3	50	80.6	10	16.1	2	3.2	1.23	.493
n_4	38	61.3	31	33.9	3	4.8	1.44	.590
n_5	60	96.8	1	1.6	1	1.6	1.05	.282
n_6	58	93.5	3	4.8	1	1.7	1.08	.329
n_7	24	38.7	20	32.3	18	29	1.90	.824
n_8	44	71.0	14	22.6	4	6.5	1.35	.603
n_9	40	64.5	17	27.4	5	8.1	1.44	.643
n_{10}	46	74.2	16	25.8	0	0.0	1.26	.441
n_{11}	44	71	15	24.2	3	4.8	1.34	.571
n_{12}	32	51.6	23	37.1	7	11.3	1.60	.689
n_{13}	46	74.2	14	22.6	2	3.2	1.29	.524

Source: Author research

After statistically presenting the answers given in Table 4, it can be concluded that the majority of respondents agree with the question asked. The highest average values have the answers to the questions in which the respondents completely agree, in questions n_5, n_6, n_3, n_{10} and n_{13}, while the lowest average values in the answers of the agreement with the statement, recorded in questions n_7, n_{12} and n_4. An insight into the data in Table 4 reveals statistically significant differences in the outputs. These statistically significant differences can be examined with the help of Analysis The Pearson Correlations, which determines whether the model of statistically significant differences obtained is relevant for reaching conclusions, the respondents 'attitudes have a significant role in creating the research conclusions, and to what extent the respondents' attitudes may influence to draw conclusions about the impact of complementary medicine on sustainable tourism development, through spa, events and nature-based tourism, as shown in Table 5.

Table 5. Analysis The Pearson Correlations

		n_3	n_4	n_5	n_6	n_7	n_8	n_9	n_{10}	n_{11}	n_{12}	n_{13}
n_3	Pearson Correlation	1	.276*	.038	.189	.014	.112	.150	.105	.015	.079	.186
	Sig. (2-tailed)		.030	.769	.141	.912	.386	.245	.419	.908	.539	.148
	N	62	62	62	62	62	62	62	62	62	62	62
n_4	Pears.Correlation	.276*	1	.167	.154	.223	.111	.226	.191	.285*	.278*	.167
	Sig. (2-tailed)	.030		.195	.232	.082	.389	.077	.137	.025	.029	.193
	N	62	62	62	62	62	62	62	62	62	62	62
n_5	Pears.Correlation	.038	.167	1	.841**	.091	-.006	.153	.030	.202	.271*	.458**
	Sig. (2-tailed)	.769	.195		.000	.482	.962	.235	.818	.116	.033	.000
	N	62	62	62	62	62	62	62	62	62	62	62
n_6	Pears.Correlation	.189	.154	.841**	1	.090	.101	.296*	.080	.201	.218	.432**
	Sig. (2-tailed)	.141	.232	.000		.488	.433	.019	.536	.117	.088	.000
	N	62	62	62	62	62	62	62	62	62	62	62
n_7	Pears.Correlation	.014	.223	.091	.090	1	.169	.235	.340**	.489**	.306*	.028
	Sig. (2-tailed)	.912	.082	.482	.488		.189	.065	.007	.000	.016	.828
	N	62	62	62	62	62	62	62	62	62	62	62
n_8	Pears.Correlation	.112	.111	-.006	.101	.169	1	.694**	.574**	.359**	.113	.135
	Sig. (2-tailed)	.386	.389	.962	.433	.189		.000	.000	.004	.380	.294
	N	62	62	62	62	62	62	62	62	62	62	62
n_9	Pears.Correlation	.150	.226	.153	.296*	.235	.694**	1	.464**	.395**	.440**	.202
	Sig. (2-tailed)	.245	.077	.235	.019	.065	.000		.000	.001	.000	.115
	N	62	62	62	62	62	62	62	62	62	62	62
n_{10}	Pears.Correlation	.105	.191	.030	.080	.340**	.574**	.464**	1	.624**	.132	.096
	Sig. (2-tailed)	.419	.137	.818	.536	.007	.000	.000		.000	.305	.458
	N	62	62	62	62	62	62	62	62	62	62	62
n_{11}	Pears. Correlation	.015	.285*	.202	.201	.489**	.359**	.395**	.624**	1	.395**	.268*
	Sig. (2-tailed)	.908	.025	.116	.117	.000	.004	.001	.000		.001	.035
	N	62	62	62	62	62	62	62	62	62	62	62
n_{12}	Pears.Correlation	.079	.278*	.271*	.218	.306*	.113	.440**	.132	.395**	1	.466**
	Sig. (2-tailed)	.539	.029	.033	.088	.016	.380	.000	.305	.001		.000
	N	62	62	62	62	62	62	62	62	62	62	62
n_{13}	Pears.Correlation	.186	.167	.458**	.432**	.028	.135	.202	.096	.268*	.466**	1
	Sig. (2-tailed)	.148	.193	.000	.000	.828	.294	.115	.458	.035	.000	
	N	62	62	62	62	62	62	62	62	62	62	62

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

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

Source: Author research

The correlation results indicate that the respondents tend to express the differences in the answers, which to a greater extent confirm certain claims. This result indicates that a significant number of respondents agree with the claim that complementary medicine has a significant share in the creation of the tourist offer of the destination. The smaller number of respondents, from the largest clusters of Serbia and abroad, can represent a significant sample for analyzing the impact of complementary medicine on sustainable tourism development through events, spa and nature-based tourism. The results obtained may be significant for the comparative analysis of sustainable tourism development in the Republic of Serbia. It can be concluded that understanding of the importance of the implementation of complementary medicine in the tourist offer of Serbia is present, especially through the organization of special events, because through events, spa and nature-based tourism, such sustainable tourism development provides different benefits (Traskevich & Fontanari, 2018; Trišić et al., 2020). This refers to data indicating that only a small number of respondents disagree with the statements made in the questions asked. What is significant is that there is an intense increase in awareness among the respondents about the importance of complementary medicine in tourism planning and development, precisely through events and nature-based tourism. The results obtained in this way can be of great importance in domestic and foreign tourism. Tourists from the countries of the region, such as Bosnia and Herzegovina, Croatia, Hungary, Romania, Bulgaria, as well as other European and world countries, are increasingly visiting the Republic of Serbia. Much of the tourism demands are directed specifically to events, spa and nature-based tourism. By developing such forms of tourism, it strengthens tourists' awareness of the importance of nature and environment, as an indispensable factor in tourism development (Valdivieso, Eagles & Gil, 2015; Geneletti, Scolozzi & Esmail, 2018).

Conclusions

The conducted research has enabled the constitution of scientific knowledge that tourists are very happy to opt for activities of traditional medicinal herbs collection, significant in complementary medicine. Such activities are realized in nature, with which tourists came in direct contact (Bottero et al., 2019). Using these resources can encourage their renewal and improvement, which is a segment of sustainable tourism development (Schmudde, 2015; Bello, Carr & Lovelock, 2016). Herbs collection activities would form a positive collective socio-cultural impact, both on tourists and on the local community (Page et al., 2017; Đurađević & Dimitrovski, 2019). The local community plays an important role in promoting these natural values of the tourist destination. Respondents, through their questionnaire, just gave importance to events, wellness and spa forms of tourism (Đurađević, 2017), which, with the aforementioned nature-based motives, can enhance Vrnjačka Banja's importance in terms of competing tourist destinations. The research and analysis of the obtained results confirmed two sets of scientific hypotheses. These are that complementary medicine is a significant component of the sustainable development of health tourism in Serbian spa destinations and that organizing an adequate complementary medicine tourism event can increase tourists' motivation for visits and their significant relationship to nature-based tourism

(through traditional plant picking and stay in nature), which would have a significant impact on the sustainable tourism development of spa tourism. Also, the results of the research in this paper showed that complementary medicine is a significant component of the development of health tourism in Serbia, and that the organization of adequate tourist events in the field of complementary medicine would increase the motivation of tourists to visit, which would significantly improve the overall sustainable tourism development of tourism. industry. The results obtained may also be significant for a comparative analysis of sustainable tourism development in the Republic of Serbia. It can be concluded that there is an understanding of the importance of implementing complementary medicine in the tourist offer of Serbia, because through events, spa and nature-based tourism, such sustainable tourism development provides different benefits. The concluding remarks made can be of great importance in domestic and international tourism. Tourists from the countries of the region, such as Bosnia and Herzegovina, Croatia, Hungary, Romania, Bulgaria, as well as other European and world countries, are increasingly visiting the Republic of Serbia. Respondents, although the number of them is not so large, represent a significant sample for correlating and comparing tourism development at local, national and regional levels. Much of the world's tourism demand is directed specifically to events, spa and nature-based tourism (Koskinen & Wilska, 2019). Complementary medicine can represent a significant link between these three important forms of tourism for Serbia, and by providing socio-cultural, economic and environmental benefits, the basic postulates of sustainable tourism development are directly fulfilled.

Conflict of interests

The authors declare no conflict of interest.

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PRODUCTION AND TENDENCY IN MILK PROCESSING IN MONTENEGRO

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ARTICLE INFO	ABSTRACT
	Production and processing of milk represents a very important sector of the agricultural industry of Montenegro. Milk production is performed primarily on family farms, from which a small percentage is further placed in processing facilities. In addition to favourable conditions for cattle rearing and milk production, production results are modest. ARIMA model was applied in order to forecast the quantities of cow's milk that will be collected and processed in 2019 into fermented dairy products and drinking milk. The observed and obtained data show the presence of seasonal and trend component in time series. Furthermore, the analysis highlighted the importance of milk processing on family farms, in addition to the need for investment in its improvement. The paper also analyzes investment support referring to the milk processing facilities in Montenegro. © 2020 EA. All rights reserved.

Introduction

At the global level, livestock represents a significant sector of agriculture. Products obtained through certain lines of livestock production (milk, meat, etc.) participate in the daily nutrition of the population. Milk comprises a huge and irreplaceable importance in providing essential ingredients in the human nutrition, as one of the main sources of protein. Global protein consumption through dairy products accounts for 10.3% of total protein intake (Deshmukh, Paramasivam, 2016). Milk and dairy products are characterized by a very important role in the structure of nutrition (Jovanović et

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al., 2001). As such, in addition to certain cereals, milk is the most important agri-food product; therefore, a special attention is paid to the production of milk and dairy products. In this regard, milk production on farms in EU countries is increasing year after year. The leading EU milk producer is Germany, followed by France, the United Kingdom, the Netherlands, Poland, Italy and Spain, producing a total of three quarters of all volume of milk at the EU level. (Eurostat, 2019).

The safety and availability of fodder significantly affects the overall development of livestock. It is necessary that the volume, range and quality of fodder is to be matched with the need for fodder resulting from the number of animal units, structure of production and production capacity of the livestock. Perennial meadows and pastures imply a dominant place in the total agricultural area of Montenegro, and therefore the most important resource in the production of the fodder. Exploitation of meadows and pastures makes it possible to reduce the fodder cost relative to fodder produced on arable land, moreover to reduce a risk of changes in the cost of fodder, primarily maize (Ivanović, 2018).

Due to favourable natural conditions and long tradition, the most important role in the field of agriculture of Montenegro refers to the livestock, with the milk production dominating on the subject of the cattle production. Lactation milk and milk composition are considered to be racial traits, regardless of the existence of extremes in milk yield and composition. (Perišić et al., 2011). However, the racial composition of cattle is quite unfavourable, in view of the fact that various beef crossbreds make up about 46% of the total population. Highly productive breeds (holstein, brown, simmental and tyrolean gray) collectively account for about 53%. Bush as an indigenous race is represented by 1% and has its significance as a genetic resource. (Ministry of Agriculture and Rural Development, 2015). Changing racial composition goes towards increasing the participation of more productive races and reducing the participation of beef crossbred.

The main activity of cattle farms is production of milk and dairy products. In Montenegro, on average, 175 million litres of milk have been produced annually in the last decade and a half. Cow's milk accounts for 94% of total milk production. It is essential to bear in mind that the success of production in the market system of economy entails continuous monitoring, analysis and forecasting of both the business results and determinants that conditioned achieved results. State analysis and prediction may be based on an ordered series of data at equal time intervals, or on the analysis of time series of observed phenomena. If forecasting is the goal of time series analysis, it is based on the available historical data on the basis of which a time series model is formulated and evaluated, which is then used to predict future series values (Novković, 2010).

Autoregressive Integrated Moving Average Process (ARIMA) was used in a number of agricultural researches. Thus, the authors (Farhan et al., 2011) forecasted milk production in Pakistan using the ARIMA model. In order to further empower all participants in the Tamil Nadu milk production chain (Sankar and Prabakaran, 2012), they used the ARIMA model to forecast future milk production. This model was used by both Deshmukh and Paramasivam (2016) and Safa Abdelgadier et al. (2018) to forecast

milk production. Novković et al. (2010) used ARIMA to forecast the production of certain types of vegetables in Vojvodina. Mutavdžić et al. (2016), using the ARIMA model, predicted prices and price parities of wheat and maize in Serbia. Mihailović et al. (2019) forecasted the prices of the most important vegetable crops (beans, tomatoes, peppers, onions, cabbages and watermelons) in Serbia, also using the ARIMA model.

The aim of this research is to predict quantities of milk that will be collected and processed in milk processing facilities not located within the family farms in Montenegro. In order to achieve this, the ARIMA model was applied using monthly data on quantities of raw cow milk purchased from the beginning of 2013 to the end of 2018. Also, the purpose of the analysis is to assess the need for investment in dairy processing on family farms.

Materials and methods

In order to observe current situation in milk processing, data from the Statistical Office of Montenegro were used. Data were processed using SPSS 23.0 statistical programme. Monthly data on cow's milk collected, data on obtained quantities of fermented milk products and data on obtained quantities of drinking milk in Montenegro for the period January 2013 - December 2018 were analyzed. Using the Box-Jenkins modelling strategy, the ARIMA models were identified that best describe dynamics of the observed phenomena. The general form of the ARIMA model is as follows (Mladenović, Nojković, 2015):

$$(1 - \phi_1 L - \phi_2 L^2 - \cdots - \phi_p L^p)(1 - L)^d X_t = \theta_0 + (1 - \theta_1 L - \theta_2 L^2 - \cdots - \theta_q L^q)e_t \quad (1)$$

where p is the order of the autoregressive component, d is the level of model integration, and q is the order of the moving average component, ϕ_1, ϕ_2, ϕ_p represent the autoregressive parameters, $\theta_0, \theta_1, \theta_2, \ldots \theta_q$ represent the parameters of the moving average model, and e_t is the white noise process. The Box-Jenkins modelling strategy is an iterative procedure that involves three stages (Mladenović, Nojković, 2015). During the first phase, the model is identified, where the researcher firstly determines whether the time series has a stable variance, then decides on the order of integration of the model, and subsequently on the order of the autoregressive and moving average components, and whether a free member is included in the model or not . In the next phase, the parameters of the model are evaluated, followed by the phase of checking the adequacy of the model, which involves checking normality and non-correlation of the residuals. Gujarati (2003) also mentions the fourth stage, which is related to forecasting a value of the observed phenomenon in the future period, based on the evaluated and tested the ARIMA model. He notes that the ARIMA models are gaining popularity precisely because of the higher reliability of forecast values than traditional econometric models.

Following the estimated ARIMA models, quantities of collected milk, fermented milk products and drinking milk produced for the January-December 2019 period were forecasted.

Agricultural production is characterized by certain seasonal fluctuations, caused by the most common effects of natural and market factors, which also affect the final production results. Seasonal ARIMA models represent special cases of the ARIMA models. Seasonal time series are characterized by periodic fluctuations that recur at intervals of up to one year. The minimum time period in which the observed occurrence is repeated is called the season period and is denoted by s. If monthly series are concerned then the season period is equal to 12, for quarterly series $s = 4$ and for semi-annual $s = 2$ (Kovačić, 1995). Sanchez et al. (2014), analyzing monthly milk production data for a period of ten years, also noted presence of a seasonal component in production, and used the seasonal ARIMA model to forecast milk production.

Results and Discussions

Observing agricultural farms according to the manner of the usage of agricultural land, 83% of the total number of farms uses perennial meadows and pastures (Statistical Office, 2016). Hay yield on meadows account 2,53 t/ha on average, whilst regarding the pastures it varies between 0,33 – 0,74t/ha. Forage crops of clover and alfalfa in 2017 were 6,40 t/ha of clover and alfalfa 6,10 t/ha.

Of the total number of farms in 2016, 71,38% reared livestock. The largest share in the structure with 70,18% is cattle-rearing farms, where 89.269 animal units are raised, of which 59.583 are dairy cows. Sheep-raising farms account for 17,64% of the total number of farms. The total number of sheep on farms is 191.992, of which 95.243 are used for milking, 10,76% of farms are engaged in goat breeding, raising 31.458 goats, of which 21.429 are for milking (Statistical Office, 2016). The number of agricultural farms based on the number of animal units they raise, is shown in Table 1. The data presented were obtained on the basis of a conducted survey on the structure of agricultural farms in Montenegro in 2016 by the Statistical Office, and for the needs of the FSS (Farm structure survey).

Table 1. Farms in Montenegro raising cattle by size of herd in 2016

Number of agricultural farms	Without cattle	Size of the class according to the number of cattle						
		1-2 units	3-9 units	10-19 units	20-29 units	30-49 units	50-99 units	100 units and more
43.791	21.852	11.684	8.512	1.444	179	76	32	12

Source: Statistical Office, Structure of agricultural farms in 2016

Table 1 shows that within the cattle-rearing farms, 53% farms have 1-2 animal units, while the share of farms with 100 or more animal units is only 0,05%. Table 2. presents data on the number of cows and the production of cow's milk in Montenegro in the period 2013-2018.

Table 2. Numbers of cows and production of milk in Montenegro for period 2013-2018

Year	Number of cows				Milk					
	Cows		Dairy cows		Total (000) l	Base index	Cow's (000) l	Base index	Per dairy cow - l	Base index
	Total	Base index	Total	Base index						
2013	61.830	100,0	60.998	100,0	181.876	100,0	168.540	100,0	2.763	100,0
2014	63.889	103,3	63.097	103,4	191.801	105,5	178.121	105,7	2.805	101,5
2015	63.262	102,3	62.812	102,9	183.086	100,7	170.701	101,3	2.710	98,1
2016	60.040	97,1	59.583	97,7	180.550	99,3	168.037	99,7	2.803	101,4
2017	60.609	98,0	60.042	98,4	181.498	99,8	169.351	100,5	2.784	100,8
2018	59.859	96,8	59.469	97,5	181.509	99,8	168.235	99,8	2.792	101

Source: Statistical Office 2018, 2019

In the observed period, the number of dairy cows increased in 2014 and 2015, with a slight decrease compared to the base year of 2013. The largest number of cows was recorded in 2014. The production of cow's milk is increasing compared to the base year of 2013, reaching its maximum in 2014, after which a decline is recorded in the following years. The production of milk per cow was also the highest in 2014, after which it declined, which is very unfavourable and indicates stagnation regarding the racial composition of the cows and the level of milk production technology itself.

Most non-family-owned milk processing facilities in Montenegro have implemented HACCP and other relevant standards. The volume of dairy production in their product range is dominated by fermented dairy products, drinking milk, cheese made exclusively from cow's milk and cream. Namely, the dairy industry in Montenegro is characterized by a narrow range of products (mainly yogurt, sour cream and various types of hard and soft cheeses and sweet (short-lived) milk and whey). Of the 25 processors in 2015, 5 produced sweet (short-lived) milk, 5 whey, 12 different types of cheese and 5 produced yoghurt. However, among the 5 dairies whose dominant product is yogurt, 4 are the largest, which together process 63% of purchased milk, leading to the conclusion that yogurt is the prevailing product in the dairy product range of Montenegro (Ministry of Agriculture and Rural Development, 2015).

The analysis of the purchase of the largest milk processors leads to the conclusion that the most produced milk is produced (59%) and processed (75%) in the central region of Montenegro. In the northern region 32% of purchased milk is produced and 22% is processed, while in the coastal region 9% is produced and only 3% is processed. Total quantities of cow's milk purchased in the period January 2013 - December 2018 ranged from 11-15% of total cow's milk produced in Montenegro, which indicates that a large part of the produced milk remains on family farms and is processed thereof.

The chemical and hygienic quality of raw milk in Montenegro is provided in (Table 3). From the above data on the chemical and hygienic quality of raw milk, it can be seen that chemical quality is improving year after year.

Table 3. Overview of the milk quality in Montenegro for period 2013-2017

Year	Fat (%)	Proteins (%)	Number of somatic cells x 1000	Total number of bacteria x 1000
2013	3,98	3,26	663	4.036
2014	3,99	3,26	636	3.179
2015	4,02	3,23	543	2.556
2016	4,04	3,24	504	2.376
2017	4,07	3,22	470	1.907

Source: Ministry of Agriculture and Rural Development, 2018

According to data from the Directorate for Food Safety, Veterinary and Phytosanitary Affairs of Montenegro, in 2017 (from farms under the official control system for milk production and processing), 2.000 producers delivered milk to milk processing facilities, while 1.000 producers processed milk on their own farm into cheese and cream intended for the market. Given the fact that most of the milk produced is processed on farms, it is clear that small milk producers sell their production to dairies, while those larger producers are more oriented towards processing milk on their own farms.

Analysis and forecast of the quantity of cow's milk collected

In the analyzed period from January 2013 to December 2018, the average amount of cow's milk collected was 2.152.933,1 kg. The minimum amount of milk collected was 1.720.616 kg, obtained in February 2016, while the largest amount collected in July 2018 was 2.613.105,9 kg. In the observed period, the trend of increase in the collected quantities of cow's milk is present during the period from February to July-August for each year, followed by a decrease in the collected quantities. This refers to the presence of a seasonal component. Such drift of the quantity of milk collected is conditioned by the volume of milk production on farms. Greater milk production is related to the quality of livestock nutrition, that is, to pasture use in summer.

Tendencies in the drift of collected cow's milk quantities in the observed period, in addition to the forecasted quantities are shown in Graph 1. Table 4. shows the parameters of the estimated model for the forecast of cow's milk collected. The estimated model forecasts quantities for the period January-December 2019 (Table 5). The estimated ARIMA model of cow's milk collected shows that the movement of production of the current month is significantly influenced by the quantities of collected milk from the same month of the previous year, which is in accordance with the biological and technical and technological characteristics of this production.

Table 4. Estimated parameters of ARIMA $(0,1,0)$x$(1,0,0)_{12}$ models for variable of collected cow's milk

Variable	Parameters	Standard Error	t - ratio	p	95% confidence interval	
					Lower	Upper
SAR(1)	0,666322	0,108100	6,163954	0,000000	0,450724	0,881920

Source: Authors' calculations

Table 5. Projected quantities of cow's milk collected in Montenegro for the period January-December 2019 based on ARIMA $(0,1,0)x(1,0,0)_{12}$

Month	Projected quantities	90% confidence interval of projected volume		Standard error of the forecast	Quantity collected
		Lower limit	Upper limit		
January 2019	2.111.736	1.953.376	2.270.095	95.001,6	2.078.011
February 2019	2.035.791	1.811.837	2.259.746	134.352,6	1.994.351
Mach 2019	2.197.822	1.923.535	2.472.108	164.547,6	2.214.211
April 2019	2.247.734	1.931.015	2.564.453	190.003,2	2.243.693
May 2019	2.395.280	2.041.177	2.749.383	212.430,1	2.513.963
June 2019	2.363.612	1.975.712	2.751.512	232.705,5	2.479.166
July 2019	2.406.006	1.987.026	2.824.986	251.350,6	2.573.433
August 2019	2.357.145	1.909.236	2.805.053	268.705,1	2.621.857
September 2019	2.265.587	1.790.509	2.740.666	285.004,8	2.459.134
October 2019	2.243.744	1.742.967	2.744.521	300.421,5	2.387.715
November 2019	2.122.012	1.596.793	2.647.232	315.084,7	-
December 2019	2.094.874	1.546.300	2.643.447	329.095,2	-

Source: Authors' calculations

It can be seen from Table 5. that the standard error of the forecast increases with the increase in the number of periods for which the cow's milk is forecasted. With the passage of time, the differences are percentage-wise increasing between forecast and actual values. This result is expected because the model does not capture all future events that may affect the observed variable.

Figure 1. Tendencies of observed and forecasted quantities of cow's milk collected
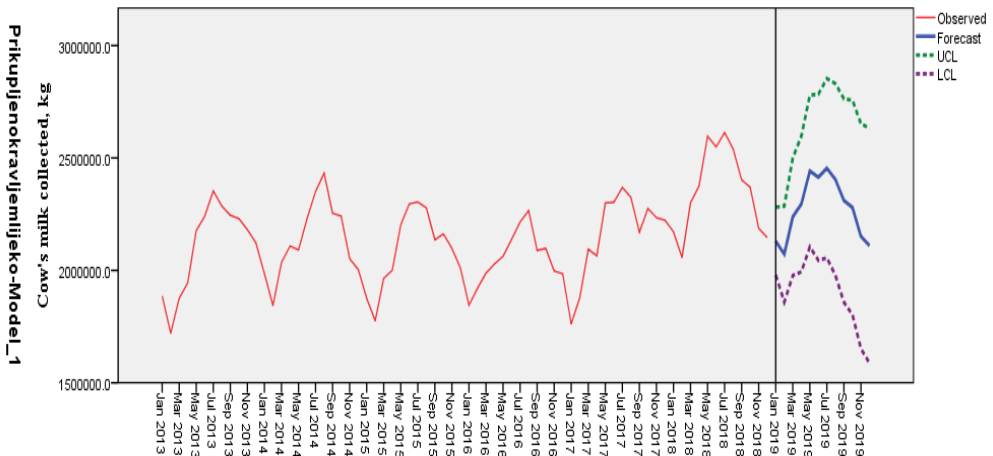
Source: Authors' calculations

Analysis and forecast of production of fermented dairy products

Fermented dairy products have the largest share in the structure of products obtained from milk processing in processing facilities. The average quantity produced of these products for the period January 2013- December 2018 was 679.123 kg. In December 2014, 459.199 kg of fermented dairy products were produced and this is the lowest amount obtained for the observed period. The largest production volume was obtained in August 2018 in the amount of 1.020.673,5 kg. Production of this product group in the period 2013-2015 had a trend of growth from February to August, while for the period 2016-2018, the growth trend recorded from January to August. For both periods, production is declining after the month of August.

Referring to the fermented dairy products, there is a trend and a seasonal component. Graph 2. shows the obtained and forecasted quantities in the production of fermented dairy products. Table 6. shows the parameters of the estimated model for forecasting the production of fermented dairy products. The estimated model forecasts quantities for the period January-December 2019 (Table 7). The estimated ARIMA model of fermented dairy production shows that the volume of fermented dairy products from the same month of the previous year is significantly influenced by the current month's production trends.

Table 6. Estimated parameters of ARIMA $(0,1,0)x(1,0,0)_{12}$ models for variable of production of fermented dairy products

Variables	Parameters	Standard Error	t -ratio	p	95% confidence interval	
					Lower	Upper
AR(1)	-0,315460	0,121597	-2,59430	0,011567	-0,558040	-0,072880
SAR(1)	0,639109	0,121846	5,24521	0,000002	0,396033	0,882186

Source: Authors' calculations

Table 7. Projected quantities of fermented dairy products in Montenegro for the period January-December 2019 based on ARIMA $(0,1,0)x(1,0,0)_{12}$

Month	Projected quantities	90% confidence interval of projected volume		Standard error of the forecast	Quantity collected
		Lower limit	Upper limit		
January 2019	718.685,5	609.651,4	827.720	65.398,0	635.804
February 2019	726.930,8	594.797,1	859.064	79.253,0	717.971
Mach 2019	762.190,1	604.812,7	919.567	94.394,0	765.196
April 2019	818.916,4	641.427,2	996.406	106.457,0	787.202
May 2019	872.941,9	676.942,9	1.068.941	117.559,1	787.579
June 2019	848.286,7	635.513,9	1.061.060	127.619,9	924.869
July 2019	911.431,3	683.074,6	1.139.788	136.967,0	1.091.010
August 2019	977.112,3	734.180,9	1.220.044	145.708,8	1.005.789
September 2019	836.859,1	580.175,9	1.093.542	153.957,1	817.051
October 2019	831.950,5	562.216,7	1.101.684	161.784,8	745.730
November 2019	779.515,7	497.333,9	1.061.698	169.251,0	-
December 2019	779.934,2	485.830,8	1.074.038	176.401,5	-

Source: Authors' calculations

Figure 2. Tendencies in production of observed and forecasted quantities of fermented dairy products
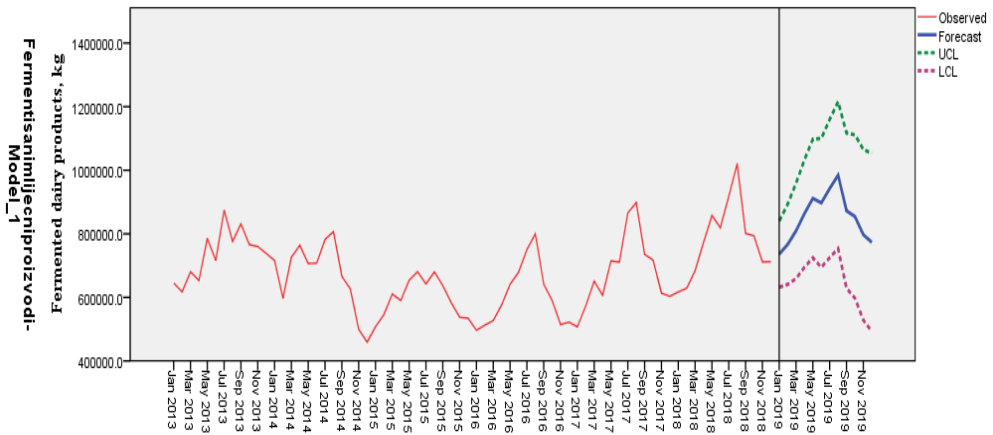
Source: Authors' calculations

Analysis and forecast of production of drinking milk

The average quantity of drinking milk produced in the period January 2013- December 2018 was 503.015 kg. Production of drinking milk from the beginning of 2013 to the end of 2014 was increasing, with minor fluctuations in the second half of 2013. In 2014, the largest production was recorded in the amount of 824.408 kg. Since January 2015, there was a constant downward trend in production, which resulted in the smallest production in December 2018 amounting to 284.348 kg.

The graphical presentation of the trend in the production of drinking milk (Graph 3) confirms notable trends in production in the analyzed period, in addition to more stable production in the forecast period. Table 8. shows the parameters of the estimated model for drinking milk production. The estimated model forecasted quantities of drinking milk for the period January-December 2019 (Table 9). The estimated ARIMA model of drinking milk produced shows that the drift of production of the current month significantly influences the volume of drinking milk produced in the same month of the previous year.

Table 8. Estimated parameters of ARIMA $(1,1,0)x(1,0,0)_{12}$ models for the variable production of drinking milk

Variables	Parameters	Standard Error	t-ratio	p	95% confidence interval	
					Lower	Upper
AR(1)	-0,270918	0,117142	-2,31273	0,023726	-0,504610	-0,037226
SAR(1)	0,294691	0,118231	2,49250	0,015090	0,058826	0,530555

Source: Authors' calculations

Table 9. Projected quantities of drinking milk in Montenegro for the period January-December 2019 based on ARIMA $(1,1,0)x(1,0,0)_{12}$

Month	Projected quantities	90% confidence interval of projected volume		Standard error of the forecast	Quantity collected
		Lower limit	Upper limit		
January 2019	318.816,0	230.918,8	406.713,1	52.720,2	350.596
February 2019	330.860,1	222.081,9	439.638,3	65.244,5	358.905
Mach 2019	331.635,3	201.989,7	461.280,8	77.760,6	375.136
April 2019	315.690,8	168.926,7	462.455,0	88.028,3	340.145
May 2019	314.501,9	152.215,6	476.788,2	97.338,4	369.614
June 2019	310.727,8	134.329,9	487.125,7	105.802,4	341.675
July 2019	314.264,3	124.790,3	503.738,3	113.645,4	319.209
August 2019	305.039,7	103.338,8	506.740,6	120.979,0	318.597
September 2019	302.901,1	89.672,4	516.129,9	127.893,4	299.355
October 2019	308.434,9	84.270,6	532.599,2	134.452,4	296.372
November 2019	310.202,5	75.611,8	544.793,2	140.706,1	-
December 2019	314.117,4	69.544,4	558.690,4	146.693,4	-

Source: Authors' calculations

Figure 3. Tendencies in production of observed and forecasted quantities of drinking milk

Source: Authors' calculations

Based on previous results, it can be concluded that the processing of milk in industrial plants is increasingly oriented towards the production of fermented dairy products, while the importance of drinking milk in the production structure of the dairy industry is declining since the beginning of 2015. On the other hand, family farms are not oriented whatsoever to the production of drinking milk, but primarily to the processing of raw milk into cheese and cream. Therefore, the placement of these dairy products in the market represents one of the important sources of income for family farms. The special importance of milk processing on family farms arises from the fact that approximately 85% - 90% of the total milk produced in Montenegro is processed thereof.

On the other hand, most of the products from family farms are within an unregistered zone, therefore it is difficult to monitor the quality of these products. It is necessary to introduce as many milk producing and processing farms as possible into the official control system for milk production and processing in order to ensure the health safety of products, given their representation in the nutrition. To this end, the Decree on Hygiene Requirements for Facilities and Premises Manufacturing Small Quantities of Primary Products for Human Consumption and Intended for Market, lays down requirements that must be implemented in order for products to be realized.

In order to improve milk processing on family farms, investments in relevant facilities and equipment are necessary. In this regard, the programme of institutional development and strengthening of agriculture - MIDAS was launched. The aim of the programme was to provide support to investments in agricultural farms with the aim of implementing rural development measures, increasing competitiveness in the agricultural market, introducing and strengthening European food production standards. The allocated funds are intended for the construction and reconstruction of facilities on agricultural farms, in addition to the procurement of equipment and mechanization, procurement of the basic herd, et cetera.

Programme was implemented in several stages, whereas support ranged from 50-60% of the investment amount. The minimum amount of eligible investments was EUR 3,000 and maximum amount was EUR 70.000. Farmers who were registered in at least one of the registers or records of the Ministry of Agriculture and Rural Development of Montenegro or administrations within its jurisdiction were entitled to support. Legal entities also had a possibility of applying for grants provided that the activity they are engaged in is in the field of agriculture.

On the basis of available data, about EUR 12,8 million has been invested so far, and the total grant support is EUR 6,53 million. The number of applicants who received support under this programme is 669. The total investment per applicant averages EUR 19.133,00 while the average grant amount per applicant is EUR 9.761,00. The largest number of investments, and consequently the amount of support, related to livestock production with just under EUR 9 million. If the territorial distribution of invested funds in livestock production is observed, the largest number of investments is allocated to the northern part of Montenegro in the amount of about EUR 5.6 million, or 43.75% of total investments. These funds were used by 458 farms and 14 legal entities. This indicates that the average investment per applicant in the northern part of Montenegro (which amounted to EUR 11.864,00) was lower than the national average. According to the livestock production sectors, the largest amount of investment is allocated to cattle, dairy and sheep farming.

In addition to this programme, agricultural farms and legal entities also had the opportunity to finance investments in milk processing through EU/IPA projects of institution building in agriculture and rural development in Montenegro (IPARD programme). Such significant investment support from a number of sources focused

on milk processing activity indicates the importance attached to this activity in the territory of Montenegro.

Investing in milk processing facilities and equipment on family farms is an approach that may significantly improve the livestock business. Thus, the production of traditional cheeses for the diversification of production on family farms and the economic development of rural areas is also suggested by many authors (Braghieri et al., 2014; Roest, Menghi, 2000; Gerz, Dupont, 2006; Santini et al, 2013). The authors state that the production of traditional cheeses has contributed to retaining essential added value within the regions originating from, increasing the income of rural producers, increasing the price of products, attracting tourists, developing catering, accommodation services, reducing migration, increasing employment, etc. In the same way, processing of milk into indigenous cheeses (and other dairy products) at family farms in Montenegro could be a significant factor in their development.

Conclusions

Having analyzed situation in milk production, further efforts are needed to increase production. This statement arises from the fact that in the observed period stagnation was observed in terms of milkiness per animal unit as a result of poor racial composition and low productivity of dairy cows. In order to intensify milk production, it is necessary to work primarily on improving genetic potential of cattle, which should be accompanied by appropriate improvements in production technology. The production range of milk processing establishments not located on family farms is very narrow. The structure of production is dominated by fermented dairy products, where production of yoghurt is leading. The analysis of time series on the quantities of cow's milk collected, the fermented milk products obtained and drinking milk, revealed the presence of trend and seasonal components.

Alternatively, most of the milk produced is processed on family farms, with the production range being very narrow and referring primarily to cheese and cream. It is necessary for family farms to continue to make appropriate investments in milk processing facilities and equipment to enable diversification of production, the introduction of appropriate standards in production and the provision of health-safe dairy products.

Conflict of interests

The authors declare no conflict of interest.

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GROSS DOMESTIC PRODUCT GROWTH RATE ANALYZING BASED ON PRICE INDEXES, IMPORT AND EXPORT FACTORS

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A B S T R A C T

Economic development could be presented by gross domestic product to show how different factors affect the development. Gross domestic product could be affected by different nonlinear factors in positive or negative way. Hence it is suitable to apply artificial intelligence techniques in order to track the gross domestic product variation in depend on the factors. AI techniques require only input and output data pairs in order to catch the output variations based on the input factors. Therefore in this study adaptive neuro fuzzy inference system was applied in order to select the most relevant factors for gross domestic product growth rate. These factors are whole sale price index, consumer price index in urban areas, consumer price index in rural areas, state per capita income, exports, import and industry income. Results shown that the whole sale price index has the highest relevance on the gross domestic product growth rate.

Introduction

Recently artificial techniques became main instrument for modelling and analyzing of complex nonlinear systems. Their application in every area is widely accepted and acknowledged. One of the potential application of artificial techniques is in social problems like economic development (Marković et.al., 2017; Mladenović et.al., 2016). Economic development could be analyzed based on different indicators but gross domestic product (GDP) is widely accepted and used indicator to track economic

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development. There are many investigations of GDP according to different input factors (Todorović et.al., 2018).

In paper (Jovic, 2019) was investigated the effect of exchange rate pass-through (ERPT) into aggregate import prices and afterwards exchange rate effect on gross domestic product (GDP) was investigated by adaptive neuro fuzzy inference system (ANFIS). GDP per capita is one of the most important indicators of social welfare and all countries try to increase their GDP per capita to contribute to their population's happiness and well-being, as well as strengthen their nation's standing in international relations (Tümer, Akkuş, 2018). Expenditures on health care continue to increase substantially, both absolutely and relative to national income, throughout most of the developed world. In study (Mladenovićet.al., 2016) was analyzed the influence of health care expenditures on the economic growth. Aggregate accounting earnings growth is an incrementally significant leading indicator of growth in nominal GDP (Konchitchki, Patatoukas, 2014). Strong evidence of discontinuities around zero in the distribution of actual minus target GDP growth rates was found in paper (Changjianget. al., 2018). The yield curve – specifically the spread between long term and short term interest rates is a valuable forecasting tool. Results presented in paper (Hvozdenska, 2015) confirmed that 10-year and 3-month yield spread has significant predictive power to real GDP growth after financial crisis. The environment that governs the relationships between carbon dioxide (CO_2) emissions and GDP changes over time due to variations in economic growth, regulatory policy and technology. The purpose of research (Marjanovićet.al., 2016) was to develop and apply the Extreme Learning Machine (ELM) to predict GDP based on CO_2 emissions.

The main goal of the paper is to present application of adaptive neuro inference system (ANFIS) (Jang, 1993) for GDP analyzing based on input factors influence. The main reason of ANFIS application is strong presence of nonlinear phenomena in the economic problem namely GDP growth rate. There are number of social phenomena like GDP where linearity is exceeded in independent variables (Subic et.al., 2007; Kuzman, Prdić, 2018; Prdic, Kuzman, 2019). Economic aspects have different variables and factors which is challenging to analyzing by conventional approaches (Kuzmanet.al., 2018; Kuzman et.al., 2017; Kuzman et.al., 2016; Kuzman, Prodanović, 2017; Nedelcu et.al, 2015). ANFIS methodology shows good capability to catch and track nonlinearity phenomena since there are multiple parallel operations during training of the ANFIS model. ANFIS technique require only input and output data pairs in order to catch the output variations based on the input factors. In this study ANFIS was applied in order to analyze GDP growth rate based on 7 input factors. These factors are whole sale price index, consumer price index in urban areas, consumer price index in rural areas, state per capita income, exports, import and industry income.

Materials and methods

In order to perform GDP analysing and prediction there is need to collect input and output data pairs for ANFIS training process. Table 1 shows used input factors and

output as well. The used input are whole sale price index, consumer price index in urban areas, consumer price index in rural areas, state per capita income, exports, import and industry income. The factors are paired with GDP. After the pairing the ANFIS models are training in order to investigate relationships between inputs and output. All of the data are acquired and arranged based on OECD database for European Union.

Table 1. Input and output factors

in 1: Whole sale price index	in 2: Consumer price index – Urban	in 3: Consumer price index – Rural	in 4: State Per Capita Income	in 5: Export	in 6: Import	in 7: Industry income	output: Gross Domestic Product
80.02	24.12	30.12	105	4153	62367	50950	286566
85.02	25.35	34.35	133	7128	85156	53550	329567
88.02	42.35	48.35	192	9465	87077	69640	368800
99.02	50.35	59.35	267	12814	87774	81360	405707
105.02	64.35	73.35	338	15849	95101	108520	454014
115.02	76.35	82.35	416	24383	101937	124950	488921
127.02	84.35	92.35	491	32517	106792	127770	532374
137.02	97.35	104.35	548	39963	107921	154930	557097
142.02	108.35	114.35	617	24535	90122	171020	606603
149.02	123.35	129.35	688	26660	94372	182740	645436
154.02	135.35	142.35	744	29635	103076	209900	672222
171.02	143.35	152.35	822	36860	125864	226330	694027
166.37	161.35	167.35	899	39198	127785	229150	720810
178.87	170.35	176.35	967	42547	128482	197910	744859
181.83	179.35	186.35	1022	45581	135809	230670	784955
199.34	193.35	200.35	1074	54166	142646	242230	824655
225.31	210.2	219.2	1151	62300	147500	259640	866113
263.91	251.09	260.09	1350	81500	209400	230930	898394
277.73	256.95	263.95	1269	89700	224075	255065	918879
303.41	302.79	311.79	1373	97900	238750	272645	961097
333.72	314.31	322.31	1376	106100	253425	313385	998466
346.28	330.07	335.07	1827	114300	268100	338030	1031660
381.53	357.26	366.26	2510	141800	290700	342260	1063491
419.16	389.75	399.75	2719	181200	298900	295400	1229030
451.74	416.34	425.34	3141	216900	385100	365800	1449271
493.78	455.34	459.45	3321	317303	465527	486600	1703392
536.16	491.68	498.19	3688	412993	522638	580500	2014567
613.25	572.27	572.04	3966	538988	535921	606500	2156190

in 1: Whole sale price index	in 2: Consumer price index – Urban	in 3: Consumer price index – Rural	in 4: State Per Capita Income	in 5: Export	in 6: Import	in 7: Industry income	output: Gross Domestic Product
693.75	643.91	654.55	4428	688423	731065	767400	2484052
718.76	689.73	695.71	5237	908580	811180	884600	2886822
779.23	751.65	766.28	6935	1246009	1254153	1156200	3522440
851.31	826.35	836.67	7236	1583283	1741672	1320500	4793736
937.9	934.09	935.51	9954	1759627	1496654	1348700	5815175
1046.06	1091.42	1093	11215	1652964	3687789	1036300	6613382
1162.23	1165.5	1164.67	15152	1877128	2348290	1363900	8103589
1199.27	1217.47	1227.47	17525	2698375	2560016	1479500	10525616
1223.26	1270.23	1280.23	18786	1173696	1882137	1653600	11564416
1251.77	1302.34	1310.34	21229	1263124	1862805	1462200	13173056
1270.32	1339.91	1345.91	20975	2503900	3569700	1510000	13091746
1340.84	1308.79	1359.95	21738	3306800	4379800	1910100	13678087
1341	1333.76	1365.73	23476	3478200	7874000	2156700	14965415
1373	1351.12	1370.34	25965	5129800	11298300	2798100	16718287
1377	1358.37	1377.41	31920	6775900	15903500	3778400	20750283
1451	1425.72	1443.49	37635	9176200	19016100	3934100	24626587
1539	1540.25	1540.23	36915	9060300	23098700	3971400	27928746
1640	1661.45	1668.45	49831	11309300	28906600	5914300	29458192
1687	1778.3	1772.38	51097	9176200	19016100	7199300	33921164
1798	2122.67	2134.67	70219	9060300	23098700	7695600	42491835
2026	2368.72	2492.13	72993	11309300	28906600	9136400	54726662
2204	2623.07	2770.16	84496	11309300	28906600	9576510	63902460

Source: Usha and Balamurugan, 1993

ANFIS network has five layers as it shown in Figure 1. The main core of the ANFIS network is fuzzy inference system. Layer 1 receives the inputs and convert them in the fuzzy value by membership functions. In this study bell shaped membership function is used since the function has the highest capability for the regression of the nonlinear data.

Figure 1. ANFIS layers
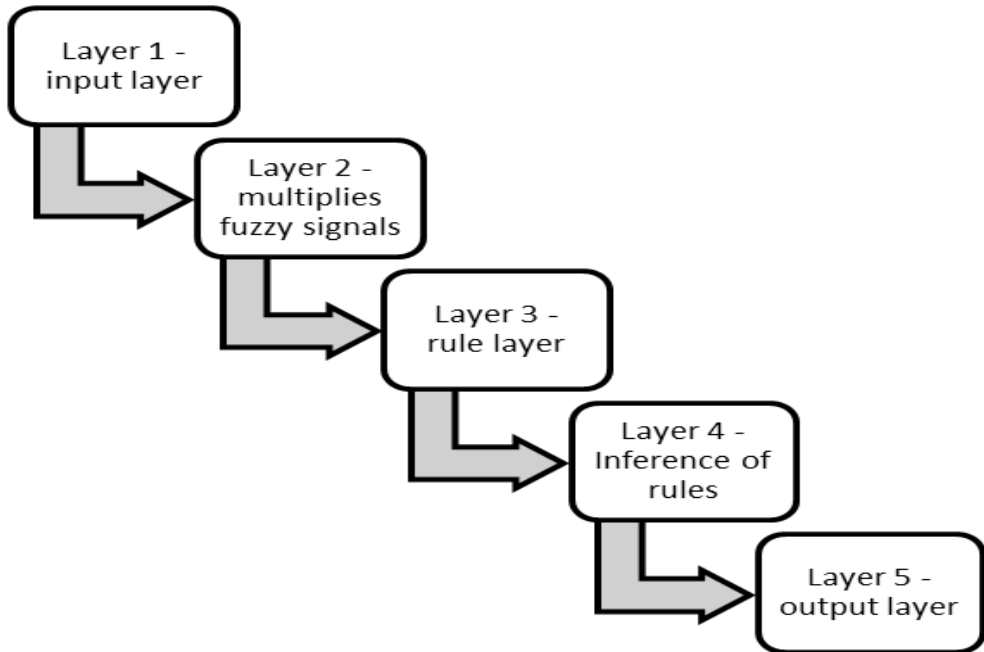
Source: Jang, 1993

Bell-shaped membership functios is defined as follows:

$$\mu(x) = bell(x; a_i, b_i, c_i) = \frac{1}{1+\left[\left(\frac{x-c_i}{a_i}\right)^2\right]^{b_i}} \tag{1}$$

where $\{a_i, b_i, c_i\}$ is the parameters set and x is input.

Second layer multiplies the fuzzy signals from the first layer and provides the firing strength of as rule. The third layer is the rule layers where all signals from the second layer are normalized. The fourht layer provides the inference of rules and all signals are converted in crisp values. The final layers sumarized the all signals and provied the output crisp value.

Performances of the proposed models are presented as root means square error (RMSE), Coefficient of determination (R^2) and Pearson coefficient (r) as follows:

1) RMSE

$$RMSE = \sqrt{\frac{\sum_{i=1}^{n}(P_i - O_i)^2}{n}} \tag{2}$$

,

2) Pearson correlation coefficient (r)

$$r = \frac{n\left(\sum_{i=1}^{n} O_i \cdot P_i\right) - \left(\sum_{i=1}^{n} O_i\right) \cdot \left(\sum_{i=1}^{n} P_i\right)}{\sqrt{\left(n\sum_{i=1}^{n} O_i^2 - \left(\sum_{i=1}^{n} O_i\right)^2\right) \cdot \left(n\sum_{i=1}^{n} P_i^2 - \left(\sum_{i=1}^{n} P_i\right)^2\right)}}$$

(3)

3) Coefficient of determination (R^2)

$$R^2 = \frac{\left[\sum_{i=1}^{n}\left(O_i - \overline{O_i}\right) \cdot \left(P_i - \overline{P_i}\right)\right]^2}{\sum_{i=1}^{n}\left(O_i - \overline{O_i}\right) \cdot \sum_{i=1}^{n}\left(P_i - \overline{P_i}\right)}$$

(4)

where P_i and O_i are known as the experimental and forecast values, respectively, and n is the total number of dataset.

Results

GDP growth rate sensitivity is analysed based on factors influence. The influence is estimated according the RMSE values with ANFIS network. Figure 2 shows GDP sensitivity based on 7 input factors. As can be seen the factors with the smallest RMSE after training process has the highest impact on GDP. In other words the GDP is the most sensitive after input 1(Whole sale price index) variation as can be seen in Figure 2. On the other hand GDP has least sensitivity for input 6 (Import).

Figure 2. Factors influence on GDP
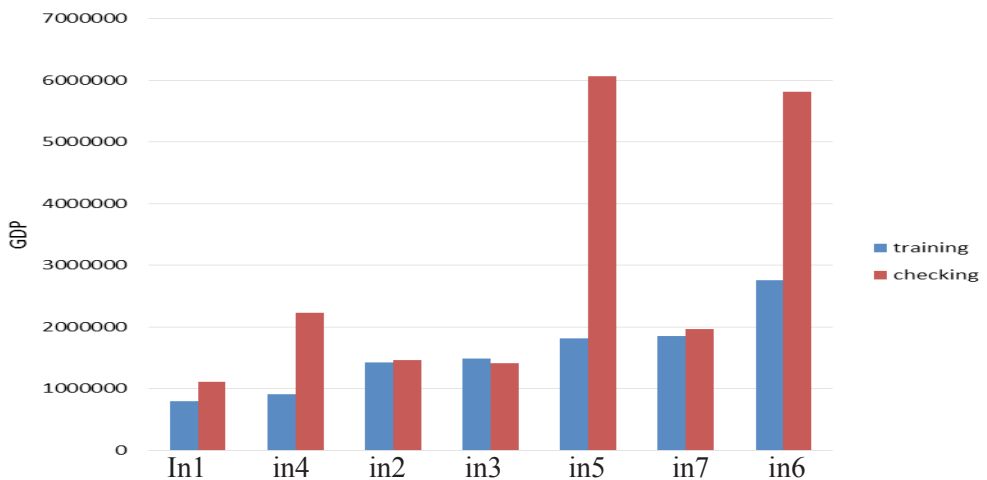
Source: Authors' calculations

Numerical RMSE values after training and checking of ANFIS network is listed in Table 2 for the single factors influence. Furthermore if one combine two factors in same time corresponding results are presented in Table 3. As can be seen factors 1 and 4 forms the most optimal combination for the GDP.

Table 2. Factors influence on GDP

ANFIS model 1: in1 -->trn=792726.2989, chk=1117756.7874
ANFIS model 2: in2 -->trn=1429807.6034, chk=1468704.3377
ANFIS model 3: in3 -->trn=1493654.3340, chk=1408339.6003
ANFIS model 4: in4 -->trn=909715.9459, chk=2230315.8341
ANFIS model 5: in5 -->trn=1822216.2325, chk=6067049.2763
ANFIS model 6: in6 -->trn=2765247.9845, chk=5810924.3048
ANFIS model 7: in7 -->trn=1855191.2124, chk=1967937.0754

Source: Authors' calculations

Table 3. Two factors influence on GDP

ANFIS model 1: in1 in2 -->trn=342960.7035, chk=2522862.7201
ANFIS model 2: in1 in3 -->trn=479709.1662, chk=2423824.7198
ANFIS model 3: in1 in4 -->trn=84837.1519, chk=3387077.6216
ANFIS model 4: in1 in5 -->trn=175552.4373, chk=9862009.8207
ANFIS model 5: in1 in6 -->trn=346639.7586, chk=1946191.6651
ANFIS model 6: in1 in7 -->trn=302732.4528, chk=2676305.7847
ANFIS model 7: in2 in3 -->trn=646425.8995, chk=6962905.5315
ANFIS model 8: in2 in4 -->trn=161513.4966, chk=652510.5949
ANFIS model 9: in2 in5 -->trn=182402.3538, chk=15125120.6863
ANFIS model 10: in2 in6 -->trn=218128.6032, chk=23763468.6240
ANFIS model 11: in2 in7 -->trn=143255.5539, chk=1261341.8891
ANFIS model 12: in3 in4 -->trn=164999.7892, chk=382264.7904
ANFIS model 13: in3 in5 -->trn=167085.2171, chk=9023759.5316
ANFIS model 14: in3 in6 -->trn=214559.7395, chk=25735917.0138
ANFIS model 15: in3 in7 -->trn=137387.8742, chk=1906955.9818
ANFIS model 16: in4 in5 -->trn=128090.9853, chk=4416677.0713
ANFIS model 17: in4 in6 -->trn=166177.7496, chk=15333450.6547
ANFIS model 18: in4 in7 -->trn=187533.9938, chk=3404479.0351
ANFIS model 19: in5 in6 -->trn=5265733.0034, chk=13071558.7207
ANFIS model 20: in5 in7 -->trn=1134210.1775, chk=289279828.8118
ANFIS model 21: in6 in7 -->trn=497525.9212, chk=211961264.6433

Source: Authors' calculations

Figure 3 shows scatter plots of GPD prediction by ANFIS based on input 1 while Figure 4 shows scatter plots of GDP prediction by ANFIS based on input 1 and input 4. As can be seen according to the coefficient of determination ANFIS results for two inputs outperforms results for one input. Table 4 shows GDP prediction based on three statistical indicators for ANFIS models. Based on the three indicators one can conclude that the ANFIS with two inputs outperforms ANFIS with one input for the GDP prediction.

Figure 3. ANFIS prediction of GDP based on input 1
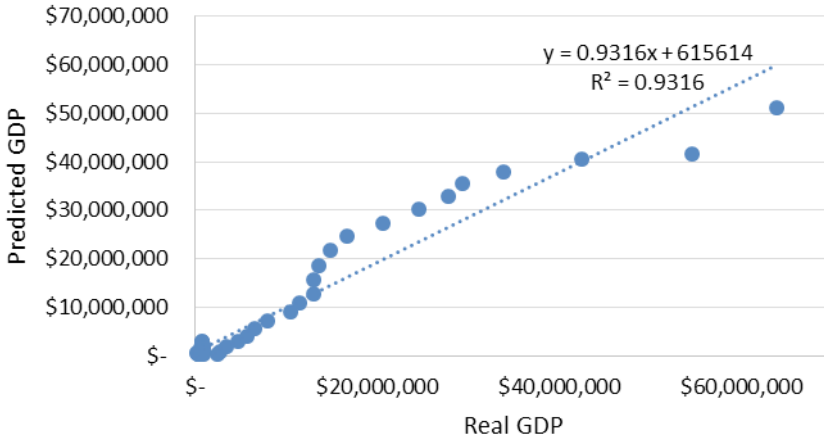
Source: Authors' calculations

Figure 4. ANFIS prediction of GDP based on combination of input 1 and input 4
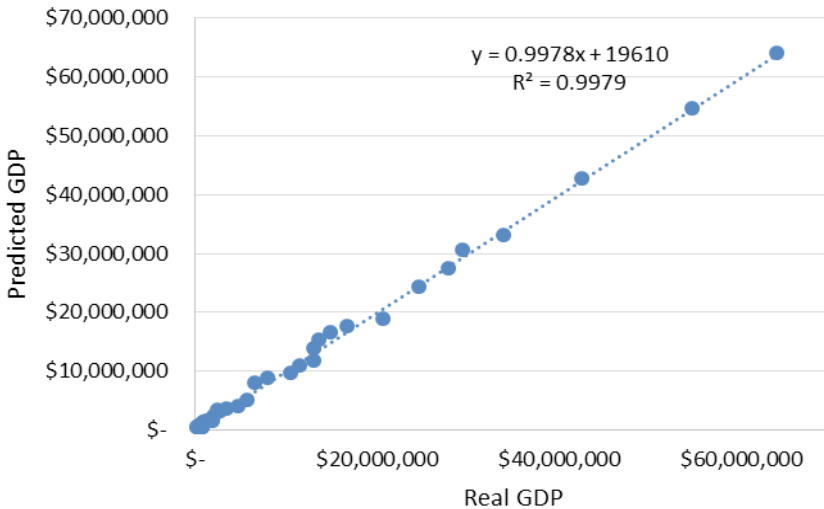
Source: Authors' calculations

Table 4. Statistical indicators for ANFIS prediction of GDP

	One input (1)	Two inputs (1 and 4)
r	0.9652	0.9989
R^2	0.9316	0.9979
RMSE	3728859.321	658353.2683

Source: Authors' calculations

Discussions

The analysis was performed by artificial intelligence model namely adaptive neuro fuzzy inference system (ANFIS) since there are strong nonlinear relationships between input and output factors in the analyzing.Results shown that the whole sale price index has the highest relevance on the GDP growth rate. Moreover combination of whole sale price index and state per capita income forms the most optimal combination for the GDP. The GDP prediction based on the selected inputs has high accuracy based on three statistical indicators. The main feature of the ANFIS model is easy adaptation to any new inputs.

Conclusions

The main goal of the paper was to analyze and to make predictive models for gross domestic product (GDP) growth rate based on 7 factors. These factors are whole sale price index, consumer price index in urban areas, consumer price index in rural areas, state per capita income, exports, import and industry income.In conclusion ANFIS could be used effectively for GDP analyzing and prediction based on given factors or any other inputs.

ANFSI network has feature for training based on its performances. Based on this the network parameters are adjusted in order to make the performance optimal. Main goal of the learning type is based on optimization surfaces where there is need to find the optimal conditions for minimum and maximum of the surface.

There are different training laws in the category of learning performance. These learning laws is based on adjusting of network parameters during training process in order to optimize the network performances.

There are two steps during optimization process. The first step is based on definition of the performance criterion. In other words there is need to find a quantity measure for the network performance which is called performance index, which is small when the network produce good results and vice versa. The second step during the optimization process is based on the finding of parameters space in order to wind the performance index.

Optimization of neural networks represent a complex task since it is need to define the performance index of the artificial neural network for the further optimization process. There are several algorithms for optimization of the performance index of artificial neural networks. One of the most popular algorithm is steepest descent algorithm.

This algorithm require only calculation of function gradient which represent index performance of the network. It is proved that the algorithm will converge up to optimal stationary point if the learning speed is slow. Drawback of the learning algorithm is learning time which is too large. Therefore ANFIS network uses combination of steepest descent algorithm with back propagation in order to increase the learning speed.

ANFIS network has adaptive adjusting feature of the learning parameters with any new additional training. In other words ANFIS network has advantage to save the learned knowledge based on the fuzzy logic system. Once trained ANFIS network has feature to keep the knowledge until new training with new dataset.

Conflict ofinterests

The authors declare no conflict of interest.

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PRICE TRANSMISSION ANALYSIS IN PORK SUPPLY CHAIN IN SERBIA

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A R T I C L E I N F O	A B S T R A C T
	As the pork supply chain was perceived through three level of chain: agricultural sector, processing and distribution sector, the main objective of this paper was the estimation of the vertical price transmission in the pork supply chain in the Republic of Serbia for period 2008-2015. The analysis of the price transmission was related on the presence of the asymmetry and was estimated with AECM model. The results indicated the presence of the negative asymmetry in the price transmission and one of the main causes of the presence of asymmetry was the abuse of the market power by processing sector, i.e. slaughtering industry.

Introduction

In the 1990s, the food supply chain went through significant changes. One of the most pronounced changes occurred in the meat supply chain. Namely, the most important changes happened in the meat processing and retail sectors. Those changes are related to the growth of concentration of this sectors. The growth of concentration of the processing and distribution sector has caused their market dominance in relation to

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agricultural producers. Accordng to Pjanić et al. (2018) „increases in the concentration of the power of the individual market participants usualy results in limiting the market power of other power participants". The market power abuse resulted in an uneven distribution of profits among the participants in the supply chain (Coleman et al., 2004; OECD, 2006). One of the ways to analyze structural changes that have occurred in the food supply chain is price transmission analysis along the food supply chain, as an important phenomenon that describes the overall functioning of the market. The changes that have taken place along all the participants of the supply chain point to the necessity of examining the formation and way of transferring prices along the food supply chain. Also, the examination of the vertical price transmission can be used as an indicator of inefficiency of the chain, and as an indicator of the degree of competitiveness within the chain itself (Blažková and Syrovátka, 2012). For better understanding of the price transmission analysis results it is important to identify factors that influence on the market. There are many factors that determine situation on the agricultural markets, but structure of the market participants and institutional framework are the most important. Also, actual process of foreign integration significantly can influence on prices of agri-food products as this process is followed by the liberalization of market, so it can pose a serious competitive threat to domestic producers (Nestorov-Bizonj et al., 2015).

Pig farming is a significant branch of agriculture in Serbia. According to the share in the total value of agricultural production, pig farming is the second most important branch of livestock production in Serbia. According to Jeremic et al. (2016), pork is the most consumed (28 kg per capita per year) and most produced meat, from 2000 to 2014 in Serbia, share of pork in total meat production was 58%. Therefore, having in mind changes that occurred in meat supply chain, as well as importance of pork production for Serbian agriculture, the focus of this paper is on the price transmission in the pork supply chain.

The vertical price transmission in the pork[6] supply chain has so far been analyzed by a large number of authors, and some of them are Boyd and Brorsen (1988), Purcell (1999), Goodwin and Harper (2000), Abdulai (2002), Backus and Fertö (2005), Jensen and Møller (2007), Čechura and Šobrova (2008), Karntininis et al. (2011), Rumánková (2012) and Djurić and Petković (2013). Also, a numerous authors analysed spatial price transmission in pork market such as Sanjuán and Gil (1998), Meyer (2004), Liu (2011), Holst and Von Cramon Taubadel (2014), Djuric and Puskaric (2015). The main objective of the paper was to idenetify the nature of the price transmission along the pork supply chain in the Republic of Serbia, and the presence of (a)symmetry is tested. Also, the aim of the paper was to identify the factors that influence the presence of asymmetry in the chain with the focus on the market structure of the participants. In accordance with the aim of the paper, appropriate econometric methods have been

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6   In this paper, only fresh meat was considered. According to Ecroys (2010), fresh meat is meat that has not undergone any processing process, except cooling, freezing and quick freezing. More precisely, the work did not analyze leather, fats, edible and inedible waste or pork products.

selected and applied. The paper consists of the following section: first, the theoretical framework of the model used for price transmission analysis was defined. Afterwards the pork supply chain in Serbia was explained and the model was estimated. In the last section of the paper final conclusion are given and ideas for future research.

Materials and methods

An Asymmetric Error Correction Model (AECM) was used to assess the presence of asymmetry in pork supply chain. AECM model was created as a result of the improvement of the methodology previously used for the analysis of asymmetry. Namely, first model that was used was developed by Wolffram (1971), which, afterwards, modified Houck (1977):

$$\Delta p_t^{out} = \gamma_0 + \gamma_1^+ D_t^+ \Delta p_t^{in} + \gamma_1^- D_t^- \Delta p_t^{in} + u_t \tag{1}$$

where p_t^{out} i p_t^{in} represents prices of output and input respectively, Δ indicates on first differences, D^+ i D^- are dummy variables which have value 1 if $p_t^{in} \geq p_{t-1}^{in}$ and value 0 if $p_t^{in} \leq p_{t-1}^{in}$, and γ_0, γ^+, γ^- are parameters. Using the equation 1 zero and alternative hypothesis are estimated. Namely, zero hypothesis, H_0, tests symmetrical price transmission (H_0: $\gamma^+ = \gamma^-$). On the other hand, an alternative hypothesis, H_1, tests asymmetry of price transmission (H_0: $\gamma^+ \neq \gamma^-$).

According to Ward (1982) equation (1) had some limitation which was overcome with by including lags of exogenous variables.

$$\Delta p_t^{out} = \gamma_0 + \sum_{j=1}^{M}\left(\gamma_1^+ D_t^+ \Delta p_{t-j+1}^{in}\right) + \sum_{j=1}^{N}\left(\gamma_1^- D_t^- \Delta p_{t-j+1}^{in}\right) \tag{2}$$

Equation (2) developed by Wolfram also had some shortage. Namely, in the equation (2) problems arising from using nonstationary data were not considered. Von Cramon-Taubadel (1998) suggested modification of equation (2) by including the concept of cointegration in it.

$$p_t^{out} = \beta_0 + \beta_1 p_t^{in} + u_t p_t^{out} = \beta_0 + \beta_1 p_t^{in} + u_t \tag{3}$$

If the estimation of the equation (3) indicates that there is no false regression, that is if indicates that variables are cointegrated, the application of the AECM model is justified, and the model has the following form:

$$\Delta p_t^{out} = \gamma_0 + \sum_{j=1}^{M}\left(\gamma_1^+ D_t^+ \Delta p_{t-j+1}^{in}\right) + \sum_{j=1}^{N}\left(\gamma_1^- D_t^- \Delta p_{t-j+1}^{in}\right) + \psi^+ u_{t-1}^+ + \psi^- u_{t-1}^- + \varepsilon_t \tag{4}$$

After the specification, model is estimated by using the ordinary least square method and testing the hypothesis of the presence of asymmetry in the transmission of prices, for short and long term. Namely, using the Wald test, the following zero hypotheses are tested:

- H_{01}: $\gamma^+ = \gamma^-$ the zero hypothesis of the presence of long-term symmetry.

- H_{02}: $\beta^+_{1i} = \beta^-_{1i}$, the zero hypothesis of the presence of symmetry in a short term between the prices of the processing sector and the agriculture sector.

- H_{03}: $\beta^+_{2i} = \beta^-_{2i}$, the zero hypothesis on the presence of symmetry on the short term between the retail and agricultural sectors.

In order to assess the vertical price transmission in the pork supply chain, data on monthly prices were used for the following participants of the supply chain: the agricultural sector (data on prices of fattening pigs), the processing sector (data on prices of pig carcases) and the retail sector (data on pork meat prices). Price data refer to the period from May 2008 to December 2015. Prices for all participants of the chain are expressed in euro per kilogram. The data used are shown in Figure 3. As data sources, the following were used[7]:

- Monthly statistical bulletins for data on prices of fattening pigs and for data on monthly retail prices of pork.

- Data from the GEA Centre on prices of pig carcases.

- OANDA database for data on the average monthly exchange rate.

Results and discussions

The pork supply chain

The pork supply chain in Serbia was perceived three participants: the agricultural sector, the processing and distribution sector. The agriculture sector, as the first participant of the pork supply chain, was observed on the basis of pig farms in Serbia. In Serbia, there are about 3.5 million pigs and 355 thousand pig farms (SORS, 2017). An analysis of the characteristics of the pig sector indicated that small family farms are the most important category of agricultural holdings in Serbia (*Figure 1.*). Namely, according to the realized value of the standard output, 80.4% of the pig farms in Serbia belong to the category of small farms[8], and in their possession there are 41.4% of all pigs. The following are medium-sized farms, which account for 18.6% and hold 31.1% of all pigs. On large farms that make up only 0.96% of the total number of farms, 27.5% of the pigs are raised. In other words, small-sized and medium-sized farms are the most numerous and have the largest number of pigs in their ownership. That means that the production of pigs and pork is mostly determined by the production trends on these farms. As the agricultural sector are concerned, there is a disunity of supply due to the presence of a large number of small agricultural producers who by their own production are unable to meet the needs of the slaughter industry. As market structure is concerned, agricultural sector, i.e. pig farms, represents competitive market.

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7   For the estimation of the models Eviews 8.1. were used.

8   The criterion for pig farms size classification is based on Popovic (2014): small sized farm is farm with less than 8,000 euro, medium sized farm is farm with 8-25,000 euro, and large farms include farms with more than 25,000 euro of standard output.

Figure 1. The size of pig farms in Serbia (000 euro standard output)

■ Republic of Serbia
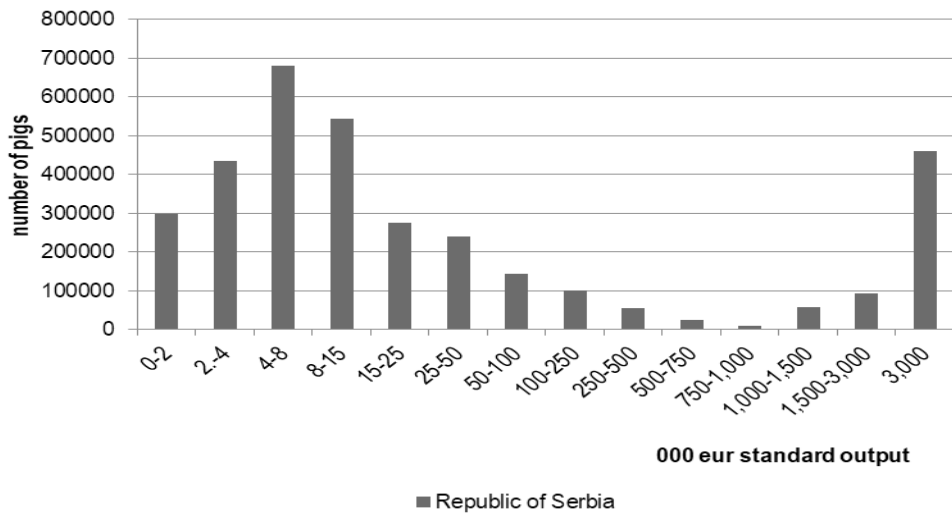
Source: SORS, 2017

On the other hand, certain conclusions were obtained by examining the characteristics of the processing sector. In the analysis of processing sector the slaughtering industry was considered. According to MAEP data (2014) the total number of facilities for slaughtering and processing in Serbia in 2010 was 1,197. That indicates that Serbia has excessive slaughtering and processing capacity. As the facilities for slaughtering, cutting and processing are concerned, Serbia had 277 slaughterhouses for ungulates and 415 combined facilities (for slaughtering, cutting and processing). It is expected that with adoption of numerous domestic and European Union (EU) standards, the number of those facilities would be significantly reduced.

As the number of slaughtered fattening pigs is concerned, although there is a tendency of growing the number of pigs slaughtered in slaughterhouses (*Figure 2.*), slaughter of pigs on family farms for their own needs is still more widespread.

Figure 2. The number of slaughtered pigs in Serbia

 Total number of slaughtered pigs (in 000)

 Number of pigs slaughtered in slaughterhouses (in 000)

 Number of pigs slaughtered on farms (in 000)
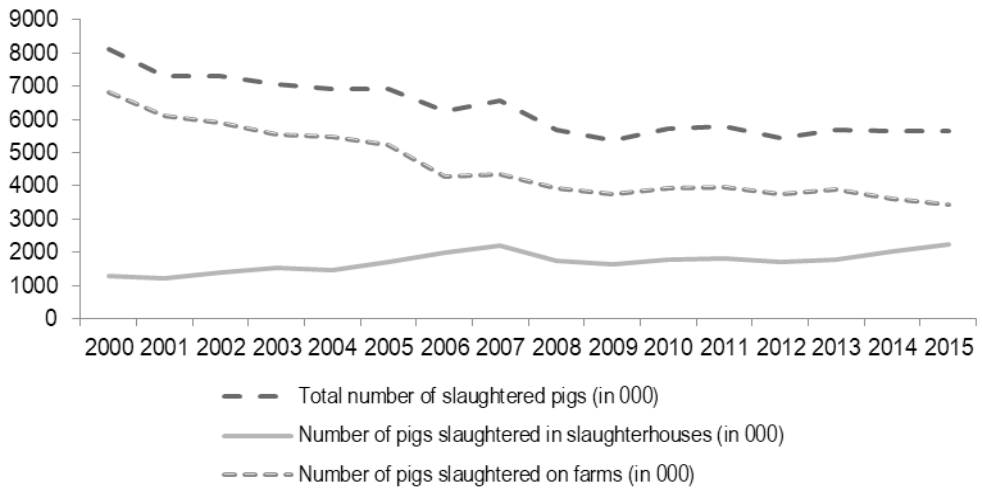
Source: SORS, 2017

Compared with EU countries, Serbia has similarities with countries that joined the EU after 2004. Namely Serbia is more similar to countries where pigs are slaughtered in places other than slaughterhouses[9]. Of the total number of pigs slaughtered in slaughterhouses, in the last 5 years, 70% are slaughtered in 10 slaughterhouses (of which some are large and some are medium sized). That means that market structure of the processing sector can be considered as oligopsony. Also, due to the domination of several slaughterhouses located in certain areas, oligopsony is especially expressed in regional markets[10].

Unlike other countries in which the process of internalization of the retail sectors started in the 1990s, in Serbia this process started later. After 2000 the structure of retail sector in Serbia changed and the participation of modern trade formats, such as hypermarkets and supermarkets increased significantly. On the other hand, the number of smaller

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9   Although in a much smaller extent, compared to Serbia, in the EU except in slaughterhouses, slaughtering of livestock is also performed in places other than slaughterhouses. In 2014, 81.3% of slaughter outside the slaughterhouse was registered in countries that became members of the EU in 2004 or later. In 13 countries that have become the latest EU members (new members), 11.3% of the total number of slaughtered livestock make slaughter outside slaughterhouses. On the other hand, in the 15 countries that first became members of the EU (old members), this percentage is only 0.4%. In general, there is a trend in the EU to reduce the number of livestock slaughtered in places other than slaughterhouses. Of the total number of livestock slaughtered in places other than slaughterhouses, the largest share refers to pigs (62.3%), followed by sheep and goats (19.3%) and cattle (18.4%) (Eurostat, 2016).

10   Namely, as the transport and storage of livestock is very complicated and can lead to injury, death and high transport costs, producers in a small pig farms mostly decide to sell livestock to local slaughterhouses and finally are accepting their terms of purchase.

trade facilities reduced. However, compared to other countries of Central and Eastern Europe, there is still relatively undeveloped trade in Serbia.

In the case of the retail sector, distribution of meat and meat products in Serbia is done through the following trade formats: super and hypermarkets, mini markets, specialized shops (butcher shop) and markets. In the past decade, the role of supermarkets has increased significantly. Although the role of supermarkets is growing, butcher shops still have a very important place in the meat distribution in Serbia. In the period from January to October 2014, the most important distribution channel for meat products with 23% share was supermarkets. A significant place with 21% share belongs to mini markets, traditional shops and butchers, while only 10% belongs to hypermarkets and cash & carry facilities (Progressive magazine, 2015). As the distribution of meat and meat products are concerned, in relation to the EU countries Serbia has similarities with countries located in the south of the EU, since distribution is mostly done through traditional shops (Trienekens et al., 2009).

Figure 3 shows the dynamics of prices of participants in the pork supply chain in Serbia. It is evident that prices follow the same trend of movement on all three levels of the pork supply chain. Above average price growth for all three levels was achieved in the period August/September 2008. Namely, this rise in prices is mainly the result of a market failure that occurred in 2007. More exactly, large quantities of live animals import led to a low purchase prices of fattening pigs and because of that a large number of farmers slaughtered a significant number of fattening pigs and sows, which significantly reduced the supply of fattening pigs in 2008. Subsequently, the prices on all three levels of the chain are constantly falling, and below the average decline was realized in the period from June to August 2010. The price growth reappears in April 2012 and reaches its maximum in September of the same year. The main cause of the rise in prices of fattening pigs is the increase in animal feed prices. The second, significantly below the average fall in prices occurred in the period January/February 2015 due to the over-supply of fattening pigs on the domestic market. The main reason for market surpluses is the suspension of exports to Russia in late 2014 and the increase in imports of fattening pigs and pork from EU countries. Recovery of the price of fattening pigs, which passed on to other levels of the chain, occurred in April 2015 due to the delivery of fattening pigs to the Directorate for Commodity Reserves, and the resumption of exports to Russia. After that, due to surpluses that re-emerged on the market, the price of fattening pigs since September were falling again[11].

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11 Expecting further growth in exports to Russia, pig farmers decided to increase the number of fattening pigs. However, due to the re-suspension of exports on the one hand, and further growth of pork and fattening pigs import, on the other hand, prices of fattening pigs have started to decline again.

Figure 3. Pork supply chain participants price dynamics
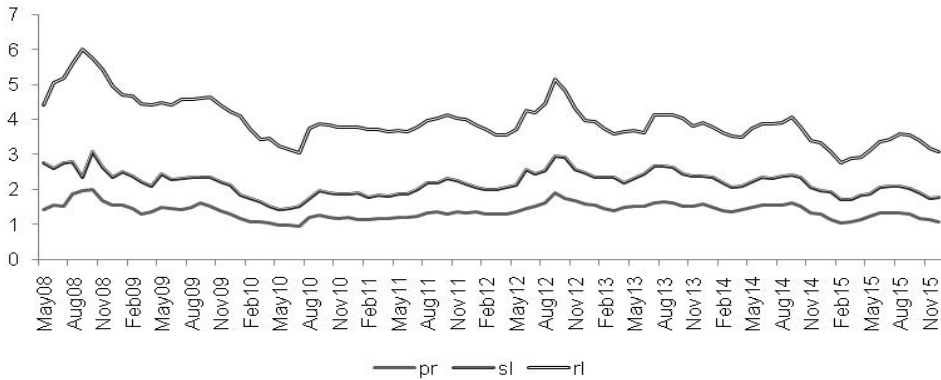
Note: pr - prices on the agricultural sector level; sl - prices on the processing sector level; rl - prices on the distribution sector level.

Source: Monthly statistical bulletins; GEA info Centre.

Estimation of the vertical price transmission

The unit root test was used to test stationary and to determine the order of integration of variables. For the test of data series stationary the augmented Dickey Fuller, ADF, test was used. The results of the ADF test are shown in the following table. According to data in *Table 1* the results of ADF test indicate that all variables are non-stationary and integrated of order 1.

Table 1. ADF test results

Variable	I	II
pr	-1.217571	-1.019039
difpr	-6.206170	-6.204973
sl	-1.022463	-1.130119
difsl	-4.923578	-4.975240
rl	-1.895142	-1.886142
difrl	-6.950128	-6.808618

Note: I - with intercept, II - with intercept and trend, significance level 5%

Source: Authors' calculations

Since the variables are integrated of order 1, the next step is the cointegration analysis between the variables. Namely, it is analyzed does the price data series have long run relationship, i.e. does the variables tend to the equilibrium relationship in the long run. The evaluation of cointegration was carried out using Johansen's cointegration rank test. Johansen's cointegration test includes two tests: a trace test and a maximum-eigenvalue test. The following tables show the results of both tests.

Table 2. Results of the cointegration analysis

Eigenvalue	Trace st	Critical value	p value	Max-Eigen st	Critical value	p value
0.340287	53.63138	29.79707	0.0000	37.02352	23.131620	0.0002
0.161393	16.64180	15.49471	0.0335	15.66511	14.264600	0.0298
0.010913	0.97667	3.84147	0.3230	0.97667	3.841466	0.3230

Source: Authors' calculations

Based on the data presented in the table of the threshold statistics and the maximum critical value test (*Table 2.*), it is evident that there is two cointegration equation among the analyzed series of price data, and therefore the application of the AECM model is considered justified. More precisely, it is evident that there is a long-term equilibrium relationship between the analyzed variables.

According to Vavra and Goodwin (2005) and Wohlgenant (2001), the largest number of authors estimate the vertical price transmission in upward direction. That is, the impact of the change in price at the level of the agricultural sector to the other participants of the chain is analyzed to a greater extent. However, according to Guillen and Franquesa (2010), most authors dealing with the analysis of price transmission in the market of fresh product consider that, changes in retail prices have a greater impact on price changes in the agricultural sector.

Therefore, in this paper, the direction of the estimation of the price transmission in the pork supply chain was "downstream". More specifically, the impact of the retail and processing sector price change on agricultural price change will be examined. Namely, in the period covered by the analysis of the price transmission, the changes that had occurred in the pork market had significant repercussions on pig farmers. Namely, because of the non-competitive purchase prices of the fattening pigs in the analyzed period the participants of the processing sector imported large quantities of fattening pigs and pork. Therefore, AECM model evaluated in this paper has the following form:

$$\Delta pr_t = \alpha_0 + \sum_{i=1}^{M} \beta_{1i}^+ + \Delta sl_{t-1} + \sum_{i=1}^{N} \beta_{1i}^- \Delta sl_{t-1}^- + \sum_{i=1}^{P} \beta_{2i}^+ \Delta rl_{t-1}^+ + \sum_{i=1}^{Z} \beta_{2i}^- \Delta rl_{t-1}^+ +$$
$$\sum_{i=1}^{W} \beta_3 \Delta pr_{t-1} + y^+ ECT_{t-1}^+ + y^- ECT_{t-1}^- + \varepsilon_t \qquad (5)$$

where Δpr_t, Δsl_t and Δrl_t are the agricultural, processing and retail sector price changes, respectively; ECT_{t-1}^+ and ECT_{t-1}^- are the lagged positive and negative residuals of the regression between pr_t, sl_t and rl_t; Δsl_t^+, Δsl_t^-, Δrl_t^+ Δrl_t^- are segmented positive and negative changes of the processing and retail sector prices; β_{1i}^+, β_{1i}^- β_{2i}^+, β_{2i}^-, β_3, γ^+, γ^- - parameters of equation.

The results of the AECM are presented in *Table 3*.

Table 3. Results of the AECM model

Variable	Coefficient	Probability (p)
α_0	-0.001940	0.8446
Δsl_t^-	0.281438	0.0001
Δsl_{t-1}^-	0.181873	0.0000
Δsl_t^+	0.168733	0.0000
Δsl_{t-1}^+	0.012172	0.7878
Δrl_t^-	0.191314	0.0000
Δrl_{t-1}^-	0.074631	0.0379
Δrl_t^+	0.213875	0.0000
Δrl_{t-1}^+	0.075577	0.0943
Δpr_{t-1}	-0.404549	0.0001
ECT_{t-1}^-	-0.456087	0.0007
ECT_{t-1}^+	-0.051172	0.6600
R^2	0.961953	
DW	1.927823	

Source: Authors' calculations

Since p=0.0429 the zero hypothesis on the presence of symmetry (H$_0$: $\gamma^+ = \gamma-$) in the long run was rejected, which means that the price transmission in the pork supply chain is asymmetric in the long run. The coefficient with ECT_{t-1}^- and ECT_{t-1}^+ has an adequate sign. However, the probability of coefficient with ECT_{t-1}^+ indicates that the estimated coefficient is not statistically significant. On the other hand, the value of the coefficient with ECT_{t-1}^- is statistically significant, which means that in the pork supply chain existed negative asymmetry in price transmission.

On the other hand, as p=0.0015 the zero hypothesis on the presence of symmetry (H$_0$: $\beta_{1i}^+ = \beta_{1i}^-$) in the transmission between the prices of the processing sector and the sectors of agriculture is rejected. That is, as the probability of the coefficient with Δkc_{t-1}^+ is greater than 5%, the estimated coefficient is not statistically significant. This means that in the case of the relationship between the processing sector and the agricultural sector, negative asymmetry in transmission is present. That is, the fall in prices at the level of the processing sector is to a greater extent transferred to the agricultural sector than it is the case with price increase.

Also, by testing the zero hypothesis on the presence of symmetry in the transmission of prices between the retail sector and the agricultural sector, in the short term, it was found that transmission in the short term is symmetrical (H$_0$: $\beta_{2i}^+ = \beta_{2i}^-$). In other words, as p=0.2248, the null hypothesis is accepted, which means that in the short run the fall and growth in the retail sector prices are both transferred to the agriculture sector.

The most important factor influencing the change in prices is the change in supply and demand relations. In the analyzed period, on the pork market the biggest changes occurred as a consequence of the following factors:

- In the analyzed period, a large quantity of pork and live animals was imported.

- The export of pork and fattening pigs was limited in some countries, while in EU was prohibited.

- The largest number of large and medium-sized processors have their own facilities, and the lack of inputs which they need for further processing procure from import. Processors import large amounts of fattening pigs especially in the period when the price of fattening pigs on the domicile market is above the price in the international market.

Conclusion

As far as the main objective is concerned, it can be concluded that in Serbian pork supply chain negative asymmetry exists as a consequence of the slaughtering industry abuse of market power. More precisely, as a result of oligopsony market structure of the processing sector, it is possible to transfer the fall in prices on the agricultural sector faster than growth. Additionally, it is evident that there is no even distribution of profits among pork supply chain participants in Serbia.

The basic reason for processing sector abuse of market power is that during the observed period the movement of prices in the supply chain of pork was largely determined by trends in the domestic market. Namely, in the analyzed period, the import of large quantities of pork (especially from Spain) was allowed. On the other hand, the export was limited in some countries and completely banned in the EU countries because of vaccination against swine fever. Additionally, the most important category of in Serbia are small pig family farms that are not able to meet the needs of the slaughter industry with the quality and quantity of their product. Except that, a large number of meat processors in Serbia have their own facilities, and very often the lack of inputs are compensating from imports. Also, due to the absence of contracted production between the pig farmers and the processing sector, as well as due to the absence of organized purchase of agricultural products, it is evident that the meat processing sector has the possibility of abuse of market power by influencing the conditions of purchase and the manner of forming the purchase price.

It can be concluded that the position of small and medium-sized pig farms engaged in the pork supply chain is very unfavourable. Bearing in mind that the future movement of pork production in Serbia is determined by the production of these farms, it is necessary to find adequate ways to include them in complex relationships in the supply chain with pork. Also, it is necessary to find a mechanism that would prevent further abuse of market power by the processing sector either through organized purchase of fattening pigs or through contracted production with participants in the processing sector.

Future research could be focused on the on the analysis of the institutional framework on impact on the price transmission in the pork supply chain. Also, it could be oriented to estimate the impact of agricultural policy measures, using the appropriate methodological framework, on the price transmission in the Serbian pork supply chain.

Conflict of interests

The authors declare no conflict of interest.

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ANALYSIS OF DEVELOPMENT OF LOCAL SELF-GOVERNMENT UNITS IN VOJVODINA

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A B S T R A C T

Discriminant analysis and logistic regressions were applied in this research for the purpose of analyzing the development of autonomous province (AP) Vojvodina local self-government units, which are classified as developed and underdeveloped. The aim of the study is to identify population economic and social characteristics as the one with the most influence on the existence of differences between the observed categories of local self-government units. Based on the results of the discriminatory analysis, number of employed inhabitants per 1,000 inhabitants and number of highly educated inhabitants per 1000 inhabitants were found to have the greatest influence on the development of the local self-government unit, while based on logistic regression results, number of employed inhabitants per 1000 inhabitants and natural increase are the most influential factors. Both models have good data classification power, the discriminant analysis model successfully classifies 90.9% of all cases, and the logistic regression model successfully classifies 88.6% of cases.

Introduction

The effects of the globalization are manifested not only at the national level, but also at the level of mesoregions or micro-regions, which increase the importance of territorial units. This stems from the fact that local and regional development responsibilities

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and competencies are delegated to the regional institutions (Liptáková, Rigová, 2020). Assessing regional and, as well as, local development is a methodologically challenging and politically relevant issue. The development of a region depends on the development level of the local governments in that region. Through local economic development, the economic capacity of the local area is developed to create a basis for economic progress and quality of life for the whole society. Local economic development integrates regional and development policy, as well as all other policies, with the aim of faster development of local communities (Glavaš-Trbić, et al. 2008). Local economic development is composite and complex area that, in addition to economic development policy including agriculture, also incorporates other divisional, structural and social policies, local infrastructural development policy, as an indispensable ambience for local economic development, as well as all sorts of civic initiatives contributing to local communities' improvement (Kačar, et al. 2016).

The aim of this research is to determine the influence of various factors on the development of the observed units in local self-government (municipalities) in the Vojvodina region by applying discriminant analysis and logistic regression, as statistical methods suitable for the categorical data analysis. Specifically, the factors that are expected to have an impact on the development of a particular municipality are: population density - population per km² (PD), number of employed inhabitants per 1,000 inhabitants (EM), number of highly educated inhabitants per 1,000 inhabitants (ED), natural increase (NI) and investment in new capacities (IN).

Materials and methods

The classification of local self-government units into developed and underdeveloped ones was carried out based on the "Decree on the establishment of a single list of development of the region and local self-governemnt units for 2014". Regions and local self-government units, which are classified into the first, second, third and fourth groups and devastated areas based on data from the authority responsible for statistics and finance. ("Sl. glasnik RS", No. 104/2014). The classification of regions and local self-government units into specific groups was done based on the gross domestic product per capita value in the region or local self-government unit, relative to the national average. For the purposes of this research, local self-government units are classified as developed (first and second group), development rate is over 80% of the national average and underdeveloped (third and fourth group), development rate is below 80% of the national average.

For statistical analysis of selected factors of development of local self-government units (municipalities), two statistical methods were applied: discriminant analysis and binary logistic regression. Discriminant analysis (DA) and logistic regression (LR) are widely used multivariate statistical methods for analyzing data with categorical outcome variables (Pohar, et al. 2004). The difference between these two methods is that the discriminant analysis implies certain assumptions that must be respected for its application, above all the normality of the data, while the logistic regression model is not based on any assumptions.

Discriminant analysis

Discriminant analysis is a multivariate technique which focuses on association between categorical dependent variables and multiple independent variables (Ahsan ul Haq et al., 2015).

Discriminant analysis is a parametric model of multivariate analysis that is based on the following assumptions:

1) there is no high correlation of explanatory variables,

2) variance and covariance of individual groups explanatory variables pairs are equal (homogeneous) and

3) explanatory variables have a normal distribution. (Sokolovska et al., 2014).

Kolmogorov-Smirnov and Shapiro-Wilks normality tests, Leven variance homogeneity test and Brown-Forsythe arithmetic mean group test were used to test the assumptions for discriminant analysis. The homogeneity of the group covariance matrices was checked using Box's M statistics.

Some authors define that the variate for a discriminant analysis, also known as the discriminant function, is derived from an equation much like that seen in multiple regression. It takes the following form (Hair et al., 2006):

$$Z_{ik} = a + W_1 X_{1k} + W_2 X_{2k} + \ldots + W_n X_{nk} \quad [1]$$

Z_{ik} = discriminant Z score of discriminant function j for object k

a= intercept

W_i = discriminant weight for independet variable i

X_{ik} = independet variable i for object k

Wilk's -test was used to interpret the obtained discriminant function, which is of the differences among group means of independent variables, was used to ascertain the level of significance for each group predictor. To estimate the degree of deviation influence, the standardized canonical discriminant function was applied (Heil, Schmidhalter, 2014).

Logistic regression

Logistic regression model represents a statistical method for predicting the outcome of categorical dependent variable based on one or more independent variables that are called predictors. When observed outcome for dependent variable has two possible options, model is called binary logistic regression model (Kovljenić, Savić 2017).

The following form of regression is used for this purpose:

$$\pi(x) = \frac{e^{\alpha + \beta 1 X1 + \beta 2 X2 + \cdots + \beta kXk}}{1 + e^{\alpha + \beta 1 X1 + \beta 2 X2 + \cdots + \beta kXk}} \ [2]$$

Where $\pi(x)$ represents the expected value of Y for a given value of X, while the parameters α i $\beta 1,2,..k$ correspond to the parameters α i $\beta 1,2,...k$ from the linear regression model and represent the average initial level of the dependent variable and coefficients regressions showing the average change in logit per unit of change independently variable. The logistic regression function thus obtained is nonlinear and can be linearized by logit transformation.

If the logistic regression function is linearized, we get the following form:

$$\ln\left(\frac{\pi}{1 - \pi}\right) = \alpha + \beta 1x1 + \beta 2x2 + \cdots \beta kxk \ [3]$$

The resulting equality is called logit and it is linear with the parameters βi, $i = 1 ... k$. It can be observed that π belongs to the interval $[0,1]$, while the logit value ranges from $(-\infty, +\infty)$, so it can be said that the logit function is the best choice for displaying this function (Chatterjee, Ali, 2006). The Wald statistic test is usually used in which β is estimated using the maximum likelihood estimator (Basu et al., 2017).

The overall assessment of the model to fit the data can be examined using the Hosmer-Lemeshow test, as well as the classification matrix provided by the SPSS software package used in the data processing. One of the most commonly used indicators of model quality is Cox and Snell and Nagelkereke pseudo R^2. Although values of pseudo R^2 indices typically range from zero to unity, values for some indices can exceed 1.0 (Walker, Smith, 2016).

The choice of variables is conditioned by many factors, the most important of which are the availability of data and the requirements set by the applied statistical methods. The survey is based on data about the development of AP Vojvodina local self-government units from the "Municipalities and regions" (Opštine i regioni) for the period 2013-2018. The SPSS software package was used for statistical data processing.

Results and Discussion

From the Table 1 it can be seen that out of 45 local self-government units in the territory of AP Vojvodina, 26 have the status of developed units of local self-government, while the other 19 have the status of underdeveloped local self-government units. In regional terms, the average number of inhabitants per km² is 82, the smallest number of inhabitants per km² is in the municipality of Sečanj 23, and the largest in Novi Sad with 528 inhabitants per km².

In terms of employment, the average at the regional level is 232 employees per 1,000 inhabitants, which shows a low employment rate. The city of Novi Sad has the highest employment rate with 400 employees per 1,000 inhabitants, while the municipality of Opovo has the lowest employment rate with 126 employees per 1,000 inhabitants.

The average number of university graduates per 1,000 inhabitants in the territory of Vojvodina is 91, the lowest number of higher educations is in the municipality of Žabalj, while the highest number is those with higher education in Novi Sad.

A negative natural increase rate is present in almost all municipalities in the territory of Vojvodina, only the city of Novi Sad stands out with a positive natural growth rate of 0.8 ppm. Investments in new capacities are presented in absolute amount. The average investment in the observed period amounts to RSD 2,737,636.91. High velues of coefficients of variation indicate that there are significant differences between the observed municipalities. The highest variability is observed with the variable investment, which is expected given the variation range.

Table 1. Descriptive statistics

Variable	Mean	Minimum	Maximum	Coefficient of variation (%)
PD	82	23	528	95.68
EM	232	126	400	25.71
ED	91	49	219	34.26
NI	-7.38	-12.2	0.8	34.09
IN	2,737,636.91	0	34,434,118.00	220.26

Source: Authors calculation

Firstly, the assumptions for applying discriminatory analysis were tested. The first assumption refers to the collinearity of the variables, and for the purpose of testing the collinearity of the variables, a correlation matrix was used within the groups to show the correlation between the variables (Table 2).Table 2 shows that the highest values of correlation coefficients are visible in the correlation between PD and IN ($r = 0.665$), followed by PD and ED ($r = 0.593$) and PD and NI ($r = 0.546$).

Table 2. Correlation matrix

Variable	PD	EM	ED	NI	IN
PD	1.000	0.461	0.593	0.546	0.665
EM		1.000	0.458	0.415	0.541
ED			1.000	0.511	0.537
NI				1.000	0.416
IN					1.000

Source: Authors calculation

Testing the homogeneity of variance of individual variables between groups was performed using the Leven test for testing the homogeneity and the Brown-Forsythe test of arithmetic means of groups equality (Table 3).

Table 3. Results of Levene's and Brown-Forsythe tests

Variable	Levene's statistics	Sig.	Brown-Forsythe statistics	Sig.
PD	5.611	0.022	12.172	0.002
EM	5.174	0.028	49.496	0.001
ED	6.770	0.013	35.767	0.001
NI	0.454	0.504	9.935	0.003
IN	7.760	0.008	7.261	0.012

Source: Authors calculation

The Leven test results for all variables except for the natural increase variable show the heterogeneity of variance. As the Brown Forsythe test was applied to test groups in the case of heterogeneous variance, the data presented in Table 3. shows statistically significant group mean.

The application of discriminant analysis assumes the existence of group covariance matrices homogeneity, which is usually checked in Box's M statistics in multivariate analysis (Table 4). This test statistical significance may be due to the deviation of the data from the normal distribution, not to the inequality of the metrics covariance.

The results presented in Table 4 show that complete agreement with the multidimensional normal distribution was not reached.

Table 4. Results of Box's M statistics

Box's M		136,478
	Approx.	7,860
	df1	15
F	df2	5338,556
	Sig.	.000

Source: Authors calculation

The last assumption of discriminant analysis concerns the normality and linearity of the original data. Apart from the fact that all variables, except for NI and EM, show deviations from the normal distribution, the original data is burdened with many non-standard observations. Since the original set of variables did not achieve complete agreement with the normal distribution, logarithmic transformation of the data was applied.

The transformation achieved not only better agreement of the transformed data distribution with normal distribution, but also a reduction in the number of non-standard observations, which gives the analysis better opportunities to more accurately extract discriminatory functions.

Results of discriminant analysis

From the results shown in Table 5 a single canonical discriminant function was isolated.

Table 5. Results of discriminant function

Function	Eigenvalue	Canonical Correlation	Wilks' Lambda	Chi-square	Sig.
1	1.523	0.777	0.396	36.559	0.001

Source: Authors calculation

The eigenvalue indicates the relative discriminant power of the discriminant function, the higher eigenvalue means that the more variance in the dependent variable is explained by the given function. The canonical correlation is 0.777; it represents the quadratic root of the relation between the intergroup and the total sum of squares.

The significance of the isolated discriminant function was tested via Wilks' lambda =0.396 and, for $\chi2 = 36,559$ and df = 5, confirmed at p = 0.000, which, together with the value of the canonical correlation coefficient, show that discriminative function is significant (Table 5).

In the Structure matrix table (Table 6) variables are ordered by absolute values of correlations with the discriminant function.

Table 6. Structure matrix

Variable	Function
logED	0.792
logEM	0.776
logPD	0.653
logIN	0.647
logNI	0.363

Source: Authors calculation

The largest contribution to the discriminatory function structure were made by variables: ED (0.792), followed by EM (0.776). The smallest contribution to the discriminant function structure had the variable NI (0.363). Although significantly different, the values of all coefficients are statistically significant.

Table 7. Discriminant function coefficients

Variable	Standardized discriminant function coefficients	Discriminant function coefficients
logPD	0.297	1.446
logEM	0.465	0.011
logED	0.433	4.510
logNI	-0.126	-0.054
logIN	0.229	0.438
Constant		-16.884

Source: Authors calculation

The discriminant function standardized canonical coefficients (Table 7) represent measure of the selected independent variables relative influence, the higher value of the coefficients corresponds to the greater discriminative ability and means that the groups differ in that variable. The independent variable with the most discriminatory power is EM, followed by ED, while the other three independent variables were less successful as predictors. Canonical discriminant function coefficients represent the coefficients of final canonical discriminant function (Table 7).

Based on the calculated coefficients, the discriminant function takes the following form:

$$Z = -16,884 + 1,446 logPD + 0,011 logEM + 4,510 logED - 0,054 logNI + 0,438 logIN$$

After discriminant function was calculated, the intersection point was determined based on the centroids in each group.

Table 8. Function at group centroids

Development of local self-government units	Function
Underdeveloped	-1.449
Developed	1.003

Source: Authors calculation

The discriminant function intersection point is weighted average between the centroids in each of the distributions. The optimum cross-sectional limit recorded is 1.003. This value classifies municipalities according to their discriminatory result, i.e. municipalities where function value is below 1.003 belong to the group of underdeveloped municipalities, while municipalities with discriminatory grades above this value belong to the group of developed municipalities (Table 8).

Results of logistic regression

The stepwise method was used to select variables in the regression analysis. The selection of variables is condusted in four steps, from which only the results of the fourth step will be described.

The performance of the model was tested using the Omnibus coefficient test, called also as "goodness of fit" because it shows how well the model predicts results.

Table 9. Omnibus tests of model coefficients

Step		Chi-square	df	Sig.
Step 4	Block	39.676	2	0.001
	Model	39.676	2	0.001

Source: Authors calculation

The Omnibus test (Table 9) found that there was a statistically significant difference between the models containing the selected independently variable and the one containing no independent variable (Sig. <0.05). The same conclusion can be drawn from the data presented in the following table.

Table 10. Hosmer and Lemeshow test results

Step	Chi-square	Df	Sig.
4	4.054	8	0.852

Source: Authors calculation

In the case of the Hosmer and Lemeshow test the indicator of poor prediction is a Sig. value of less than 0.05. In the analyzed example, the value for the Hosmer and Lemeshow test is 4.054 with a significance of 0.852, which leads to the conclusion that the model can be the basis for the prediction.

Model fit was estimated using Cox and Snell's and Nagelkerke Pseudo R-Square coefficients. The values of these coefficients indicate how accurately the model explains the analyzed data set.

Table 11. Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
4	19.859	0.594	0.801

Source: Authors calculation

The third and fourth columns (Table 11) show the values of pseudo coefficients, the values of these two indicators are 0.594 and 0.801, which indicate that the model with the given set of variables is well fitted to the data.

Table 12 presents information about contribution or importance of each predictor variable. The contribution of predictor variables were valuated based on the results of the Wald test.

Table 12. Variables in the equation

Step	Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Step 4	EM	0.081	0.028	8.386	1	0.004	1.084
	NI	0.816	0.378	4.649	1	0.031	2.261
	Constant	-10.506	4.597	5.224	1	0.022	0.000

Source: Authors calculation

Based on the Wald test Sig. value presented in the Table 12, it can be concluded that only two, of the observed predictor variables, have statistical significance.

In this analysis, the main factors that influence whether a municipality will be developed are EM (Sig = 0.0004) and NI (Sig = 0.031), while other factors did not significantly contribute to the model predictive capabilities.

Based on the predictor variables calculated coefficients the logistic regression model equation is calculated, and it takes the following form:

$$Y = -10.506 + 0.081EM + 0.816NI$$

An area under the rock curve (AUC) was calculated, for the purpose of additional analysis on the degree of the prediction agreement with the data.

Table 13. Area under the curve

Variable	Area	Std. Error	Asymptotic Sig.	Asymptotic 95% confidence interval	
Discriminant analysis	0.991	0.021	0.000	0.929	1.000
Logistic regression	0.970	0.009	0.000	0.974	1.000

Source: Authors calculation

The results (Table 13) show that the AUC for the logistic regression model is 0.970, while the AUC for the discriminant analysis model is 0.991. The area mentioned here speaks ofextraordinary separation.

The ROC curve to which the above analyzes refer is shown in Figure 1.

Figure 1. ROC curve
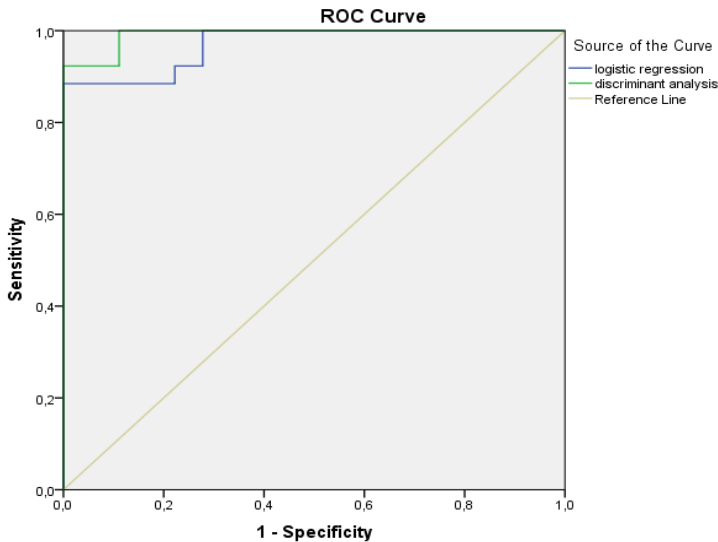
Source: Authors calculation

Data presented in the Table 14 show how accurately the model predicts categories of dependent variables. The discriminant analysis model successfully classifies 90.9% of all cases, while the logistic regression model successfully classifies 88.6% of all cases.

Table 14. Classification table

Development	Discriminant analysis		Logistic regression	
	Underdeveloped	Developed	Underdeveloped	Developed
Underdeveloped	16	2	16	2
Developed	3	24	3	23
Total (%)		90,9		88,6

Source: Authors calculation

Based on the values in the classification table, it is possible to determine the sensitivity of the model (Table 15).

Table 15. Comparison of models

Discriminant analysis			Logistic regression		
Sensitivity (%)	Specificity (%)	AUC (%)	Sensitivity (%)	Specificity (%)	AUC (%)
92,31	84,21	99	92	84,21	97

Source: Authors calculation

It can be noted (Table 15) that logistic regression and discriminant analysis models have successfully classified approximately the same percentage of cases. However, based on the AUC values, it can be concluded that the discriminant analysis model slightly exceeds the logistic regression model.

Conclusion

This paper compares two methods: discriminant analysis and logistic regression to assess the impact of five variables on the likelihood of a local government unit being classified as developed or underdeveloped. Variables that were assumed to have an impact on the development of municipalities are: population density - number of inhabitants per km², number of employees per 1,000 inhabitants, number of highly educated inhabitants per 1,000 inhabitants, natural increase and investments in new capacities. Out of 45 municipalities in AP Vojvodina, 26 municipalities belong to the group of developed, while 19 municipalities have the status of underdeveloped municipalities. After testing the assumptions for the application of discriminant analysis, the discriminant function was calculated. The discriminatory analysis results showed that the most important factors influencing the municipality classification are number of employees per 1,000 inhabitants and the number of higher education inhabitants per 1,000 inhabitants. The significance of the discriminant function was confirmed by the Wilks' lambda test and the canonical correlation coefficient value. The logistic regression results showed that number of employees per 1,000 inhabitants and natural increase are the most important predictors. The model evaluation was performed by measuring the overall classification accuracy, sensitivity and specificity as well as by examining the area under the ROC curve (AUC). The results show that both models have good classification power. The discriminant analysis model successfully classified 90.9% of all cases, while the logistic regression model 88.6% of all cases. When considering the percentages of sensitivity,

specificity and AUC, it can be observed that the differences between the two models are insignificant, but in the specific example the discriminant analysis model gave better results and should be used as a basis for prediction.

Conflict of interests

The authors declare no conflict of interest.

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UNCERTAINTY IN SMES' ASSESSMENT OF CORONAVIRUS PANDEMIC RISK IMPACT ON AGRI-FOOD SECTOR IN WESTERN BALKANS

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ARTICLE INFO	ABSTRACT
	The subject of the research is to explore the operational risks - the risk of emergencies and specific Coronavirus pandemic risk that are SMEs from agribusiness sector, from Western Balkan countries exposed to, and the significances of their effect as independent variables to the sustainability of revenues in 2020. For that purpose, a survey of 102 SMEs from Agri-food and farms from the agribusiness sector from Serbia, Montenegro, Bosnia and Herzegovina, Albania and Montenegro were provided at the end of March 2020. Methods used are: descriptive statistical analysis, correlation and regression analysis, ANOVA test, Person's correlation and multiple linear correlations. The results confirmed the hypothesis of the research - which the Sustainability risk of SMEs and farms in Western Balkan countries is significantly influenced by operational risk of emergencies and, ongoing Coronavirus pandemic) risk level in 2020. The contribution could to the sector actors' exposure to these risks for efficient managing future uncertainties.

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Introduction

The world has seen an explosive growth of infections with the deadly novel virus in the first half of 2020. Most of the countries have been forced to shut down large areas of social and economic life to slow contagion, the Western Balkans have not been spared. Serbia, Montenegro, Bosnia and Herzegovina, Albania and North Macedonia, have been forced also to impose tight restrictions on economic life to contain the Coronavirus pandemic.

It has to be said that the Western Balkan growth model was vulnerable before the crisis. In the region, consumption accounted for more than 60 per cent of the growth in recent years. Consumption growth in some countries has been fuelled by higher public spending and buy one-off wage policies and near double-digit growth in household lending, raising questions about the sustainability of the consumption-driven growth in the region. The contribution of investment was about 47 per cent in 2019 while net exports subtracted from growth. In Albania and Bosnia and Herzegovina, growth of investment in 2019 has been limited while consumption grew strongly driven by remittance inflows and higher consumer lending.

Across the region, net exports in 2019 were a drag on growth: on average, in 2012-18 they subtracted from growth because of the high level of imports, there are few competitive exporters, and the region's main trading partners, in particular EU members, were weakening. Productivity, including the growth of advanced manufacturing and services, has lagged behind what is necessary for the region to catch up with incomes in the advanced EU.

Going into the Coronavirus crisis, Western Balkan countries had different economic strengths and weaknesses. At 2019, Western Balkan trade deficits reached 13.8 per cent of Gross domestic product. The resilience of Western Balkan economies will be tested as the Coronavirus crisis unfolds. The economic freeze will put pressure on both government budgets and private sector balance sheets. Households will lose jobs, and some once-viable businesses will close. Throughout the economy's liquidity will need to be carefully managed to avoid escalating the crisis. There are many institutions in the Republic of Serbia and region in charge to realise integral disaster risk management measures in emergencies, such is Coronavirus, and therefore agricultural protection, but despite all efforts their work is sometimes very questionable (Radovic et al., 2015). Hence, not only government restrictions, but also the responses of households and businesses to the crisis are putting unprecedented strain on the economies in the region. Declining economic activity is also complicating public finances and expanding the financing needs of governments. Aggregate demand is collapsing, and aggregate supply is also contracting, with the collapse in orders, and the food supply chain problems. Disruptions in global and domestic supply chains hurt agribusiness very much, especially small household farming. Liquidity constraints might cause further disruptions in Agri-food production. So the risk which is an important aspect of the farming business, with the uncertainties inherent in weather, yields, prices, government

policies, global markets, and other factors that impact farming can cause wide swings in farm income, got a new dimension in corona pandemic risk. Risk management, which involves choosing among alternatives that reduce the financial effects that can result from such uncertainties, is at the base of the motivation for the research of this paper, to explore the impact of the Coronavirus pandemic on the Agri-food sector in Western Balkan countries (Jevtic et al., 2013).

The paper is structured to present main data on the agribusiness sector in the Western Balkans, after the introduction, literature overview of the organisational risk of unexpected events and Coronavirus pandemic, and to present main findings of the field research provided in the March of 2020, on the impact of Coronavirus on the sector by surveying the attitudes and estimations of 102 SMEs from agriculture production, Farm households, and services. Discussion and Conclusions, as well as references in the Harvard style, are given at the end of the paper.

Agri-food sector in the Western Balkan countries

Agri-food sector in Western Balkan countries (Grozdanic, 2013) use to be, and still is one of the main sources of production, employment and growth in these countries (T.1)

Table 1. The importance of agriculture in the WB countries, 2013, 2017, 2019.

Indicator	Albania			Bosnia & Herzegovina			Montenegro			North Macedonia			Serbia		
	2013	2017	2019	2013	2017	2019	2013	2017	2019	2013	2017	2019	2013	2017	2019
Gross added value (GAV) for agriculture (% of total GVA)	22.4	22.7	22.0	8.3	7.1	7.0	11.4	10.9	9.2	9.8	9.6	8.2	9.4	7.3	6.0
Employment in agriculture (% of total employment)	52.5	38.2	43	18.9	18.9	17.1	18.7	16.2	7.8	18.2	17.4	16.0	21.3	17.2	16.9

Source: EU Commission Directorate-General for Agriculture and Rural Development Unit, data.

The situation in Western Balkan country's agriculture in 2019 recorded positive economic developments, indicating continuing economic recovery from the severe economic crisis, which started in 2009 and in most countries bottomed out in 2012 (T. 2).

Table 2. The situation in the Western Balkan country's agriculture in 2019.

Indicator	Albania	Bosnia and Herzegovina	Montenegro	North Macedonia	Serbia
Total area (km²)	28 750	51 209	13 812	25 713	88 407
Utilised Agricultural Area (% of total land area)	1.18 mil.ha (40.5% of total)	1.6 mil.ha	0, 9 mil.ha (38% of total)	0,509 mil.ha (40% of total)	3.44 mil. ha (43% of total)
Population (mil.)	2.8	3.8	0.6	2.1	7.2
Rural population (% of total)	39,7%	53.2%	33,2%	42.0%	43,9%

Indicator	Albania	Bosnia and Herzegovina	Montenegro	North Macedonia	Serbia
Population density (km²)	97	75.1	45.0	83.5	81.9
GDP (USD billion)	13.2	17.3	4.8	10.9	42.5
GDP per capita (USD)	4 320	5 093	7 782	5 311	5 900
Share of agriculture in GDP	22.9%	3.3%	8, 2 %	10%	7.5%
Employment in agriculture (% of total)	43%	17.1%	7,8%	16,0%	16.9%

Source: Authors, based on EU data

The total UAA for Albania, Bosnia and Herzegovina and North Macedonia was estimated by reducing the total agricultural land area by the recorded unused arable land and by 50 % of the land under permanent grassland. The accession of WB countries to the EU has gained new momentum in 2018, with the EU Council concluding that North Macedonia and Albania, opened accession talks in 2019. These two countries, thus follow in the footsteps of Montenegro and Serbia, where accession negotiations are already underway, while potential candidate, Bosnia and Herzegovina are lagging behind in the accession process (Volk, 2010; Rednak et al. 2013).

Literature review

Modern Agri-food chains involve a lot of actors with different interests, multiple stages, and diverse risks requiring complex, multilateral, and multilevel governance on a large scale. The variety of existing and emerging threats and risks (natural, technological, behavioural, Coronavirus pandemic) in the modern agri-food chains are identified in the literature (DTRA & IIBR, 2011; Humphrey and Memedovic, 2006; OECD, 2011). Diverse market and private modes evolved to address specific risks driven by ethics, competition, health threats, consumer demand, business initiatives, trade opportunities such as direct marketing, volunteering and industry standards, insurance schemes, guarantees, fair-trade, trade with brands, origins, and organic and quality products.

The globalization of exchange and threats/risks increasingly requires setting transnational public order (ISO, WHO, FAO, WTO). There are a number of opportunities for risk governance in the Agri-food chain (Figure 3): advances and dissemination of technical food chain, training and risk management methods (microbiological, genetic, electrical, laser, robotic, immunological, chemical, nanotechnology, ICT etc.), integral and food chain approaches, and research, monitoring, testing, decision making, and forecasting capabilities for risk-detection, assessment, prevention, and mitigation (Trench at al., 2011; Luning et al., 2006; Sarkar et al., 2012).Trying to define the risk, it can be said that risk is any current or future hazard (event) with a significant negative impact(s). It is either idiosyncratic (accidental, low probability, unpredictable events) or systematic (high probability, predictable events).

The Agri-food sector, which is in the focus of the research in this paper, can face risks associated with each component or it could cause risks: risk of from farming, from food processing, from food-distribution, from diseases as Coronavirus pandemic, is. Risk can be internal to agri-food chains such as hazards caused by one element affecting another within the sector. Risk can be external and associated with external factors (natural environment, government policy, international trade) and/or effecting external components (consumers, residents, industries, nature). Risk can be private when it is assumed by individuals, collectives, entities, or industries, or it can be public when it affects large groups, communities, consumers, or future generations. In a narrow (technical) sense, risk management comprises individual, collective and public action(s) for reducing/eliminating risk and its consequences. In a broader sense, risk management is the specific system of social order (governance) that is responsible for the particular behaviour (s) of agents and determining way(s) to assign, protect, exchange, coordinate, stimulate, and dispute risks, rights, resources, and activities (Bachev & Nanseki, 2008; Beslac & Coric, 2019). In a particular, social-economic, technological, natural environment, the specific system of risk governance that is in place is intimately responsible for the efficiency of the detection, prevention, mitigation, and reduction of threats/risks and their consequences (Miskic et al., 2017). According to Bachev, 2013, generic forms and mechanisms of risk governance are as follows (Figure 1):

Figure 1. Risk Management in the Agri-food Sector
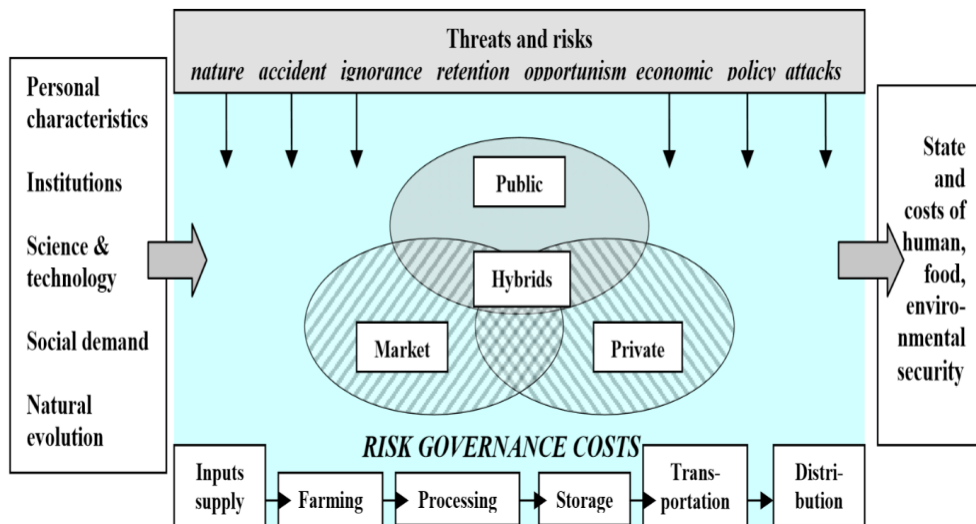
Source: According to Bachev, 2013.

In the agrarian and food sectors the management of natural, market, criminal, policy diverse risks are issues with particular topical interest (Babcock, 2004; CIPS, 2012; Deep & Dani, 2009; EU, 2011; Notarnicolaa et al., 2012; OECD, 2008; Olsson & Skjöldebrand, 2008; Ramaswami et al., 2008; RPDRM, 2012; Schaffnit-Chatterjee, 2010; Shepherd et al., 2006; Tummala & Schoenherr, 2011; Weaver & Kim, 2000;

Domazet et al., 2016). Evolving uncertainty, risks and crises associated with the progression of natural environments, products, and technologies, social demands, policies, and globalization present new challenges to the current systems of risk management. The literature on the Agri-food sector focuses predominately on technical methods and capabilities to perceive, prevent, mitigate, and recover from diverse threats and risks (Barker, 2005; Beni et al., 2012; Hefnawy, 2011; Jaffee et al., 2008; Zhang & Li, 2012).

Consequently, a complete range of risks is left not managed, which has adverse effects on the size and sustainability of Agri-food enterprises, market development, the evolution of production and consumption, the state of the environment, and social welfare (Curcic et al., 2017; Zakic et al., 2019). Depending on the costs and the efficiency of the specific system of governance in a particular (sub) sector, region, country, supply chain, etc., there will be unlike outcomes in terms of "residual" risks and dissimilar states and costs of human, food, environment, etc., security in different regions and periods of time. For instance, when there is inefficient public enforcement of food, labour, and eco-safety standards (lack of political will, administrative capability), then grey agrarian and food sectors develop with inferior, hazardous, and counterfeit components.

Methods and materials

Research description

The aim of the research is, based on the literature on operational risk and statistical properties of operational losses, to explore the operational risks - the risk of the risk of emergencies and specific Coronavirus pandemic risk that are SMEs from Agri-food sector, from Western Balkan countries exposed to, and the For To that purpose, a survey of 102 SMEs from the Agri-food sector and farms from Western Balkan countries: Serbia, Montenegro, Bosnia and Herzegovina, Albania and Montenegro were provided in March 2020.

The hypothesis of the research is:

H= The risk of emergencies and Coronavirus risk that are SMEs from the Agri-food sector from Western Balkan countries exposed to, significantly affect their sustainability in 2020.

There are 2 independent variables in the research; two operational risks- of emergencies (ORE), and the Coronavirus risk, and one independent variable- sustainability risk (SR).

Methods of descriptive statistics used in the elaboration of the research data and findings are correlation and regression analysis, ANOVA test, Person's correlation and multiple linear correlations.

Methods of descriptive statistics used in the elaboration of the research data and findings are correlation and regression analysis, ANOVA test, Person's correlation and multiple linear correlations.

Sampling

Table 3 presents the main activity of the surveyed farm households and SMEs from Agri-food sector production; where SMEs from Agri-food production make 51 (50.00%) of the total sample, Farm households, 33 (32.35%), and services in agribusiness, 18 (17.64%).

Table 3. The main activity of firms

The main activity of firms	Count	Prob
Agri-food production	51	0.50000
Farm households	33	0.32353
Services in agribusiness	18	0.17647
Total	102	1.00000

Source: Authors

All SMEs are private-owned companies/farms, and rural entrepreneurs (from 1-9 employees), and service companies from the sector. Respondents were mostly business owners 52, 9%, and managers 47, 1% (F. 2).

Figure 2. The position of the respondents
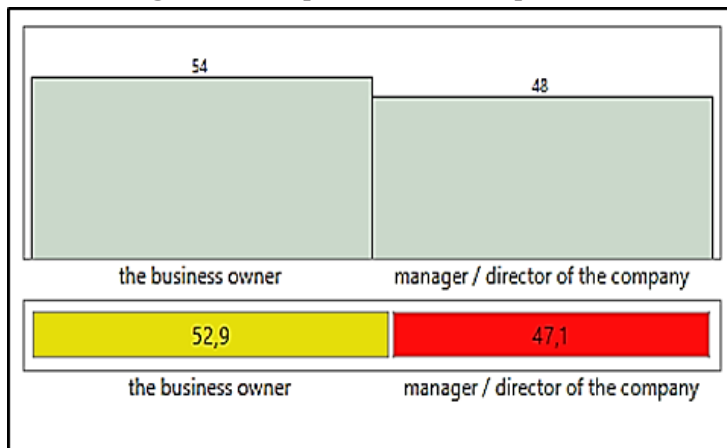
Source: Authors

According to the revenues of the firms in 2019 (given in Figure 3), there are: 27 companies and farms with the revenue < of 10.000€, (26.47%), from 10.001 to 50.000€ – 28, (27.45%), from 50.001 to 200.000€ - 24 or 23.52%, and from 200.001€ - 23 or 22.54% (F. 3)

Figure 3. The company's revenue in 2019

27	28	24	23
less than 10.000 €	from 10.001 to 50.000 €	from 50.001 to 200.000 €	over 200.001 €

26,5	27,5	23,5	22,5
less than 10.000 €	from 10.001 to 50.000 €	from 50.001 to 200.000 €	over 200.001 €
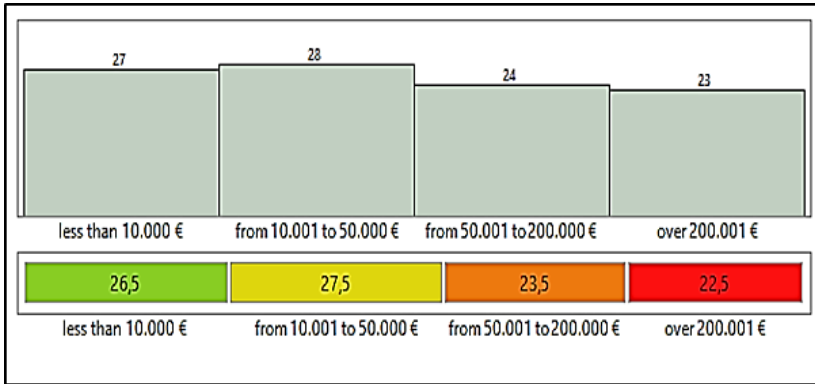
Source: Authors

The origin of the *company's revenue in 2019 was a predominantly* domestic market - 81 (82.35%), and the foreign market for 18 firms (17.64%), what was illustrated in Figure 4.

Figure 4. The origin of the company's revenue in 2019

84	18
domestic market	foreign market

82,4	17,6
domestic market	foreign market
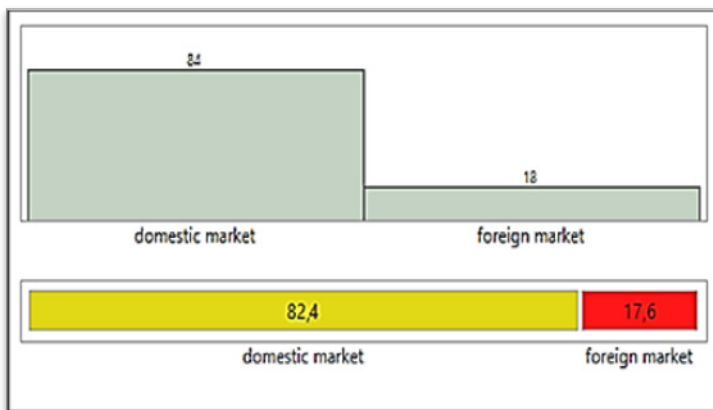
Source: Authors

Key findings

The cross-tabulated values for the main agribusiness activity of the company and the company's revenue in 2019 are presented in Table 4. It can be seen that the highest number of companies were operating in the Agri-food production, these with the revenue in 2019 from € 10,001 to € 50,000, and small agricultural householders with the revenue less than 10.000 € in 2019, as well as the service companies in agriculture in that category of revenues.

Table 4. The main activity of the company and revenue in 2019, cross-tabulated values

The main activity of the company and revenue in 2019	Agri-food production				Farm household				services in agribusinesS				All	
	N	Column %	Row %	% of Total	N	Column %	Row %	% of Total	N	Column %	Row %	% of Total	N	% of Total
less than 10.000 €	7	13.73%	25.93%	6.86%	10	30.30%	37.04%	9.80%	10	55.56%	37.04%	9.80%	27	26.47%
from 10.001 to 50.000 €	18	35.29%	64.29%	17.65%	8	24.24%	28.57%	7.84%	2	11.11%	7.14%	1.96%	28	27.45%
from 50.001 to 200.000 €	11	21.57%	45.83%	10.78%	8	24.24%	33.33%	7.84%	5	27.78%	20.83%	4.90%	24	23.53%
over 200.001 €	15	29.41%	65.22%	14.71%	7	21.21%	30.43%	6.86%	1	5.56%	4.35%	0.98%	23	22.55%
All	51	100.00%	50.00%	50.00%	33	100.00%	32.35%	32.35%	18	100.00%	17.65%	17.65%	102	100.00%

Source: Authors

In table 5 are given the cross-tabulated values for the origin of the company's *revenue* where it is evident that most of the companies, 82.35% earned their revenues in 2019, on the domestic market.

Table 5. The main agribusiness activity of an SME/farm and the origin of the revenue in 2019, cross-tabulated values

The main activity of the SME / farm origin of income	Agri-food production				Farm household				Services in agribusiness				All	
	N	Column %	Row %	% of Total	N	Column %	Row %	% of Total	N	Column %	Row %	% of Total	N	% of Total
Domestic market	43	84.31%	51.19%	42.16%	25	75.76%	29.76%	24.51%	16	88.89%	19.05%	15.69%	84	82.35%
Foreign market	8	15.69%	44.44%	7.84%	8	24.24%	44.44%	7.84%	2	11.11%	11.11%	1.96%	18	17.65%
All	51	100.00%	50.00%	50.00%	33	100.00%	32.35%	32.35%	18	100.00%	17.65%	17.65%	102	100.00%

Source: Authors

In Table 6 are given the cross-tabulated values for the main activity of the SME/farm household and the impact of Coronavirus on income sustainability in 2020. Companies from agri-food production assessed that the highest impact Coronavirus risk would have on their liquidity, farms assessed that main negative impact would be on revenue decrease, as well as service companies. All together see revenue decreases in 2020. Production companies think that the high impact could be on the amount of employee reduction. All think that Bankruptcy & Termination could happen with only 8.82%.

Table 6. The main activity of the SME/farm and expected impact of Coronavirus on income sustainability in 2020

The main activity of the SME/farm and the Impact of Coronavirus on the income sustainability	Agri-food production				Farm household				Services in agribusiness				All	
	N	Column %	Row %	% of Total	N	Column %	Row %	% of Total	N	Column %	Row %	% of Total	N	% of Total
The number of employees' reduction	12	23.53%	60.00%	11.76%	7	21.21%	35.00%	6.86%	1	5.56%	5.00%	0.98%	20	19.61%
The loss of the market	10	19.61%	62.50%	9.80%	4	12.12%	25.00%	3.92%	2	11.11%	12.50%	1.96%	16	15.69%
Liquidity reduction	15	29.41%	62.50%	14.71%	7	21.21%	29.17%	6.86%	2	11.11%	8.33%	1.96%	24	23.53%
Revenue decrease	9	17.65%	27.27%	8.82%	14	42.42%	42.42%	13.73%	10	55.56%	30.30%	9.80%	33	32.35%
Bankruptcy & Termination	5	9.80%	55.56%	4.90%	1	3.03%	11.11%	0.98%	3	16.67%	33.33%	2.94%	9	8.82%
All	51	100.00%	50.00%	50.00%	33	100.00%	32.35%	32.35%	18	100.00%	17.65%	17.65%	102	100.00%

Source: Authors

In the further tables are given statistical values for independent and dependent variables.

The statistical values for the operational risk of of emergencies (ORE) with its variables: external theft, natural disasters, lows and suppliers are given in Table 7.

Table 7. Statistics for the operational risk of of emergencies (ORE)

The operational risk of of emergencies (ORE), variables	Mean	Std Dev	Std Err Mean
External theft	3.5392157	1.2560473	0.1243672
Natural disasters	3.7843137	1.2791353	0.1266533
Laws	1.8235294	1.2381059	0.1225908
Suppliers	2.9803922	0.8557365	0.0847305
All variables	3.0318627	1.0540302	0.1043645

Source: Authors

The statistical values for the operational risk of Coronavirus with its variables: unprecedented health, social and economic challenges, the immediate pressure experienced by SMEs, self-employed people in the Agri-food and the need for the direct legislative power over Coronavirus matters are given in Table 8.

Table 8. Statistics for Coronavirus risk

Coronavirus risk variables	Mean	Std Dev	Std Err Mean
Unprecedented health, social and economic challenges	3.872549	1.2560473	0.1243672
The immediate pressure experienced by SMEs, self-employed people, specific sectors	3.872549	1.2560473	0.1243672
The need for the direct legislative power over Coronavirus matters	3.0686275	0.9038948	0.0894989
All variables	3.5163399	1.0794892	0.1068854

Source: Authors

The statistical values for the Sustainability risk (SR) with its variables: The number of employees' reduction, the loss of the market, Revenue decrease and Bankruptcy & termination is given in Table 9.

Table 9. Statistics for the Sustainability risk (SR)

Sustainability risk (SR), variables	Mean	Std Dev	Std Err Mean
The number of employee reduction	3.5882353	1.2456096	0.1233337
The loss of the market	2.9705882	0.9795522	0.0969901
Liquidity reduction	3.4117647	1.0374468	0.1027225
Revenue decrease	4.1372549	1.2667821	0.1254301
Bankruptcy & termination	2.5980392	1.2288593	0.1216752
All variables	3.3411765	1.081835	0.1071176

Source: Authors

The correlation of the presented model is given in Table 10, by Pearson correlation values.

Table 10. The correlation of the formed model

Risks	The operational risk of emergencies (ORE)	Coronavirus risk (C19)	Sustainability risk (SR)
The operational risk of emergencies (ORE)	1.0000	0.9709	0.9754
Coronavirus risk (C19)	0.9709	1.0000	0.9860
Sustainability risk (SR)	0.9754	0.9860	1.0000

Source: Authors

Between the independent variable Coronavirus risk and the dependent variable Sustainability risk (SR) is the highest correlation coefficient, 0.9860, and it is strong. The coefficient of Determination is 0.972196, which means how accurately can be predicted the dependent variable Sustainability risk (SR) relative to the independent variable Coronavirus risk, that is worth 97.21%.

In Table 11 the evaluation of the model is given. The total coefficient of determination is 0.977929, with 97.79% can be explained the variability of the dependent variable Sustainability risk (SR) by the 2 independent variables. The correlation between the variables is strong.

Table 11. Evaluation of the model

RSquare	0.977929
RSquare Adj	0.977483
Root Mean Square Error	0.162337
Mean of Response	3.341176
Observations (or Sum Wgts)	102

Source: Authors

The statistical significance score is given in (Table 12) and sums it up [F (2. 99) =2193.242, p<0. 0001].

Table 12. ANOVA

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	115.59809	57.7990	2193.242
Error	99	2.60897	0.0264	Prob > F
C . Total	101	118.20706		<.0001*

Source: Authors

The largest single contribution makes the independent variable Coronavirus riks, 67.85%, while the independent variable, the operational risk of emergencies (ORE) affects 31.66% the dependent variable, Sustainability risk (SR). Based on these data, it can be confirmed that hypothesis H_0 holds that: The operational emergencies risk (ORE) level risk and the Coronavirus risk (C-19) level significantly influence the Sustainability risk (SR) level. The contribution of independent variables to the dependent variable Sustainability risk (SR) is determined in Table 13.

Table 13. Coefficients' contribution

Term	Estimate	Std Error	t Ratio	Prob>|t|	Std Beta	VIF
Intercept	-0.035425	0.0583	-0.61	0.5448	0	.
The operational risk of emergencies (ORE)	0.3250059	0.063962	5.08	<.0001*	0.316653	17.419449
Coronavirus risk (C19)	0.6800334	0.062453	10.89	<.0001*	0.678559	17.419449

Source: Authors

Based on the data in Table 13, Formulas 1 and 2 of multiple regression linear equations were formed, which read:

$$y = -0.035425 + 0.3250059 \cdot x_1 + 0.6800334 \cdot x_2 \tag{1}$$

or

$$\text{Sustainability risk } (SR) = -0,035425 + 0,3250059 \cdot \text{ The operational risk of emergencies } (ORE) + 0,6800334 \cdot \text{ Coronavirus risk } (C19) \tag{2}$$

Discussion and Conclusions

The key findings of the research in the paper have demonstrated that the Agri-food sector in Western Balkan countries deserves so special attention at the time of Coronavirus pandemic risk threatens. The Agri-food sector is, according to the information given in the paper very important sector of activities, employment and entrepreneurship, and would have to be subject of government financial and other support to overcome the expected problems.

The findings of the research in the paper confirm the hypothesis that the risk of unpredictable events and Coronavirus risk could affect the sustainability of SMEs from the Agri-food sector and farm households from Western Balkan countries in 2020.

Looking further, it can be concluded that governance, along with technical, information and other issues, play a central role in risk management analysis and design. Moreover, the system of risk management is to adapt/improve by taking advantage of the summarized new opportunities and overcoming/defending against evolving new challenges.

Often, the introduction and enforcement of new obligations in the food secure, risk-management responsibility, and supporting private and collective initiatives in informing, training, assisting, funding, could be of more efficiency. In order to provide effective support of national policies, the design of modes for public interventions, and individual, collective and business actions, the greater support would have to be given to multi and interdisciplinary research on factors, modes, impacts of risk governance in the Agri-food chain.

Conflict of interests

The authors declare no conflict of interest.

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INDIVIDUAL FARMS AND AGRO-TOURISM IN ROMANIAN BANAT. A PARALLEL ANALYSIS

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A R T I C L E   I N F O

A B S T R A C T

The specificity and diversity of the natural and anthropic patrimonies of the different regions can lead to the development of tourism and, as a result, to the sustainable development in those communities. Starting from the fact that Caraş-Severin and Timiş counties cover most of the historical region of Romanian Banat, thus preserving the traditions and multiculturalism specific to these regions (preserved in its rural communities), the research aimed for a comparative analysis of the evolution of individual farms and of agro-tourism in the two counties as a way of sustainable development and their advertise as tourist destinations. The results obtained highlighted, on the one hand, the existence and maintenance of an economic potential capable of ensuring the development of agro-tourism, a process in full development in this region, and on the other hand the fact that, at least so far, the effects of agro-tourism on the stability of residents are barely visible.

Introduction

Throughout historical evolution, peoples and civilizations have interfered by bringing together different cultures, ethnicities and beliefs that have lived more or less peacefully through the rise and fall of empires, that empires have failed to alter the cultural values of those communities. In this context, the historical province of Banat can be characterized, over time, by an area of interculturality and multilingualism (Dabu,

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2019), by mixed ethnic populations with identities and peculiarities transmitted from generation to generation through the port (Ada-Flavia & Marec- Sirb, 2014), customs and language and which, including in the context of globalization, tends to preserve its national culture, the feeling of social space with aspecific language for each ethnic group (Woudstra, 2006).

Today, the Romanian Banat fully covers the counties of Timiş and Caraş-Severin, a part of Arad county, located south of the Mureş river, as well as the Orşova area in Mehedinţi county and some communes in Hunedoara county (ER, 2008). With the exception of Mehedinţi County, the other counties are part of the West Development Region. From an ethnic point of view, although before 1989 there were, besides Romanians, communities of Germans, Serbs, Hungarians, Italians and Jews, after 1990 most Germans of Italians and Jews left the country (Para & Moise, 2014). However, the Banat spirit is still alive (Dabu, 2019), full of traditional values (Tripa & Gologan, 2010). The mentalities and cultural peculiarities being factors that help foreign investments in this region (Foldi, 2019).

The Banat Mountains constitute a significant tourist potential of this region, especially since there are a number of rural communities with specific anthropogenic potential on their area, which contributes to increasing the quality of tourist products (Danici-Patru, 2018). At the same time, traditional products specific to local communities, the important component of their culture, can be vectors of sustainable local development (Gheorghe, Nistoreanu & Filip, 2013).

Due to the specificity of tourist products, their immaterial character, tourist circulation depends fundamentally on the degree of awareness of tourists about the natural potential and cultural attractions of the area (Dinu & Dinu, 2017), advertising being a factor fundamentally influencing the behavior of the service consumer. On the other hand, through the positioning and specificity of this region, it can be a brand in Romanian tourism (Stancioiu et.al., 2011).

One of the most important roles in promoting Banat's cultural values belongs to the rural communities that still keep their customs and traditions unchanged.

In the conditions of increasing pollution and urban stress, holidays in the natural environment are increasingly preferred (Avram, 2016). The return to nature, the experience of life from traditional farms, is an effective mean of revitalization for urban citizens, especially from big cities.

Unfortunately, legislative imperfections and low political interest in rural areas have made the process of development and integration into the market economy system of small farms quite slow (Alexandri, 2014). A better perspective for rural communities began to be seen after the year 2000 when rural tourism, both concept and practice, began to make its presence felt.

Tourism as a phenomenon, by its spatial, economic, sociological, psychological, cultural, political and other connotations, has no counterpart in any other phenomenon of the modern world (Lakićević & Žarevac, 2014). In this way, in the last decades, rural

tourism has evolved upwards, gradually becoming a means of economic development of rural areas (Ibanescu et.al., 2018, Sagić et al., 2019; Durkalić et al., 2019) with positive results.Within it, agro-tourism came with significant offers to meet the needs of tourists with activities and products made in their own household (Marian, 2017). This is an important fact in ensuring sustainable development in those communities, on the one hand by capitalizing on local agricultural and non-agricultural raw materials, and on the other hand by creating jobs and revitalizing rural localities (Sima, 2016).

Considering that the rural tourism potential in Romania is still very little explored, a quantitative and qualitative increase of this form of tourism is to be expected (Pop, Coros & Balint, 2017).However, more attention is needed from the managers on regional sustainable development, given that in Romania differences between regions are deepening, among the causes being migration (Balan, 2018) so that Romania to be no more among the last places on the development index human beings (Zechariah, 2019).

Given these aspects, the main objective of the research was the parallel analysis of the evolution of agricultural production of vegetables and animals in individual farms in the West Development Region, focusing on Timiş and Caraş-Severin counties, and the evolution of agro-tourism highlighted through the accommodation infrastructure and the intensity of the tourist traffic, in the last 20 years. Also, in correlation with it, were analyzed aspects regarding the evolution trends of the population living in rural areas and the correlations between it and the intensity of tourist traffic in agritourism resorts.

Data sources and methodology

The source of the main data series included in the analysis was the National Institute of Statistics of Romania (NIS, 2020), the online database (TMPOL, 2020) and it refers to establishments of tourist reception with functions of tourists accommodation, tourist accommodation capacity in function by type of establishment, macro-regions, development regions and counties, arrivals and overnight stays in the establishments of touristic reception, livestock, by animal category and crop production by main crop in individual holdings, number and mean age of permanent resident population from rural area and , last but not least, local expenditures for environmental protection. The variables used and their meanings are shown in Table 1.

Table 1. Identifiers, meanings and units of measurement of the variables used

ABH	Agro-touristic boarding houses	number
ACF	Touristic accommodation capacity in function of agro-touristic boarding houses	place-days
ARV	Arrivals in agro-touristic boarding houses	number
OHS	Overnight stays in agro-touristic boarding houses	number
VP	Vgetable production of individual holdings	tonnes
LBV	Livestock of bovine animals	number
LPG	Livestock of pigs	number
LSH	Livestock of sheep	number
LHS	Livestock of horses	number

LPT	Livestock of poultry	number
LBF	Livestock of bee families	number
MAG	Mean age of permanent resident population from rural area	ages
PVA	Population residing in rural areas, aged 24-39 years	years
PVB	Population residing in rural areas, aged 40-54 years	years
PVC	Population residing in rural areas, aged 55-64 years	years
MAG	Mean ages of the population residing in rural areas	years

The characteristic of the distributions of the variables included in the analysis (Table 2) highlights the fact that from the point of view of the central tendency the variables ABH, ARV, OHS, LBV LSH, PVA, PVC and MAG are right skewed and the others are left skewed, with the observation that, given the relatively small value of skewness, the LPT variable can be considered to have a symmetrical distribution.

Table 2. Descriptive Statistics of used vaiables at West Region level

	Min	Max	Mean	Median	Std. Dv.	CV*	Skewness	Kurtosis
ABH	7	211	95	81	58	0.62	0.678	-0.515
ACF	147953	1367679	824390	870919	428387	0.52	-0.262	-1.487
ARV	436	81499	26961	15524	26152	0.97	0.940	-0.327
OHS	1278	144926	53159	31157	49180	0.93	0.753	-0.924
VP	280266	465460	385622	387015	46991	0.12	-0.346	0.039
LBV	121718	235370	173032	170815	43793	0.25	0.186	-1.869
LPG	173252	556609	385512	402342	125394	0.33	-0.237	-1.419
LSH	890888	1508797	1191012	1184473	220016	0.18	0.134	-1.552
LHS	#	61253	36781	33161	15651	0.43	-0.244	0.281
LPT	2973454	6378276	4690204	4686403	818795	0.17	-0.084	1.399
LBF	81808	179454	139420	141431	35704	0.26	-0.440	-1.453
PVA	150423	173648	157896	156393	6510	0.04	1.170	0.953
PVB	123810	180204	153231	149640	17429	0.11	0.161	-1.352
PVC	122445	142507	131795	132002	5159	0.04	-0.143	-0.190
MAG	39.4	41.7	40.4	40.3	0.7	0.02	0.292	-1.249

*coefficient of variation, # missing data

Source: developed by authors using SPSS

From the point of view of the degree of spread, the highest values are registered for the variables ARV (97%), OHS (93%), and ABH (62%). Taking this into account, it results that the average values of the three variables do not provide statistically significant information in the analysis of their evolution. On the other hand, the lowest spreads were recorded for the variables MAG (2%), PVC and PVA (4%), PVB (11%) VP (12%), LPT (17%) and LSH (18%). . For these variables, as well as for LBV, LPG and LBS the average values are representative.

The characteristics of the amplitudes of the distributions of the values of the variables included in the analysis also highlight differences between them. Thus, while the VP variable has an approximately normal amplitude distribution, LHS, LPT and PVA are leptokurtic type, the others are platykurtic type.

The main tools used in data analysis and formulation of conclusions were econometric modeling and correlation analysis. The ANOVA methodology and the F test were used to test the statistical hypotheses regarding the statistical significance of the regression models, and the bilateral t (Student) test was used to test the validity of the regression model parameters and the statistical significance of the parametric correlation coefficients and partial correlations. For both tests the null hypothesis is: the model (respectively the value of the parameter) is not statistically significant. The significance threshold used was $\alpha = 0.05$ (95% confidence level).

Results and discussions

According to the objectives of the research, the analyzes focused on four aspects of the evolutions registered at the level of rural communities in the two counties that cover the vast majority of the Romanian Banat territory. These are: the evolutions of livestock and vegetable production from individual farms; the number of rural residents; development trends of agro-tourism and testing the existence of correlations between the structural evolutions of the rural population and the development of agro-tourism.

Individual farms - sources of income and basis for agro-tourism

During the analyzed period, both in terms of animal evolutions and vegetable production volumes in Caraş-Severin and Timiş counties, there were both similarities and particularities.

In the period 2000-2018, the percentage of livestock in individual farms in Caraş-Severin County, in relation to their total in the West Region, remained approximately same (about 24%) in cattle, increased significantly in pigs, from 7.94% in 2000, to 25.97% in 2018 and decreased both in sheep, by 6.49 percentage points (from 27.75% in 2001, to 20.26% in 2018), and in horses by 7.57 percentage points, (from 28.21% in 2001, at 20.64% in 2018). Regarding the number of poultry and bee families, the percentage of their amounts in relation to the West Region evolved with small fluctuations around 19% for poultry and 30% for bee families, respectively.

From a numerical point of view, in Caraş-Severin County, the first place was occupied by poultry (Figure 1), their number oscillating between 1293403 poultry in 2013 to 538514 in 2017. This category also corresponds to the most significant annual rates of evolution. Thus, in 2016 compared to 2015, there is the largest decrease in the number of birds by 47.92%, while the largest increase was recorded in 2012 compared to 2011.

Under the category of birds, the category of sheep occupies the second place in the ranking of the amounts. In 2016, the number of sheep reached a maximum of 336,202

animals. As for the smallest amounts (190074 sheep), it is recorded in 2004. The annual rate of evolution ranged between -20.41%, recorded in 2004 and 25.87%, recorded in 2013.

Figure 1. Evolutions of livestock, poultry and bee families in the individual agricultural exploitations from Caraş-Severin county
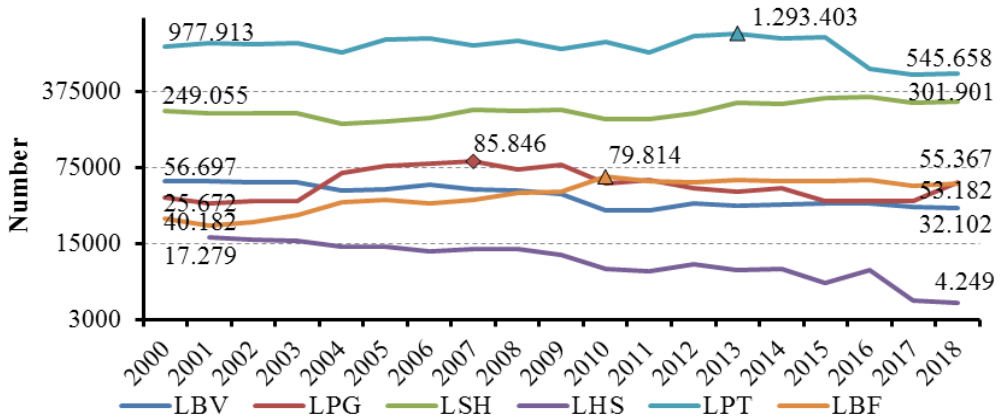
Source: authors based on TEMPO (2020)

The amounts of the following two categories of animals (cattle and pigs) oscillate in value around each other throughout the analyzed period. Thus, if in 2000 the bovine amounts (LBV) was higher than that of pigs (LPG), since 2004 the amounts of pigs exceeded that of cattle, due to a significant increase of 29681 animals (from 37217 to 66898), while the number of cattle is reduced by 9102 animals (from 55218 to 46116). The number of pigs increases until 2007 when it reaches 85846 animals, after which there is a decrease from one year to another until 2015 when their number reaches a difference of only 1829 animals compared to that of cattle, the decline continuing in the next two years. At the same time, from 2004 to 2018 the cattle amount registered a continuous decrease, except for the year 2006 when a small increase of the amount was registered, reaching almost the one registered in 2003 (52666 animals).

Regarding the annual rates recorded for both categories, it can be mentioned that the most significant developments are also recorded in the number of pigs. Thus, in 2004 compared to 2003 there is the highest increase in the number of pigs, with 79.75%, while the most significant decrease is recorded in 2010 compared to 2009 (-32.92%). For the cattle amount, the most significant increase is 16.47%, recorded in 2012, while the most drastic decrease does not exceed 27.83%.

The evolution of the number of bee families, in Caraş-Severin county, was generally on an ascending trend, increasing from 25672 bee families in 2000, to 53182 bee families in 2018, the average increase being 1528 families/year. There have been oscillations around this general trend. Thus, after the significant decrease by 3839 bee families in

2001 compared to 2000 when, with 21,833 families this category is at the lowest level, significant successive increases follow, on average by approximately 4468 families/year, until 2010, when it is registered the largest number of bee families (62043 families) after which, in the following years, until 2018 their number decreases, on average by 1108 families/year.

The evolution of horse amount, the lowest compared to other categories of animals, followed a general downward trend from the highest level of 17279 animals, recorded in 2001, to 4249 animals in 2018, the average decrease being about 766 horses/year.

The analysis of the percentage of animal production in individual agricultural holdings in Timiş County in relation to their total production in the West Region highlights a different situation from that of Caraş-Severin County. Thus, in the period 2000-2018, the levels of the amount in Timiş County, those registered at the level of the West Development Region, increase for cattle from 22.85% to 26.96% (by 4.11 percentage points), for sheep from 34.53% to 39.29% (with 4.76 percentage points), respectively for birds from 36.91% to 40.11% (by 3.20 percentage points). Decreases in the amounts were registered in pigs, from 41.44% to 23.26% (by 18.18 percentage points) and in bee families from 23.56% to 20.87% (by 2.69 percentage points). At the same time, in Timiş County the levels of the amount of horses, during the analyzed period, remained approximately constant (about 26%).

The number of poultry, registered in Timiş County, is almost double that of Caraş-Severin, increasing from 2000 to 2005 (Figure 2), when the highest values are recorded (1993365 poultry). Since 2005 there is a decreasing trend to 119,264 poultry in 2018. The annual evolution rates ranged between -29.18% in 2017 and 19.25, a value recorded in 2004.

Figure 2. Evolutions of livestock, poultry and bee families in individual farms in Timiş County
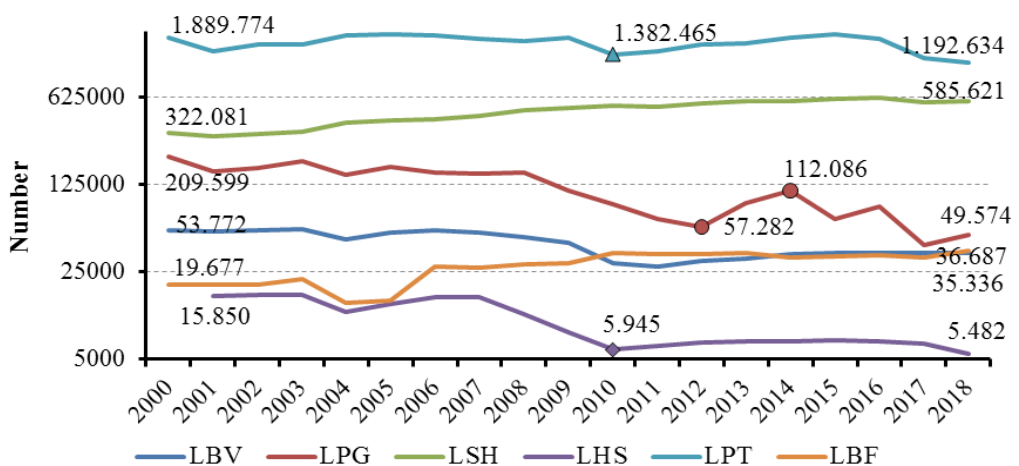
Source: authors based on TEMPO (2020)

Sheep also register an increase in Timiș, as in Caraș-Severin, but this is manifested over a longer period, from a minimum of 30,178 animals in 2001, to a maximum of 6,14815 animals in 2016. The absolute increase recorded during this period of evolution of the number of sheep is 20873 sheep/year. After 2016, the number of sheep is slightly decreasing from one year to another, in 2018 being registered with 29,194 fewer animals than in 2016. In sheep, the annual rates of evolution were in the range of -6.42% (value recorded in 2017) and 18.11% (value recorded in 2004).

Regarding the number of pigs, it can be noted that it is the category that faces a quite sharp decrease from 2000 to 2017, on average with about 9922 pigs/year. An exception occurs in 2014 when the number of pigs reaches close to 2009, the difference being 23492 animals higher than in 2013 and 45721 animals compared to their number in 2015. In 2017 compared to 2016 the number of pigs decreased the most, by 51.15%, while the highest increase by 54.66% was recorded in 2013 compared to 2012.

The evolution of the number of cattle and horses follows a similar decreasing trend. Thus, in both categories, the most significant decrease is from 2003 to 2010, for horses (from a maximum of 16433 animals to 5949 animals), and until 2011 for cattle (from a maximum of 54678 animals to a minimum of 27783 animals). In the next period, from 2010 to 2017 the number of horses increased from 6422 to 6750 horses, to reduce quite drastically in 2018 when the lowest number of the entire analysis period is recorded (5482 animals). For cattle, the evolution of the amount from 2012 to 2018 is of continuous increase, on average the increase being approximately 792 animals/year.

Analyzing the annual rates of change in livestock, there is a significant decrease in the number of horses in 2009 compared to 2008, by 28.65%, and by 31.99% for cattle, in 2010 compared to 2009. The largest increases were recorded in 2005 both for horses (14.35%) and for cattle (12.42%).

It is noticeably that in the next two years after 2016, all livestock, including poultry and bee families on individual farms, register a reduction from one year to another, both in Timiș and in Caraș-Severin.

The percentage of vegetable production both in Caraș-Severin County and in Timiș, in relation to their total production in the West Region, overall decreases during the analysis period. Thus, for Caraș-Severin the percentage of vegetable production in relation to their total production in the West Region, in 2018 compared to 2000 is reduced by 8.15 percentage points (from 12.58% to 4.43%), while for Timiș the decrease is only of 3.75 percentage points (from 44.18% to 40.42%). If for Caraș-Severin the highest percentage is registered in 2009 (15.74%), and the minimum in 2016 (4.0%), for Timiș the maximum is registered in 2002 (45.51%), and the minimum in 2010 with (30.73%).

Figure 3. The evolutions of vegetable production in Caraş-Severin and Timiş counties compared to the West Development Region
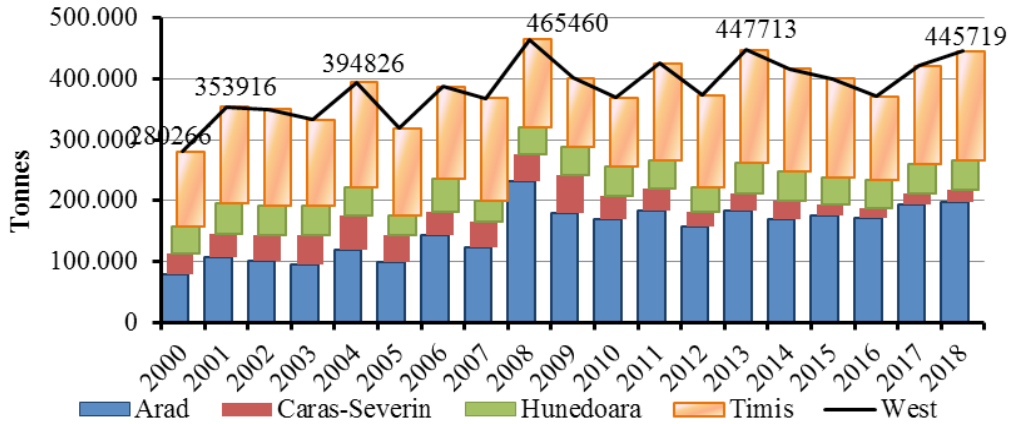
Source: authors based on TEMPO (2020)

The vegetable production analyzed by each county, in the period 2000-2018, highlights the different evolution trends (Figure 3). The level of vegetable productionin the West Development Region, it shows ascending trend of about 5585 tons per year.

Caraş-Severin County is characterized by a production of vegetables which, over the whole study period, registered an average decrease of approximately 862 t/year. The vegetable production reached the maximum value in 2009 (63271 t) and the minimum in 2016 (14863 t), the variation interval of the production being of 48408 t.

The evolution of vegetable production for Timiş County is different,recording an average increase of approximately 3129 t/year over the entire analysis period. The amplitude of the variation of the vegetable production is almost double compared to the Caraş-Severin county, of 73226 t, in the conditions in which the maximum of the vegetable production of 186216 t being obtained in 2013, and the minimum of 112990 t in 2009.

Low shares of the young resident population

In order to identify the structural changes from the point of view of the age of the resident population in rural areas in Caraş-Severin and Timiş counties, in the last two decades three age groups were formed: population residing in rural areas, aged 24-39 years (PVA), population residing in rural areas, aged 40-54 years (PVB), population residing in rural areas, aged 55-64 years (PVC).

Of the three age categories, in the analyzed period, in Caraş-Severin County (Figure 4), the one between 35-49 years is the only one in which there was an average increase of approximately 170 people/year. The other two categories registered decreasing trends, the rural population aged 50-64 decreasing on average by 49 people/year, while the rural population aged 20-34 decreased on average by 257 people/year.

Figure 4. Evolutions of the number of residents in rural areas, in Caraş-Severin county, by age groups
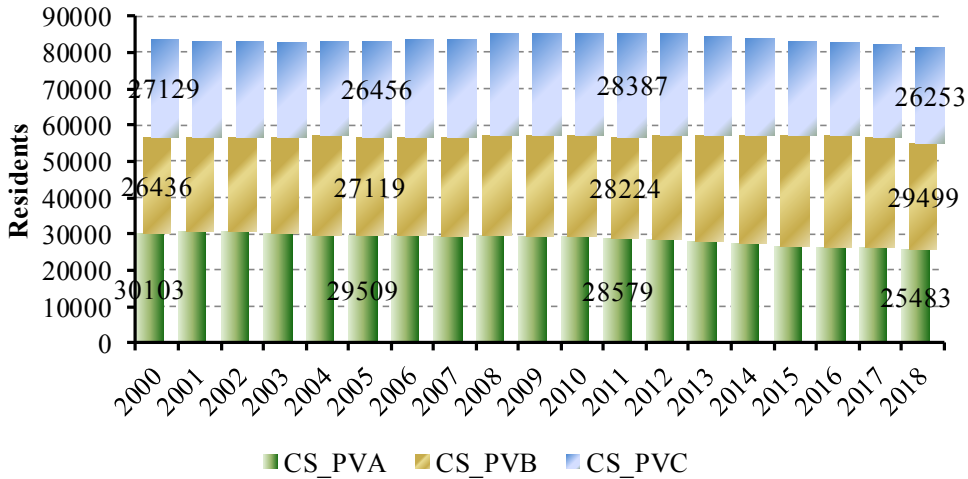
Source: authors based on TEMPO (2020)

Structurally, the rural population of the county is distributed quite balanced on the three age categories, the range oscillating around 30%. For the category of rural population aged 20-34 years, its amount is reduced starting with 2002 from 36.93%, to 31.37% in 2018. At the same time, in the case of the resident population in rural areas aged between 40 and 54 years, there was an increase in structural amount from one year to another, the amplitude of 6.12 percentage points being calculated between the maximum percentage of 37.30% from 2017 and the minimum of 31.18% since 2002. Regarding rural residents aged between 55 and 64, their percentage remained around 32%.

The consequence of these developments was the change in the relationships between the three age groups. Thus, if in 2000 the largest age group was 25-39 (35.98%), followed by the 55-64 age group (32.42%) and the 40-54 age group (31.60%), in 2018 the largest age group was 40-54 years (36.31%), followed by the 55-64 age group (32.32%) and the 25-39 age group (31.37%). The analysis of the evolution of the number of rural residents in Timiş County, highlights an evolution similar to that in Caraş-Severin County (Figure 5). It should be noted that, in Timiş County, all three age categories face the lowest number of people in 2004. Starting with 2005, their number increases by an average of 613 people/year for the age group between 20-34 years (PVA), with 916 people/year in the category aged 50-64 years (PVC) and with 1844 people/year for those aged 35-49 years (PVB).

Figure 5. Evolutions of the rural population residing in Timiş County by age groups
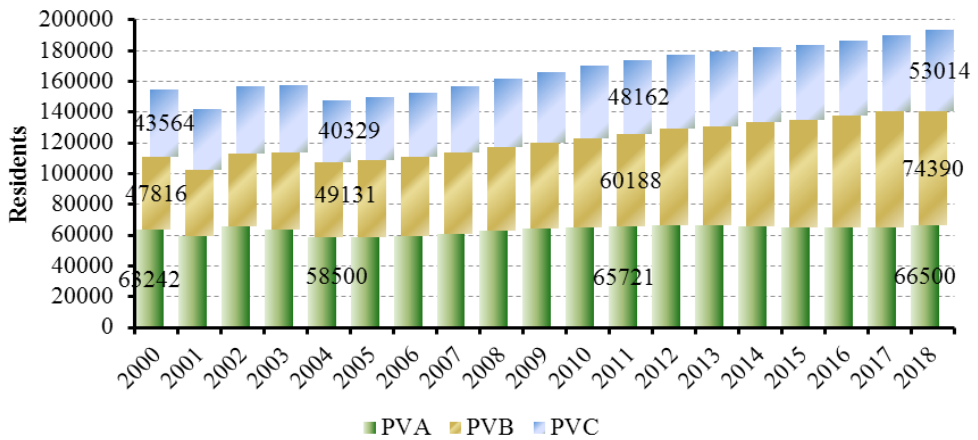
Source: authors based on TEMPO (2020)

Structurally, the rural population of Timiş County is no longer distributed balanced on the three age categories as it was in Caraş-Severin County. The number of residents aged 25-39 ranged between the maximum value of 41.81%, recorded in 2002, and the minimum value of 34.30%, recorded in 2018.

Also, a process of structural percentage reduction from one year to another, is also registered for residents aged between 50-64 years, the maximum variation range being 2.13 percentage points from 28.17% in 2000 to 26.04%. in 2017. On the other hand, the percentage of residents in rural areas, who are between 40-54 years old, generally registered with an increasing trend from 30.92% in 2000 to 38.36% in 2018.

What made the two counties look like in terms of the age structure of rural residents is a negative phenomenon, this being the reduction of the percentage of residents in the age group 25-39 years. Thus, in the case of Caraş-Severin County, this age group reaches, in terms of amount, the first place in 2000, the last place in 2018, the reduction being 4.61 percentage points. In the case of Timiş County, the reduction was even higher, of 7.5 percentage points.

Reducing the percentage of the population of young rural residents has, both, present and especially future negative effects on the sustainable development of rural communities. A present consequence of this evolution is the increase of the average age of the rural residents from Caraş-Severin county from 40.7 years in 2001, to 43.7 years in 2019, and from 37.4 years in 2001, to 39.7 years, in 2019, in the case of Timiş county.

Agro-tourism - a path to sustainable rural development

In the period 2000-2018, both the accommodation infrastructure and the tourist circulation at the level in the agro-tourist resorts, in Caraş-Severin and Timiş counties, evolved upwards and at a rather intense pace, which highlights an increase of the concern of the owners of individual agricultural exploitations to this new type of business.

From the point of view of tourist accommodation capacity in function of agro-tourism boarding houses, it evolved from 20411 places-days, in Caraş-Severin county and 52416 places-days, in Timiş county (Figure 6), values registered in 2000, at 357972 places-days, respectively 360466 places-days, in 2019, being in the upper part of the range of values corresponding to the entire West Development Region and represented in Figure 6 by the hatched area.

Figure 6. The evolutions of the accommodation capacity in operation of the agro-tourism facilities from Caraş-Severin and Timiş counties
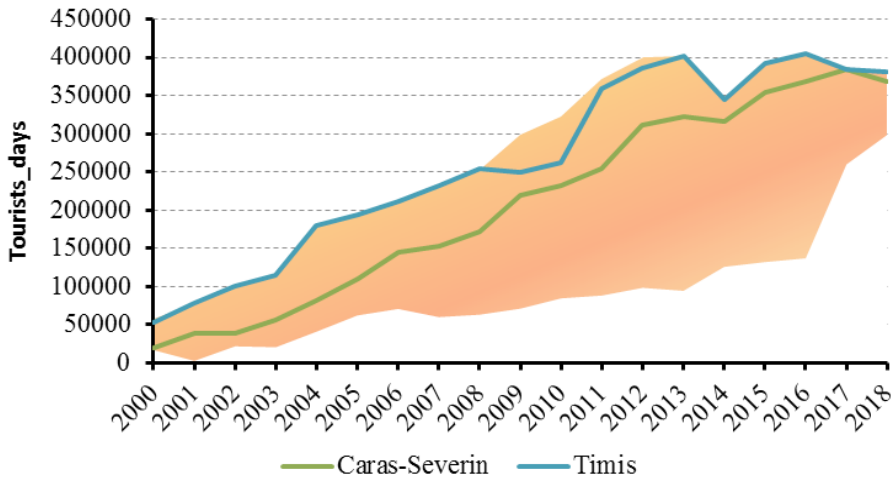
Source: authors based on TEMPO (2020)

Compared to the other component counties of the West Development Region, the percentage of the number of places-days of accommodation capacity in function of agro-tourism boarding houses in Caraş-Severin and Timiş counties, their total number, varied between 54.84%, in 2010 and 63.81% in 2007.

In Caraş-Severin county, except for the years 2014 and 2018 when there were reductions of 1.86% and 4.13% respectively, accommodation capacity in function of agro-tourism boarding houses increased with annual rates between 47.22%, value registered in 2004, and 3.12 %, in 2013. Over the entire analyzed period, the evolution trend was on an upward trend represented by the linear model CS_ACF (Table 3). Taking into account the values of the parameters F and Sig.F, it results that the null hypothesis of the F test is rejected and, consequently, it results that the model is statistically significant

and offers a very good approximation of the time evolution of ACF (coefficient of determination R2 = 0.982) . Also, the regressor b is statistically significant (Sig.t = 0.000 <α = 0.05) and highlights the fact that accommodation capacity in function of agro-tourism boarding houses increased on average with values between 20874 and 23994 places-days, the most probable value being 22434 places-days.

Table 3. Characteristics of the evolution models of accommodation capacity in function of agro-tourism boarding houses in Caraş-Severin and Timiş counties in the period 2000-2018

Model	R	R²	F	Sig.F	Coefficients		t	Sig.t	Lower*	Upper*
CS_ACF	.991	.982	920.7	.000	a	-16587	-1.968	.066	-34374	1198
					b	22434	30.343	.000	20874	23994
TM_ACF	.960	.921	199.2	.000	a	57773	3.499	.003	22935	92612
					b	20442	14.115	.000	17386	23497

* Confidence interval 95%

Source: developed by authors using SPSS

The evolution of accommodation capacity in function of agro-tourism boarding houses in Timiş County differs from the one registered in Caraş-Severin County mainly by the fact that in 2014 it registered a decrease of 14.34% compared to 2013 compared to only 1.86% in Caraş-Severin. There were also reductions in 2009 (-1.96%), in 2017 (-4.99%), in 2018 (-1.06%) and in 2019 (-5.67). Above all, in Timiş County, the evolution of accommodation capacity as a function of agro-tourism boarding houses was also in line with an upward trend described by the TM_ACF model (Table 4). And in this case, although, both the TM_ACF model, as a whole, and the regressor (b) are statistically significant, it results that, in Timiş County, accommodation capacity in function of agro-tourism boarding houses increased on average with values between 17386 and 23497 places-days the most probable value being 20442 places-days.

Regarding the number of arrivals in agro-tourism resorts, an ascending evolution can be noticed both for Caraş-Severin county and for Timiş. If in Caraş-Severin the amplitude of the variation of the number of arrivals is 28501 tourists (from 373 tourists in 2000 to 28874 tourists in 2018), in Timiş the arrivals in the agro-tourism resorts increased from 103 tourists in 2001 to 14642 tourists in 2018.

Comparing the arrivals of the two counties with those of the West Region, it can be highlighted that, for Caraş-Severin, due to aquite high number of arrivals, it is as in the case of the accommodation capacity in operation, on the whole, in the upper range of values corresponding to the entire West Development Region (Figure 7) through the hatched area. The situation is different for Timiş County when, between 2005 and 2009 the number of arrivals in agro-tourism resorts is very low compared to that of the West Development Region, so that, after an increase from 2010-2012 it started to decrease, so that in 2018 to be placed below half of the hatched area.

Figure 7. The evolutions of the number of arrivals in the agro-tourism facilities from Caraş-Severin and Timiş counties
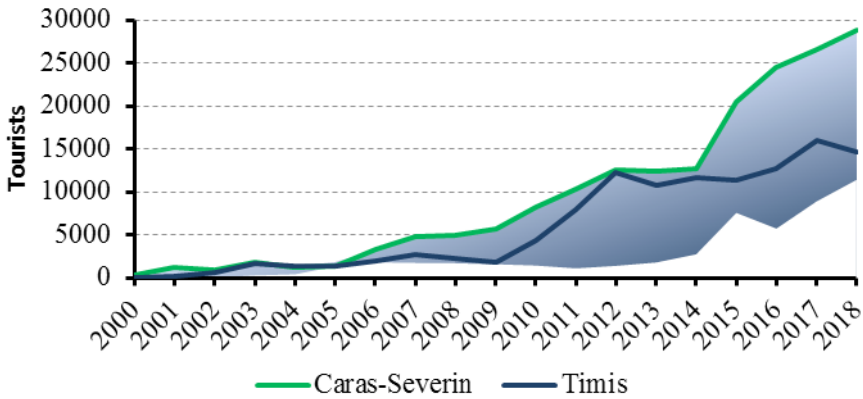
Source: authors based on TEMPO (2020)

In both counties (Caraş-Severin and Timiş) the percentage of arrivals, compared to the other component counties of the West Development Region, ranged between 43.66% in 2005 and 79.91% in 2003.

From the point of view of the annual rates, for Caraş-Severin county there are three years in which there are decreases: in 2002 compared to 2001 by 22.18%, in 2004 compared to 2003, when the most significant decrease is registered, by 33.26%, and in 2013 compared to 2012 by only 0.74%. In terms of annual growth rates, they vary between 2.04% in 2014 compared to 2013 and 89.25% in 2003 compared to 2002.

In Timiş County, the agro-tourism resorts faced small problems during the analysis period, a fact highlighted by several negative values of the annual evolution rates. There are reductions in the number of tourist arrivals in 2004 (-13.51% compared to 2003), 2008 when there is the largest reduction (-19.59% compared to 2007), 2013 (-11.97% compared to 2012), 2014 (- 13.51% compared to 2013) and 2018 (-8.49% compared to 2017).

Table 4. The characteristics of the evolution models of arrivals in agro-tourism boarding houses in Caraş-Severin and Timiş counties in the period 2000-2018

Model	R	R^2	F	Sig.F	Coefficients		t	Sig.t	Lower	Upper
CS_ARV	.934	.873	116.7	.000	a	-5888	-3.6	.002	-9330	-2446
					b	1546	10.8	.000	1244	1848
TM_ARV	.961	.921	199.2	.000	a	-3928	-3.7	.002	-6143	-1715
					b	984	11.1	.000	796	1174

Source: developed by authors using SPSS

However, the evolution trend of arrivals in agro-tourism resorts, in the period 2000-2018 is increasing, as in the case of accommodation capacity in operation, both for Caraş-Severin county and for Timiş, a fact highlighted by linear models CS_ACF and TM_ARV (Table 4). Both models are statistically significant (Sig.F is lower than the significance level of 5%) and provide a good approximation of the evolution of arrivals, an observation based on the values of the coefficients of determination (R^2) of 87.3% for Caraş-Severin and 92.10% for Timiş County. As a result, according to the econometric models CS_ACF and TM_ARV, in the period 2000-2018, the arrivals of tourists in the agro-tourism resorts from Caraş-Severin county increased on average by approximately 1546 tourists/year, and in those from Timiş county by approximately 984 tourists/year.

The number of overnight stays in agro-tourism boarding houses also has ascending evolutions both for Caraş-Severin county and for Timiş county. Thus, their number increased from 1207 overnight stays in 2000 to 66608 overnight stays in 2018, in Caraş-Severin county, and from 1030 overnight stays in 2000 to 24552 overnight stays in 2018 in the county. Compared to the other counties of the West Development Region, the number of overnight stays in agro-tourism resorts in Caraş-Severin is in the upper part of the range of values corresponding to the entire West Development Region (Figure 7), while Timiş county is about half it.

Figure 8. Evolutions of the number of overnight stays in agro-tourism facilities from Caraş-Severin and Timiş counties
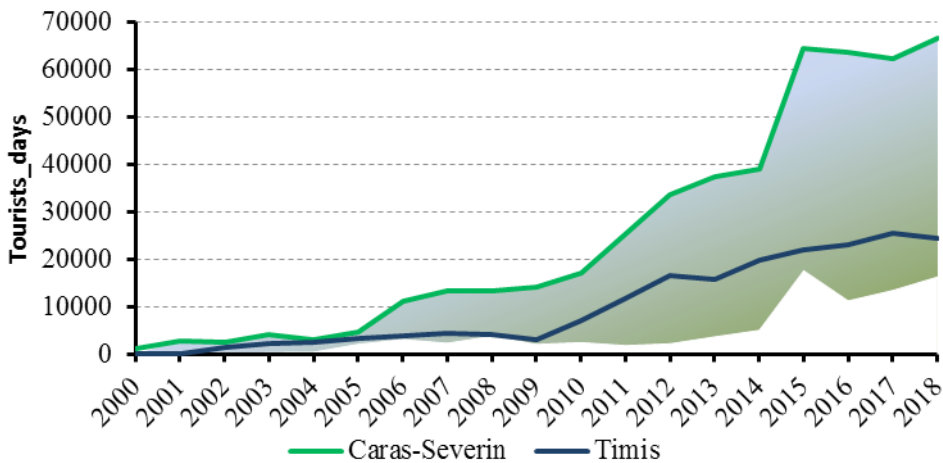
Source: authors based on TEMPO (2020)

Regarding the percentage of the cumulative number of overnight stays of the two counties, compared to the other component counties of the West Development Region, it ranged between a minimum of 61.20% in 2005 (61.20%) and a maximum of 83.17% in 2003.

From the point of view of the values of the annual rhythms of evolution of the number of overnight stays, in the analyzed period, in both counties, four negative values are highlighted: In Caraş-Severin County, negative values of the evolution rate of overnight stays in agro-tourism resorts were registered in 2002 (-7.46% compared to 2001), 2004 when the largest reduction was registered (-29.16% compared to 2003) , 2016 (-1.21% compared to 2015) and 2017 (-1.99% compared to 2016). In the case of Timiş county, the negative values were registered in 2008 (-5.13% compared to 2007), 2009 when the biggest reduction is registered (-26.41% compared to 2008), 2013 (-3.68% compared to 2012) and 2018 (-3.64% compared to 2017).

Table 5. The characteristics of the evolution models of overnight stays in agro-tourism boarding houses in Caraş-Severin and Timiş counties in the period 2000-2018

Model	R	R Square	F	Sig.F	Coefficients		t	Sig.t	Lower	Upper
CS_OHS	.941	.885	131.2	.000	a	-14373	-3.6	.002	-22704	-6043
					b	33966	11.5	.000	3235	4697
TM_OHS	.950	.903	149.4	.000	a	-6463	-4.1	.001	-9775	-3152
					b	1630	12.2	.000	1347	1913

Source: developed by authors using SPSS

In the period 2000-2018, the evolution trend of overnight stays in agro-tourism resorts in the two counties includes ascending trends described by the econometric models CS_OHS for Caraş-Severin county and TM_OHS for Timiş county (Table 5). Taking into account the values of the parameters F, Sig.F it results that each of both models is statistically significant. Also, taking into account the values of the determination coefficients (R^2 of 0.885 in Caraş-Severin and 0.903 in Timiş) it results that this provides a good evaluation of the studied process, so that, with 95% confidence level, it can be estimated that during analyzed, the number of overnight stays in agro-tourism resorts in Caraş-Severin county increased by 33966 overnight stays per year, and respectively by 1630 overnight stays per year in Timiş county.

Correlations and non-correlations

The analysis also aimed to identify possible correlations between the evolution of accommodation capacity in operation, indicators of tourist traffic in agro-tourism resorts in Caraş-Severin and Timiş counties, and the evolution of the number of residents in rural areas, by the three age groups taken into account during the performed analysis.

For Caraş-Severin County, the bilateral correlation coefficients (Table 6) show that there are significant correlations both in terms of accommodation capacity and the intensity of tourist traffic in agro-tourism resorts and the population in the age groups 25-39 and 40 -54 years. In the case of the population in the 55-64 age group, the correlations are insignificant conclusion underlined on the one hand by the very low values of the correlation coefficients, and on the other hand, by the fact that the values of the Sig. (2-tailed) indicator are higher than the significance threshold used ($\alpha = 0.05$).

Table 6. The values of the bilateral correlation coefficients between the agro-tourism evaluation indicators and the number of rural residents in Caraş-Severin County

Correlate Variables		CS_PVA	CS_PVB	CS_PVC
CS_ACF	Pearson Correlation	-0.923**	0.956**	-0.022
	Sig. (2-tailed)	0.000	0.000	0.928
CS_ARV	Pearson Correlation	-0.977**	0.922**	-0.315
	Sig. (2-tailed)	0.000	0.000	0.188
CS_OHS	Pearson Correlation	-0.978**	0.951**	-0.314
	Sig. (2-tailed)	0.000	0.000	0.190

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

Source: developed by authors using SPSS

The analysis of the values of the bilateral correlation coefficients highlights an aspect that requires a wider investigation. It's about that the correlations between the tourist traffic indicators and the population in the age group 25-39 years are negative (inverse correlation), while for the age group 40-54 years they are positive (direct correlation).

In order to elucidate this aspect, the partial correlation coefficients were determined between the accommodation capacity in operation, the tourist traffic indicators and the number of residences in the age group 40-54 years, given the constancy number of residents in the age groups 25-39 and 55-64 years (Table 7), as well as the correlation between the same indicators and the residents in the age group 24-49 years, in the conditions of the constancy of the number of residents from the other age groups.

Table 7. The values of the partial correlation coefficients between the agro-tourism evaluation indicators and the amount of the rural resident population from the age groups 25-39 years and 40-54 years from Caraş-Severin county

Control Variables		CS_PVA & CS_PVC	CS_PVB & CS_PVC
Correlate Variables		CS_PVB	CS_PVA
CS_ACF	Correlation	0.692	-0.659
	Sig. (2-tailed)	0.002	0.004
CS_ARV	Correlation	-0.216	-0.834
	Sig. (2-tailed)	0.404	0.000
CS_OHS	Correlation	0.270	-0.731
	Sig. (2-tailed)	.294	0.001

Source: developed by authors using SPSS

In the case of residents aged 40-56, the results show, on the one hand, the existence of a direct correlation between the evolution of their number and the accommodation capacity in operation, and on the other hand the non-existence of a significant correlation between tourist traffic indicators in agro-tourism resorts (arrivals and overnight stays)

in Caraş-Severin county and the number of rural residents in this age group. This result may lead to the conclusion that the development of agro-tourism facilities can contribute to increasing the stability of rural residents in the age group 40-56 years.

Regarding the age group 25-39 years, although there is a reduction in the intensity of the correlation between the analyzed indicators, the fact that the signs of correlation coefficients remain negative, indicating an inverse correlation, raises questions about the veracity of the link between those variables. It is possible that the downward trend in the number of rural residents in Caraş-Severin County is primarily the result of reduced birth rates and emigration than other factors.

In the case of Timiş county (Table 8), a first difference compared to Caraş-Severin county is that all bilateral correlation coefficients are statistically significant, indicating only direct correlations, but of different intensities, the lowest being recorded for the group of age 25-49 years, and the oldest for the age group 40-54 **years.**

Table 8. The values of the bilateral correlation coefficients between the agro-tourism evaluation indicators and the number of rural residents in Timiş County

Correlate Variables		TM_PVA	TM_PVB	TM_PVC
TM_ACF	Pearson Correlation	.614**	.915**	.848**
	Sig. (2-tailed)	.005	.000	.000
TM_ARV	Pearson Correlation	.716**	.961**	.892**
	Sig. (2-tailed)	.001	.000	.000
TM_OHS	Pearson Correlation	.687**	.977**	.880**
	Sig. (2-tailed)	.002	.000	.000

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

Source: developed by authors using SPSS

In order to eliminate the reciprocal influences between the age groups considered and the three indicators for evaluating agro-tourism in Timiş County, the partial correlation coefficients corresponding to each age group were determined given the constancy of the number of residents in the other age groups (Table 9). The obtained results lead to the conclusion that there are no correlations between the indicators analyzed in the case of residents in the age groups 25-39 years and 55-64 years.

Table 9. The values of the partial correlation coefficients between the agro-tourism evaluation indicators and the population of the resident population by age groups from Timiş county

Control Variables		TM_PVB & TM_PVC	TM_PVA & TM_PVC	TM_PVA & TM_PVB
Correlate Variables		PM_PVA	TM_PVB	TM_PVC
TM_ACF	Correlation	-0.247	0.443	0.308
	Sig. (2-tailed)	0.357	0.085	0.245
CS_ARV	Correlation	0.154	0.759	-0.097
	Sig. (2-tailed)	0.568	0.001	0.721
CS_OHS	Correlation	0.223	0.885	-0.322
	Sig. (2-tailed)	0.406	0.000	0.223

Regarding the residents in the age group 40-54 years, it can be admitted the existence of a correlation of average intensity between their number and the accommodation capacity of the agro-tourism facilities in Timiş county for a 90% confidence level ($\alpha = 0.10$) and have relatively strong intensities in the case of arrivals (75.9%) and overnight stays (88.5%) for 95% confidence level ($\alpha = 0.10$).

These results could indicate that, in Timiş County, the agro-tourism is a factor of stability of the rural population, at least for the middle-aged population. With positive effects on the sustainable development of rural communities.

Conclusions

Sustainable economic development of rural communities cannot be done without paying attention both to the development of individual farms and to supporting the capitalization of their results. A good way to act in this way is the development of rural tourism and especially agro-tourism as much as it is a form of tourism increasingly in the options of potential tourists, nowadays.

In this context, the specificity and diversity of the natural and anthropic tourist potential in the Romanian Banat can become a tourist destination of first interest. Analysis performed on the evolutions of vegetable production and livestock in individual farms, as a basis for agro-tourism development, in the main counties of Banat (Caraş-Severin and Timiş), parallel to the evolution in the last 20 years of rural tourism in this region lead to the conclusion that in this region rural communities can become a tourist attraction of prime interest.

From the point of view of livestock, in the last two decades, it continues to play an important role in terms of the percentage in the total number of West Development Region amount, both in Caraş-Severin County and in Timiş County, even if the relations between the two counties fluctuated from year to year. As common aspects, during the analysis period, at the level of these counties, there were increases in the number of

sheep and the number of bee families, and reductions in the number of cattle, horses and poultry. A differentiation was highlighted in the number of pigs that increased in Caraş-Severin county and registered a reduction in Timiş county.

From the point of view of vegetable production, there was a decreasing trend for Caraş-Severin and an increase for Timiş, in the period 2000-2018, while, compared to their total production in the West Region, the percentage of vegetable production is recorded for both counties a relative decrease.

The development of rural communities, and in particular of individual agricultural holdings, is closely linked to the evolution of the age structure of the population residing in rural areas as well as to the evolution of its average age. The analysis showed a tendency to reduce the number of residents aged between 25 and 39 years both in Caraş-Severin County and in Timiş, while for the age group 40-54 years there was an increase. Of course, these developments are mainly due to significant changes in the birth rate in recent decades. However, it must also be taken into account that part of the young rural population migrates to urban communities, further reducing the workforce in rural communities.

In parallel, the analysis of the evolution of rural tourism showed that the accommodation infrastructure, assessed by the accommodation capacity in operation, as well as the intensity of tourist traffic at the level of agro-tourism resorts, assessed by the number of arrivals and overnight stays in agro-tourism facilities, shows an upward trend, with a fairly sustained pace throughout the analysis period for both counties.

It should be noted that, for Caraş-Severin County, all three indicators analyzed are in the upper part of the value range corresponding to the entire West Development Region, while for Timiş County, the values of the indicators are lower, being placed in the middle of the value range corresponding to rural tourism in the entire West Development Region.

Starting from the results obtained regarding the evolution of rural tourism, there was analyzed the possibility of correlation between it and the number of rural residents from the three age groups included in the research. Given that the analysis of the two-way correlations between the indicators under analysis may lead to erroneous conclusions due to the multitude of influencing factors, there was used the partial correlation. The obtained results highlighted the fact that in Caraş-Severin there are no correlations between the analyzed indicators which means that, at least, until now, the development of rural tourism in this county has not led to a visible increase of jobs or to a stabilization of active population in rural areas. A different situation was highlighted in Timiş County, where a partial correlation was identified between the evolution of rural tourism and the resident population in the age group 40-54 years old.

The aspects highlighted in the paper about the evolutions and interdependencies manifested at the level of Caraş-Severin and Timiş counties in the period 2000-2018 considering the agricultural production of vegetables and livestock from individual

farms, the population living in rural areas, the capacity and the intensity of tourist traffic in agritourism guesthouses, is on the one hand, the starting point for future research in this field, and, on the other hand, useful information in developing strategies for sustainable development of, both, rural communities at the level of Caraş-Severin and Timiş counties, as well as of the West Development Region.

Conflict of interests

The authors declare no conflict of interest.

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ANALYSIS OF CANOLA (RAPESEED) PRODUCTION COST AND INCOME IN CONTEXT OF OILSEEDS PRODUCTION SUPPORT POLICIES: A CASE STUDY FROM TRAKYA REGION OF TURKEY

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ABSTRACT

The study aimed to analysis the cost and income of canola production in the context of support policies to oilseeds production in the Trakya region of Turkey. In this study, the average production costs of canola were calculated as 600.13 US$ ha-1. Gross profit and net profit excluding support payments were found as 515.98 and 310.32 US$ ha-1, respectively. It was determined that the gross profit and net profit including support payments were found to be 921.37 and 715.72 US$ ha-1. It was calculated that the share of supports is 44% in gross and 56.64% in net profits. The results indicated that the supports of diesel oil, fertilizer, certified seed usage and premium support have important increasing effects on farmer income and decreasing costs in canola production. As a result, it can be said that with the support policies applied in canola production, important increases have occurred in canola cultivation areas and production in Turkey. In order to have an efficient oilseed support policy, farmer's extension service should develop various programs regarding sustainable canola production practices to educate farmers.

Introduction

Canola refers to a cultivar of either rapeseed *(Brassica napus L.)*.Canola is an important edible vegetable oilseed crop in the world. Its seeds are used to produce edible oil which is suitable for consumption by humans and livestock (Monjezi and Zakidizaji, 2012; Suzer, 2015). The rapeseed oil content in the seed ranges from 38% to 48% and protein content ranges from 16% to 24%. The oil is also suitable for biodiesel use.

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Rapeseed production in the world ranks second following the soybean. According to FAO in 2016, canola production in the world was 73,776,943 ha area. In the same year, the canola production in the world was 43 705,654 tons. The most important share in production belongs to Canada (21.08%), China (20.02%), India (10.68%), Germany (8.47%), France (7.49%), Australia (5.19%) and Poland (4.44%) (FAOSTAT, 2017). Because of the increase in population, vegetable oil seed production cannot meet the vegetable oil demand in Turkey. Therefore, Turkey has been dependent on the importation of vegetable oil seeds to meet this demand (Unakıtan and Kumbar, 2010). Growing enough oil seed crops in Turkey, it is possible with increasing yield, planting areas and introducing into crop rotation new alternative oil seed crops like rapeseed. Increasing rapeseed production in Turkey will support the biodiesel industry to get the best quality vegetable oil to produce renewal, alternative fuel sources instead of imported diesel-fuel.

The winter type rapeseed can be grown Trakya, Marmara and the Black Sea, whereas spring types can be grown in the Mediterranean, Aegean and Southeast Anatolian region of Turkey. Rapeseed is very useful in crop rotation with cereals for decreasing root diseases, increasing soil organic matter and sustainable agriculture. It allows growing the double-crop in irrigated soil conditions because of the early harvest. The long flowering of rapeseed plants in the early spring help to honey bees for collecting pollen.

The Turkish government began supporting oilseeds production in 2001. The government of Turkey pays a premium to producers for oilseeds, fertilizer and diesel support per kg and certified seed usage support per hectare. With the support policies applied in canola production, important increases have occurred in canola cultivation areas and production in Turkey. As a matter of fact, Turkey's canola cultivation area which was 82 hectares in 2000, increased to 35,453 hectares in 2016 with oil seeds production supports. The total canola production increased around 668 fold from 187 tons to 125.000 thousand tons during the 2000–2016 periods (TURKSTAT, 2017). Trakya region has provided to 39% of canola production in Turkey.

The oilseed crops are the basic source of nutritional substance for consumers. For this reason, governments resort to oilseed production supports for both stabilizing farmers' incomes and protecting consumers. Oilseed production supporting tools used in the context of agricultural policies, interventions, government decisions finally effect on national welfare through effecting a big mass of producers, oilseed production, food self-sufficiency of the country, budget, producers income, resource uses and consumers expenditures. It is clear that investigating the effects of oilseed production policies on the income of farmers in canola growing and making more realistic decisions according to the results of those investigations in Turkey where the efficiency of oilseed production supporting policies discussed in the last years. There is limited available information about this subject. There is a need for this study to fill the gap. This study aimed to analyse the effects on farmer's income of oilseed support policies in canola production in the Trakya region of Turkey.

Literature Review

Many studies investigated, support of agricultural production and the effects of these supports on agricultural production, farmer's welfare and reflection to producer income in various countries and Turkey. However limited research examined the effects of canola production support policies on farmers' incomes in the world and Turkey. In the study, information on studies especially related to the research carried out in various countries is provided.

Chau and de Gorter (2005) concluded that the effect of income supports on aggregate output could be minimal only if the output of marginal farms is small. Ören and Bahadır (2005) indicated that the supports to livestock sector are mainly provided by the protection relatively high domestic cost prices against to abroad in Turkey, in developed countries such as the EU and the US, various domestic support tools are used beside border measurements. Yilmaz et al., (2006) showed that policy changes have differently influenced farmers regarding their farm sizes. As farm size increased it was observed that farmers benefited more from agricultural support. Yilmaz et al., (2008) showed that there is a significant relationship between the farmers receiving and not receiving direct income support, considering farmers' age, membership of cooperative agricultural, gross product value, the average size of farmland, size of arable land and the size of owned land.

Strelecek et al., (2009) concluded that the subsidies applied according to the type of production might affect production diversity. Benni et al.,(2012) indicated that the influences of agricultural policy changes on income risks are also empirically assessed at different spatial scales. Semerci (2013) concluded that premium supports are inefficient in increasing sunflower cultivation area and production. However it also concluded that it has an important role in producer income and the determination of the market price. Munćan and Božić (2013) founded that the measures of direct support in field crop production to be simulative, especially to small producers who were noted to apply optimal agricultural practices. Dorward and Morrison (2015) examined the effects of agricultural supports on food security and poverty reduction. Drabenstott (2015) urged an answer to the question of whether agricultural support payments would promote rural economic growth.

Semerci, (2016) confirmed that agricultural support amount per farm in Turkey is 4.3 times lesser than the EU average. Also, agricultural supports do product cost reducing and producer revenue increasing effect. Devadows et al. (2016) showed that the contrary to the existing literature, removal of direct payments augments productivity while removal of price supports does not impact productivity, and direct payments can lead to larger production distortions than price supports under certain conditions. Lajqi et al., (2017) showed that both a higher economic and financial sustainability of good agricultural practice for conventional farming, while the opposite was true in terms of employment effects of intervention programs.

Celik Ates et al., (2017) revealed that small-scale farmers were unable to use the support provided by the policies; as a consequence, many of them were unable to cultivate their land and had to migrate. In general, stated that significant social and economic changes did occur in rural areas. However, they emphasized that these changes were to the detriment of small-scale farmers and instead favoured farmers operating on the large scale. In this study, it is examined the effect on production cost and farmers income in canola farming of oilseed production support policies in Turkey.

Materials and methods

Description of the research area: The study area, Kesan is a district of Edirne Province, is located in the Trakya region, Turkey. Edirne lies between 40°30' and 42°00' North latitude and 26° 00' and 27° 00' East longitude. There is Greece to the East, Bulgaria to the Northeast, and the Aegen Sea to the South. Kesan is located on the eastern side of a plain extending up to the Meric River in its west. Its total area is 1087 km². The Marmara type of the Mediterranean climate is dominant in District. The yearly average temperature is 13.69 °C. The months of autumn and winter are cold and rainy, and the summer is dry. The average amount of rainfall is 569.55 mm/year. The climate is milder in the region having a coast to the Saros Bay. A large part of our district is usually covered by flat land and cereal fields. As a large part of the land of the district is arable, the people do live on farming. The economy generally based on agriculture in the district, endowed with arable soil. The mainly cultivating crops are wheat, sunflower, canola, barley, corn, and rice (MP, 2005).

Sampling technique and data collection: The study was conducted in villages of Keşan district of Edirne Province, Turkey. The intentional sampling method was used to determine the village and the number of samples for each village based on canola growing activities (Karasar 1991). Data were collected mainly from primary sources by a questionnaire administered to 73 canola growers selected by simple random sampling method. The questionnaire was implemented in July- August 2016 in 12 villages were selected to represent the canola growing area.

Methods of Analysis: In this study, the total production costs and incomes were analyzed using a partial budgeting approach during the canola growing period. According to the method, production costs and returns were calculated only for the canola production. In the study, interest in total variable costs was calculated. This interest is called revolving fund interest and reflects the opportunity cost of capital invested for production. Revolving fund interest was taken as half the interest rate (4%) applied by Turkish Republic Agricultural Bank to variable costs for crop production credits. Fixed costs included administrative costs and land rent. An administrative cost was assumed to be 3% of variable costs. This method was applied in most of the previous studies (Kiral et al., 1999; AERI, 2001).

Results and Discussion

General characteristics of the farms: Summary of descriptive statistics and cropping pattern of the farms in the research area were given in Table 1. The average age of the farmers was 54.08 and the average experience of farmers in canola production was 4.59 years. The average household size was 3.47 people. Farmers' average years of education was 8.49 (Table 1). The average farm size was 24.91 ha. It was found that the farms under irrigation were 36.33% of farm size and the dry land was 63.67%. The average farm area of the farms was 24.91 ha of which 17.22% was devoted to canola (4.29 ha) production. The share of crop planting patterns in surveyed farms were 40.98%, 20.92%, 17.22%, 7.41%, 5.59%, 4.74% and 3.14% for wheat, sunflower, canola, maize, paddy, barley and oat, respectively (Table 1).

Table 1. Summary of descriptive statistics and cropping pattern in surveyed farms

Descriptive statistics	Mean	%
Farmer's age (years)	54.08	-
Farmer's education(years)	8.49	-
Number of people in the family	3.47	-
Farmer's experience (years)	30.10	-
Canola growing experience (years)	4.59	-
Average farm size (hectare)	24.91	100.00
Irrigated area (ha)	9.05	36.33
Non-irrigated area (ha)	15.86	63.67
Owned land (ha)	11.16	44.81
Rented land (ha)	11.13	44.66
Shared land (ha)	2.62	10.53
Cropping Pattern (ha)		
Canola	4.29	17.22
Wheat	10.21	40.98
Barley	1.18	4.74
Sunflower	5.21	20.92
Paddy	1.39	5.59
Maize	1.85	7.41
Oat	0.78	3.14

Source: Authors' calculation based on survey data

Economic analysis of canola production: Cost items of canola production are given in Table 2. In this study, the average production costs of canola were calculated as 600.13 US$ ha^{-1}. Other similar studies were conducted in Iran by Taheri-Garavand et al., (2010) and in Turkey by Unakitan et al., (2010) who found that the average production costs of canola were 641.1 US$ ha^{-1} and 839.98 US$ ha^{-1}, respectively.

The variable cost was the main contributor to production cost. In the study, the proportion of variable cost in total production cost was 65.73% and the fixed cost was 34.27%. Labour and machine power costs were 38.71% of canola production costs.

Soil preparation was 16.31% of total canola production costs, then respectively, harvest (11.85%) and transport (4.54%). The cost of machine power is more than other cost items because the diesel price is very high. It was determined that the most important cost was land rent in fixed costs (32.30%).

The rates of input costs in the cost of total production were 24.50%. Of all inputs cost, the share of seed, fertilizer, and pesticides were 2.96%, 13.34%, and 8.19%, respectively. In this study, the average cost of seed, fertilizer, and pesticides in canola production was calculated as 17.77, 80.08 and 49.15 US$ ha^{-1}, respectively. Other similar studies were conducted in Iran by Taheri-Garavand et al., (2010) who found that these costs were 25.3, 32.7 and 25.6 US$ ha^{-1}, respectively. Since the governments of Turkey give subside to certified seed usage, the cost of it was low.

Table 2. Costs of canola growing in surveyed farms (US$ ha^{-1})

Cost items	(US$ ha^{-1})	(%)
1. Labour and machine power costs		
Soil preparation *First plugging (50,25 US$)* *Second plugging (22,47 US$)* *Harrowing (13,93 US$)* *Deep Harrowing (11,21 US$)*	97.86	16.31
Sowing	16.90	2.82
Labour of fertilizing	9.42	1.57
Labour of pesticide application	9.75	1.62
Harvest	71.13	11.85
Transport	27.25	4.54
Total	**232.30**	**38.71**
2. Input costs		
Seed	17.77	2.96
Fertilizer	80.08	13.34
Pesticide	49.15	8.19
Total	**147.01**	**24.50**
3. Interest on total variable costs	15.17	2.53
A-Total variable costs (1 + 2 + 3)	**394.48**	**65.73**
Administrative costs (A*0.03)	11.83	1.97
Land rent	193.82	32.30
B-Fixed costs	**205.65**	**34.27**
C-Total costs (A+B)	**600.13**	**100.00**

Source: Authors' calculation based on survey data

Effects of oilseed production support policy on farmer's income in canola growing: Gross profit, net profit and relative return for canola production excluding support payments are given in Table 3- Part A. The approximate price received by the producer was 0.35 US$ kg^{-1} and approximate yield for hectare was 2 601.30 kg ha^{-1}. Therefore, gross production value from canola production was 910.46 US$ ha^{-1}. Then by subtracting the variable cost from gross production value, gross profit from canola production was calculated. The gross profit from canola production was determined as

515.98 US$ ha^{-1}. It is an important indicator that determines the competitive edge of the production activity of the farm in terms of insufficient resources use. In other words, it is and indicator that showing the enterprise's success (Erkus et al. 1995).

Net profit was calculated by subtracting the total cost from gross production value. Net profit from canola production was determined as 310.32 US$ ha^{-1}. The production cost for one kg canola was calculated as 0.23 $ kg^{-1}. The relative return was calculated by dividing gross production value by total cost (Rehber 1993; Erkus et al., 1995). Relative return is another indicator that measures the success of a farm enterprise. Relative return shows return obtained for every one unit invested. Thus values lower than one means that total production cost exceeds gross product value leading a loss. If the value is larger than one, it indicates that the enterprise is profitable. Relative return from canola production was determined as 1.52. A similar study was conducted in Iran by Taheri-Garavand et al., (2010) and Unakitan et al., (2010) who found that relative returns were 1.86 and 2.09, respectively.

Gross profit, net profit and relative return for canola production including support payments are given in Table 3-Part B. In 2016, canola producers received US$ 30.22 ha^{-1} towards the cost of fertilizer+diesel oil, US$ 10.99 ha^{-1} for certificated seed support. The premium support for canola farmers in 2016 was US$ 364.18 ha^{-1}. It is estimated that the whole supports for canola production amount to US$ 405.39 ha^{-1}.

It was by taken into consideration the effects of the support payments on canola gross production value, gross profit and net profit reaches up to the level of 1 315.85, 921,37 and 715,72 US$ ha^{-1}. The share of supports payments in gross profit and net profit value of which was calculated in consideration of support payments are 44% and 56.64%. These rates reveal the contribution and importance of support payments on gross profit, net profit and gross production value of canola production.

Table 3. Canola Production Cost and Income in Context of Support Payments

Canola farmer's income, excluding support payments (Part A)	
A. Canola Yield, kg ha $^{-1}$	2 601.30
B. Sales price, US$ kg^{-1}	0.35
C. Gross production value, US$ ha^{-1} (A*B)	910.46
D. Variable costs value, US$ ha^{-1}	394.48
E. Total cost, US$ ha^{-1}	600.13
F. Total cost, US$ kg-1 (E/A)	0.23
G. Gross profit, US$ ha^{-1} (C-D)	515.98
H. Net profit, US$ ha^{-1} (C-E)	310.32
I. Relative return (C/E)	1.52
Canola farmer's income, including support payments (Part B)	
A. Canola Yield, kg ha $^{-1}$	2 601.30
B. Sales price /US$ kg^{-1}	0.35
C. Premium support /US$ kg^{-1}	0.14
D. Fertilizer+diesel oil support/US$ ha^{-1}	30.22
E. Certified seed usage support / US$ ha^{-1}	10.99

F. Total support/US$ ha-1 ((A*C)+D+E)	405.39
G. Gross production value, US$ ha^{-1} (A*B)+F	1 315.85
H. Variable costs value/US$ ha^{-1}	394.48
I. Total cost, US$ ha^{-1}	600.13
J. Gross profit, US$ ha^{-1} (G-H)	921.37
K. Net profit, US$ ha^{-1} (G-I)	715.72
L. Share of supports in gross profit (%)	44.00
M. Share of supports in net profit (%)	56.64

Source: Authors' calculation based on survey data

Factors influencing on canola production of farmers: Table 4 shows the Factors influencing on canola production of farmers. The research results showed that the most important factors influencing canola production of farmers were high income, easy marketing, favorable climatic conditions, effortless canola farming, production supports and dealing with beekeeping. (Table 4).

Table 4. Factors influencing canola production of farmers

Reasons	N	%
Income is high	51	69.86
There is no marketing problem	37	50.68
Wild pigs cannot harm canola	30	41.10
Climate conditions are very suitable for canola growing	15	20.55
Government supports are too much for canola production	15	20.55
Canola growing is very easy	11	15.07
I engage beekeeping	3	4.11

Source: Authors' calculation based on survey data, *Multiple responses allowed. N = 73

Conclusions

Canola growing is an important part of oilseed production in Turkey. Besides canola oil, it would be used for biodiesel and bioethanol production, which gives the alternative source of income and market opportunities to farmers. It can be said that the implemented supports policies and encouragement have provided remarkable increases in oilseed production in Turkey. However, the amount of vegetable oil produced in Turkey has not met with country demands. The extending of oilseed crops growing has become a necessity to increase production and reduce imports of oilseed crops in Turkey. In this study, we analyzed the effects on farmer's income of oilseed support policies in canola production in the Trakya region of Turkey. The primary data used in the study were obtained via the survey from 73 farmers engaged in canola growing in the Kesan district of Edirne Province in the Trakya region of Turkey. Gross profit for canola production excluding and including support payments was calculated as 515.98 and 921.37 US$ ha^{-1}, respectively. The share of supports payments in gross profit and net profit value of which was calculated in consideration of support payments were 44% and 56.64%. Based on the findings of the study, it can be said that the supports of diesel oil, fertilizer, certified seed usage and premium support have significant increasing effects on farmer income and decreasing costs in canola production.

As a result, canola production support policies should be continued because Turkey needs to increase canola oil seeds production by using intensive modern crop growing techniques. Therefore, it can be said that as a significant oilseed crop, to increase canola production in Turkey, supporting canola production with the proper agricultural political tools ensuring the sustainability of the crop is essential for the farmers.

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Conflict of interests

The authors declare no conflict of interest.

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PRODUCTION COSTS AND MARKET PRICE OF WHEAT BEHAVIOR ANALYSIS AS A SUPPORT FOR HEDGING STRATEGIES

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ABSTRACT

Information on the linkage between production costs and market price of wheat allows farmers to forecast the direction of the market price and reduce the immanent business risks on the farm - whether to sell before harvest, immediately after harvest or to store and sell later. The paper is in line with the hypothesis that market price for storable agricultural products has empirically confirmed bottom limit. If the market price reaches the level of operating costs, farmers will stop sales and store their product in anticipation of a higher price in the near future. This behavior is based on the premise that supply shortage will stop further decline in wheat price. The results of the analysis indicate a strong positive correlation between operating costs and market price of wheat. This indicator allows forecast of the future wheat price behavior and timely decision on the appropriate price risk hedging strategy.

Introduction

On a global scale, wheat is one of the world's leading cereals and crops. Given the size of the arable land under wheat (over 220 million ha), it is the most widespread crop product (Kiss, 2011). According to the quantities produced, this cereal keeps up with maize and rice, but it should be noted that in the last three decades there was a moderate downward trend in harvested areas of about 0.25%, paired with an upward trend in yields of almost 1.5%, which is the consequence of the development of the used technology matrix (Enghiad et al., 2017).

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Countries that are nowadays leaders in wheat production include China, India, Russian Federation and USA (*Figure 1.*).

Figure 1. Top 10 countries wheat producers in 2016, in tones
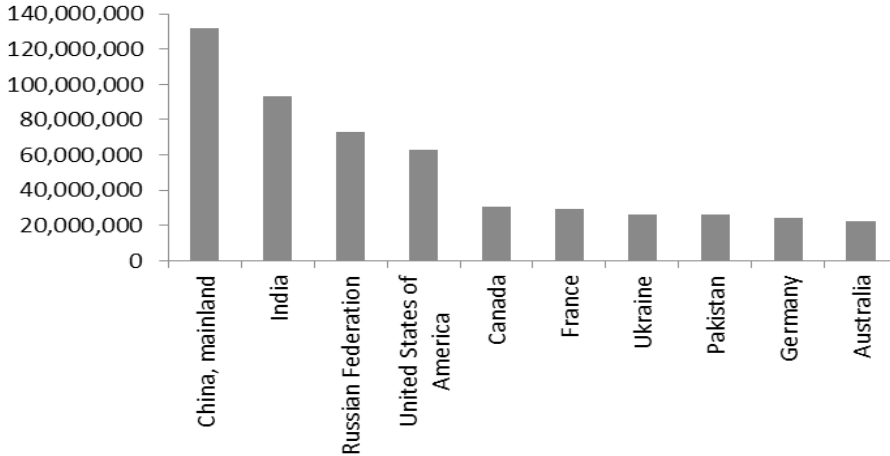
Source: FAO, 2018a.

Net production value of wheat reaches the total amount of 66.5 billion of Int. USD for top 10 countries (*Figure 2.*).

Figure 2. Net production value of wheat in 2016, in constant 2004-2006 1000 Int. USD
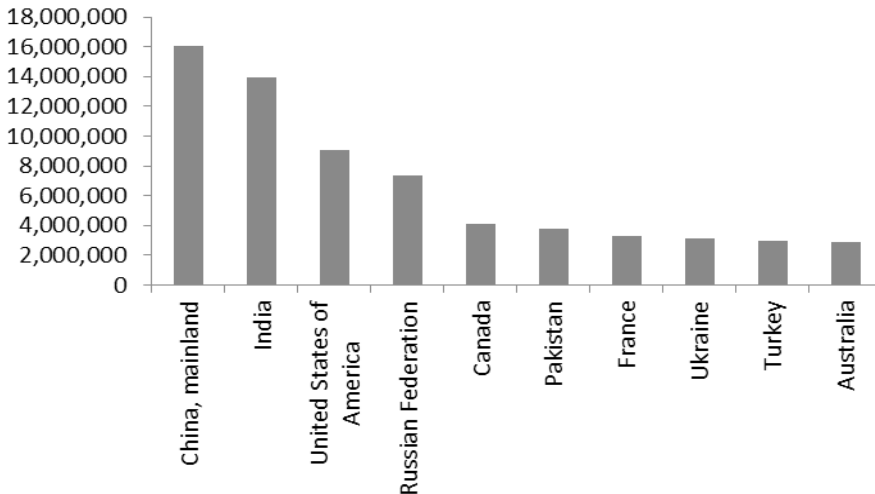
Source: FAO, 2018a.

The significance of wheat is recognized in its high consumption value for human and animal nutrition (by-products from wheat processing or vegetative parts of the plant), food

industry (baking industry and pasta industry, confectionery products, baby food, beer and alcoholic beverages, starch, gluten, etc.), pharmaceutical industry, etc. Global estimates suggest that, on a daily basis, wheat accounts for over 20% of the total calories and proteins in human nutrition (in India, over 50%), and, thus, ensures food security (Grewal, Goel, 2015; Jeločnik et al., 2017). This triggers strong wheat marketability and mobility (trading product), with a relatively high global export value, which in the past years, depending on climatic conditions and quantities produced, ranged from about 35 to over 50 billion of USD (Kefyalew, Henneberry 1997; Imexco, 2017). Main wheat exporters are presented by next Figure (*Figure 3*.).

Figure 3. Export value of wheat in 2016, in thousands of USD
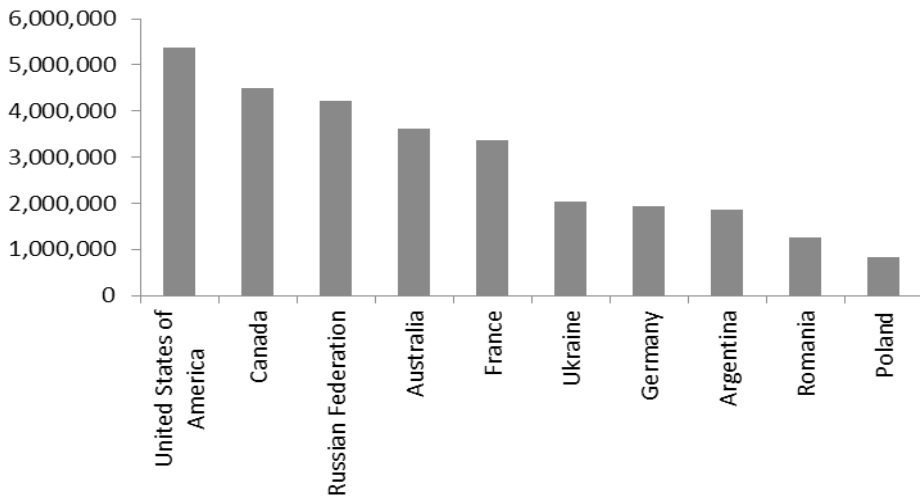
Source: FAO, 2018b.

The rest of the paper is organized as follows: section 2 provides literature review, section 3 offers description of used methodology and data sources, section 4 refers to results and discussions, while section 5 concludes the analysis.

Literature Review

The literature on forecasting soft commodities supply response on market price has a long history, even for organic products (Nerlove, 1956; Houck, Ryan, 1972; Lee, Helmberger, 1985; Tomas Simin et al., 2019). The production costs are main driver of wheat market price. Production costs per unit vary over the years (production cycle) and depend primarily on the amount of the variable production costs and yields. Price of oil has the largest impact on production costs (Vasiljević et al., 2008), while yields are highly dependent on the climatic conditions during the vegetation period. On the other hand, through direct applying of the concept of economies of scale the average cost per unit of production could be decreased as the size of the farm (total production) increases, meaning that farmer is able to spread more production over the same level of fixed expenses.

For storable agricultural products such as wheat, farmers have to decide whether to store the product and wait for a higher price or to sell it partially, i.e. immediately before or after the harvest (Pejovich, 1990; Shi et al., 2014).

Hassouneh et al. (2016) point out that besides wheat production costs increase in global stocks is reducing wheat market price, while higher interest rates increase the wheat price volatility.

Figure 4. Wheat price average annualized volatility, period 1961-2011
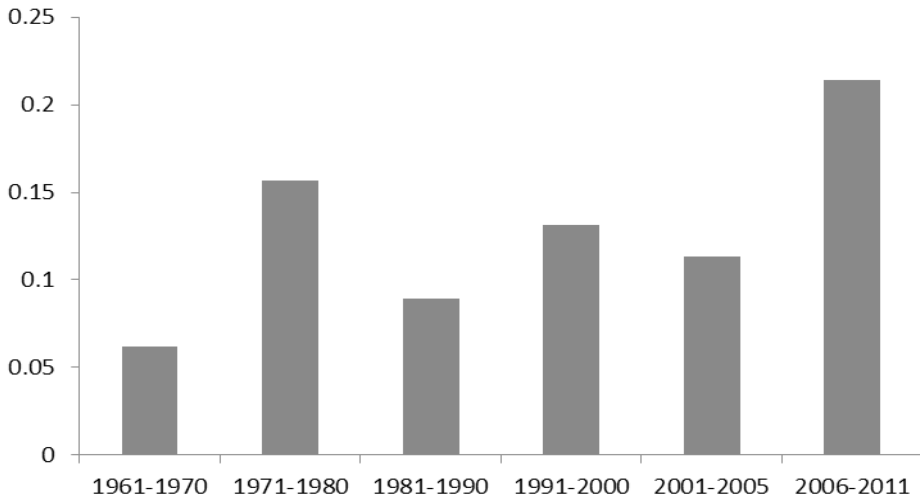
Source: Mekbib et al., 2016.

Note: Price volatility is measured by the standard deviation of logarithmic monthly prices using World Bank international prices. Prices are in real 2005 USD per metric ton. The figures in each bar refer to average values of the annualized volatilities over the respective decade.

After five decades of relative wheat prices stability, since 2005 the prices volatility has surged, driving the farmers' need for hedging strategies in order to manage price risk (Mekbib et al., 2016). Global crisis provoked investors' "flight to safety" behavior, shift from financial assets to commodities, that resulted in commodities prices increase. High wheat market prices led to supply response in which producers started to allocate more land to the wheat production and increased investments (and production costs) that were oriented to yields growth (OECD, 2008).

Besides production costs, increased demand and price volatility, the influence of other "non-production factors" is significant, i.e. speculative factors, which are affecting the wheat market (Zuppiroli, Revoredo Giha, 2016). Finally, climate changes are influencing soft commodity prices by decreasing yields, limiting supply, and affecting market prices, which might create additional spillover effects on the global market (Ziolkowska, 2016).

Methodology and Data Sources

During the analysis of research results, broad and in detail overview of scientific sources in the field of cereal price calculation and cereal prices forecast was carried out. During the research, and the results interpretation phase, in-depth interviews were conducted with relevant experts from the sphere of cereal production and markets. The research involved the use of statistical methods for data processing and analysis, such as descriptive statistics, coefficient of variation, correlation and regression analysis.

Empirical part of the analysis is based on the data from the United States Department of Agriculture (USDA), obtained from the Commodity Costs and Returns database for a twenty-year period (1996-2015). The reliance on USDA data for the analysis is based on the fact that the United States is one of the world's largest wheat producers, with the pronounced impact on the global wheat market. Even though the analysis was carried out based on production conditions on the territory of the USA, the method also has a high level of applicability on other markets.

The dominant goal of the market-oriented agricultural producers is to make profits. Profit per unit of product in agricultural production can be expressed as (Urfi et al., 2011; Hubbard et al., 2013):

$$P = MP - TCP \qquad (1)$$

where:

P - Profit; MP - Market price; TCP - Total production cost.

Total production cost per unit of product can be expressed as:

$$TCP = OC + FC \qquad (2)$$

where:

OC - Operating costs; FC - Fixed costs.

In plant (crop) production, in this case wheat production, operating costs represent: seed, mineral fertilizers and manure, pesticides and agro-chemicals, custom operations, water, motor fuel, lube, electricity and repairs for used mechanization and equipment, interest on operating inputs, buildings and machines upkeep and some other variable expenses (Subić et al., 2010; DGARD, 2016).

On the other hand, fixed costs in plant (wheat) production include: hired labor, costs of purchased mechanization, opportunity cost of unpaid labor, opportunity cost of land (rental rate), certain taxes, fees and insurance, general farm overhead (general farm utilities, office equipment, business travel and other costs), etc. (Hallam et al., 1998).

Information on the correlation between wheat's production costs and market price can be helpful when deciding on potential sales terms. Furthermore, predicting wheat market

prices based on expected or projected production costs and price/costs relationship allows a farmer to decide whether to perform hedging strategies on derivatives' market.[4]

Determining the correlation between production costs and market prices of wheat and their connection to other grains (Kovačević et al., 2017) is very useful in analyzing the wheat production profitability over a longer period of time. It should be emphasized that by using market price to production cost indicators the effect of inflation is avoided, i.e. the obtained indicators can be directly compared in different years. Additionally, price risk hedging strategies may be chosen more effectively.

Results and Discussion

The main goal of the paper was to determine the linkage between operating/total cost and market price of wheat. Initial assumption of the research was that production costs of wheat are significantly correlated with the market price. The initial hypothesis referred to the idea that since wheat is a storable product, in the case of low prices on the market, the farmers will store the product rather than sell it immediately (at harvest time), causing a contraction of market supply, i.e. stopping further decline in wheat prices.

In next tables (*Tables 1a/b.*) are shown the data on production costs and market prices of wheat, valid for the territory of the United States during the observed period. The summarized data for Operating costs and Overhead costs were used for calculation of Total wheat production costs on annual level. Based on the USDA data, the following parameters were subsequently calculated: Operating costs per bushel; Market price/operating costs per bushel; Profit/operating costs; Total costs per bushel; Market price/total costs per bushel and Profit/total costs.

Table 1a. Wheat costs of production and profitability indicators for the period 1996-2015, excluding government payments

Element/Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total, operating costs	70.0	70.5	57.4	54.8	58.4	64.9	57.1	67.7	70.8	79.5
Total, allocated overhead	25.5	27.2	107.8	111.3	115.5	118.4	118.6	123.4	119.8	128.0
Total, costs listed	95.5	97.7	165.2	166.2	173.9	183.3	175.6	191.1	190.6	207.5
Yield (bushels per planted acre)	30.4	35.9	41.4	38.6	37.6	34.5	27.9	40.7	39.8	39.9
Price (USD per bushel at harvest)	4.8	3.5	2.7	2.5	2.5	2.8	3.3	3.1	3.4	3.2

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4   Commodities represent the fastest growing market within the worldwide globalised economy. Globalisation has brought many new benefits to the participants involved in agricultural production. However, it also implies potential risks. For example, the increased price volatility and its impacts became one of the major global issues during the previous period. Usually the producers' low income and market fluctuations lead to price instability, which generally impedes the growth of grains market. Consequently, producers oriented to commodity markets tend to be more focused on the commodity price risk and potential hedging activities (Rusnakova, 2015; Yu et al., 2016).

Element/Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Operating costs per bushel*	2.3	1.8	1.3	1.3	1.5	1.8	1.9	1.6	1.6	1.8
Market price/ operating costs per bushel*	2.3	1.9	2.1	1.9	1.7	1.5	1.7	2.0	2.1	1.7
Profit/operating costs* (in %)	127	93	105	85	68	54	71	97	110	73
Total costs per bushel*	3.0	2.6	3.9	4.2	4.5	5.2	6.2	4.6	4.7	5.0
Market price/total costs per bushel*	1.6	1.4	0.7	0.6	0.5	0.5	0.5	0.7	0.7	0.6
Profit/total costs* (in %)	63.1	36.0	-31.5	-41.3	-45.8	-47.2	-46.8	-32.6	-26.0	-37.2
* Author's calculation based on the USDA data.										

Source: USDA, 2017.

Table 1b. Wheat costs of production and profitability indicators for the period 1996-2015, excluding government payments (continuation)

Element/Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total, operating costs	85.0	93.0	125.7	112.9	102.8	121.9	126.7	128.2	126.5	115.5
Total, allocated overhead	131.8	139.0	151.7	150.3	154.6	165.7	175.3	183.9	189.3	193.5
Total, costs listed	216.8	232.0	277.4	263.2	257.4	287.6	302.0	312.0	315.8	309.0
Yield (bushels per planted acre)	33.2	37.4	41.3	40.0	45.3	37.6	43.8	38.9	36.9	40.1
Price (USD per bushel at harvest)	4.1	5.3	7.9	5.5	4.8	7.4	7.6	7.1	6.4	5.1
Operating costs per bushel*	2.3	2.3	2.8	2.7	2.1	3.0	2.7	3.0	3.2	2.7
Market price/ operating costs per bushel*	1.8	2.3	2.8	2.1	2.3	2.5	2.9	2.4	2.0	1.9
Profit/operating costs* (in %)	76	130	179	109	125	146	186	135	104	94
Total costs per bushel*	6.3	6.0	6.5	6.4	5.5	7.4	6.7	7.7	8.3	7.5
Market price/total costs per bushel*	0.7	0.9	1.2	0.9	0.9	1.0	1.1	0.9	0.8	0.7
Profit/total costs* (in %)	-34.7	-12.4	21.0	-13.5	-14.1	-0,7	14.0	-8.4	-22.3	-31.5
* Author's calculation based on USDA data.										

Source: USDA, 2017.

Next Figure (*Figure 5.*) shows movements of the operating costs, total costs and market price at harvest time (per bushel, as annual averages) for the wheat in USA during the period 1996-2015.

Figure 5. Comparative presentation of operating costs per bushel, total costs per bushel and market price per bushel (at harvest) in USA, in period 1996-2015
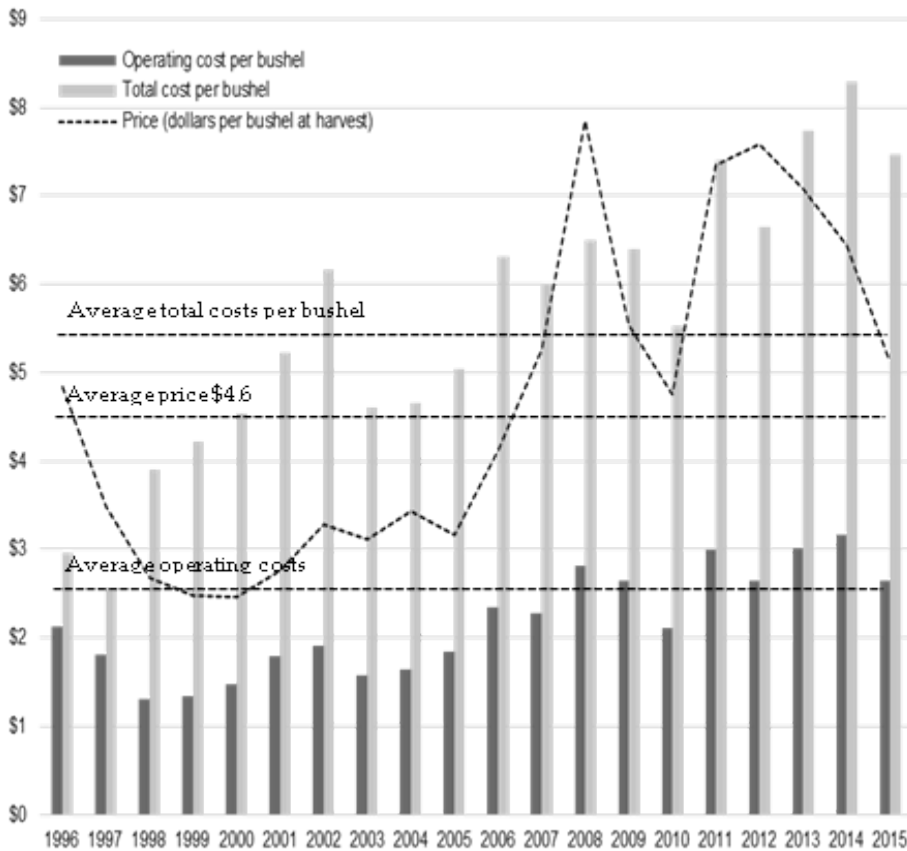
Source: Authors' calculation and presentation based on USDA, 2017.

It is illustrative that market price is highly correlated with operating costs, as well as that it has never been under the level of operating costs. The price of the wheat reached two peaks in recent history, at the beginning of global financial and subsequent debt crisis in Eurozone, in 2008 and 2012 respectively. The first reason for this may lie in the, so called, "flight to safety" behavior of market participants that ran away from financial towards real assets in times of distress, increasing the demand and price of commodities. The second reason was the rise in oil prices that increased the input costs and in addition demand for substitute biofuel agricultural commodities. Furthermore, the data from previous tables (*Tables 1a/b*.) indicate that the highest profit/operating costs ratio was reached in these two years (wheat price significantly increased, while the rise in operating costs was less pronounced).

The positive co-movement of total costs and market price is also present but, to a certain extent, weaker. The ratio of profit/total costs was mostly negative over time. The farmers are often willing to sell the products under the total costs because they are not taking into account own labor costs, opportunity costs, lost land rent, etc. In addition, government subsidies were

not taken into account when calculating profitability. In 2008 and 2012 ratio had positive value because of significant increase in wheat market price that surpassed the level of total production costs.

For the purpose of wheat price forecast the ratio of market price /operating costs may prove to be more reliable in comparison to market price/total costs due to higher positive correlation between operating costs and price of wheat.

Figure 6. Regression analysis between the total costs per bushel and market price per bushel (in USD) at the harvest time
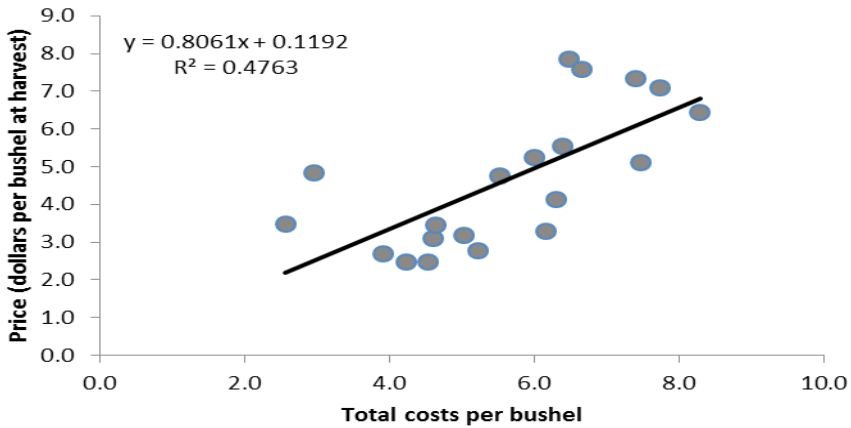
Source: Authors' calculation based on USDA, 2017.

Figure 7. Regression analysis between the operating costs per bushel and market price per bushel (in USD) at harvest time
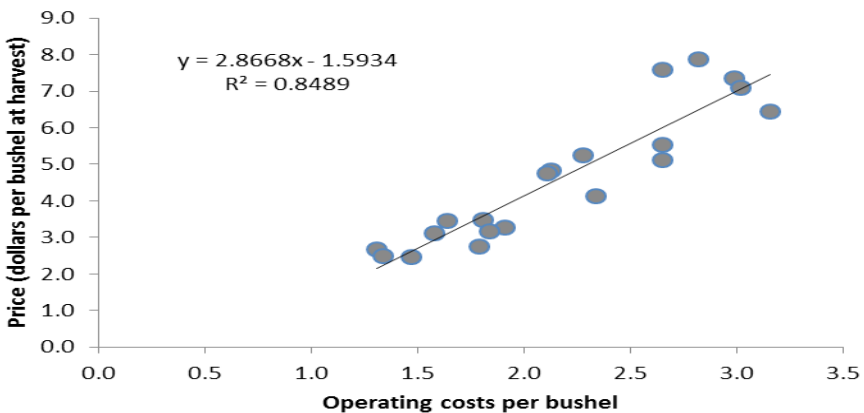
Source: Authors' calculation based on USDA, 2017.

The previous harts (*Figures 6. and 7.*) present regression analysis for total (operating costs) and market price. High positive correlation was expected, and higher portion of explained variability in total is got for operating costs as explanatory variable. The values of correlation coefficients are presented in next table (*Table 2.*).

Table 2. Correlation matrix

Wheat	Total costs/bushel	Price (USD/bushel at harvest)	Operating costs/ bushel
Total costs/bushel	1		
Price (USD/bushel at harvest)	0.690	1	
Operating costs/bushel	0.821	0.921	1

Source: Authors' calculations

The previous table shows that the correlation between total costs, operating cost and market price is high and positive.

Standard deviation, average values and coefficients of variation for market price/operating cost per bushel and market price/total cost per bushel are provided in next table (*Table 3.*), while log changes of ratios are presented in next Figure (*Figure 8.*).

Table 3. Standard deviations, mean values and coefficients of variation

Element	Standard deviation (%)	Average	Coefficient of variation (%)
Market price/operating cost per bushel	35.29	2.08	16.94
Market price/total cost per bushel	29.63	0.84	35.10

Source: Authors' calculations

Figure 8. Market price/operating (total) costs log changes
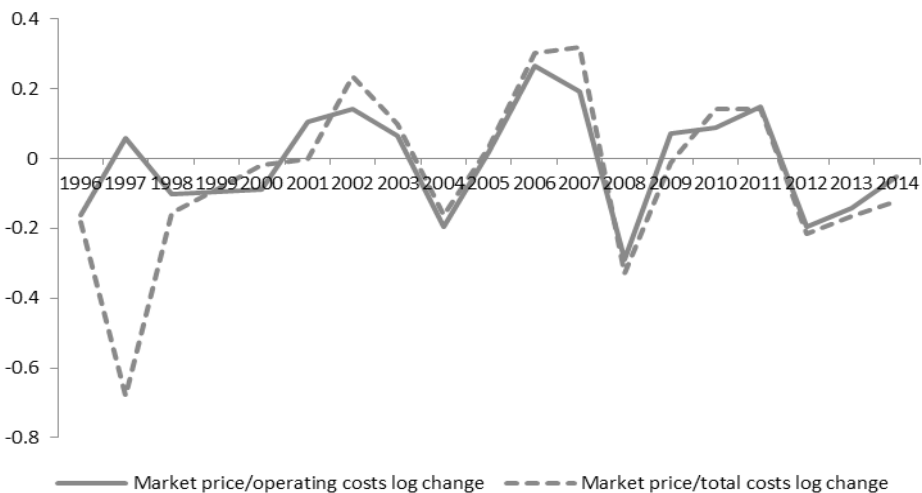
Source: Authors' calculations

In previous table and Figure (*Table 3*. and *Figure 8*.) are shown the relative dispersion indicators for market price/operating costs per bushel and market price/total costs per bushel. Operating costs are characterized by higher correlation to market price. The ratio market price/operating costs has lower variability, and thus appears to be a more reliable indicator in the forecast of market price of wheat compared to the ratio of market price/total cost per bushel. Furthermore, the value of operating costs per bushel had always had a lower value than the market price of wheat during the observed period, which was not the case with total costs per bushel.

The explanation for such results is that farmers for storable products, such as wheat, usually take into consideration only direct operating costs, which is equivalent to money invested in seeds, fuel, chemicals, etc. Therefore, if the market price approaches operating costs, farmers will instinctively try to avoid a visible loss, and will store wheat, expecting a higher price in the near future. As a result, decrease in spread between market price and operating costs leads to increasing storage and withdrawal of wheat from the market which slows down further decrease in wheat price and ultimately leads to the subsequent price increase due to reduced supply.

The reason producers are willing to sell the wheat below the level of total production costs lies in the fact that government subsidies and supports within the various timeframes are not taken into account in profitability calculation. In addition to direct payments to farmers, current USA farm programs are more and more insurance based (Keeney, 2013). These may be rational behind the predominantly negative spread between total production costs and market price, as previously shown.

On the other hand, overhead costs are "less visible" and understandable to farmers as the opportunity costs, lost rent for plots that could have been leased or the value of hiring own labor. Thus, when market price approaches and even falls below the total production cost of wheat that has a weaker effect on farmers' decision to sell or store the product than market price approaching the operating costs.

Wheat price behavior and price risk hedging effectiveness

Stated characteristics of wheat price behavior and presented ratio of market price/operating costs offer simple tool for future price forecast and timely and effective hedging of price risk.

The following Figure 9 illustrates the historical market price/operating costs ratio for USA wheat producers and turning points of this time series. It can be noticed that minimum and maximum levels reached by the ratio in the past present the form of support and resistance levels for price to costs relation.

Figure 9. Boundaries for market price/operating costs ratio movements
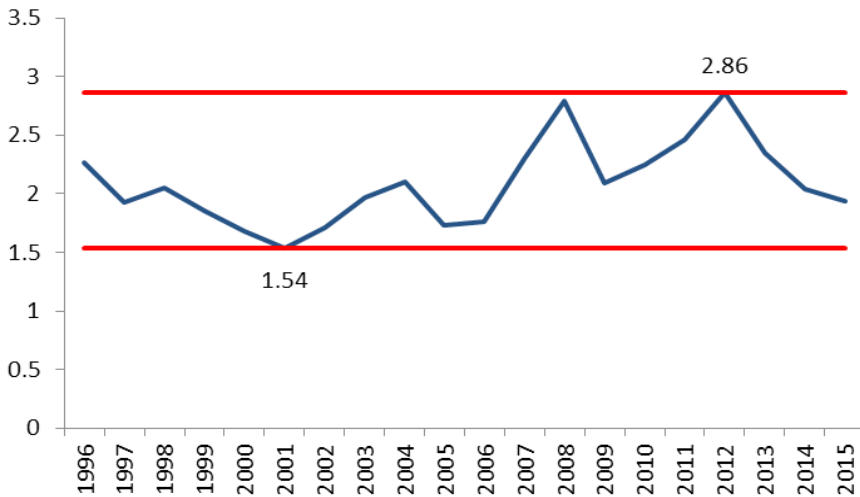
Source: Authors' calculations

Practical applications of the ratio market price/operating costs of wheat in farmers hedging activities decisions are shown in the following two examples.

Example 1. An example of the practical application of the low wheat market price/operating costs ratio to decision making process for hedging strategies on the futures market.

Let's assume that in January, a milling company has the need to purchase certain quantities of wheat in July. Based on the forecasted producer price and wheat price on the futures market for delivery in July, the company calculated that the ratio futures contract price/operating costs is 1.54. According to the results of the analysis in this paper, this would be an excellent opportunity for opening long positions in July wheat futures, since during the period covered by the analysis, the ratio of market price/operating costs showed this to be the lowest level in previous two decades. Therefore, rise in wheat price is expected and in this case it is a good business decision to use hedging strategies with futures. The similar hedging strategy can also be applied by purchasing July wheat call options.

Example 2. An example of the practical application of the high wheat market price/operating costs ratio to decision making process for hedging strategies on the futures market.

Assuming the case opposite to the case in Example 1, a farmer in January forecasts the production costs of wheat, and on the basis of known futures price at harvest time (futures in July), using the methodology shown in this paper, determines that futures contract price/operating costs is 2.86. Farmer decides, based on this ratio, to open short position on July futures contract since according to the results of the analysis, that would be a perfect moment for the wheat sale, as the market price/operating costs ratio in the past twenty years has never been higher, and therefore decrease in market prices is expected. The similar hedging strategy can also be applied by purchasing July wheat put options.

Conclusions

The aim of the paper was to analyze wheat market price to costs behavior in order to provide decision support tool for hedging strategies in agribusiness sector. The analysis was carried out based on the United States Department of Agriculture data for the twenty years period. The obtained results showed a high positive correlation between operating costs and market price and lower but significant correlation of total production costs and market price.

The observed difference in the correlation between the two costs categories and market price could be explained by the greater "visibility" of the direct operating costs to the farmers. In the case of market price approaching operating costs, farmers start to withdraw wheat from the market and store it which reduces the current market supply. Resulting supply shortage slows down and, ultimately, stops further decline in wheat price.

In the case of market price/total production costs, the overhead costs - opportunity costs, lost rent that could be charged when leasing land and the costs of own labor, are less "visible" to farmers. As a result farmers are willing to sell wheat below the total production costs, while they are reluctant to sell below clearly visible operating costs.

Presented ratio of wheat market price/operating costs proved to be simple and effective tool for price risk management. Advantage of this approach in macroeconomic and profitability analyses, lies in the fact that mentioned ratio can be directly compared over different time periods without the need to calculate the effect of inflation. Finally, this methodology can be used for other storable soft commodities such as corn, rice, soybeans, etc.

Further research in this area could take into account other factors affecting wheat market price behavior such as price of substitute commodities, the currency exchange rates, the interest rates, the wheat transitional stocks, the projected demand for wheat, etc.

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Conflicts of Interest

The authors declare no conflicts of interest.

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LOGISTICAL SUPPORT OF AGRICULTURAL SECTOR IN UKRAINE: LEGAL FEATURES

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A R T I C L E   I N F O

A B S T R A C T

The article is devoted to the issue of legal regulation of logistical support of Ukrainian agriculture. The relevance of the article is that Ukraine's agriculture is far behind optimal international norms, and the provision of agriculture with fixed assets does not meet the needs of production. The authors used the dialectical method, the analysis method, the synthesis method, the logical method, the historical method, the method of comparison. As a result of the study, the following conclusions were made that the legislation on state support of agrarians in the sphere of equipment purchased is not substantiated. This is a significant destabilizing factor, as well as insufficiently professional and scientifically substantiated preparation of such regulatory acts. There is an increasing tendency for the use of a "manual regime" for providing state support in agriculture, which is in the situation of instability, is a risky way.

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Introduction

Logistical support is an important condition for the effective development of the Ukrainian agricultural sector. At present, Ukraine's agricultural sector is far behind the optimum standards considering this criterion, and the provision of agriculture with fixed assets does not meet the needs of production. In 2014, in agricultural enterprises, the actual availability of fixed assets per 1 hectare was only 22% lower than their regulatory demand (Zakharchuk, 2016). Despite such catastrophic consequences for agriculture caused by negligent logistical support, this problem is not even mentioned in the Law on State Aid for Agriculture in Ukraine. However, it should not be forgotten that the functioning and organization of production of agricultural products depends on the material and technical support of producers' primarily agricultural machinery, spare parts for it, fuel, and lubricants. According to V. P. Zhushman, agricultural production is dead without adequate logistical support and without the support of the state in providing agricultural producers with the means of industrial and technical purposes agriculture is unable to get out of the crisis (Zhushman, 2010).

Complex problems with the sufficiency and quality of logistical support of modern agriculture in Ukraine the urgent need to intensify the processes of state aid in this area. According to the National Joint-Stock Company "Ukragrolizing", the need for agriculture to purchase labor mechanization is UAH 15-20 billion, while the purchasing power of agricultural enterprises remains at UAH 2.5 billion. The solution is to purchase equipment under schemes that do not provide for a single transfer of the entire amount of its value at the expense of own funds. The most popular way to get money for buying expensive equipment is to enter into credit agreements with financial institutions (but their services are expensive and require some security conditions). As an alternative to the loan, agrarians were offered to use the leasing legal structure, but in times of crisis and instability, leasing services are also expensive and inaccessible. The state has offered agrarians state aid for the leasing of agricultural machinery to help solve actual problems in the field of logistical support of the agro-industrial complex. This way is aimed at eliminating the main problem – the high cost of leasing operations in commercial financial institutions.

This mechanism is that a private lessor, which requires high-interest rates, is replaced by a specialized state-owned company that sets a lower commission rate. The National Joint Stock Company "Ukragrolizing" (since 2001) and the State Enterprise "Spetsagrolizing" (since 2010) were established for this purpose. The procedure for granting state aid is regulated by this scheme by some resolutions of the Cabinet of Ministers of Ukraine (Resolution of the Cabinet of Ministers of Ukraine on the procedure of using the state budget funds for the purchase of domestic agricultural machinery and equipment for financial leasing and financial leasing operations (No. 1904/2003), 2003; Resolution of the Cabinet of Ministers of Ukraine on approval of the Procedure of using the funds provided in the state budget for financial support of agricultural entities through the mechanism of cheaper loans and compensation of leasing payments (No. 794/2010), 2010; Resolution of the Cabinet of Ministers of Ukraine on approval of the Procedure

of using the funds provided in the state budget to increase the authorized capital of the National Joint Stock Company "Ukragrolizing" for the purchase of technical means for the agro-industrial complex with their subsequent transfer under financial leasing conditions (No. 709/2015), 2015).

Thus, legislation, implementation practices, leasing support issues under this legal mechanism require detailed investigation in this article.

Materials and methods

The authors used the dialectical method, the analysis method, the synthesis method, the logical method, the historical method, the method of comparison to write this article. The method of analysis allows to study in detail the regulatory acts supporting agricultural producers, industry. The comparison method identifies new ways to improve leasing and to abandon the inefficient method of supporting agribusiness. The dialectical method made it possible to draw conclusions from the study. The historical method helps to avoid the mistakes of the past in the effective support of the agricultural sector in the country. The materials in this scientific article were regulatory acts that provide support to the agricultural sector in the country.

Results

It should be noted that in 2014-2016, agricultural entities received indirect state aid, in particular, through a special VAT tax regime, totaling UAH 79.6 billion, fixed agricultural tax – UAH 12 billion, which is on average nearly UAH 31 billion annually.

Since 2017, Ukraine has renounced indirect state aid in agriculture, in particular through a special VAT tax regime, and has started to introduce more extensive mechanisms for direct state aid for agricultural producers. Thus, in 2014–2018 the total amount of direct state financial aid to agriculture at the expense of budgetary funds amounted to UAH 10 302.7 million (actual state aid), of which 9231.3 thousand UAH in 2017–2018 (which is almost 10 times higher than the corresponding volume of 2014) (Figure 1), while in 2017-2018 almost 60% of the total state aid was directed to support the livestock industry.

Figure 1. Dynamics of changes in the amount of state aid for agriculture in 2014–2018 (UAH, thousand)
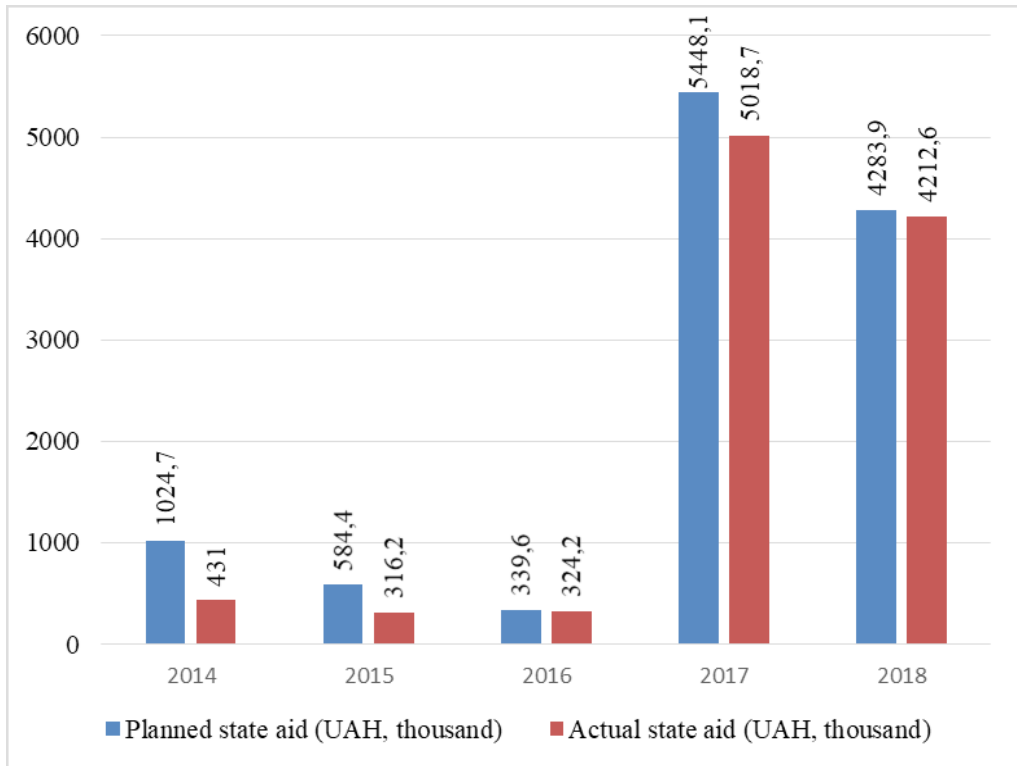
However, both direct and indirect government subsidies are not effective. In particular, the audit conducted by the Accounting Chamber of Ukraine in 2019 of the efficiency of the use of state budget funds aimed at providing state aid to the agro-industrial complex, showed the lack of clarity of the legislatively implemented mechanisms for providing state aid to the entities receiving it, which do not fully ensure the efficient use of funds budget programs and do not contribute to the timeliness and completeness of management decisions by participants in the budget process, which affected the legality and efficiency of budget funds.

Thus, the audit revealed the fact that the state budget suffered losses in the amount of UAH 3 298.1 thousand and ineffective management of funds in the amount of UAH 16 821.3 thousand, which were returned to the state budget due to their non-use. In addition, the audit revealed the use in 2018 of part of the state budget funds under these programs in violation of current legislation (UAH 1,045,397.2 thousand) and not for the intended purpose (UAH 6,649.0 thousand) (Report of the Accounting Chamber on

the results of the audit of the effectiveness of the use of state budget funds aimed at providing state aid to the agro-industrial complex (No. 20-6), 2019).

One of the effective ways of providing state aid to agricultural producers is not full financing, but point support, in particular – assistance in the purchase of agricultural machinery under leasing agreements.

Leasing in domestic agrarian legislation appeared in the context of state aid for agriculture (Presidential Decree on measures to solve the crisis of payments and support for domestic producers (No. 88/95-rp of May 22, 1995), 1995; Osadko, 2014a). At present, the legal mechanism of state aid in the field of agricultural machinery leasing is regulated by a large number of legal acts (for example, by the Decrees of the Cabinet of Ministers of Ukraine "On the Procedure of Use of State Budget Funds for the Purchase of Domestic Machinery and Equipment for Agro-Industrial Complex…, 2003; "On Approval of the Procedure of Using the Funds Provided in the State Budget for Increasing the Authorized …, 2015; "On Approval of the Procedure of Using the Funds Provided.., 2010).

The much greater popularity of the National Joint Stock Company "Ukragrolizing" in comparison with the State Enterprise "Spetsagrolizing" stipulates that in our research it is the activity of the first state company that we focus on. The contractual nature of state aid in the field of agricultural machinery leasing imposes a significant imprint on the legal mechanism for its provision. The entities receiving such support were initially referred to in Order 2003 of 1904 as «agricultural enterprises and other business entities in the Agro-Industrial Complex», but since 2009 this list has been supplemented by Agricultural Servicing Corporations and individuals – members of private farms, which was explained by the need to consider their non-commercial status. In our view, state aid should be provided to agricultural producers and agricultural service cooperatives (as an optimal way to organize joint purchases of expensive machinery).

The object of state aid is the leasing of machinery and equipment for the agro-industrial complex, the main legal features of which are designation and origin. A technique is considered to be domestic if it combines subjective and objective criteria (Resolution of the Cabinet of Ministers of Ukraine on Approval of the Procedure for Determining the Degree of Localization of Production of Enterprises of the Machine-Building Industry for the Agro-Industrial Complex of Domestic Machinery and Equipment for the Agro-Industrial Complex (No. 369/2013), 2013). It should be noted that, although the legislation provides for the possibility to lease not only equipment but heifers and cows (Order of the Ministry of Agrarian Policy and Food of Ukraine on approval of the Regulations on the Bidding Commission on determining the priorities of providing the basic funds of agricultural producers under financial leasing (No. 504/2012), 2012; Resolution of the Cabinet of Ministers of Ukraine on approval of the Procedure of using the funds provided in the state budget for financial support of agricultural entities through the mechanism of cheaper loans and compensation of leasing payments (No. 794/2010), 2010), in fact in Ukraine this type of preferential leasing, unfortunately, does not work.

The 2003 order did not include the criteria for the selection of lessees in its original versions, and only in 2009 a three-stage system of their definition was formed:

1) a requirement for the absence of negative conditions;

2) filtering by prevailing conditions: a) by type of activity (animal husbandry, storage); b) organizational (agricultural cooperatives, small and medium enterprises);

3) optional auctioning of bidders, which mainly secures the interests of the National Joint Stock Company "Ukragrolizing", rather than farmers.

The contractual terms of support can be summarized in the following aspects:

a) the main contractual arrangement is financial leasing;

b) advance payment of not less than 15% of the cost of the equipment;

c) with or without transfer of the object to the lessee's property;

d) the remuneration of the National Joint Stock Company "Ukragrolizing" has not been fixed at a solid percentage (since 2015 it amounted to 50% of the National Bank of Ukraine discount rate per annum of undamaged equipment cost);

e) the medium-term effect of the contract (in science it is necessary to extend the lease term for a long-term term (Osadko, 2014b).

The characteristics of the main elements of the legal mechanism of preferential leasing should be complemented by research into the practice of implementing such support. The analysis of court case files allows all disputes to be presented in the form of three main groups of violations:

1) the breach of the schedule of payment of lease payments (for example, The decision of the Commercial Court of Kyiv of September, 5, 2016);

2) the violation of the requirements for insurance of the leased asset (for example, The decision of the Commercial Court of the Kyiv region of September, 10, 2015; The decision of the Rivne Economic Court of Appeal of January 1, 2015);

3) the violation of the operating conditions of the equipment, resulting in a decrease in its cost compared to the calculated one (for example, The decision of the Commercial Court of Kyiv of December 3, 2013).

Leasing is described and analyzed in the literature (Yermolenko, 2010; Barabash, 2004; Berlach, 2009; Kornienko, 2005; Osadko, 2016; Semchik, 2001; Stativka, 1999; Stoyko, 2014), but its popularity in the agro-industrial complex remains unsatisfactory, especially in the face of an acute shortage of logistical support in domestic agriculture. The National Joint Stock Company "Ukragrolizing" has a powerful protection potential that is underutilized. It is quite eloquent to recognize the fact that the company is lagging behind its competitors in the leasing market (Decision of the directorate of NJSC "Ukragrolizing" on approval of the terms of transfer of equipment for financial

leasing by the National Joint Stock Company "Ukragrolizing" (dated February 28, 2019), 2019). As a result of the analysis of the legal mechanism of state aid in the field of leasing, as well as the study of the case law, we have come to the conclusion that protectionism should become the main purpose of activity of the National Joint Stock Company "Ukragrolizing" in comparison with the purpose of profit (Grigorieva, 2017).

From this point of view, the protection character should be realized in the following components:

a) the attractiveness of the offer – this means that the priority of the activity should be the expansion of the range of equipment based on constant monitoring of consumer demand;

b) cheapness and profitability – this means setting the minimum required a percentage of remuneration aimed at ensuring optimized activity of the National Joint Stock Company "Ukragrolizing". Many scientists point to a significant unjustified increase in the price of the equipment as a result of the operation of the National Joint Stock Company "Ukragrolizing" (Svistun, 2009; Golovchuk, & Nepochenko, 2010), and this fact significantly reduces the agro-protective effect of state support;

c) affordability – this means the simplest possible procedure for participation in the preferential leasing program. Currently, the batch of documents required for the initial submission is about 16 different documents (National Joint Stock Company "Ukragrolizing", 2019). Nevertheless, the appeal is not guaranteed to be satisfied. Given the contractual nature of this type of state support, in our view, it is quite possible to limit ourselves to general documents of the person and documents confirming the absence of negative conditions and the presence of prevailing ones. It would be convenient to develop an automated electronic filing system and a package of documents for the initial review. Such a step would allow, among other things, to optimize the structure of the National Joint Stock Company "Ukragrolizing" and its activities;

d) flexibility – this means applying an individual approach, categorizing clients (Dudchik, 2019), reaching compromise decisions on reviewing payment schedules for leasing payments, etc. In this case, flexibility should not turn into permissiveness. A weak system of liability for breach of the lease agreement resulted in mass ignoring of schedules and considerable losses of the state in similar legal relations in Belarus (Drozdov, 2008). A. S. Osadko (2016) points out that most of the problems that accompany state aid in the field of agricultural machinery leasing lie in the legal position of the national joint-stock company "Ukragrolizing" or the improper exercise of its rights and obligations. The analysis of the legal mechanism of direct preferential leasing of agricultural machinery and equipment indicates the need to improve the legislative regulation of these relations.

Unlike the previous legal mechanism for leasing agricultural machinery, the legal mechanism for compensation for leasing payments has a legal basis at the level of the Law of Ukraine "On State Support for Agriculture of Ukraine", although they have emerged only since 2012 (Law on Amendments to Article 13 of the Law of Ukraine on State Aid of Agriculture of Ukraine (Verdicts of the Verkhovna Rada of Ukraine, No. 31/2012, p. 383, 2011). The objects of state support are leasing payments under a financial lease contract concluded by an agrarian with a financial institution. The entity's expenses to be recovered are of two types: a lease payment (40% of the leased asset's value) and a lessor's fee (1.5% National Bank of Ukraine discount rates) (Resolution of the Cabinet of Ministers of Ukraine on Approval of the Procedure of Using the Funds Provided in the State Budget for Financial Support of Measures in the Agro-Industrial Complex on Conditions of Financial Leasing (No. 648/2010), 2010). The legal basis for such support has not developed, and the main reason is the lack of financing of the budget program in the direction of compensation for leasing payments, and therefore, the lack of need to adjust the legal framework for its implementation.

Discussions

As a result of the study of the features of legal mechanisms of state aid in the field of leasing of agricultural machinery in Ukraine, we can draw some conclusions. The proposed method of state aid – the provision of equipment for preferential leasing – is contractual in nature and the legal relationships that are formed in the process of providing it have the features of traditional financial leasing.

The main differences of the analyzed legal mechanisms can be represented as follows:

1) the preferential lease agreement is beneficial to the state, the agrarian and the supplier, whereas the compensation of leasing payments is directed only to the agrarian;

2) the state can profit from preferential contracts – there is no such opportunity when compensating for leasing payments;

3) state regulation of concluding of the preferential lease agreement is supplemented, if necessary, by contractual regulation. The regulation of the procedure for compensation of leasing payments is characterized by gaps in the legislation;

4) when concluding a preferential contract, a certain degree of freedom of action remains, whereas state aid in the form of payment compensation is enclosed within the rigid frameworks of the agrarian-legal procedure, and the recipient has no possibility to influence the conditions of granting him support.

Conclusions

As a result of the conducted research, we can conclude that the legislation on state aid of agrarians in the sphere of equipment purchased is not substantiated. The legal

acts governing these relationships are subject to permanent amendment, which is often fundamental and corrects essential aspects of state aid directly in the process of providing it. This is a significant destabilizing factor, as well as insufficiently professional and scientifically substantiated preparation of such regulatory acts. Also, the example of the analyzed program of compensation for the cost of technology can see the ambiguity of measures aimed at such a fight against bureaucracy. The removal of such barriers by involving banks instead of government bodies was eliminated by the lengthy procedure of harmonization of equipment lists. On the one hand, funding for state support is increasing, and on the other, farmers cannot obtain it because of the imperfection of the organizational and legal framework. It can be concluded that there is an increasing tendency for the use of a "manual regime" for providing state aid in agriculture, which is a situation of instability is a rather risky method. These conclusions should be taken into account in further improving the legislative regulation of government leasing support. In our opinion, relations of state aid in the field of agro-leasing should find their legislative regulation at the level of the laws of Ukraine «On state aid of agriculture of Ukraine" and "On state logistical aid of agriculture».

Conflict of interests

The authors declare no conflict of interest.

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SATISFACTION OF VISITORS WITH FOOD OFFER AT GASTRONOMIC FESTIVALS IN RURAL AREAS

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A B S T R A C T

The purpose of this paper is to explore visitors experience, habits and attributes that have significant impact on their satisfaction with food offer at "Plum Fair" held in Osečina. Collected data were analyzed and interpreted using some basic descriptive statistics techniques as well as non-parametric test such as Spearman's Rho. The results of the study showed that the majority of visitors come from the surrounding municipalities, motivated by the preservation of traditions and countryside. Purchase of food products was motivated by novelty as well as supporting local producers. Visitors were most satisfied with the taste of food products and least satisfied with their price. It might be noted that the rural gastronomic festivals and products have a great promotional and entrepreneurial potential by offering these products in the local restaurants as well as retail chains, which would positively affect the revitalization of rural area of Western Serbia.

Introduction

Gastronomy is defined as the scientific discipline that explore the historical development of nutrition, tradition of preparing and presenting the food of particular regions (Vukić, 2008). In order to preserve the identity of one's own nation, it is necessary to know the gastronomic history as well as eating habits of its people. On the other hand, knowing

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the eating habits of other nations and exchange of experiences with them is an important prerequisite for keeping up with global culinary trends. The importance of gastronomy as the main component of the tourist product, can be seen especially in the fact that many users find it a leading motive when discovering new destinations. Gastronomic tourism could represent an added value to general experience of the existing tourist offer (Sims, 2009), so it becomes a significant market niche that promotes economic and social development in urban and rural areas (Yun et al., 2011). Gastronomy can also be a new attraction by itself (Szívás, 1999), as well as the primary motive that meets a multitude of tourists' needs and desires. Gastronomic festivals are events that involve the whole local community in promoting local food (Everett, Aitchison 2007). They are also a place of social and cultural cohesion between communities, which brings in direct contact locals, visitors and organizers, encouraging the creatives and using specific local resources (Jamieson, 2014; Kwiatkowskia et al., 2019). Entrepreneurial potential of this events should be specially emphasized, because they can be start-ups for co-branding, testing new business ideas, co-creation and strengthening tourism operators' marketing (Dimitrovski, 2016; Hjalager, Kwiatkowski, 2018). Today's gastronomic festivals focused not only on delicious food, but also on delightful entertainment (Wu et al., 2014), and that why they are liminal areas in which the transformation of social space gives way to non-traditional behavior (Picard, Robinson, 2006).

When it comes to gastronomic festivals in rural area, one of the main obstacles is the lack of mapping of rural zones with specific specialties, as well as insufficient information and signalization. With clear promotion strategy tourist operators would have a better insight into the festival's offer (Grigorova et al., 2016). Despite the great potential of rural tourism, special emphasis has to be placed on ecology and sustainable development (Milićević et al., 2020).

The aim of this paper is to explore visitor's satisfaction with food offer at rural gastronomic festivals, as well as their experiences and habits. Based on the results of an empirical research of "Plum Fair" in Osečina, purpose is also to point out the potential of this type of festivals in the wider tourism market.

Theoretical background

In the last ten years, the number of researches of the food festival in rural areas has increased considerably, however, in literature are still dominating the publications of the food festival in the cities (Clark, Rice, 2019). The main focus of these researches is sustainability and revitalization of rural areas (Morgan, 2015; Black, 2016; Rinaldi, 2017; Wilson et al., 2017; Cong et al., 2019;), impact on destination branding (Lee, Arcodia, 2011; Vukic et al. 2012; Blichfeldt, Halkier, 2014; Clark et al., 2019), impact on the local community (Alves et al., 2010; Smith, 2012; Nwokori, 2015; Ducros, 2018) as well as the motives and profile of visitors (Renting et al., 2003; Çela et al. 2007; Sidali et al., 2015; Eusébio et al., 2017; Kwiatkowskia et al., 2019). However, very few of the works dealt with the satisfaction of visitors with the gastronomic offer festival in rural areas (Wan, Chan, 2013; Bruwer, 2014; Jung et al, 2015; Markovic at al., 2015; Sohn et al., 2016; Lee at al., 2019).

Gastronomic festivals in rural areas are usually small-scale events which aim is to have a presentation of characteristic local products such as different types of dishes, drinks, fruits and vegetables or varies kind of contests (Mogan, 2015; Krajíčková, Shauer, 2018). Visitors to these festivals are often ready to pay a higher price for unique specialties and experience (Renting et al., 2003), which often can be extended thanks to the consumption of these products at home (Sidali at al., 2015). Consumers' profile of these visitors is connected with higher education and belonging to medium-high class (Çela at al., 2007). As motives of visit, it has been specified desire to connect with the nature, environmental protection, search for authentic taste, support to the local producers (Sidali at al., 2015), but often as a dominant motive, it also extracts the desire for socializing (Eusébio et al., 2017; Kwiatkowskia et al., 2019). They can have a significant role in finding a solution to stop the weakening of the country's economic power and depopulation (Vukic et al., 2016). Food in terms of its diversity, quality and the price, was a decisive factor of visitors' satisfaction of many other kinds of festivals (Anil, 2012). The most often factors of satisfaction with rural food festivals were: attribute related to food, food uniqueness, staff quality, adequacy of information and facilities, programs, entertainment, creativity, hygiene (Vukić, 2015; Jung et al., 2015; Lee at al., 2019)

Not so few works dealt with the connection of gastronomies and rural areas in Serbia (Stojanović, 2013; Duvnjak at al., 2014; Vukić, 2015; Bjelja at al., 2016; Vujko et al., 2017; Cvijanovic, Ružić, 2017; Stanisic et al., 2018) however, according to the author's knowledge the subject none of those works was satisfaction of a visitor to gastronomic offer at the festivals in rural areas of Serbia. Using cluster analysis author Vukić (2015) revealed four segments of visitors in Serbia: "Rural gastronomies", "Gastronomic aesthetics", „Tasters", and „Gastronomic adventurers ". Although the "rural gastronomies was at least" the most important attributes when choosing the Festival were to be held in the rural environment and to offer local specialties. In the third place, was the duration of the festival tradition, while they were at least interested in the food presentation and entertainment. The largest number of gastronomic events in Serbia is organized at that time of year when the country attendance is the highest, but also that these events are not in the regions with the largest tourist traffic, so that we cannot link the number of tourist visits with the organizing of these festivals (Stanisić at al., 2018). The importance of food festivals is most reflected in the unadopted interaction agricultural producers and tourists, as well as market placement of national gastro products, providing spreading of positive image of Serbia as the destination of gastronomic tourism (Cvijanovic, Ružić, 2017; Vujko et al., 2017).

Gastronomic manifestation in rural areas of Serbia

In Tourism Strategy of the Republic of Serbia, events and festival are recognized as power means for destination branding (Novaković, Mandarić, 2019). Organizing different types manifestations can be adequate marketing strategy for overcoming seasonal character of tourist demand in rural areas (Grubor et al., 2019). The oldest

tourist events in Serbia were dedicated to fruits and vegetables, and starting from the 1990s, the 20th century of this event is becoming more and more present (Bjeljac, 2006). On the territory of the Republic of Serbia, according to the event calendar, it is planned to be maintained 949 events of different categories and content in 2019 (National Tourism Organization of Serbia, 2019). Of the specified number, 369 are theatre manifestations, 3 of the general type, 111 is among the national creativity, 100 are gastronomic, congresses and fairs are 112, economic is 87, sports 138, while holidays' is 39. From here, we can conclude that by the total number of manifestations, the events which as main aim have promoting of gastronomic product are on the third place. However, to those numbers of events surely can be added a certain number of manifestations that are presented in other categories, where visitors are offered promotions of gastronomic products.

The event, which as subject has plum and products of plums, is in very small numbers having in mind that Serbia is ranked fourth in the world, with a production of 400 000t annually. In the Republic of Serbia, Plum is grown at 40% of total orchard area, while the region of Šumadija and western Serbia has the highest participation in production with 62.22% of total production (Statistical Office of the Republic of Serbia, 2018). Events that are being held in our country and are dedicated to the plum are only three: "The days of plum" in Blace", held from 22th August until 25th, "Plum Fair" in Osečina from 30th August to 1th September and „Fair of schnapps" from 28th September until 29th in Šljivovica (National Tourism Organization of Serbia, 2019). According to this information, it is possible to conclude that plum is fruits that in Serbia have a long tradition of breeding, but to promote this fruit and gastronomic products to its processing, it almost does not exist. That the patterns and gastronomic products of it may be a brand that will promote Serbia in the world, according to the fact that schnapps is registered on the list of the non-materialized cultural heritage of Serbia in October 2015 (Ministry of culture and information republic of Serbia, 2019).

When we are talking about rural manifestations in Serbia it is necessary to first define the term of the rural area. We can safely say that there is no a unique definition of this term. Organization for Economic Co-operation and Development (2018) distinguish rural regions close to cities from remote rural regions. As general criteria of rurality this organization states: dominant in agricultural surface, agriculture as base activities, weak population and low income. In Serbia, the Republican Institute of Statistics implements dichotomous division based on administrative and legal criteria, where urban and "other" settlements differ. Settlements that have a general urban plan are classified in urban, while other automatically are rural (www.stat.gov.rs, 2018). The municipality of Osečina with all surrounding municipalities can be considered as rural and according to the criteria of the OECD, but also the statistical Office of Serbia, because agriculture has over 66% of the territory, while 70% of the population deals with some other type of agricultural production. The production of plums, raspberries and blackberry are most present. There are about 800,000 plum trees in the municipality, which is a capacity of about 16 000 tons (Municipality of Osečina, 2019). Recently, our country has adopted

a number of economic policy measures, in order to stimulate agricultural production, such as subsidizing production, stimulating interest rates, writing off part of the debt to agricultural enterprises, reducing taxes (Pjanić et al., 2018) which can more increase production throughout Serbia as well as Western Serbia.

Materials and methods

In order to explore the experience and satisfaction of visitors to the food festival in rural area, study of local festival "Plum Fair" in Osečina was conducted. The municipality of Osečina is located in Western Serbia and consists of 20 settlements and 18 villages. The municipal seat is a village of Osečina which is 130 km away from Belgrade (Municipality of Osečina, 2019).

"Plum Fair" is an annual festival which has been held since 2006. And aims to affirm all resources that the municipality has. This manifestation was chosen because it is one of the few in the region of western Serbia and Šumadija that promotes the autochthon Serbian fruit varieties, as is the gastronomic products originating from it and are specific for the region.

The survey was conducted in August 2019 on the sample of 106 respondents. The general rule to calculate the sample size is to have a minimum of 5 observations per variable and maximum 10 observations per variable (Hair et al. 2014, Van Belle, 2011). In this study we have 11 variables, so we can consider sample size statistically significant. One part of the data was collected on the spot during the three days of the event, from August 30th to September 1st, while the second part was collected by the link of the survey through social networks to friends and friends of friends who have visited this event. The questionnaire specially created for this research, contained 3 sets of questions: demographic, tenth questions related to visitors' experience and habits, as well as four statements regarding visitors' satisfaction with food product. Visitors evaluated statements on a five-point Likert scale, where 1 stands for "Strongly Disagree", while 5 stands for "Strongly Agree". The collected data were analyzed using SPSS. Descriptive statistical analysis was used to describe respondents' demographic characteristics and to evaluate visitors' satisfaction, experience and habits. Spearman's rank correlation coefficient is used to examine correlation between satisfaction and visitors' habits, because Shapiro Wilk test of normality showed that the distribution of each variables is significantly different from normal.

Results

Demographic characteristics of visitors suggest that the number of female respondents is more than male. The largest number of respondents had graduated high school (45.3%), while among them was equal number of employees (44.34%) and unemployed (42.45%). More than half of the visitors were over 36 years old. More detailed demographic information is in table 1.

Table 1. Demographic structure of respondents

Category	Variable	No. of respondent	%
Gender	Male	45	42.5
	Female	61	57.5
Age	Under 18	19	17.9
	From18 to 25	25	23.6
	From 26 to 35	11	10.4
	From 36 to 45	25	23.6
	From 46 to 60	14	13.2
	More than 60	12	11.3
Education	Primary school	6	5.7
	High school	48	45.3
	College	16	15.1
	Faculty	25	23.6
	Master	11	10.4
	Phd	/	/
Employee status	Employed	47	44.3
	Unemployed	45	42.5
	Retired	14	13.2

Source: Authors' calculations

Analysis of visitors' experience and habits

By analysis of the experience and habits of the visitors of the "Plum Fair" it was determined that the largest number of visitors have been informed about this manifestation through acquaintances (49.1%) and social networks (23.6), while drastically less informed through other means (9.4%), television commercials (8.5%), flyers (6.6%) and printed media (2.8%). Since the largest number of visitors (75.5%) were up to 45 years of age, it is logical that social networks were the basic source of information.

Visitors to this event came, in largest number, with friends (32.1%) or family (31.1%), then in the company of partners (13.2%) and alone (12.3%), and minority of them stated that they came with colleagues (3.8%) and through organized tourism (2.8%). The 4.7% stated as answer - the rest. A shared experience in gastronomic manifestations is exactly what makes them special. They can make a sense of togetherness, closeness that is increasingly losing in modern lifestyle. Offer of additional benefits such as entertainment, prize games, or themed lectures that are not primary when visiting gastronomic festivals, can increase the total created value of visitors that in this way satisfy their needs for socialization. It is needed a greater engagement of travel agencies that would include such events in their program, but also the tourism organizations that would invest more in the promotion of such events.

The largest number of visitors comes from Serbia (82.1%) of which 70.1% are from places that are up to 50 km. From the territory of the former Socialist Federal Republic

of Yugoslavia comes 13.2%, while only 4.7% came from the diaspora. As the event is attended predominantly by domicile population, this event ha local character. However, by linking this event to other tourism, such as rural, religious, spa or mountain it is possible to attract visitors from other parts of Serbia or the region, thus boosting the duration of stay in destination.

Regarding the frequency of the visit, half of the respondents (57.5%) only once a year visit such events, 27.4% of respondents visit two to four times a year and only 15% visit more than 5 times. As the main motives of visits, the respondents stated the preservation of traditions (28.3%), love of nature (18.9%) and the atmosphere (17%), a slightly smaller percentage as reasons stated socializing (13.2%), while an equal number of visitors, i.e., 7.5% stated free tasting, curiosity and professional reasons as the main motive for the visit. It is interesting that research in the motives of visitors as a dominant motive has been extracted by the desire for socialization (Pesenos, 2015, Eusébio et al., 2017; Kwiatkowskia et al., 2019) while here is only in fourth place.

When visiting the most important attributes of the event are prices (42.5%), product quality (44.3%), while they are very little important to the aesthetics of products (2.8%), exhibitor's hygiene (1.9%), attendance (0.9%) as well as availability of products only during the event (Unique Offer) (0.9%). They 6.6% of them cited other reasons. Such a small interest in the attributes of the unique offer can be connected with the visitors of this event mainly to the local that these products are easily available to. Since the highest number of visitors has purchased one of the gastronomic products (68.9%) and 18.9% have declared that it is intended, we can conclude that this fair has a strong economic impact whether it is a direct and indirect expenditure of the participants. Only 12.3% of them did not buy anything. Also, the number of visitors said the offer of free tasting products was enough (49.1%), even extremely rich (34.9%), while 16% were not satisfied. The main reasons for the purchase of gastronomic products were the desire to try something (32.1%), support to local producers (20.8%), impulsive purchase (16%), professional reasons (3.8%), desire to buy product as souvenir (13.2%) and to conserve for more favorable prices (14.2%).

Visitors' satisfaction with food offer and correlation with their habits

Apart from the habits of visitors of the event "Plum fair" in this paper, it has been analyzed their satisfaction with certain attributes of the exposed food products (Table 2). By observing the arithmetic mean of individual items of satisfaction factor, it can be noted that visitors are most satisfied with the taste of gastronomic products (means = 4.528) and at least their price (means = 4.198). The descriptive data for each feature of the gastronomic offer is in the Table 2.

Table 2. Structural view of summary satisfaction scale of gastronomic offer

Assess your satisfaction with the following attributes of the exhibited gastronomic offer from 1 to 5	means	St.dev	min	max
Diversity	4.4151	0.741529	1	5
Aesthetics	4.4623	0.758125	1	5
Taste	4.5283	0.807200	1	5
Price	4.1981	0.960355	1	5

Source: Authors' calculations

In addition to the satisfaction of certain features of the product, it is also calculated summed satisfaction of the gastronomic offer which is the sum of the scores on the questions attached in the table 2 and then divided with the number of questions. Central tendency measures, such as arithmetic mean and standard deviation, the summary scale of satisfaction said that respondents on average are satisfied with the offered products (means = 4.4), and that the responses of the respondents are not different from each other (Std. Deviation = 0.70768). In order to calculate the reliability of the created scale of satisfaction, the Chrombach Alpha reliability test was used, which equals 0.884, which showed that the data obtained in this survey may be considered as reliable.

Because the value of Chrombach Alpha, in case when each of the individual items would be thrown out, is less than Chrombach Alpha for the whole scale (table 3), the decision is to retain each of the item when creating the new satisfaction scale. Also, from the table can be seen how much each of the item contributes to explaining the summed satisfaction, where the diversity is most contributing to explaining satisfaction, since its value Corrected Item-Total Correlation the largest, i.e., it can be concluded that 67% of total satisfaction is explained only by the attributes of diversity, which shows the coefficient of determination which is obtained by squaring of the correlation coefficient.

Table 3. Structural view of summary satisfaction scale of gastronomic offer

Indicators	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Diversity	13.1887	4.802	0.819	0.829
Aesthetics	13.1415	4.999	0.720	0.863
Taste	13.0755	4.699	0.761	0.847
Price	13.4057	4.224	0.726	0.869

Source: Authors' calculations

In order to examine the connectivity of satisfaction with visitors ' habits, such as the distance from which they come, the frequency of visits, the offer of free products and the habit of purchasing, the correlation analysis was performed (table 4). For this purpose, Spearman's rho was used having in mind that Shapiro Wilk test of normality showed that the distribution of the above variables is significantly different from normal ($p < 0.05$).

Table 4. Spearman's rho

		Purchased product	Frequency	Satisfaction
Distance	Correlation Coefficient	0.272	0.365	-0.90
	Sig. (2-tailed)	0.005	0.000	0.361
Free tasting offer	Correlation Coefficient	0.167	0.227	0.338
	Sig. (2-tailed)	0.087	0.019	0.000
Purchased product	Correlation Coefficient	1.00	0.313	0.049
	Sig. (2-tailed)		0.001	0.620

Source: Authors' calculations

The results of the correlation analysis showed that there is a linear connection between the distances from which the visitors are coming and the frequency of the visit (0365; $p < 0.01$), distance and purchase of products (0272; $p < 0.05$), frequency of the visit and offers of free products (0227; $p < 0.05$), frequency of visit and purchase of the product (0313; $p < 0.01$), and between satisfaction of offer and offer of free products (0338; $p < 0.01$).

Also, based on the correlation results, the total satisfaction is not dependent on a gender, education, age or employment status of respondents, to what the value of Spearman's Rho ($P > 0.05$) refers to.

Conclusions

Rural food products, as a part of national gastronomy, traditions and customs, represents a mirror of the material culture of one nation. Although gastronomic manifestations constitute only one tenth of the total number of events in Serbia, we are witnessing that this number has a trend of increasing. Rural areas of Western Serbia and Šumadija together with their natural and anthropogenic and ecological values can have a significant role in attracting tourists who search for authentic experiences and products. "Plum Fair" in Osečina is mainly visited by local visitors, so it is very important that the organizers pay more attention to the promotion of this festival in the other regions of Serbia or nearby countries. Better knowing the main motives, which were in this case preservation of tradition and nature, can help in creating additional content such as workshops about local herbal species, healthy eating habits, hiking, competitions or organize meals with locals in their home.

Such an event, can have a significant economic impact on all stakeholders, especially because of the high sale rate of food product. Since taste was the attribute with the highest score these products can be offered in local restaurants and hotels. With adequate branding strategy it is possible to increase the visibility of these products on the wither market by selling them in chains of hypermarkets, department stores and grocery stores. This idea derives from results of this study which showed that visitors who come from remote areas purchase more often than the other ones.

Conflict of interests

The authors declare no conflict of interest.

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SPECIFICITY OF OPERATION OF GENERAL INTEREST IN THE SERBIAWITH SPECIAL VIEW ON WATER MANAGEMENT

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A R T I C L E I N F O	A B S T R A C T
	In this paper, the author presents the specificities of economic entities performing activities of general interest. In the Republic of Serbia, the state is responsible for the regulating of organized and permanent performance and the development of activities of general interest. In Serbia, the state ensures performing this activity through public companies or capital companies of which it is the sole founder, but it is possible to allow performing the aforementioned activities by entrusting them to a third party. The author conducted a survey related to the necessary conditions for performing activities of general interest by entrusting to a third party a few dozen of economic entities in Serbia. The author considers that, with fulfillment of prescribed conditions, the successful performing activities of general interest can be carried out by privately owned economic entities, since state-owned enterprises have proved to be insufficiently efficient and economical in practice.

Introduction

Activities of general interest are part of an economy that is in many ways different from traditional market activities. The fact that, as a rule, no competition is introduced into these activities (often not even possible, especially in non-profitable industries), places activities of general interest in some form of monopoly position. A specialty of the activities of general interest is that this monopoly is also controlled through the status of the companies themselves (control of functions by the founder) and by direct control of the prices of services of general interest. All activities of general interest have the common feature that they represent an indispensable condition for the life and work of citizens.

The state is obliged to ensure the continuous performance of activities of general interest, and about that, the economic entities that perform mentioned activity have the same obligation, because it is a very important function for each state and society as a

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whole, have a great impact on the community, so they have an obligation to act in the general social interest (Corbett, 2008), respecting the good rules of socially responsible business. In the case of disruption in the performance of these activities, the state is obliged to take measures that will provide conditions for the smooth performance of activities of general interest. Property solutions in this sector based on public property, are undeniably effective in preventing private monopoly, and as the convenience of such a solution is the fact that state can effectively manage the development of technical systems in a particular area, which allows them to effectively implement different development policies. A solution like this, at least in principle, can provide high security of supply, respectively the regularity of providing services of general interest. It is clear that the state cannot go bankrupt, so there is no risk of disruption of business activity due to the financial difficulties of the operator.

On the other hand, a property solution like this implies lower efficiency of performing the mentioned activities, low possibilities for financing investments in the development of these activities, a greater burden on the competent budgets, and also provides opportunities for the appearance of some more negative side effects. This property or organizational solution is being implemented in Germany and the Scandinavian countries, ie. countries with strong government and secure funding.

The obligation of the state to provide the citizens with the most optimal living and working conditions in the territory, determined, of course, by the overall level of diversity, in the field of economic and social development, will not be excluded, regardless of the ownership status of the enterprises engaged in activities of general interest. The issue of responsibility for the functioning of infrastructure of an activity of general interest through ensuring continuity, quality, scope and development cannot be left to anyone else. This is one of the basic obligations, rights and responsibilities of the state.

Higher level of development of the country's economy is accompanied by diversification of activities of general interest, their increasing number and better quality (more frequent washing of streets, more frequent removal of garbage, better quality of water, better water, better urban and suburban transport, etc.). Agriculture is the main economic sector which depends to a considerable extent on the natural situation (Vasilescu et al., 2010). The thermal solar potential can be reached if technologies are being advertised for institutions that have a high consumption of warm water and heat (Dusmanescu et al., 2014).

The state, the Republic of Serbia (RS), the Autonomous Province (AP) and local self-government units (LSGU) are competent for a wide range of activities of general interest, including public utilities. According to the provisions of the Law on Public Enterprises (LPE) and the Law on Local Self-Government, the regulation of organized and permanent performance and development of activities of general interest, respectively public utilities, are the responsibility of the state. The state is obliged to provide the organizational, material and financial conditions for providing these services to end

users. Business entities that performing activities of general interest have their assets by which they are liable for their obligations, and they should operate independently, financially transparently and on an equal footing with other companies in the market. If the general interest requires that the prices of services or products of business entities that performing an activity of general interest, must be formed at a non-market level, the state will be obliged to provide the budget with funds for that amount and to disclose it.

According to the provisions of the LPE, activities of general interest are activities defined as such by law in the fields of: mining and energy, transport, electronic communications, publishing of the official gazette of the Republic of Serbia and publishing of textbooks, nuclear facilities, weapons and military equipment, utilization, management, protection, landscaping and promotion of goods of general interest and goods of general use (water, roads, forests, navigable rivers, lakes, coasts, spas, game, protected areas, etc.), waste management, scientific research, public utilities, as well as other activities defined by law as activities of general interest.

There are several hundred state-owned enterprises in the Serbian economy. These include public companies of republic (JP EPS, JP Srbijavode, JP Srbijagas) and capital companies, Elektromreza ad, Telekom Srbija ad, etc, several public companies founded by an autonomous province, local public utilities (water and sewerage, garbage collection), but also companies that do not perform activities of general interest, do not have a special status, but compete with others on the market (until recently RTB Bor, Dunav osiguranje ad, Expert Bureau Novi Sad, JRB ad Belgrade, etc.).

Business entities responsible for public interest activities – solutions in some countries

Activities of general interest in France are conducted by economic entities constituted in the form of public institutions with industrial or commercial character or in the form of companies of capital, as well as public enterprises of national or local importance, and companies with public capital incorporated by the state or which are nationalized and mixed-capital companies of national or local character (Dufau, 1973).

Public sector activities in England, such as gas, water, rail, electricity, infrastructure, etc. were performed by companies established by state-owned law.

Most of these companies were later privatized, and those that remained in state property are most often entrusted with the concession agreement to privately owned companies and precisely specifies the rights and obligations of the contracting parties, with special reference to the need for continuously conducting this activity and satisfaction of needs of service users, as significant target functions of these companies, in addition to, of course, the primary function, earning profit (Gower, 1992).

In Germany and the Scandinavian countries, activities of general interest are performed predominantly through entities established by the state.

Thus, the performance of the activity of the general interest may be carried out directly

by the state, or by the establishment of economic entities for the purpose of performing the mentioned activity, as follows:

- the establishment of a capital company by the state through law (for example: in the field of water, rail transport, scientific research, production, processing and marketing of oil and natural gas, electricity, mail, etc.) in which case the state appears as a single owner , a shareholder or stakeholder, depending on the form in which the company is founded (Hamel & Lagarde & Jauffret, 1980),

- performing public utilities, production and delivery of water, gas, heat, maintenance of streets, roads, public areas of cleanliness, funeral services, public transportation of passengers in settlements, waste water treatment and disposal, etc. establishment of a capital company by decisions of territorial units (republic, province, district, city, municipality) (Hamel & Lagarde & Jauffret, 1980),

- direct performance of the activity through public services by the state or territorial unit (whereby these entities do not acquire the capacity of a trader) (Hamel & Lagarde & Jauffret, 1980),

- establishment, the so-called public corporation (our term "public corporation" corresponds to "statutory company" or "chartered company" - in English law, or "public", a corporation founded by a state or territorial unit in U.S. law, and the term "open corporation" corporations established by public registration of capital, joint stock companies) and communal enterprise as existing forms that will gradually be transformed into privately owned companies by privatization,

- then, nationalization, which is less and less represented in modern market-oriented countries, of certain private companies that the state finds interested in (banks, insurance organizations) by paying a fee in cash or bonds and preserving the form of capital company (and the commercial character of its business) a nationalized company (banks, insurance organizations, of which the sole member is the state) (Hamel & Lagarde & Jauffret, 1980).

In addition, contractual and / or equity relations in area of activities of general interest may be pursued as follows:

- concluding a concession contract by a state with a legal or natural person, by which the concessionaire gives to the concessionaire for a limited time a right to use, manage and perform a public service, at his own risk ("exclusive right of use"), with the obligation to protect the public interest and payment of the agreed usage fee(Hamel & Lagarde & Jauffret, 1980),

- by setting up joint ventures of capital (with state capital and / or with capital of territorial units and private capital).

- transformation of state-owned or nationally-owned companies into state-owned joint ventures in the aftermath of privatization (most often also with so-

called "workers' actions" and with the use of a special type of action - so-called golden shares - eg SNCF, Air France, etc.) (Hamel & Lagarde & Jauffret, 1980).

Public, state owned companies perform activities of general interest in the territory of the Republic of Serbia.

A public company is enterprise that performs an activity of general interest, established by the RS, an AP or a unit of LSGU, in order to perform that activity.

In addition to a public company, an activity of general interest may also be performed by:

- a limited liability company and a joint stock company whose sole owner is a public company,

- a capital company whose sole owner is the Republic of Serbia, an autonomous province, a unit of local self-government, as well as a subsidiary whose sole owner is that capital company,

- another capital company and an entrepreneur, entrusted by the competent authority with the performance of that activity, respectively an economic entity in private or other ownership, which fulfills the conditions for performing an activity of general interest (Law on Public Enterprises).

According to the provisions of the law which edit position of public enterprises, public enterprises and capital companies specified in the law, are established and they operate for the purpose of:

- ensuring permanent performing of activities of general interest and regularly satisfaction of needs of users of products and services

- development and promotion of activities of general interest,

- ensuring the technical, technological and economic unity of the system and the coherence of its development,

- gaining profit and

- pursuing another legally established interest.

Confidentiality of operating activities of general interest

The time of the 1990s and the beginning of this century in the countries of Western Europe was marked mainly by the privatization of the public sector of the economy. The state is gradually withdrawing from the economic function, since as an entrepreneur, it cannot compete with a private entrepreneur, given its many other functions. This applies not only to the commercial sector of the economy, but increasingly to the activities of general interest, that is, the public sector. Increasingly, the state reserves the right to prescribe market game rules for market participants and to ensure strict enforcement of their application, both privately and publicly. It is much more important for the state to have good taxpayers than to have state-owned companies operating at a loss and having

to deal with it continuously and comprehensively. In general terms, well – managed societies contribute to the domestic economy and in same time community, and to pay attention on providing greater profits, to strengthen investor confidence in the domestic market (Berber, Slavić, Aleksić, 2019).

To the extent that it remains in economic function, the state is increasingly forced, due to budget deficits and inefficiencies of the public sector, to abandon the position of exclusive ownership in public sector activities, both at national and territorial units. In such a situation, begin to form capital companies, joint stock companies and limited liability companies which are performing these activities. If for some reason the state has to remain the sole owner of some companies which performing activities of general interest (investor is not interested in privatization, securing competition before privatization - experience shows that the natural monopoly sector requires privatization before privatization - introducing competition, as one monopoly - state would not replace another monopoly - private, which is more dangerous and more difficult to resolve) then the state is obliged to ensure their equal position on the market entity and transparency of financial business (Vasiljević, 1999).

To the extent that it remains in the economic function, the state has an interest in transforming that business entity into a joint stock company, because of the highest mobility of that capital. If the state is a shareholder, in principle it has a position in a joint-stock company like all other shareholders: profit and management is commensurate with capital. However, in case of activities for which is determined by law to have a public interest, then the state or a narrow territorial unit may also acquire special rights in the capital companies which perform that activity, and even if in those entities they have a minority share capital or no capital.

This is especially important from the point of view of the need for ensuring the permanency and continuity of the performance of these activities, as well as the equal treatment of users of services in that activity. Special rights of the state can be acquired in the process of privatization of public sector enterprises, when it can retain a special type of shares - the so-called a golden share, which grants it a majority right to decide, in which case, when it comes to the regime of conducting business, the position of the state is independent of the share capital structure of the company in which it owns the golden share.

Therefore, performing activities of general interest by entrustment, differs from performing activities by enterprises established by the state for conducting activities and directly performing activities by the state administration, among other things, because these entities have the original legal right to perform certain activities of general interest, while the economic operators entrusted with performing this activity do not have such a right.

They will only be able to authoritatively step toward users, citizens and legal entities only in case when they have been entrusted by the competent authorities with the performance of such tasks in accordance with the law and the contract.

The basis for performance of general interest by confidence

There are many different forms of private sector involvement in performing activities of general interest, and the most common classifications are based on the criteria of investment, ownership of capital and equipment and responsibility (risk). Observing the process of changes in almost all countries, especially countries in transition, private sector involvement in areas of state competence is in an upward trend.

The way that private sector participates varies from country to country and from industry to industry. In the practice of other countries of general interest, the most common forms of entrustment are the activities of general interest, concessions, leasing, BOT, joint venture and service contract.

The choice of any form of private equity participation will be determined by the state or a lower unit of territorial administration, depending on the legislation of the country, of course choosing the most appropriate form according to its capabilities and above all, according to the needs of the beneficiaries, for which it is responsible.

However, regardless of the form of cooperation with a private partner, it should be kept in mind that in our country, the practice of quality contracting is quite underdeveloped, and also arbitration and protection in cases of default or deviation from the contractual obligations are quite weak. Conscientious private partner, with successful and long business, precision of the contract and prescribed contractual guarantees, are in activities of general interest, extremely important, which is why they should be an integral part of the contract, because without them it is not possible to provide the necessary reliability of contractual clauses.

The risks, especially in the part of concluding international treaties, are great, especially in large multinational companies. It is of paramount importance to the State that the partner who has undertaken the obligation to carry out an activity of general interest fulfills that obligation. In case of any deviation, it is necessary to have reliable guarantees, but also a realistic alternative. On the other hand, serious problems can arise when a Contracting Party is unable to fully discharge its obligations under the contract.

Specifities of business entities submitting business of general interest

State-owned enterprises should be de lege ferenda treated as an economic term for all enterprises whose sole or majority founder is a state, RS, AP or local government unit, in which capital from public sources is invested - budgetary funds. Such enterprises are solely with one founder or with one of the majority founders, which are by their nature, public entities and which invest in public funds for the establishment and operation of such enterprises. Such companies are established as public companies (including public utility companies in Serbia) and as equity companies - joint stock companies and limited liability companies. The economic policies that such companies should consistently implement should primarily be based on a well-designed development and investment concept that, in addition of improving economic efficiency in complete

operations, production processes, plants and facilities to reduce energy costs and increase the company's competitiveness, implies a reduction of emission of gases in greenhouse and conservation of natural resources.

Competence for the performance of activities of general interest by state-owned enterprises implies the original rights defined by law and, by contrast, obligations relating to the performance of activities of general interest.

The founder of the company is obliged to provide a structure through which the goals of the company will be set, to define the means for achieving those goals and monitoring the performance, and at the same time, appropriate stimulation to the executives and board members in the company, in order to pursue the goals that are in the interest of the company and the owners of the capital, and enable effective supervision to ensure business continuity.

The main common goal of any legal entity, whether it is a company with different forms of ownership or a company organized as a joint stock company, is to ensure business continuity. The goal of non-profit activities is to satisfy the interests of the wider community. Although the goals that affect the essence of their business are different, all legal entities at the core of their existence have a need for continuity in their work and duration for an indefinite period.

In theory and practice, it is indisputable that an enterprise has a lucrative purpose, it is established for the purpose of acquiring, disposing and distributing profits among the members of the enterprise, with the preliminary payment of obligations to all creditors and other persons interested in the business of the enterprise. Therefore, with the exception of non-profitable legal entities, the company has a legal presumption of commerciality. In the economic literature, an enterprise is considered to be the basic economic cell of society and, above all, of the economy.

Therefore, all economists point out as the most important two basic aspects of each company: organizational aspect and target aspect - profit.

According to the well-known principles of corporate governance, adopted in most countries, the achievement of the company's objective function - profit maximization, respectively, the value of the company, is an imperative of every company.

It is well-known that the main goals of the modern corporation and its managers today are: a) a safe increasing return on investment, a safe and long-term inflow of cash, as the most liquid assets and increased earnings; b) high management income with the possibility of valuable annual bonuses; v) the increasing growth and expansion of the corporation in order to expand its business and expand its market; g) good competitive position. These goals are in a causal consequence, and so we come to the highest goal of the corporation and its management, which strives for a steady increase in profits, because this is how the safe life of the corporation is maintained (Rajnović, 2013). Profit is an means for distributing periodic and annual corporate profits to corporate owners through dividends, rewards to management for achieved results, because it is necessary to establish a certain relationship a number of factors of the management

and the processes within the board, that willhavepositive businessresults in order to effectively and efficiently perform all of its functions (Ljubojević & Dašić, 2018) and, of course, it is partly accumulated for investing in new projects, or preserving for corporate survival and overcoming problems in case of all-weather or occasional cyclical developments in the world (Rajnović & Bukvić, 2017).

Everywhere in the world, companies perform a very important function for every state and society as a whole, they have a great influence on the social community, so they have an obligation to act in the general social interest, respecting the good rules of social responsible business.

With the law that governing the business of public companies is stipulated that the founder "shall be obliged to ensure that the activity of general interest is carried on continuously" (Law on Public Enterprises).

In order to gain mentioned condition, the founder must provide the business entity with a mode of financing the business. In the case of a non-profit activity, the founder is obliged to provide financing for the performance of the activity in complete. In the case of a business entity that is performing a profitable business, the founder and business entities should fully comply in accordance with market conditions.

According to the provisions of domestic law, there are contours which make a difference between a state-owned enterprise engaged in an activity of general interest relative to all other companies, whether state-owned, privately owned or mixed-ownership. The law stipulates that every state-owned enterprise perform an activity of general interest:

- based on the law and the founding act,

- has a revenue base provided,

- has an obligation to carry out the activity on a continuous basis,

- operates for profit,

- is obliged to transfer 50% of the profits to the budget of the Republic of Serbia, autonomous provinces or local self-government units, according to the final account for the previous year,

- cannot perform additional activities without the consent of the founder,

- is under the strict supervision of the founder, respectively, the state and in the case where the founder is another public company or a state-owned capital company

- in the case of disruption of public enterprise, the Government, the competent authority of an autonomous province or local self-government unit, shall take measures to ensure the conditions for the undisturbed performance of activities of general interest, unless by the founding act and the law is determined differently, but in any case ,the provision of services of general interest must be ensured to the service users.

The state, RS, an AP or a LSGU are the owners of several companies, capital companies that are likely going to be privatized in the near future, which companies actually carry out business of general interest, but get them by tendering with contracting authorities - public companies and other state-owned capital companies established for the purpose of performing their activities of general interest. These companies, although in form the same as capital companies that carry out activities of general interest, perform this activity in practice as sole or additional activity, but are substantially different from enterprises established for this purpose, because they do not have the original basis of their activity, they do not have a basis of income other than if they do not obtain a job in the market, they are not obliged to perform activities of general interest on a continuous basis (except for a contractual obligation when / if they get a job in the public procurement procedure) and are not subject to the obligations prescribed by the LPE. In these companies, the state as the owner acts as a civil legal entity and has property and personal rights and obligations prescribed by the Companies Act.

It is frequently stated in the founding acts of these companies that they also perform an activity of general interest that they actually perform, but this does not mean that they are entrusted with performing water activities within the meaning of the LPE provisions. Each company must have a registered predominant activity specified in the founding act, but it can perform all other activities except those for which the law prescribes the issuance of a special permit, whether or not they are specified in the founding act.

In addition, with the law that governing the legal status of public companies is prescribed that a state (except city) cannot establish another public company or a capital company for performing the same business of general interest for which already exists a previously established company.

For example, the Public Company Elektroprivreda, was established for the purpose of carrying out the activity of electricity production (from the state was granted the right to use and manage the resource, water, coal, etc.) and from that it exists (by selling its product - electricity to users), good or bad depending on the management's ability to organize and manage the business, the Public Company Elektromreža (a subsidiary of JP Elektroprivreda) was established to perform the activity of electricity transfer - and it exists from income, Telekom Srbija ad is founded for the provision of telecom services, sale of services and it exits from the income from its work, PC Srbijavode and Vojvodina are financed from the budget - therefore, all above mentioned and other companies have the legal basis of incorporation, the security of income provided by law and the founding act and therefore the obligation of continuous performing activities that are an indispensable condition of life and work of users, citizens and other persons.

Supervision of the enterprise operating in the general interest

One of the most sensitive and significant issues of business of companies, public enterprises and capital companies, which are in the exclusive or majority state ownership

in the Republic of Serbia (including the ownership of narrow territorial units) and in European countries, which are performing activities of general interest, is the issue of control of their work. The basic function of this control is to ensure their functioning as an entity of business (commercial) law, and not as an entity of administrative law (the state as the holder of domination rather than empire). As the management of these societies is increasingly moving towards a kind of "technocratism", it is understandable that the instruments of their control are being strengthened. These are various instruments of previous control (through giving consent of the competent state body to certain acts, decisions, tariff systems, election of the administration), control through a specially appointed supervisory board in Serbia (reviewing the annual report, annual accounting and proposals for profit distribution and reporting on the competent state authority) as well as the instruments of ex-post control (control by government, control by specially appointed verification committees, control by parliament), through the direct participation of representatives of the state in management and supervisory boards of these companies (as in some developed countries) and through the participation of representatives of service users and competent institutions in supervisory boards or other management bodies that supervise the work of the company (Punter, 1987).

The formation and evolution of a management model depends on the degree of development, as well as on the changes in the requirements of the business. The objective function of a functional model in an enterprise is to balance the role of business and function. A balanced functional management model implies the allocation of responsibilities, the business is responsible for the operating result, for achieving the business results and for the efficient management of the operational business of all functions, and the founder supplies it with the necessary resources and controls its operations (Haller, 1998). Business sets operational tasks in the ordinary course of business. Therefore, both, business and the state, should take into account the opinion of the latter and agree on everything.

Case study in practice in area of water management

The author has been researching the status of companies owned by the Republic of Serbia that have been performing water activities for decades, and for centuries, in accordance with the law which governing water activities, activities of general interest (Law on Water). In practice, the question has arisen whether these enterprises were established by the state for the purpose of conducting water activities, as activities of general interest, or are they state-owned enterprises engaged in conventional commercial activities for profit?

In the course of the research, the author has determined the facts regarding the history of the emergence of comanies engaged in water activities (water activities companies or water management companies: WAC), with the transformation initiated, the acts of the enterprise and especially the existence of attributes characteristic only of state enterprises for which it is unambiguously clear that they were established for performing activities of general interest: basis acquisition of the right to perform the

activity, provided base of income and the existence of an obligation in continuous performance of activity.

Namely, until 2014. year, water utilities operated in the form of social enterprises. Since the privatization of social capital was tied to a deadline (end of 2015), in 2014. year the RS Government adopted a conclusion which took over the capital of the company so the change of legal form and ownership was entered in the register of companies at the end of 2015. year, on the basis of which the companies became 100% in the ownership of the state, the Republic of Serbia, and as it was planned, as a transitional phase of further reorganization that was planned at that time.

In analyzing the mentioned case, the author took into account a LPE provision that stipulates that in addition to public companies, the activity of general interest may be performed by a capital company whose sole owner is the Republic of Serbia, an autonomous province and a unit of local self-government, as well as other economic entities mentioned in the quoted article (Law on Public Enterprises). In practice have appeared doubts whether water utilities are capital companies that fall under the aforementioned legal provision. According to the author, the ministry in charge of the economy, without deeper analysis, has taken the opinion that water management companies were established for the purpose of conducting water activities as activities of general interest and thus have an obligation to operate in accordance with the LPE.

On the basis of the above facts, the author concluded that water management companies are not enterprises which, based on takeovering capital by the RS and the actual performance of water activities, have become undertakings of general interest in accordance with the LPE, for the following reasons:

- Articles 23 and 150 - 152 of the Water Law stipulate that water activities, activitie of general interest, is performed by two public companies of JP Srbijavode and JP Water of Vojvodina, as well as the financing of the operations of these companies is carried out from the founders budget, which is prescribed in the founding acts of companies, which are established for the purpose of performing activities of the general interest. In order to conduct water activities in the manner of public companies, it is not sufficient for the water management companies to meet the requirements of the LPE. Water management companies can only start the water business if they succeed in the tender with contracting authorities - public companies to get a job in competition with all other private companies. Outside of this, Water management companies have absolutely no other formal powers, rights and obligations to engage in water activities.

- In addition, with the founding acts of the WAC, in accordance with the provisions of the Companies Act, is prescribed the predominant activity of the WAC - 4291 - construction of hydraulic structures. The fact that in the acts is stated that WAC perform water activities, also does not mean that they are entrusted with performing water activities within the meaning of the aforementioned LPE provisions, which entails performing activities of general

interest under the law itself as a public company or by contract. Each company must have a registered predominant activity specified in the founding act, but it can perform all other activities except those for which the law prescribes the issuance of a special permit (Law on Public Enterprises), whether or not they are specified in the founding act.

• In addition, article 14 of the LPE stipulates that the founder can not establish another public company or a capital company referred to in article 3, paragraph 2, items 1 and 2 of the LPE to perform the same activity of general interest, which means that the water activity performed by JP Srbijavoda excludes the possibility of performing the same activity by the WAC under the conditions under which the water activities are performed by public companies, respectively the WAC were not established for the purpose of performing activities of general interest. In this case, the essential difference between the WAC and the public companies is clearly specified.

• WAC get part of the job (if they get it) by participating in the tender of contracting entities - public companies, which is why they do not have a secure basis of income, except on the basis of a contract with a public company, again if they get a job in the public procurement procedure, and because of that they cannot have the obligation to carry on business on a continuous basis, with the exception of the obligation under a contract with a public company.

• WAC cannot perform water business until they have acquired that right to public procurement, because, under the Water Act, the original right in performing this activity belongs to public companies.

• This is the essential difference between the WAC and other companies which perform an activity of general interest referred to in Article 3 of the LPE - therefore, 1) the manner of obtaining the right to perform the activity, 2) the basis of financing, and 3) the obligation of continuously performance of activity.

Obviously, the right creator did not intend the LPE to create contradictory, logically contradictory legal provisions. Logical interpretation aims to avoid logical contradictions within a particular legal norm. However, the resolution of logical contradictions extends to larger units, groups of legal norms, entire legal acts, and ultimately to the whole legal system. The legal system is considered to be one logical non-contradictory whole, so that certain legal regulations must be interpreted in accordance with that whole (Mitrović, 2017).

Argumentum a contrario or interpretation to the contrary, implies that to all cases not covered by a norm, the opposite norm applies, e.g. if the RS established JP Srbijavode to perform water activity (and in addition to the provision of the LPP, no other company engaged in the same activity can't be established), it is concluded that the RS did not establish a WAC for the purpose of performing water activity. In this regard, the author has determined, by linguistic and logical interpretation of the law, as follows:

- firstly, by the legal norm of the Water Law, it was unambiguously interpreted by linguistic interpretation that the RS established JP Srbijavode for the purpose of performing water activities, i.e. the aforementioned standard covers PE Srbijavode, but not WAC, and Article 14 of the LPP clearly and unequivocally stipulates that Republic of Serbia cannot establish another company to perform the same activity,

- secondly, that standard establishes that the WAC are not covered by the aforementioned provision of the Water Act, so their case is different from the case of JP Srbijavode, and

- thirdly, it is concluded that the norm of Article 23 of the Water Law and Article 14 of the LPP cannot be applied to cases which do not include, respectively, to a case that is a legal void, of water utilities, another norm should be applied, contrary to the mentioned norm. On the basis of the above, it is concluded that the WAC were not established for the purpose of performing water activities as activities of general interest.

Conclusion

In economic entities carrying out activities of general interest, due to the importance of activities for users, civil and legal entities on the one hand and rational management of budget funds intended for those activities, providing an adequate system of monitoring and analysis of spending of funds, as well as an adequate system of training of employees, information at all levels can be provided to support the operational management of systems and to make adequate management decisions.

Business development policy and modernization of all business segments should focus on the application of world best practices in this area and regulation of the level of all costs, with a clear distinction between economic entities which perform activities of general interest based on original law, which have clear specificities, from those who do not actually engage in this activity and who should operate fully on the market, without any government interference in their business, except as the owner of the capital.In such a case, the state would be less occupied by a number of owner-occupied economic entities that do not carry out the original activity of general interest, and more focused on its other activities and process planning necessary to establish the overall scope of the project related to economic entities of general interests, until their eventual privatization, define and refine the goals and develop a plan for achieving the goals, continuously develop a management plan as well as monitor, control and review the progress of business entities, comparison of predicted and achieved performance, analysis of deviations, initiation of appropriate changes, etc. (Project Management Institute PMI, 2013).

In the last few decades, there has been a significant increase in the participation of private property in performing activities of general interest in the world, respectively, an increase in the importance of private capital in that activity. This process is universal,

so that in addition to developed countries, it has also affected countries in evolving, respectively countries in transition.

Since there are also significant differences in the economic nature of various activities of general interest, it is not possible to define a universally optimal proprietary and organizational solution in this activities.

Valuation of solutions based on the introduction of private property, an activity of general interest in Serbia, must be performed at the level of individual regions and individual activities. When defining the optimal solutions for each industry or area in Serbia, other factors should be taken into account, such as the size of the region, the specifics of the services provided to customers, then the size and characteristics of the demand for services, the need for new investments.

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Conflict of interests

The authors declare no conflict of interest.

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REGULATION ON FOREIGN OWNERSHIP OF AGRICULTURAL LAND IN THE REPUBLIC OF SERBIA

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A R T I C L E   I N F O

A B S T R A C T

The research topic in the first part of the paper is the regulation on foreign ownership of agricultural land in XIX and XX century, while the second part focuses on analysing foreign ownership regulation in XXI century. The paper aims to provide an overview of the rights of foreign citizens to acquire real estate,with an emphasis on their right to acquire agricultural land in the Republic of Serbia through a methodological-theoretical framework. The legislation which has regulated the said legal concept in our region in different ways throughout history will be viewed through the prism of history by using the historical method. The current regulations which regulate the said subject matter in the Republic of Serbia will be analysed by the normative method, in addition to the use of content analysis that will complete this research through the systematic anlysis of literature. The conclusion will sum up the results of the research which point to the fact that even though in certain periods foreign citizens were entitled to acquire agricultural land, their right was never complete as it implied meeting certain requirements.

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Introduction

Real estate forms part of the territory of a country and serves as the basis for many business activities such as agriculture, construction, traffic etc. For this reason it has a great economic, political and security importance for every country. This results in countries taking a very reserved stand when it comes to the possibility of foreign citizens acquiring real estate on their territory. A country's right to restrict the right of ownership of immovable property to foreign citizens is recognized in international law, and confirmed in practice. (Stanivuković, 1989). Thereby the restrictions made while acquiring property by foreign citizens are varied. For example, foreign citizens in Mexico can't buy real estate in 100 km border area, i.e. 50 km off the coast of the sea. The said restriction was imposed due to security reasons. In Brasil the law also stipulates that foreign citizens may not acquire real estate in the areas of critical importance for security (Varadi, 1987). Apart from security and economic reasons, social reasons also affect the regulation of this matter. For instance, immovable property such as agricultural, construction and forest land, as well as the land in the tourist areas is restricted in number, and its price depends on the demand. For this reason free sale to foreign citizens who have higher purchasing power than the local population, might lead to the increase in prices of the said types of immovable property, which in the long term would result in forcing out local subjects from important branches of economy, such as agriculture, tourism, construction, etc. Agriculture represents an economic branch with specificities and developments that do not comply with the classical economic laws, at least from the perspective of production and prices (Drăgoi et al., 2018). Therefore, many countries including the underdeveloped ones restrict the ownership rights of foreign citizens to immovable property (Stanivuković, 2012).

As for the foreign citizens' rights to acquire ownership of agricultural land in the Republic of Serbia, this right has changed through the decades from a restrictive attitude which meant that foreign citizens could not acquire this right through a legal transaction, to the attitude that foreign citizens may acquire property on certain conditions. According to the provision of article 2, paragraph 1 of the Law on Agricultural Land (Official Gazette of the Republic of Serbia no. 62/06, 65/08 – other law, 41/09, 112/15, 80/17 and 95/18 – other law) agricultural land denotes the land used for agricultural production, such as arable land, orchards, gardens, vineyards, pastures, meadows, fishponds, reeds and marshes, as well as the land intended for agricultural production through an adequate planning law. It is a relevant piece of information that out of the total available land in the Republic of Serbia up to 72% is taken up by agricultural land, and 64,3% by used agricultural land, based on which it can be concluded that it dominates in our region (Đurić, Njegovan, 2016). Agriculture and hence agricultural land as its most important resource have a crucial influence on the general development of our community especially in the process of implementing reforms and transition. The above stated points to the fact that agriculture is the most valuable potential of the Republic of Serbia, which is confirmed by the data on the area occupied by it, as well as by the number of people whose livelihood depends on that activity, and the income

made by this particular branch of economy (Vukićević, et al., 2011). On the other hand, changing the purpose of arable agricultural land into construction land is a current issue which needs to be dealt with in more detail by our legislator by the introduction of positive legal regulations (Počuča, Draškić, 2015).

In addition, this is a very current topic today given the fact that the Republic of Serbia is a candidate for EU memebership, and the Stabilisation and Association Agreement prescribes coordinating regulations with the EU law. Therefore, coming into force of the Stabilisation and Association Agreement between European communities and their member states on the one side, and the Republic of Serbia on the other side (Official Gazette of the Republic of Serbia, International Agreements no. 83/2008), influenced the regulation of the subject matter in question, which will be discussed in more detail in this paper.

Aim of the paper

The basic aim of this paper is the study and analysis of the particularity of the legislation which regulates the rights of foreign citizens to acquire ownership of agricultural land in the Republic of Serbia through a methodological-theoretical framework. Apart from this the aim of the paper is also the study of the social and economic significance, as well as the chronological monitoring of the legislation development in this area of law.

Methodology

In order to get a good understanding of the legal concept in question it is necessary to study its historical growth, which is why the historical method will be used in the research. The historical method uses basic facts through the chronology of events, in this case the rights of foreign citizens to acquire ownership of agricultural land in the Republic of Serbia, as well as the analysis of the regulations and concepts throughout the years. The historical method provides the understanding of the sense of the legislation which has regulated this matter in different ways. The said method will be completed by the normative method which will be prioritised while studying this legal concept. The normative method places special emphasis on the analysis of the current national laws which play a relevant role in the regulation of the studied matter. Alongside the stated methods, content analysis will also be used for the purpose of analysing the terms relevant to the topic of the paper, such as the concept of a foreign citizen as property acquirer, as well as adequate literature, to complete this research.

The concept of a foreign citizen as property acquirer

A foreign citizen is normally considered to be a person who is not a domestic national, which means – a person who is a foreign citizen or a person without citizenship. The stated represents the classic interpratation of the concept of foreign citizens and it most often comes into play in the matters of determining their legal status (Stojanović, Pop Georgiev, 1980). Pursuant to the Law on Resolving Conflicts of Law with Regulations of Other Countries (Official Gazette of SFRY, no.43/82 and 72/82 – as amended.,

Official Gazette of SRY, no. 46/96 and the Official Gazette of RS, no. 46/06 – other law) a natural person with a foreign citizenship and a Serbian citizenship is considered a Serbian national, and if they have two or more citizenships they are considered to be the citizens of the country in which they have a domicile. According to the Law on Foreigners (Official Gazette of RS, no. 24/18, 31/19) a foreigner is any person who does not have the citizenship of the Republic of Serbia.

In certain countries during wartime, in accordance with the legislature of those countries, a foreigner is considered any person with a domicile on enemy territory and the territory occupied by the enemy, regardless of the person's citizenship. It is the so called enemy foreigner, whose property is blocked during the war by the domestic country in its own territory and against whom certain measures are taken to the end of weakening the economic potential of the enemy country. In certain countries during economic crisis, according to the regulations of the said foreign countries, a foreign citizen is considered to be any person with a domicile in a foreign country, regardless of the person's citizenship (Stojanović, Pop Georgiev, 1980).

In the domestic territory of a country not all the rights are equally available to the domestic nationals. In consideration of the rights available to foreign citizens and the terms under which they can be granted those rights, all the rights can be categorized into three basic groups. The first group are the absolutely reserved rights, or the rights the owners of which may not be foreigners under any condition, since those rights are absolutely unavailable to them. They are reserved strictly for the domestic nationals for it is through them that the influence on social-economic structure or the security of a country can be exerted. The second group are relatively reserved rights. These are the rights that are available to foreign citizens if certain requirements are met, such as reciprocity for instance. The next group of rights are general rights. More precisely, those are the rights which are available under equal terms to domestic nationals and foreign citizens alike (Stojanović, Pop Georgiev 1980).

Foreign citizens mainly acquire the right of ownership over real estate under the condition of reciprocity, or mutuality. The forms of reciprocity differ according to the way they were created, thus accounting for three types of reciprocity in international relations: diplomatic, legal and factual. Diplomatic reciprocity is formed based on an international agreement when two or more countries mutually commit to granting the citizens of the other signatory party the rights which are contained in and agreed by the agreement. The legal reciprocity is formed when the mutuality is established on a legal level, and factual when the acquisition of certain rights by foreign citizens is factually obtained in practice (Panić, 2017).

Foreign ownership of agricultural land in Serbia during XIX and XX century

The rights of ownership of real estate and other real rights, the so called sectoral rights were not granted to foreign citizens in neither slavery nor feudalism. It was the French bourgeois revolution of 1979. that marked the turning point in this regard. However not

even then were those rights recognised to foreign citizens in every country, and even if recognised they did not have the characteristics of universal rights. In our region, or in our country these rights were recognised for the first time in 1844. (Jezdić, 1982). Namely, with the codification of the civil law, i.e. with the enactment of the The 1844 Civil Code, the issue of the property of foreign citizens is regulated by the legislator as well. The provision of article 15 of the Civil Code prescribes that foreign citizens have the right to acquire ownership of real estate, including agricultural land, that is guaranteed to them under the same conditions as to Serbian nationals. This kind of, arguably, liberal attitude concerning the rights of foreign citizens to real estate was altered in 1852, by the enactment of the Regulations against the abuse of foreign citizens, concerning the immovable property in Serbia on the name of foreigners (Srpske novine no. 96/152). These regulations prohibited foreign citizens from acquiring ownership of property in the future, while the already acquired property had to be alienated. The system which was introduced by these regulations implied absolute prohibition for foreigners in terms of acquiring ownership, and it particularly concerned those foreign citizens who purchased land on the name of Serbian nationals. For this category of foreign citizens there is a requirement of mandatory registration of such purchased immovable property within the period of three months, to be advised of the possibility of public sale. The only stipulated exception concerning foreign citizens was their right to own a house pursuant to a contract (Carić, 2006).

The rights of foreigners to property in Yugoslavia between the two world wars were governed by the laws in the finance section. Hence a provision of article 48 of the Yugoslav Budget Law of July-August 1923, prescribed that the rights of foreigners to acquire property are to be regulated in a universal manner for the whole country, taking into account the difference dependent on the location of the immovable property. If it is located in the border or coastal zone within 50 km, foreigners were allowed to acquire property only if they were granted approval of two ministers, minister of the army and minister of the navy. The other law that governed the foreign ownership of immovable property is the provision 94 of the Finance Law for 1925-26 which did not introduce any essential changes in comparison to the previous law other than it stipulated the possibility for the foreigners buying estates in Southern Serbia to settle permanently based on the registration filed with The Court of First Instance. Following the repeal of this provision the new Finance Law came into force for 1927-28 which regulated the same subject matter. More precisely, after the repeal of the provision of 1928, only the special regime regarding real estate in the border and coastal area, and the rigorous sanctions involving the breach of the said regime were abolished which means that the general regime of acquiring real estate in the interior zone for foreign citizens remained the same. Foreign citizens were able to acquire right to foreign ownership in Yugoslavia until the beginning of World War II only if the reciprocity requirement was met (Carić, 2006).

Following World War II Jezdić (1982) states that regarding the right of foreign citizens to acquire ownership of immovable property, there are two periods according to our law. The first period refers to the period after the national revolution was carried out,

when foreign citizens were able to acquire ownership of immovable property if granted the approval of the competent authority, ie. the President of the Economic Council. The second period is the period after the implementation of the nationalization of the foreign citizens' immovable property in which this right is dealt with in different ways depending on whether the right to acquire ownership refers to the real estate that was acquired by legal transactions inter vivos – pursuant to an agreement on purchase, gift or exchange or mortis cauza i.e. based on inheritance. In the said second period, the right to acquire ownership of immovable property in Yugoslavia by inter vivos transactions was at first treated as an absolutely reserved right, i.e. as a right that may not be enjoyed by foreign citizens.

Of all the means available to acquire property in socialist Yugoslavia, a foreign citizen was able to acquire the right to ownership of land or buildings only by means of inheritance – legal and testamental. This possibility was recognized to foreign citizens by a provision of article 8 of the Law on Land and Building Transactions of 1955. (Official Gazette of SFRY no.19/1955), and by a provision of article 5 of the Law on inheritance of 1955, a provision of article 5 (Official Gazette SFRY, no.20/55), except that there were certain restrictions. Namely, according to a provision of article 159, paragraph 2 and 3 of this Law, a foreign citizen was not allowed to own more agricultural land based on their inheritance than a Yugoslav national, therefore a foreign citizen was allotted a corresponding monetary compensation in exchange for the agricultural land that may not be owned.

Pak (1989) states that in the earlier periods foreigners were allowed to acquire ownership of real estate by means of a contract, but only exceptionally. More precisely, in the period between 1962 and 1967, foreign citizens were able to acquire buildings and the right to use land for rest or recuperation purposes only on the condition of obtaining approval of the Secreteriat for Commerce and Toursim and the consent of the Federal Secretariat for Internal Affairs (article 16 of the Bylaw on acquiring rights to buildings and apartments and lands by foreign citizens and foreign legal persons, Official Gazette of SFRY, no.53/62). This right was abolished in 1967, by the enactment of the Law on Changes and Amendments to the Law on Land and Building Transactions (Official Gazette of SFRY no. 1/67), while in the period from 1974 to 1982 the right to property of a family-owned building and the right to use land was recognized to natural persons with merits in the Yugoslav Resistance. The said right was governed by the Law on Land and Building Transactions (Official Gazette of SFRY no. 11/74), and the same provisions were annulled by the enactment of the Law on the Elements of Property Law Relations in 1982. (Official Gazette of SFRY, no. 6/80, Official Gazette of SRY, no. 3/90, no. 29/96 and the Official Gazette of the RS, no. 115/2005 – other law). A provision of article 82 of this Law regulates the legal status of foreign citizens in the matter of them becoming owners of the right to property. According to paragraph 2 of the said article, in the territory of SFRY all natural persons were entitled to ownership of land and buildings on two conditions as follows: the existence of reciprocity and acquiring that right by inheritance. This kind of legal option was stipulated by the legislator unless otherwise prescribed

by the international agreement, and if that is the case then the provisions of the said international agreement were applied and not the provisions of article 82, paragraph 2 of the Law on the Elements of Property Law Relations.

It is relevant to point out that the legislator did not specify the form of mutuality, i.e. reciprocity in question. It can only be assumed that it referred to that form of mutuality that provides most possibilities for the foreign citizen to acquire ownership of real estate, i.e. that the matter of whether the country of the foreign citizen treats Yugoslav nationals in the same way as the nationals of other countries will be investigated. Another interpretation of the reciprocity principle implied a request for the foreign country to treat Yugoslav nationals in the same way as Yugoslavia treats foreign citizens which would lead to citizens of some countries not being able to acquire ownership of real estate in Yugoslavia (Đurđev, 1997). The previously mentioned Law on the Elements of Property Law Relations which was enacted in 1982 was changed and amended a few times, and in those changes and amendments of 1990 it is stipulated that every foreign legal or natural person is required to perform a business activity in Yugoslavia in order to acquire ownership right of real estate. However, the legislator did not define the notion of "performing a business activity in Yugoslavia", so it was considered that this notion included all types of direct investments, since those are the kind of activities that imply presence in Yugoslavia, and in order to perform them there usually has to be a real estate involved (Stanivuković, 1996). Nevertheless, any real estate except for agricultural land was subject to acquisition. On the other hand, in a privatization process a foreign citizen was able to buy a public company registered for performing agricultural activity that, in addition, owns the rights to dispose of publicly owned agricultural land. Thus a foreign citizen despite not being a direct owner of real estate was able to effectively exert their influence on the decision making process through a legal person who was the direct owner and had the authorizations of an owner. In order to avoid the previously described exploiting of loopholes it was necessary to regulate with precision the foreign ownership of agricultural land.

Foreign ownership of agricultural land in Serbia in XXI century

The question of enacting a universal law that would regulate foreign ownership of agricultural land in the Republic of Serbia was materialised by the enactment of the Law on Agricultural Land in 2006 (Official Gazette of RS, no. 62/06). With this law our legislator restricted the right of foreign ownership of real estate in the Republic of Serbia intended for agricultural production. In the first article the legislator already specifically states that "The owner of agricultural land may not be a foreign natural, or legal person." From this provision it ensues that as of the date of its coming into force foreign citizens may not acquire neither ownership rights of agricultural land nor a legal transaction, i.e. contract, nor inheritance, since they can not own the said entities.

Nevertheless, this law had certain flaws since it did not account for a possible form of foreign ownership of agricultural land, which is through a legal person that was established only for the purpose of performing a certain transaction instead of their

founder and to act as owner in their place. Therefore if the potential acquirer of the land is a foreign citizen there is way to find a loophole since the agricultural land is only formally owned by a domestic legal person when in reality it is actually controlled by foreign citizens (Stanivuković, 2012). More specifically, according to a provision of article 3 of the Law on Foreign Trade Transactions of the Republic of Serbia (Official Gazette of RS, no. 36/09, 36/11, other law and 88/11) foreign citizens in Serbia were able to found legal entities with the seat in Serbia, i.e. that are registered in the Republic of Serbia and that are considered domestic.

In addition, the Law on Agricultural Land did not account for the consequences of acquiring agricultural land by means of inehritance. This is debatable since a provision of article 7 of the Inheritance Law (Official Gazette of RS, no. 46/95, 101/03 – Decision of Constitutional Court of RS and 6/15) prescribes that a foreign citizen has the same inheritance status as a domestic national. Article 212 of the same law prescribes that inheritance passes down to heirs by force of law at the moment of death of the decedent. If the inheritance is agricultural land and the heir is a foreign citizen, by force of law he or she become the owner of that land, which opposes the provision of article 1 of the Law on Agricultural Land of 2006. In order for the said provision to be valid, the inherited real estate would have to be confiscated from foreign citizens, but there is no procedure prescribed to regulate that matter, neither to regulate the right to compensate for the value of the seized property. Also, the said law lacks provisions which would regulate the procedure in case of a domestic owner of agricultural land losing domestic citizenship due to gaining citizenship of another country. Due to the lack of provisions that would regulate the above mentioned occurrences, confiscating the inherited agricultural land would open the issue of the right to protection of property as a human right (Stanivuković, 2012).

Due to the fact that property is one of the basic human rights of individuals and legal persons alike, countries' constitutions pay special attention to the protection of this law. More specifically, by a provision of article 85, paragraph 1, of the Constitution of the Republic of Serbia (Official Gazette of RS, no. 98/06), the legislator prescribes that foreign natural and legal persons may acquire property in accordance with the law or the international agreement.

Thus pursuant to a provision of article 82a, paragraph 1, of the Law on the Elements of Property Law Relations of 2005, the legislator prescribes that foreign natural, and legal persons that perform their business activities in the Republic of Serbia, on the condition of reciprocity may acquire rights over immovable property on the territory of the Republic of Serbia which they need in order to perform those activities. However, the Law on Agricultural Land of 2006 is lex specialis compared to the Law on the Elements of Property Law Relations since, as already mentioned, it specifically states that the owner of agricultural land may not be a foreign natural or legal person. Consequently, a question ensues whether it is good in a legally technical sense to have this kind of norm in the Law on Agricultural Land which regulates planning, organization, protection and use of agricultural land, as well as other relevant issues thereof, and not in the law which regulates proprietary relations (Baturan, 2013a).

When it comes to acquiring ownership rights over immovable property for business purposes then this acquisition represents an investment, which can be foreign, hence the person acquiring it can be a foreign investor. Investors who are foreign natural or legal persons may acquire right over property, and other real rights over immovable property located on the territory of our country, and in accordance with the Constitution and the law, while in respect of their own investments foreign investors have the same status and the same rights and obligations as domestic investors. However, investment shall not be subject to expropriation whether directly or indirectly by measures the aim of which is the effect equal to expropriation (article 5 and 6, of the Law on Investments, Official Gazette of the RS, no. 89/15, 95/18). Expropriation is a form of restricting rights over property, or a forced deprivation of property.

The crucial issue regarding expropriation is the just compensation owed to the owner of the confiscated immovable property (Trgovčević-Prokić, Počuča, 2016). In that respect when the investor is a foreign legal or natural person they have the rights, after having regulated all the prescribed obligations, to a compensation for expropriation, i.e. other measures with a similar effect (article 9, Law on Investments, Official Gazette of the RS, no. 89/15, 95/18).

A very important, arguably crucial milestone for the Republic of Serbia is the fact that in 2008 it signed and ratified the Stabilization and Association Agreement with the European Union (hereinafter Stabilization and Association Agreement) which came into force in 2013. In accordance with the politics of the European Union which is reflected in the creation of a universal market, it requests from all member states to repeal the provisions which stand in the way of the free development of economic relations, and all to the end of creating a universal market (Resolution on Accession to EU, Official Gazette of RS, no. 112/04).

In order to meet the requirements the Republic of Serbia committed to changing its legislation with reference to the foreign ownership of real estate and of agricultural land in order to provide the same treatment to the citizens of EU states as to its own citizens within four years as of the date of the coming into force of the Stabilization and Association Agreement. However, the deadline that the Republic of Serbia set for repealing the restrictions on the purchase of agricultural land for foreign citizens represents a premature, even a reckless step that may have farfetched and negative effects on the agricultural development and agricultural land alike (Vukićević, et al., 2011). With respect to the deadline by which future member states will have to repeal the restriction on the purchase of agricultural land for foreign citizens, they mostly set a more extended deadline for the repeal of the restriction. For example, Hungary while still in the negotiation process for the accession to EU, reached a decision by which foreign citizens would be able to buy agricultural land only upon the expiration of a ten-year period of its EU membership. Hungary became a member state on May 1, 2004, and it was not until June 21, 2013 that it adopted the Law on Agricultural and Forestry Land Transactions, imposing thereby to foreign citizens the terms for acquiring ownership of land, which curtailed one of the basic freedoms of the European

Union – freedom of capital transactions. For that reason, the European Union initiated court proceedings against Hungary (Spalević, 2013/2014). Denmark made it possible for foreign citizens to buy agricultural land on the condition that they live in that country for at least two years. The government of Denmark pointed out that it is in the public interest for the national legislature to try and preserve the farming of agricultural land by its owners, who live on that land, to ensure that agricultural land be farmed exclusively by its owners, to preserve a permanent agricultural community as a measure of planning of cities and the country, and to improve the rational use of available agricultural land, which will reduce the pressure put on the same land (Case C-370 05, 2013/2014). During the negotiation process for accession to EU, the Republic of Croatia also extended the deadline for the liberalization of land sale to foreign citizens, thus it remain unclear why Serbia agreed to authorize the sale of agricultural and forest land before becoming a member of the European Union. It can be argued that this step would lead to domestic farmers being left to their own devices in the market "game" with a far more powerful competition from EU (Rankov, 2013/2014). The current low prices of agricultural land will be an incentive for foreign citizens who will be able to buy agricultural land at more than reasonable prices, and our farmers will be forced to work for foreigners. Moreover, by purchasing agricultural land located on the outskirts of big cities, foreigners will gradually turn it into construction land, which will affect the reduction of the surface of that land, as well as the reduction of products and income (Vukićević, et al., 2011).

Along with the repeal of the restriction on foreign acquisition of agricultural land, the arrival of big manufacturers ready to offer higher prices to small estates is to be expected. It is assumed that in that case domestic manufacturers would be forced to pay more for agricultural land (Baturan, 2013b). Based on the commitment that the Republic of Serbia made when concluding the Stabilization and Association Agreement, our legislator enacted the Law on amendments to the Law on Agricultural Land that was adopted in August 2017, and started being applied as of September 1, 2017 (Official Gazette of RS, no. 80/2017). Even the provision of the article 1 paragraph 4 of this law emphasizes that the said law was enacted in order to comply with the obligation prescribed by the Stabilization and Association Agreement. The said provision stipulates that "The owner of agricultural land may not be a foreign natural or legal person, unless otherwise prescribed by this Law in accordance with the Stabilization and Association Agreement between their member states on the one side and the Republic of Serbia on the other side." However, from the added article 72đ of this Law it is clear that the citizens of the European Union are discriminated both formally and essentially compared to domestic nationals. This results from the fact that the legislator differentiated between the number of conditions to be met for domestic nationals on the one hand, and foreign citizens on the other. Those conditions have to be fulfilled cumulatively, whereas they actually represent barriers for foreigners when entering the market of agricultural land in the Republic of Serbia. Our legislator prescribed that a citizen of the European Union may acquire agricultural land, of over

two hectares of land area, if having been permanently settled in the municipality in which the transaction of the agricultural land takes place for not less than ten years, if having farmed the agricultural land that is the subject of the legal transaction for not less than three years, with or without compensation, if having had a registered agricultural estate with an active status as the holder of a family agricultural estate, pursuant to the law that regulates agriculture and rural development for not less than ten years, without discontinuity, and if owning the mechanization and equipment for agricultural production. Baturan (2017) states that this norm discriminates not only against the citizens of the European Union but our citizens as well since it restricts the rights of domestic nationals who own agricultural land. This restriction can be viewed in the fact that domestic nationals may not sell agricultural land to the citizens of the European Union, at probably higher prices, which is not to be disregarded. On the other hand, it is relevant to point out that the legislator specifically stated which agricultural land may not be the subject of the legal transaction, and that is the land which pursuant to the law was designated as construction land, which belongs to protected landmarks and which borders military facilities and military installations, military infrastructure or Ground Security Zone. In addition, in the event of sale of agricultural land to a citizen of the European Union, the legislator prescribes that the Republic of Serbia has the right of first refusal. In respect of this right, a question is raised in what way the Republic of Serbia benefits from the function of right of first refusal.

By introducing amendments in 2017, our legislator temporarily disabled foreign citizens from acquiring ownership rights to agricultural land, which means that no long-term changes were made. It is our opinion that the Republic of Serbia will have to equalize the rights of foreign citizens, i.e. citizens of the European Union with the rights of domestic nationals with respect to acquiring ownership rights of real estate, including agricultural land. The question arises whether the legislator will do so under the pressure of the European Union or court authority.

Conclusion

Regarding the conducted research which referred to the foreign acquisition of ownership of agricultural land there is an evident shift of legal regulations that advocated different "opinions" starting from the ones that advocated the position that foreign citizens should not be equal to domestic nationals in reference to ownership rights of agricultural land, to the more liberal approach to the issue. Nevertheless, even though foreign citizens were, at one point, allowed to have free access to real estate, including agricultural land, that freedom was never complete since it involved meeting certain requirements. For example, the restrictions that were, in an earlier period, prescribed for foreigners wanting to acquire ownership of real estate, including agricultural land, were mitigated in the former SFRY up to a point, by amending the Law on the Elements of Property Law Relations of 1982, and then they were additionally "loosened" by the amendments of the same Law of 1990 and 1996. On the other hand, despite the expressly stated restriction stipulated by the Law on Agricultural Land of 2006 according to which

foreign natural or legal persons may not be owners of agricultural land, foreign citizens managed to indirectly obtain large areas of arable agricultural land, which arguably resulted in a risk for potential investors of the manner in which domestic courts would construe this norm in the future.

From the latest amendments to the said Law, and in accordance with the Stabilization and Association Agreement, it is evident that the amendments of 2017 cannot introduce long-term changes and that our legislator will have to equalize the rights of the citizens of the European Union with the rights of domestic nationals with regard to acquisition of ownership rights to agricultural land. However, we feel that it is necessary for our legislator to move this matter from the Law on Agricultural Land, which regulates the protection, planning and organization of agricultural land to the Law on the Elements of Property Law Relations which, among other things regulates foreign citizens' right to property, hence it would be "suited" for this Law to regulate the rights of foreign ownership of agricultural land.

The authors believe that our market of agricultural land is appealing to foreign investors, due to the relatively reasonable prices in comparison to other markets of the European Union member states, and to certain natural features, such as climate conditions, but also due to the social advantages reflected in the relative formation of the democratic institutions. To sum up, we conclude that with reference to property rights of foreign citizens to agricultural land in the Republic of Serbia it is necessary to primarily bear in mind the real interest of the state and its needs, but also the extent to which foreign citizens really take an interest in the market of agricultural land in the Republic of Serbia.

Conflict of interests

The authors declare no conflict of interest.

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IMPACT OF COMMERCIAL AND INVESTMENT ACTIVITIES IN AGRICULTURE ON LOCAL DEVELOPMENT

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A B S T R A C T

The main idea in this paper was to investigate how agriculture and processing sectors are connected through commercial activity, and how they influence municipal economic development in Serbia. This was examined through the influence of relevant non-price structural factors related to agricultural and processing sector on the ratio between agricultural product procurement and overall agricultural production. The focus was placed on agricultural investments and subsidies. A multi regression model was developed based on hard data provided by SORS and SBRE on a municipal level in Serbia. The analysis confirmed the relation between agricultural commercial activity and municipal level of economic development. In addition, important findings concerning municipal investment and agricultural subsidies allocation have been provided as well.

Introduction

Agriculture represents one of the foundations of Serbian economy (Vukadinovic et al., 2017). The country has come a long way in the last century in terms of industrial expansion, but the agriculture remains one of the key components in the national GDP, with the total share ranging between 6% and 7% in the last decade. These figures

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are significantly higher compared to EU-28 counterparts. This can be attributed to the abundant natural resources and favourable climate conditions for agricultural production (Užar & Radojević, 2019). Serbian agricultural sector is slowly going through the market concentration phase. According to the data provided by Statistical Office of the Republic of Serbia (SORS), compared to the data from 2012, 2018 has seen an increase in the total used arable land by 1.1%. This is coupled with a significant drop in the overall number of farms by 9.9%. As a consequence, the average farm size increased by 13.5%. Larger fields allow for higher productivity and yields, creating the room for potential investments. Overall, 80% of farms possesses some form of mechanisation, although most of which is older than 20 years (86%).

Serbia possesses around 5.2 million ha of arable land, of which 67.1% is economically utilized. According to OECD, wheat and maize are one of the most globally cultivated crops, alongside sugar can, rice and soybean. In Serbia, wheat and maize represent two most commonly cultivated agricultural products, with the total farmland share of 25.89% and 18.56%, respectively. This implies that almost half of the used arable land is used for the cultivation of these two crops. Many authors used maize (Jones et al., 2003; Karp & McCalla, 1983; Lin et al., 2003) and wheat (Dorosh & Salam, 2008; Paarlberg & Abbott, 1986) as relevant denominators of agricultural production. Following this logic, and since our empirical data are related to the Serbian market, our research revolved around the aggregated data regarding the production of these two crops.

Rural area constitutes the majority of Serbian territory (85%), where around 48% of active rural population works in agriculture (Agriculture and Rural Development Strategy of the Republic of Serbia for the period 2014-2024.). This is also reflected on the fact that agriculture is the important contributor to the total income of rural population (Zarić et al., 2016). In developing countries, amongst which Serbia, agricultural sector contributes more to the overall GDP per capita, compared to developed countries (Savic et al., 2016). Although rural areas are heavily dependent on primary production (Vukadinovic et al., 2017), cross-industrial effects on overall rural and national growth are also present (J. P. Brown et al., 2014). This effect is especially present in the processing sector (Savic et al., 2016), since agricultural products represent one of the most significant inputs for processing industry. These effects are transferred amongst different sectors through trade (Karp & McCalla, 1983). This is not surprising, since the development of commerce and agriculture has always been interlinked throughout history, even from the earliest civilizations. Thus, many authors focused their research on specific intersections of these two sectors, such as international trade (Bessler & Babula, 1987; Goldberg & Knetter, 1995; Kristjanson, 1967; Lin et al., 2003), national purchasing (J. P. Brown et al., 2014; Tudor & Balint, 2006; Vukadinovic et al., 2017) and lately, e-commerce (Lu & Perreau, 2005; Nadarajan & Ismail, 2011).

Local discrepancies can have a significant influence on a national agricultural market (Birthal et al., 2011; Nganje et al., 2004). This is also the case with Serbia, where significant socio-economic (Mijačić & Paunović, 2011; Stojković et al., 2018) and geographic (Manić et al., 2013) differences exist. Drawing upon the aforementioned correlation

between agricultural and processing sector (Savic et al., 2016), the main idea in this paper was to investigate how these sectors are connected through commercial activity, and how they influence municipal economic development in Serbia. This was examined through the influence of relevant non-price structural factors related to agricultural and processing sector on the ratio between agricultural product procurement and overall agricultural production. Regarding relevant non-price structural factors, contemporary literature analysed the effects of investments (Anderson et al., 1994; Mogues & Olofinbiyi, 2020), employment (Tudor & Balint, 2006) and subventions (Ildikó et al., 2009). In this paper the focus was placed on investments and subsidies, as confirmed means of economic development (Cicea et al., 2010), whereas employment was observed separately, in the context of the overall municipal level of development. In order to implement a municipal level of analysis, a drill-down approach was used on hard data for Serbia, as a European transition economy, provided by the Serbian Business Registers Agency (SBRA) and Statistical Office of the Republic of Serbia (SORS).

The structure of this paper reflects the logic applied to the research process. First, relevant literature was analysed to develop research hypotheses. After that, an overview of the implemented methodology is provided, followed by model development and the presentation of derived results. Afterwards, a discussion of the research findings is provided, coupled with the analysis of practical economic implication. Concluding remarks are related to the research topic outlook, along with potential future research directions.

Literature review

Strong and modernised agriculture is one of the backbones of a nation`s economic growth and prosperity (Nganje et al., 2004). Well-developed agricultural sector is characterised by high levels, as well as growth rates of labour productivity, which both lead to higher levels of export on a national level, and economic (rural) development on a local level (J. P. Brown et al., 2014). In terms of macroeconomic effects, prospering, export-oriented agricultural sector positively influences the reduction of a national twin deficit (Eldemerdash et al., 2014; Mudassar et al., 2013). Effects of agricultural development are also felt on the local level, where they strongly influence the level of municipal disparities within a country (Birthal et al., 2011). High share of agriculture in national GDP is not always a positive indicator, though. In developing countries, including Serbia, the correlation between GVA in agricultural sector on GDP per capita is much higher compared to developed countries (Savic et al., 2016). Therefore, it is vital to have a well-developed, efficient national agro-business.

Agricultural production is the key denominator of national and global food security (Iganiga & Unemhilin, 2011). Having in mind the dependence of agricultural output on various internal and external factors (Boserup, 1975; Fisher et al., 2012), its effect on agricultural sector as a whole is complex, significant and oftentimes unpredictable. This is especially true for economies in transition, which are even more susceptible to unpredictable market fluctuations (Desai, 1998). The negative effect of volatility and unpredictability is felt the most on a local, municipal level.

The development and growth of agricultural and commercial sectors is co-dependent, especially for economies still going through transition. Extensive research into agro-commercial connections exists, focusing both on international aspect (Bessler & Babula, 1987; Goldberg & Knetter, 1995; Kristjanson, 1967; Lin et al., 2003), as well as national perspective (J. P. Brown et al., 2014; Petrick & Weingarten, 2004; Tudor & Balint, 2006; Vukadinovic et al., 2017). Research into the effects of various ICT innovations in modern trade is also gaining in momentum (Lu & Perreau, 2005; Nadarajan & Ismail, 2011). Within the existing literature, the analysis of agro-commercial relations is mainly related to investigating different effects on agricultural product purchasing (Fayçal & Ali, 2016; Petrick & Weingarten, 2004; Vukadinovic et al., 2017). Certain authors, such as Brown (2014), do provide a regional analysis of the topic, going into effects on a local level, but these efforts also fall short in terms of a specific focus on transition economies. Drawing upon this, in this research a link between agricultural and commercial sector was modelled through the introduction of a synthetic indicator depicting agricultural product purchase intensity. Therefore, we develop the following hypothesis:

H_1: *Commercial activity based on agricultural products positively influences municipal economic level of development.*

Commercial activity based on agricultural products was modelled by proposing an indicator calculated as a ratio between agricultural product purchasing and the production of those specific products. This ratio represents a municipal agricultural product purchase intensity, which in itself should possess informational value on municipal level of economic development.

When analysing in detail papers investigating agricultural inter industrial influences, two predominant research patterns emerge, depending on whether price or non-price factors are considered (Chhibber, 1988). First research angle focuses on observing price-related factors, such as price incentives (Thiele, 2003) and policies (Dorosh & Salam, 2008; Fulginiti & Perrin, 1993). These research efforts adopt a macroeconomic perspective, analysing either international markets (Bessler & Babula, 1987; Lin et al., 2003; Thiele, 2003) or aggregated national market situations (Dorosh & Salam, 2008; Park & Fortenbery, 2007). The second research approach is based on analysing non-price agricultural factors of influence. Non-price factors have a profound influence on local agricultural development (Birthal et al., 2011; J. D. Brown, 2009; Nganje et al., 2004), oftentimes more than price-related factors (Thiele, 2003). In this sense, authors observed investments (Cicea et al., 2010), subsidies (Ildikó et al., 2009) and employment (Tudor & Balint, 2006). Since the close link between agriculture and processing industry has already been identified (Savic et al., 2016), this paper focuses on analysing influence of identified structural non-price factors in the context of two aforementioned industries on proposed agricultural product purchase ratio. This allows for a comprehensive, theoretically-sound analysis of agricultural inter-industrial effects, modelled through commercial activity on municipal economic development.

One of the basic Government instruments of agricultural policy entails decisions on subsidy allocation to agricultural producers. The purpose of the subsidies is to bridge the gap between the relatively high costs of production and the relatively low prices of agricultural products in the market. Accordingly, the producers are economically motivated to stay on their farms and continue with the production to ensure food security for the population. Subsidies themselves represent a sort of investment activity, with wider, societal considerations (Ildikó et al., 2009). Therefore, it is important to consider the effect of subsidies on the sale of agricultural products

H_2: *Municipal subsidy allocation has a positive effect on municipal agricultural commercial activity.*

Effective and efficient investment policy is vital in ensuring a long-term growth of the agro-business (Anderson et al., 1994). Higher levels of well-planned investments lead to higher levels of agricultural sector development (Cicea et al., 2010). Optimal investment allocation is especially important for Serbia, dealing with limited financial resources. Since investment planning on a municipal level is vital for the development of local and national markets, the following research hypothesis is derived

H_3: *Municipal investment allocation has a positive effect on municipal agricultural commercial activity.*

In the context of aforementioned inter industrial effects, the link between agricultural and processing sector development has to be accounted for (Savic et al., 2016). In this sense, third hypothesis can be divided into two corresponding sub hypotheses.

$H_{3.1}$: *Municipal investment share in agricultural sector has a positive effect on municipal agricultural commercial activity.*

$H_{3.2}$: *Municipal investment share in processing sector has a positive effect on municipal agricultural commercial activity.*

The following chapter is dedicated to explaining the implemented research methodology, followed by the presentation of derived results, along with the corresponding discussion.

Methodology

For the purposes of the research, hard data provided by the Serbian Business Registers Agency (SBRA) and Statistical Office of the Republic of Serbia (SORS) were used. Data on the municipal purchasing and production of agricultural products were provided by SORS. Data on wheat and maize purchasing and production were aggregated and used as proxies for municipal agricultural products, as two most cultivated crops in Serbia. The chosen unit of observation was municipality, as the key administrative unit in Serbia. Data regarding investments in agricultural and processing sectors were also provided by SORS. Data on agricultural subsidies on a municipal level were given by SBRA. Observation year was 2017. The analysed sample included 145 municipalities with registered purchase of agricultural products. Detailed overview of model variable definitions is provided in Table 1.

Table 1. Definitions of model variables

Variable	Unit of Measure	Definition
Agricultural product purchasing	Tons	Purchase of agricultural products refers to agricultural products purchased or taken over directly from family holdings by agricultural, trade, industrial and other organizations, for the purpose of further sale or processing (Statistical Yearbook of RS, 2019).
Agricultural production of major crops	Tons	Agricultural production is the output of production of plants and livestock products, fish farming, poultry farming, bees, or other forms of agricultural production, which is carried out on agricultural land, as well as on other land or construction unit located on the territory of the Republic of Serbia
Municipal agricultural product purchase intensity	(%)	Ratio of municipal agricultural products purchasing and municipal agricultural production
Share of municipal agricultural subsidies	(%)	According to the Law on Subsidies in Agriculture and Rural Development of the Republic of Serbia, we can define four types of incentives: Direct payments, Rural development measures; Special incentives; Credit support (Official Gazette of the RS, 2016). **Subsidies allocated to the municipal level** are the amounts of incentives allocated to the territorial level of each selected municipality in particular. The share of municipal agricultural subsidies is the share of this subsidies in total municipal subsidies from aforementioned sources.
Share of municipal investments in agricultural sector	(%)	The share of investments in agriculture in total investments in the reporting year present the value of effectively finalized constructions, production or acquisition of facilities, equipment and other fixed assets, disregarding whether these investments were accomplished and whether they were paid out (excluding revaluation)*
Share of municipal investments in processing sector	(%)	The share of investments in processing sector in total investments in the reporting year present the value of effectively finalized constructions, production or acquisition of facilities, equipment and other fixed assets, disregarding whether these investments were accomplished and whether they were paid out (excluding revaluation)

*Investments in agriculture, forestry and fishing includes: crop and animal production, hunting and related service activities, investments in forestry and logging and investments in fishing and aquaculture.

The general form of the regression model is:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_p X_{pi} + \varepsilon_i \qquad (1)$$

Where Y_i is the dependent variable, X_{pi} is the independent variables, β_p is the regression coefficients, ε_i is the stochastic error, $i \in [1..., n]$ and $p \in [1..., n]$.

In order to make valid inferences from regression, the residuals of the regression should follow a normal distribution. A normal Predicted Probability (P-P) plot has

been examined and the residuals are normally distributed. Homoscedasticity refers to whether these residuals are equally distributed, or whether they tend to bunch together at some values, and at other values, spread far apart. This assumption has been confirmed by plotting the predicted values and residuals on a scatter plot. So, the residuals are normally distributed and homoscedastic.

To test the assumption that residuals are independent (or uncorrelated), the Durbin-Watson statistic has been used. This statistic can vary from 0 to 4. Assumption will be confirmed if this value is close to 2. The Durbin-Watson statistic showed that this assumption had been met, as the obtained value was close to 2 (DW of 1.57). The validity of the defined model is also confirmed in terms of potential multicollinearity. Since the Tolerance indicator value is higher than .1, and VIF indicator value is lower than 10 we can conclude that the model assumption of non-multicollinearity has not been violated.

Results and discussion

As explained in the theoretical part of the paper, the guiding research thought was to encompass structural, non-price factors from agricultural and processing sector, analyse their influence on municipal commercial activity regarding agricultural products, and understand the effects on the overall municipal economic development. An overview of these relations is summarised in Table 3, depicting results for 145 observed municipalities in Serbia (settlements with more than one municipality were analysed aggregately).

Table 2. Descriptive municipal data (Serbia, 2017)

Level of municipal development	Average municipal agricultural product purchase ratio	Average municipal share of employment in agriculture	Aggregated share of agricultural production
I (above national average, N=20)	34.15%	1.69%	22.56%
II (100-80% of national average, N=34)	27.22%	3.15%	33.37%
III (80-60% of national average, N=47)	18.02%	4.73%	35.82%
IV (below 60% of national average, including devastated areas, N=44)	5.19%	2.27%	8.25%
The municipalities of Kosovo and Metohija were not included in the analysis due to the lack of data. Settlements with more than one municipality were analysed aggregately.			
Source: Authors' calculations			

A further graphical comparison between municipal level of economic development (Figure 1) and municipal agricultural product purchase intensity (Figure 2) is also possible.

Aggregated descriptive and graphical findings allow for some crude suggestions. It seems as if the most developed municipalities have the lowest participation of agricultural employment, as well as the highest average agricultural product purchase ratio per municipality. The lower the economic development of the municipality is, the lower the average agricultural product purchase ratio is. This implies that commercial activity is an important catalyst for agricultural, and also overall municipal development. We can conclude that the higher the share of non-traded agricultural product turnover, mainly consisting of intra organisational use and individual consumption, the lower the overall development of the municipality.

Figure 1. Municipal level of economic development (based on data by SBRE)
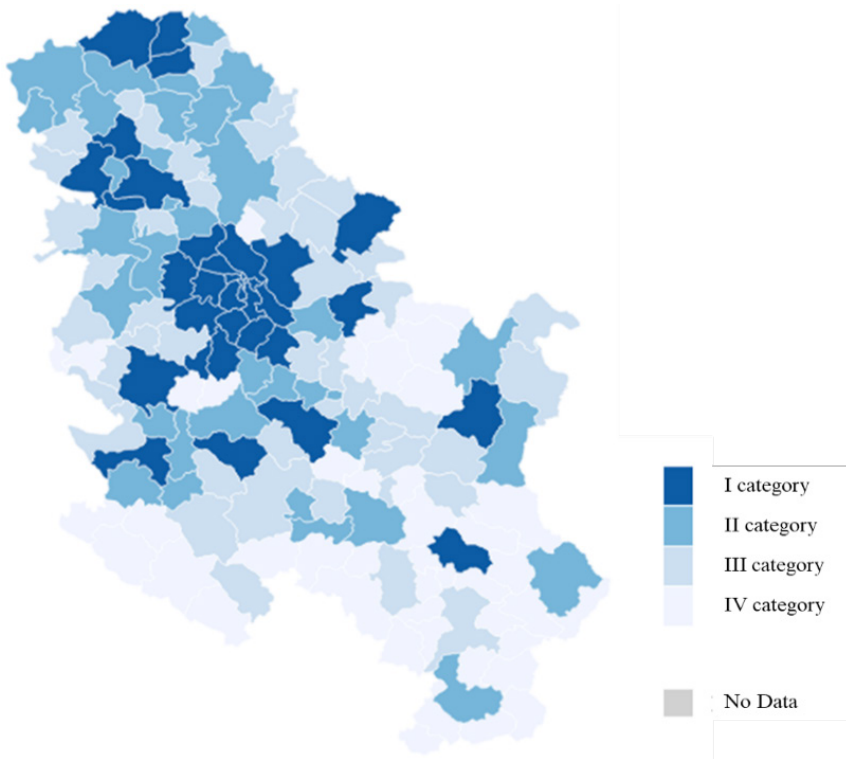
Source: Authors' calculations

Figure 2. Municipal agricultural product purchase intensity
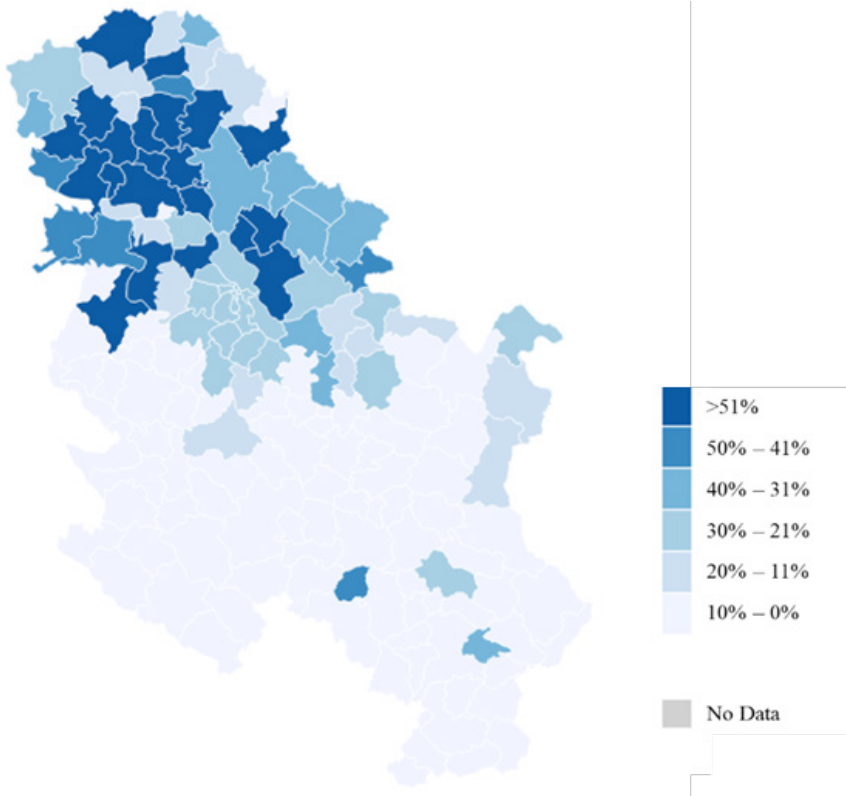
Source: Authors' calculations

In order to fully understand the relation between municipal level of development and municipal agricultural product purchase intensity, a regression model was developed. This analysis also encompassed the effect of employment share in two observed relevant sectors. This model is shown in equation 2.

$$Z = 3.310 - .016y + .051x_4 - .016x_5 + \varepsilon \qquad (2)$$

Obtained partial regression coefficients of relevant variables are presented in Table 3.

Table 3. Multiple regression model depicting municipal level of economic development

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.310	.216		15.337	.000
Agricultural product purchase ratio (y)	-.016	.003	-.427	-5.101	.000
Share of employment in agricultural sector (x_4)	.051	.025	.179	2.089	.038
Share of employment in processing sector (x_5)	-.016	.007	-.173	-2.218	.028
a. Dependent Variable: Municipal level of economic development (Z)					

Source: Authors' calculations

The results led to some interesting findings. First, proposed agricultural product purchase ratio (y) has a positive influence on municipal level of development. Since the municipal development is observed through 4 categories on an inverted scale (category I – highest level of development, category IV – lowest level of development), we can conclude that an increase in municipal agricultural product purchase intensity of 62.5 percentage points (pp), the municipality enters a higher category of development. Second, share of employment in processing sector (x_5) has a similar effect as the previously discussed variable, which implies that this share also has to increase by 62.5 pp in order for the municipality to enter a higher development category. Lastly, share of employment in agriculture (x_4) has a negative effect on municipal economic development. This is an interesting finding, which confirms that, regarding long-term economic development, high levels of agricultural employment do not yield best macroeconomic results (Savic et al., 2016). The developed model was confirmed as statistically significant using ANOVA (F-statistic of 11.964 and .000 significance) with the predictability potential of .186.

Having confirmed the relation between agricultural commercial activity and municipal level of economic development (H₁), the next step was the development of a regression model for understanding municipal agricultural product purchase intensity. In total, 3 independent variables were observed, modelling the influence of municipal share of agricultural subsidies in all municipal subsidies (x_1), as well as the share of investments aimed towards agricultural (x_2) and processing (x_3) sectors. This model is shown in equation 3.

$$Y = 2.156 + .293x_1 + .518x_2 + .236x_3 + \varepsilon \qquad (3)$$

Obtained partial regression coefficients of relevant variables are presented in Table 4.

Table 4. Multiple regression model depicting municipal agricultural product purchase ratio

Coefficients[a]					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	2.156	3.798		.568	.571
Share of agricultural subsidies (x_1)	.293	.092	.244	3.189	.002
Share of investments in agricultural sector (x_2)	.518	.149	.267	3.466	.001
Share of investments in processing sector (x_3)	.236	.072	.249	3.265	.001
a. Dependent Variable: Municipal agricultural product purchase ratio (Y)					

Source: Authors' calculations

Presented findings indicate statistical significance of the parameter β_1, depicting the importance of subsidies allocation on agriculture in the developed model. It can be concluded that by increasing the share of municipal agricultural subsidies by 1 pp, municipal agricultural product purchase ratio consequently increases by .293 pp. This finding confirms the second hypothesis (H_2). Therefore, we can conclude that the higher share of subsidies in agriculture have a positive effect on the municipal agricultural product purchase intensity. Transition economies operate with significant financial limitations, therefore the use of funds, especially in the form of subsidies, must be efficient and effective. It is important to understand all positive effects of means allocation to agriculture, since inter industrial effects are also present.

The influence of municipal investment allocation was also examined. The results show that both β_2 and β_3 parameters are statistically significant. With the increase in the municipal share of investments dedicated to agriculture or processing sector of 1 pp, the municipal agricultural product purchase ratio consequently increases by .518 pp and .236 pp, respectively. This finding confirms both $H_{3.1}$ and $H_{3.2}$, which in terms confirms H_3 entirely. Implications are such that higher shares of municipal investments in both agricultural and processing sector have a positive impact on municipal agro-commercial activity. This confirms the inter industrial effects of agricultural sector, and shows that a developing processing sector is also an important driver of municipal agricultural product purchase intensity, and consequently overall municipal economic prosperity. Interestingly, agricultural investments have an opposite effect compared to agricultural employment share. What this means is that in the long run, municipalities can economically prosper through capital-intensive development of agricultural sector, rather than stimulating agricultural employment, as a short-term macroeconomic "fix".

When observing the developed model as a whole, it is important to determine whether the model specification is correct. This is statistically introduced through the null hypothesis that $H_0: \beta_1 \dots \beta n = 0$. The developed model has the correct specification if

the null hypothesis is rejected. In this paper, for this purpose the analysis of variance was performed. Results from the conducted ANOVA test show that aforementioned null hypothesis regarding model specification can be rejected, which confirms statistical significance of the observed model (Table 5).

Table 5. Developed model specification analysis

ANOVA[a]					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	22369.209	3	7456.403	11.533	.000[b]
Residual	91158.730	141	646.516		
Total	113527.938	144			
a. Dependent Variable: Municipal agricultural product purchase ratio (Y)					
b. Predictors: (Constant): Share of agricultural subsidies (x_1), Share of investments in agricultural sector (x_2), Share of investments in processing sector (x_3)					

Source: Authors' calculations

Final component of the model analysis is its explanatory potential. This is depicted by R^2 which show the percentage of variance of dependent variable explained by assumed independent variables (Novaković 2019). Adjusted R^2 is a measure of predictive power loss in a model, or shrinkage in regression. The adjusted R^2 also shows how much variance would be accounted for, had the model been derived from the population from which the sample was taken (Field, 2013). Higher values of adjusted R^2 parameter indicate better model fit. The adjusted coefficient of determination shows that 18.0% of the total model variance is explained by independent variables, which is line with results from similar researches (Newman & Tarp, 2019).

Conclusion

Agricultural sector has an important role in sustainable economic, ecological and social development of countries undergoing a transition phase, such as Serbia. Economic progress of rural areas is especially tide with the level of agricultural development. Agricultural sector is also important because of its cross-industrial, multiplicative effects. In this regard, the link between processing and agricultural sectors is of upmost importance. These effects are transferred and yield short and long term economic results through agricultural commercial activity. Drawing upon this, the focus of this paper was to investigate whether relevant municipal subsidies and investments influence the municipal purchase of agricultural products. Special attention was dedicated to local discrepancies, because of which the analysis was conducted on a municipal level.

Findings confirmed that the proposed ratio depicting municipal agricultural product purchasing intensity is a relevant factor in municipal level of economic development. This allowed for the link between municipal development and agriculture-related non-price structural factors of influence to be modelled through commercial activity based on agricultural products. Share of agricultural subsidies was found to be significant, confirming similar previous findings (Ildikó et al., 2009). Important finding is

that higher share of subsidies in agriculture have a positive effect on the municipal agricultural product purchase intensity. However, it should be pointed out that the use of funds, especially in the form of subsidies, must be efficient and effective. In terms of investment allocation, the existence of inter industrial effects between agricultural and processing sectors was confirmed, affirming the importance of proper, capital-intensive agro-business development (Savic et al., 2016).

It is important to note certain limitations regarding this research. First, empirical data are from a single national market. Although a relevant sample size was attained through adequate drill-down approach on a municipal level, certain national market and local specificities can somewhat influence derived results. Extension of this research topic is needed on other national and international markets. Second, developed economies, as well as developing economies differ in terms of economic growth dynamics compared to transitional economies and may exhibit different results from those presented. Third, observed municipal agricultural subsidies included only national funds allocated to municipalities. More detailed analysis including data on international subsidies is needed to gain a deeper understanding of their local implications. Fourth, data on agricultural product purchasing and production are related to wheat and maize, as most relevant crop types. Finally, data on investments are related to only one year. For a more precise analysis, a chronological perspective would be beneficial. Additionally, investments in processing sector were observed as a whole, without the extraction of the agro-business related part.

Researchers and national decision-makers would benefit from presented findings, as they represent a basis for further research into agricultural-related factors influencing municipal development.

Conflict of interests

The authors declare no conflict of interest.

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AGRICULTURAL ENTERPRISES AND ECONOMIC GROWTH: A REGIONAL ANALYSIS IN THE REPUBLIC OF SERBIA

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A R T I C L E I N F O	A B S T R A C T
	Since agriculture is the highly important economic activity in the Republic of Serbia, it is necessary to create an environment in which competitive agricultural enterprises will develop. However, regions in the Republic of Serbia considerably differ regarding the intensity of agricultural activity. This paper examines the impact of agricultural enterprises on the region's contribution to the gross domestic product (GDP) of the country in the period between 2010 and 2018. Activity of agricultural enterprises was observed using number of agricultural enterprises, number of employees in them, their turnover and gross value added. Random-Effects GLS regression showed that regions with higher agricultural activity contribute to the lesser extent to the GDP of the country. Research results are robust to changing sampling period and lagging independent variables. In this regard, several proposals have been recommended.

Introduction

The performance of agricultural enterprises is determined by their ability to adapt to volatile market conditions and integrate into the economic system. As agriculture is the important industry in the Republic of Serbia, it is necessary to emphasize the significance of agricultural enterprises and their participation in the economic growth of the Republic of Serbia.

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The role of agricultural enterprises in the development of the entire agribusiness sector is crucial. Agribusiness may be defined as the sum of all operations covering the production and distribution of agricultural supplies, production operations on the farm, storage, processing and distribution of agricultural goods and objects made from them (King et al., 2010, p. 554). In other words, agribusiness consists of the pre-farm activities (production of industrial inputs for the agrarian sector), primary agriculture (production of agricultural raw materials for food processing and production) and post-farm activities (processing, sales and consumption of final food products) (Milanović et al., 2013, p. 299). The coordination and integration of such activities is important, because only in these conditions an adequate environment for the development of agricultural enterprises may be created. Challenges that alter management efficiency and modern decision-making are crucial to the agrarian sector and, wider, to the agribusiness (Lowe & Preckel, 2004).

Agribusiness is a particularly interesting field for small and medium-sized enterprises (SMEs), as it is a very broad area covering the production and processing of agricultural and food products, as well as numerous inputs for agricultural production (Maletić & Ćeranić, 2010). SMEs are usually family businesses. There are one or more owners in these companies, mainly family members, and a few full-time employees.

The structure of agricultural enterprises in the Republic of Serbia is dominated by SMEs that represent the main source of increasing employment, export and welfare of the country. In Serbian agricultural sector, the largest percentage of enterprises regards micro and small enterprises, followed by medium and little portion of large enterprises. Strong development and competitiveness of the SMEs may be one of the guides for economic development of the Republic of Serbia, similar to those in developed countries. In fact, SMEs represent a basis of economic development, both for developed and developing countries (Bošković & Kostadinović, 2011), and have become one of the most important economic operators in the agrarian sector, thus replacing the dominance of cooperatives and large agricultural enterprises (Pantić, 2015).

Cooperatives, SMEs and other forms of business associations should support the economic development, since small family households are the largest employers in the world and provide more than 80% of the value of the world food (Aničić et al., 2019). In addition, "SMEs networks are becoming increasingly important for the innovation activities of agri-food firms" (Batterink et al., 2010, p.68) as innovative products and market research have become some of the main tasks of the agri-food system (Avermaete et al., 2003; Drăgoi et al., 2018; Knudson et al., 2004).

In the context of economic growth (Andrei et al., 2017), the attention should not be only paid to the SMEs, but also to the large agricultural companies. In this regard, the position of large agricultural companies in the Republic of Serbia does not significantly differ from the position of SMEs. For instance, Tomašević et al. (2019) find that large agricultural companies report higher profitability than agricultural SMEs, but this difference is not statistically significant.

Many agricultural companies, in particular large companies, experienced severe financial difficulties after bad privatization processes and global financial crisis (Bubić & Hajnrih, 2012). Such circumstances resulted in declining profitability and efficiency of agricultural companies and also in the problems to service their liabilities.

"Agriculture is the highly important economic activity in the Republic of Serbia" (Petrović & Vuković, 2016, p.1433). However, "the Serbian agriculture is largely characterized by family farms with inadequate age and educational structure and low entrepreneurship levels" (Sedlak et al., 2016, p.1230). At most of these farms, the production is at a low technological level, which directly results in low productivity levels. Therefore, it is important to create an adequate environment and access to resources for their development, given that SMEs in particular have limited access to financing sources and higher costs of them than large enterprises. "Developing the capital market and providing better access to agribusiness loans, including new forms of lending, is one of the preconditions for the development of micro and SMEs" (Sedlak et al., 2016, p.1231).

It is interesting to analyze the contribution of agricultural enterprises to the gross domestic product (GDP) on the regional level, assuming the considerable cross-regional differences in intensity of agricultural activity in the Republic of Serbia. For instance, two most developed regions in the Republic of Serbia – Belgrade and Vojvodina (Mijačić & Paunović, 2011) completely differ regarding the agricultural activity. Belgrade has the lowest, while Vojvodina has the highest agricultural activity in the Republic of Serbia. In addition, most of the SMEs in agribusiness are located in Vojvodina as a region with favorable conditions and long tradition in entrepreneurship (Maletić, 2014).

The analysis that ranked the municipalities according to their SMEs development pointed out the unequal regional development regarding agricultural SMEs. In the Vojvodina, there are the most registered agricultural SMEs, followed by Central Serbia and Southern and Eastern Serbia. The most developed ones are those from Vojvodina and some Belgrade municipalities, unlike those from Central Serbia, and especially from Southern and Eastern Serbia (Popović, 2009).

Therefore, regional specificities are the starting point in planning the development of agrarian sector, agribusinesses and the economy as a whole. This should overcome the problems of underdeveloped and rural areas, unbalanced regional development and better exploitation of natural resources.

For the further development of agricultural sector in the Republic of Serbia, a state-supported stimulating environment is needed (Ristić, 2013). In order to strengthen the development of agriculture and rural areas, the Strategy for the Agriculture and Rural Development of the Republic of Serbia 2014-2024 defines three most important reform segments (Aničić et al., 2016, p. 176):

1. "Agricultural policy reform;

2. Legislation adoption and complete application;

3. Institutional reforms".

The very important feature of the agricultural and overall economic development is entrepreneurship development. Even in agriculture, in the Republic of Serbia there are great possibilities for entrepreneurship development in agribusiness. On the other hand, agricultural companies have mainly shared the destiny of the rest of the economy in the Republic of Serbia at the beginning of the 21st century: insufficient GDP growth and stagnation, unfavorable macroeconomic environment, high unemployment rate, etc.

The subject of the paper are agricultural enterprises in the Republic of Serbia. Researching this issue, Vržina & Dimitrijević (2020) find that "agricultural enterprises in the Republic of Serbia report only moderate profitability rates" (p. 8). These companies usually have highly concentrated ownership and relatively low indebtedness due to difficult access to the debt market. In addition, many agricultural companies have problems with disparity between assets maturity and debt maturity. On the other hand, Aničić et al. (2016) argue that agriculture can contribute to the "economic development, increase GDP and become the framework of the total economic stability" (p. 178).

The objective of the paper is to examine the impact of activity of agricultural enterprises on the economic growth. Respecting cross-regional differences in the agricultural activity, the analysis in the paper is conducted on the regional level. Therefore, the paper examines the impact of activity of agricultural companies on the region's contribution to the GDP.

In the line with defined research subject and objective, the following null and alternative research hypotheses will be tested in the paper:

H_0: Activity of agricultural enterprises does not have statistically significant impact on region's contribution to the GDP.

H_1: Activity of agricultural enterprises has statistically significant impact on region's contribution to the GDP.

After the introduction, the materials and methods of the paper are presented. The following section of the paper presents research results, including also the robustness checks and research results discussion. Final section of the paper concludes and provides recommendations for future research.

Materials and methods

In the paper was examined how the activity of agricultural enterprises affects the contribution of the region to the GDP of the Republic of Serbia. Therefore, NUTS (Nomenclature of Units for Territorial Statistics) 2 regional level was used in the paper. In this regard, five regions in the Republic of Serbia exist (Belgrade, Vojvodina,

Šumadija and Western Serbia, Southern and Eastern Serbia, and Kosovo and Metohija). The region of Kosovo and Metohija was excluded from the analysis due to data unavailability. The analyzed period is from 2010 to 2018, as NUTS 2 classification was introduced in 2010. Covering four regions across nine-year period, the sample represented the balanced panel data of 36 observations.

Activity of agricultural enterprises was measured by number of agricultural enterprises (A_ENT), number of employees in them (A_EMPL), turnover (A_TURN) and gross value added (A_GVA) of agricultural enterprises. Necessary data were retrieved from the Statistical Office of the Republic of Serbia (2010-2018). Data contains the numbers from annual statutory financial statements for enterprises and cooperatives in the Republic of Serbia.

Contribution of the region to the GDP of the country is measured by the relation between GDP of the region and GDP of the country (GDP_C). The impact of the agricultural enterprises on region's contribution to the GDP was controlled for the impact of some macroeconomic and demographic variables: share of region's unemployment (UNEMPL), export (EXPORT) and population (POPUL) in the country's total. These data were also retrieved from the Statistical Office of the Republic of Serbia. Table 1 presents definition of employed variables.

Table 1. Definition of variables

Label	Definition
Dependent variable	
GDP_C	GDP of the region / GDP of the country
Agricultural independent variables	
A_ENT	Number of agricultural companies in the region / Number of companies in the region
A_EMPL	Number of employees in agricultural companies in the region / Number of employees in companies in the region
A_TURN	Turnover of agricultural companies in the region / Turnover of companies in the region
A_GVA	Gross value added of agricultural companies in the region / Gross value added of companies in the region
Control variables	
UNEMPL	Number of unemployed people in the region / Number of unemployed people in the country
EXPORT	Exports of the region / Exports of the country
POPUL	Population of the region / Population of the country (as of 2011 Census of population)

Source: Authors' definition

Considering employed variables, it is possible to formulate the following linear regression model:

$$GDP\_C_{i,t} = \alpha + \beta_1 AGRICULTURE_{i,t} + \beta_2 UNEMPL_{i,t} + \beta_3 EXPORT_{i,t} + \beta_4 POPUL_{i,t} + \varepsilon_{i,t} \quad (1)$$

where AGRICULTURE refers to A_ENT, A_EMPL, A_TURN and A_GVA of region i in year t.

A random-effects General Least Squares (GLS) regression was employed in the paper, as Breusch-Pagan LM test showed that this model should be preferred over Ordinary Least Squares (OLS) estimates. In addition, fixed effects regression was not applied due to near singular matrix problem, as population variable is invariant over time. The statistical package Stata 14 was used for the analysis.

In order to test the robustness of the results, changes of the initial research model were also conducted in the paper. There were conducted following robustness checks:

- change of the sampling period (2014-2018 instead of 2010-2018) to cover only the period under the Strategy for Agriculture and Rural Development 2014-2024;
- lagging the independent variables employed in the model.

Research Results

The following part of the paper presents research results including descriptive statistics, univariate analysis, regression analysis, robustness checks and discussion of the results.

Descriptive Statistics

Table 2 presents descriptive statistics for all variables used in the analysis. Region's contribution to the GDP of the country (GDP_C) was the variable with the highest deviation from the arithmetic mean. This finding implies significant regional differences in the Republic of Serbia. In each year, the Belgrade region had the highest GDP_C value, followed by Vojvodina, Šumadija and Western Serbia, and Southern and Eastern Serbia. The highest GDP_C value regards Belgrade region in 2018, while the lowest value regards Southern and Eastern Serbia in 2016.

Agricultural independent variables (A_ENT, A_EMPL, A_TURN and A_GVA) also exhibited important cross-regional differences. Vojvodina is the region with the highest agricultural activity, as maximum values of each agricultural independent variable regard this region. On the other hand, minimum values of these variables regard Belgrade region, except of the A_EMPL that regards Šumadija and Western Serbia region. In addition, Šumadija and Western Serbia region, and Southern and Eastern Serbia region had nearly same values of agricultural independent variables across the observed period.

Table 2. Descriptive Statistics

n = 36	Arithmetic mean	Median	Minimum	Maximum	Standard deviation
Dependent variable					
GDP_C (%)	24.98	22.90	13.63	41.35	9.89
Agricultural independent variables					
A_ENT (%)	4.34	4.50	0.82	7.63	2.36
A_EMPL (%)	3.41	1.83	1.15	9.66	3.05
A_TURN (%)	3.74	2.41	0.71	10.49	3.50

n = 36	Arithmetic mean	Median	Minimum	Maximum	Standard deviation
A_GVA (%)	2.99	1.38	0.79	9.27	3.12
Control variables					
UNEMPL (%)	25.00	25.73	17.19	31.14	3.58
EXPORT (%)	24.99	24.67	12.82	37.20	7.20
POPUL (%)	25.00	24.99	21.76	28.27	2.70

Source: Authors' calculation

Regarding control independent variables, the lowest value of UNEMPL was reported in Belgrade in 2010, while the highest value was reported in Šumadija and Western Serbia in 2018. In fact, the Belgrade region contributed the least to the country's unemployment in each year. On the other hand, the Vojvodina region, on the average, contributed the most to the export of the country, while Southern and Eastern Serbia contributed the least. The largest region in terms of population was Šumadija and Western Serbia, while Southern and Eastern Serbia had the lowest population.

Univariate Analysis

Table 3 presents Pearson's correlation coefficients and their statistical significance. It may be concluded that only one agricultural independent variable (A_ENT) had a significant correlation with our dependent variable. On the other hand, there was significant high and positive correlation between all the agricultural independent variables. In general, control variables appeared to have significant correlation with agricultural independent variables, with the highest correlation recorded between A_GVA and EXPORT.

Table 3. Pearson's Correlation Matrix

n = 36	GDP_C	A_ENT	A_EMPL	A_TURN	A_GVA	UNEMPL	EXPORT	POPUL
GDP_C	1.00							
A_ENT	***-0.53	1.00						
A_EMPL	0.10	***0.75	1.00					
A_TURN	-0.08	***0.87	***0.97	1.00				
A_GVA	0.07	***0.78	***0.99	***0.99	1.00			
UNEMPL	***-0.47	***0.55	0.22	**0.34	0.25	1.00		
EXPORT	**0.37	***0.46	***0.74	***0.71	***0.75	0.27	1.00	
POPUL	-0.08	***0.53	**0.39	***0.48	**0.42	***0.66	***0.67	1.00

Note: *, **, *** denotes statistical significance at the level of 10%, 5% and 1%, respectively

Regression Analysis

Since the activity of agricultural enterprises was measured with four different variables, there were four regression models to be reported. Table 4 presents random-effects GLS regression estimates. Multicollinearity problems are not expected since Variance inflation factor is lower than 10 for each variable in each regression model.

Table 4. Random-Effects GLS regression estimates

	Dependent variable: GDP_C			
	Model 1	Model 2	Model 3	Model 4
Intercept	***34.78 (4.37)	***52.82 (4.49)	***45.38 (4.16)	***50.51 (4.36)
A_ENT	***-3.13 (-7.48)			
A_EMPL		**-1.33 (-2.21)		
A_TURN			***-1.62 (-3.56)	
A_GVA				**-1.48 (-2.53)
UNEMPL	*-0.57 (-1.77)	***-1.29 (-2.74)	**-1.08 (-2.49)	***-1.24 (-2.68)
EXPORT	***1.17 (7.50)	***1.34 (4.04)	***1.45 (5.26)	***1.39 (4.31)
POPUL	-0.45 (-0.88)	-0.97 (-1.18)	-0.94 (-1.28)	-1.00 (-1.24)
Adjusted R²	0.82	0.56	0.64	0.58
Wald chi square	***140.05	***39.62	***54.86	***42.55
Period	2010-2018	2010-2018	2010-2018	2010-2018
Observations	36	36	36	36

Note: beta coefficients in front of parentheses, z-values in parentheses; *, **, *** denotes statistical significance at the level of 10%, 5% and 1%, respectively

Multicollinearity problems are not expected since Variance inflation factor is lower than 10 for each variable in each regression model. Regression estimates suggest that agricultural enterprises had a negative and statistically significant impact on the region's contribution to the GDP of the country. In other words, regions with higher agricultural activity contributed to a lesser extent to the economic growth of the country, on the average. This conclusion holds regardless of the measure of the activity of agricultural enterprises. However, this impact was the strongest using the number of agricultural enterprises as a measure of agricultural activity. Therefore, the research results support the alternative hypothesis, thus rejecting the null hypothesis.

Among control independent variables, UNEMPL and EXPORT are the variables that had a significant impact in each regression model. Therefore, the regions with lower share in country's unemployment and higher share in country's export contributed more to the economic growth of the country.

Robustness Checks

First robustness check was conducted using shorter sampling period in order to cover only the period under the Strategy for Agriculture and Rural Development 2014-2024. Table 5 presents the regression estimates for the first robustness check.

Table 5. Random-Effects GLS regression estimates for the period 2014-2018

	Dependent variable: GDP_C			
	Model 1	Model 2	Model 3	Model 4
Intercept	***46.83 (4.99)	***66.23 (4.41)	***57.46 (4.36)	***61.63 (4.16)
A_ENT	***-2.96 (-6.97)			
A_EMPL		***-2.11 (-2.91)		
A_TURN			***-1.95 (-3.96)	
A_GVA				***-1.98 (-3.01)
UNEMPL	0.37 (0.80)	0.71 (0.95)	0.58 (0.88)	0.77 (1.04)
EXPORT	***1.75 (7.77)	***2.50 (5.59)	***2.42 (6.66)	***2.51 (5.69)
POPUL	***-2.48 (-3.32)	***-4.59 (-3.90)	***-4.02 (-3.93)	***-4.52 (-3.89)
Adjusted R^2	0.89	0.70	0.77	0.70
Wald chi square	***118.89	***34.46	***49.61	***35.63
Period	2014-2018	2014-2018	2014-2018	2014-2018
Observations	20	20	20	20

Note: beta coefficients in front of parentheses, z-values in parentheses; *, **, *** denotes statistical significance at the level of 10%, 5% and 1%, respectively

Regression estimates from the Table 5 suggest that the impact of the agricultural activity on the region's contribution to the GDP of the country is robust to the change of the sampling period. Using only the period under Strategy for the Agriculture and Rural Development 2014-2024, it may be concluded that the impact of agricultural activity on region's contribution to the GDP remained significantly negative. Robustness regression model employing A_ENT variable suggest that such negative impact was weaker after the implementation of the strategy, while regression models employing A_EMPL, A_TURN and A_GVA suggest the opposite.

An important feature of the macroeconomics is that some variables may affect each other with a time lag. Therefore, the second robustness check assumed lagging independent variables and using their first lag. Table 6 presents the regression estimates with lagged independent variables.

Regression estimates from the Table 6 confirm the initial research results, suggesting that agricultural activity also had a negative impact on region's contribution to the GDP with the one-year time lag. However, the impact of lagged independent variables is slightly weaker than the impact in the initial regression estimates. Therefore, it may be concluded that research results are robust to lagging the independent variables.

Table 6. Random-Effects GLS regression estimates with lagged independent variables

	Dependent variable: GDP_C			
	Model 1	Model 2	Model 3	Model 4
Intercept	***37.13 (4.12)	***55.69 (4.37)	***48.56 (4.06)	***53.71 (4.28)
A_ENT(-1)	***-3.08 (-6.41)			
A_EMPL(-1)		*-1.19 (-1.89)		
A_TURN(-1)			***-1.48 (-3.01)	
A_GVA(-1)				**-1.33 (-2.16)
UNEMPL(-1)	*-0.63 (-1.65)	***-1.52 (-2.89)	**-1.27 (-2.56)	***-1.46 (-2.81)
EXPORT(-1)	***1.22 (7.20)	***1.38 (3.97)	***1.47 (5.05)	***1.44 (4.21)
POPUL(-1)	-0.54 (-0.96)	-0.92 (-1.04)	-0.92 (-1.16)	-0.96 (-1.11)
Adjusted R^2	0.81	0.57	0.63	0.58
Wald chi square	***111.77	***35.26	***46.47	***37.50
Period	2010-2018	2010-2018	2010-2018	2010-2018
Observations	32	32	32	32

Note: beta coefficients in front of parentheses, z-values in parentheses; *, **, *** denotes statistical significance at the level of 10%, 5% and 1%, respectively

Discussion

In total, twelve regression models showed that agricultural activity negatively affected the region's contribution to the GDP. In other words, regions with higher agricultural activity contribute to the lesser extent to the GDP of the country. As the agriculture is one of the core industries in developing economies, some changes in the organization of agricultural activity in the Republic of Serbia have to be considered. Therefore, several improvements may be proposed. In general, there are two broad areas of improvements:

- enhancing the coordination and cooperation in agricultural sector in order to overcome the problem of fragmentation of production (many companies with relatively small production capacities);

- modernization of agricultural production and implementation of information technologies in order to improve efficiency of agricultural enterprises.

Coordination and cooperation in the agricultural sector should be enhanced both on horizontal and vertical basis. In this regard, horizontal cooperation between agricultural companies may increase their negotiating power. For instance, Volpentesta and Ammirato (2018) argue that innovative organizational models and clusters should be implemented in order to overcome the challenges that world-wide agrarian sector cope with.

In addition, vertical coordination should improve the competitive position of the agri-food sector in the Republic of Serbia. Ideas on improvement of vertical coordination have a long tradition (Folkerts & Koehorst, 1997) and are particularly important for developing countries (Kirsten & Sartorius, 2002). Regarding agricultural enterprises in the Republic of Serbia, it is important to produce and export the products of higher processing stages as it enables agricultural enterprises to gain higher profit margin. In addition, exporting products of higher processing stages may increase overall profitability and competitiveness of the enterprises (Boganović & Hadžić, 2018).

It may also be suggested to furtherly develop the concept of multifunctionality of agriculture (Casini et al., 2012; Lehmann et al., 2009), which also have an impact on sustainable development (Hediger & Knickel, 2009). For instance, agricultural industry may be integrated with secondary sector's manufacturing companies as well as tertiary sector's tourism organizations (Garabinović, 2019). In addition, the development of the agrarian sector may be achieved through the integration with both the pre-farm and post-farm sectors.

Second group of improvements refers to the implementation of modern technologies in the agricultural enterprises. In this regard, agro-industrial enterprises should apply modern information technologies in production, since the application of these technologies and innovations, together with coordination between different levels of the agri-food sector play a significant role in improving their competitiveness (Boehlje et al., 2011; Streeter et al., 1991).

However, investments in modernization require additional funds (Andrei & Darvasi, 2012). Popović et al. (2018) argue that agricultural enterprises should more rely on the agricultural loans, concluding that this segment is not developed enough in the Republic of Serbia. In addition, agricultural enterprises in the Republic of Serbia do not use corporate bonds to finance investments. Therefore, issuing bonds may be the attractive option, in particular for larger agricultural enterprises.

In particular, agricultural SMEs (as dominant players in the agricultural industry) should continuously innovate and introduce information and communication technologies into their businesses (Burke, 2010), in order to increase productivity and competitiveness at the national and international level. Bearing in mind that the export of agro-industrial products makes the basis of agricultural development, it is essential to raise the level of technological level of production, productivity and efficiency in this area (Vlahović et al., 2011).

Such improvements may increase the efficiency of agricultural companies and make the impact of agriculture on economic growth better. In addition, such improvements and state-supported macroeconomic environment should encourage private investments in agriculture and further development of agricultural enterprises.

Conclusions

The paper examined the impact of agricultural enterprises on the economic growth of the Republic of Serbia in the period between 2010 and 2018. Considering important cross-regional differences in agricultural activity, the analysis was conducted at the NUTS 2 regional level. Activity of the agricultural enterprises in the region was measured by number of agricultural enterprises, number of employees in them, their turnover and gross value added.

The random-effects GLS regression showed that agricultural enterprises negatively impacted the economic growth of the country. In other words, the regions with higher activity of agricultural enterprises contributed to GDP of the country to the lesser extent. Therefore, there is enough evidence to reject the null hypothesis, and to accept the alternative hypothesis.

Research results are same regardless of the measure of activity of agricultural companies. In addition, results are robust to the changes of the sampling period and lagging the independent variables. In total, twelve regression models confirmed the statistically significant negative impact of agricultural sector on the economic growth. In particular, we found that the implementation of the Strategy for the Agriculture and Rural Development 2014-2024 did not considerably change the impact of agriculture on the economic growth. However, the full effects of this strategy should be considered only after the 2024 as a final year of the strategy. The paper covers only the half of the period of the strategy.

In this regard, some recommendations for the improvement of efficiency of agricultural enterprises and their impact on the economic growth of the country were proposed. First, a state-supported macroeconomic environment is needed with appropriate agricultural strategy and, in particular, support towards the micro enterprises and SMEs. On the other hand, it should be noted that agriculture is traditionally less capital-intensive industry and that some more capital-intensive industries (such as information technologies industry) ensure the faster economic growth of the countries.

Second, the efficiency of agricultural enterprises may be increased in many ways that can be placed into two broad areas: enhancing the coordination and cooperation among agricultural enterprises, and modernization of agricultural production and implementation of the information technologies. For instance, integration of agricultural enterprises into clusters should enable the enterprises to overcome the problem of fragmentation of production. On the other hand, continuous innovation is considered as a path for agricultural enterprises development both in developed and developing countries.

In addition, agricultural enterprises should overcome the lack of financing sources problems. Micro and small agricultural enterprises should have the better access to the agricultural loans, while medium and large agricultural enterprises should consider the corporate bonds issuance.

The paper contributes to the research on the development of agricultural companies in the Republic of Serbia as a possible path for enhancing the economic growth of the country. In particular, the paper sheds the light on the efficiency of the agricultural companies and gives the recommendations for the improvement of their efficiency. An important feature of the paper is that it covers all agricultural companies regardless of their size, unlike many previous research covering only SMEs.

The authors believe that many interest groups may benefit from the research results. Macroeconomics policymakers and Ministry of Agriculture, Forestry and Water Management may use the research results when designing strategy of the economic development of the country and deciding on the ways of the development of the agricultural industry, respectively. In particular, research results from this paper should be useful when deciding on state-support programs in the agricultural sector. On the other hand, owners and managers of the agricultural companies may find useful recommendations for improving the efficiency of their companies.

The research results should be used in the light of some limitations. The main limitation of the research may be found in the relatively short sampling period and relatively small number of regions. In this regard, future research should cover other transition countries in order to compare research results. In addition, future regional analysis may focus only on the SMEs in order to examine only their impact on the economic growth. It would also be interesting to conduct the analysis after the final year of the Strategy for the Agricultural and Rural Development 2014-2024.

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Conflict of interests

The authors declare no conflict of interest.

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THE CIRCULAR ECONOMY HANDBOOK, REALIZING THE CIRCULAR ADVANTAGE, BY PETER LACY, JESSICA LONG, WESLEY SPINDLER, A BOOK REVIEW

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A R T I C L E I N F O

A B S T R A C T

The paper prepared in the form of a book review is a review of the book written by the authors Peter Lacy, Jessica Long and Wesley Spindler. The book is entitled "The Circular Economy Handbook, Realizing the Circular Advantage". The book was published by Palgrave Macmillan in 2020. Apart from their academic background, the authors of the book are world-acknowledged experts experienced in leading the world's largest circular economy and sustainability strategy programs and studies, advising the senior leaders of the Fortune 500 companies and public organizations towards zero-waste policies and the circular economy. The book was written as a support to the effort made by the World Economic Forum, the Forum of Young Global Leaders, the Platform for Accelerating the Circular Economy (PACE) in the development of the circular economy and the forewords in the book were written by PACE's C.E.O. and other program co-founders and the world-known thought leaders in those specialized fields.

Introduction

Peter Lacy, Jessica Long and Wesley Spindler authored the book entitled "The Circular Economy Handbook, Realizing the Circular Advantage". The book is the continuation of its own kind of the authors' research, which began with the book entitled "Waste to

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Wealth", published by Palgrave Macmillan, a UK publisher, in 2015. The book was published by Palgrave Macmillan in 2020 and addresses the students' and companies' need for learning valuable lessons; it was intended to be a practical guide for the necessary business models and system shifting within known industries. This book is the subject matter of the research regarding this scientific article (Lacy et al., 2020). The authors of the presented book also wrote other books published within the framework of the topics of the circular economy, waste management, growth and sustainability issues, written on the basis of their academic and expert analyses and rich experience within the specialized of waste management, sustainability and ecology.

Within the part of book review entitled *The Methodology and Goal of the Paper*, the scientific goals of this review and the methodology used will be acknowledged.

Within the part of the book review entitled *The Paper Results with Discussion*, the presented book content will be analyzed within the existing structure of the book. The book is structured into three separate and relatively independent wholes, alongside the introduction, the two appendixes, and the index. The authors' endeavors to collect and present in the right manner the anamnesis of the linear economy and the symptoms, and define the accurate descriptions of the problem(s), as well as to suggest a pivot – namely solutions and an adequate therapy within the framework and in the form of the circular economy – were supported by numerous individuals and institutions, first of all through the five forewords authored by the most significant names of the foundations and platforms for the development of the circular economy.

At the end of the book review, the conclusions are presented based on the material presented in the book in comparison with the other available literature – books, scientific papers, the legislation and studies.

The Methodology and Goal of the Paper

*The book review is aimed at presenting the scope, structure and basic values of and the lessons learnt from the book entitled "*The Circular Economy Handbook, Realizing the Circular Advantage", published by Palgrave Macmillan at the beginning of 2020. The presented facts and information revealed in the book review were produced based on the content analysis, perceiving and comparing the basic values of the book with the current scientific and professional literature.

Bearing in mind the kind of the scientific paper, the research will base the scientific research methods characteristic of a book presentation (content analysis, induction, deduction, case study analysis, comparison, the historical method).

The Paper Results with Discussion

The book has 350 text pages written in the Royal format with 28 schemes and figures and 31 tables. The concept of the book is such that, through the 28 chapters organized into three separate wholes, it defines the current state of environmental, social and business issues (the

first whole), the optimal projected state (the second whole) and offers practical solutions to how achieve the optimal, projected state independently of the status of companies (the third whole) within the framework of the circular economy model. The book highlights the economic character of the problems that used to be treated primarily (sometimes even exclusively, too) as environmental problems. Through the presentation of the specificities of different industries, the book presents the most frequent obstacles to a transformation from the 'linear' business doing model to the 'circular'. The authors of the book say that the aim they followed was to present to readers the points of view that would help them perceive how they would "scale the circular economy within their organizations and drive competitive advantage throughout their value chains." (Lacy et al., 2020).

The introductory, and the first chapter at the same time entitled "The Path to Transformation Is Circular" presents environment-related issues (the climate change, a climate crisis, a devastating loss of biodiversity and the habitat, resource scarcity etc.), addressing them as social and business issues, and indicate the general point that solutions to problems lie in the understanding of the broader issues of sustainability and resource usage. Like the other reference authors, the authors of the book emphasize the pragmatic side of the circular economy. Tonneli and Cristoni find that the circular economy is the pragmatic approach that can help society change the current path of natural exploitation we witness to and fear. (Tonneli, Cristoni, 2019) The authors Janić and Jovčić have also recently expressed a similar attitude in their research, establishing a fact that, in the last fifteen years, the weight of discussion about the consequences of global climate changes has been changing and that the standpoint is not always connected with ecology, but rather with the economy. (Janić, Jovčić, 2016) Stahel also considers that the circular economy rebuilds all kinds of capital (financial, manufactured, human, social or natural) and seeks options for all organizations. (Stahel, 2019)

The authors emphasize the fact that only one part of the global problem will be solved if carbon emissions are reduced through "energy efficiency, zero-carbon production, and renewable energy" (Lacy et al. 2020), whereas to solve the overall problem, both production and consumption of energy must be perceived. The above-mentioned environmental, social and business issues, as well as many others (e-waste, food waste, plastics…) must be approached instantly, which many governments have recognized and accordingly have created proactive (the authors used the term 'aggressive') targets/ measures, like those targeted by the European Union (e.g. banning cutlery and straws by 2021). The role of regulation bodies is recognized as important in various arias like the role of the state regulatory bodies in the regulation of the food in America. (Ilić, et al, 2019) In their paper, Vilke et al. also recognize the EU strong response to the environmental challenges like climate change, food safety, and sustainable growth. (Vilke et al., 2019) Different government (and not only government) policies and strategies will also exert numerous influences on the economy and society. Adkins et al. establish a fact of the general growth of the capital and wealth of companies and pose questions about assets and a growing inequality as a result of economic and political strategies. (Adkins et al., 2019)

Changes in consumer behavior and habits are also noticed; as a good example, the authors mention the asset-sharing services practiced by millennials, and other ecologically conscious habits. By monitoring changes in government policies, on the one hand, and changes in consumer behavior as well, companies increase the use of recycled materials, zero waste and reusable and recyclable packaging.

The authors highlight the need for the general understanding of the principle(s) of the circular economy independently of whether actors are consumers, i.e. citizens, the government or the economy. From the point of view of the consumer, the general involvement of citizens is suggested in all sustainability aspects. A similar piece of advice is also given by Petljak et al. in their research carried out in 2019, within which they established a fact that, while some individual users pay attention to the symbols of a product packaging and opt for an ecologically sustainable packaging because they are motivated by care for environment and personal health, a certain number of them considers them to be unimportant. (Petljak et al., 2019) In their research study, Tešić et al. highlight their significance when medications are in question – the medication instruction that would contain all relevant information for consumers and help them make a decision on buying the medication. (Tešić et al., 2010)

The introductory chapter further clarifies the difference from the traditional 'linear' path of doing business to the new principles of circularity, referring to the circular economy as 'a new economic system', as well as 'a business strategy'. The circular economy as presented in the first, introductory chapter is the one that eliminates the concept of waste, changing the way the economy produces and the economy and society consume, which has the product of making a healthier "ecosystem that circulates value throughout the economy and society." (Lacy et al., 2020).

The circular economy is felt as a response to the growing needs of humankind, respecting the limitedness of resources at the same time, so it is based on sustainable development. The circular economy is based as a concept which would enable the renewal of the ecosystem, which requires a large number of innovations and changes in the habits of the economy and society. An important characteristic of the circular economy is its orientation towards the zero-waste concept. The current attitudes of the authors as Franco-García et al. (Franco-García et al., 2019) towards zero waste consider this concept to be an alternative solution to waste management problems.

In the first thematic whole entitled "Where are We Now? – Setting the Foundation", the elaboration of the notionally introduced discipline in the introductory (first) chapter is presented through the two chapters of The Circular Business Models and Disruptive Technologies. The authors present five circular business models: Circular Inputs, Sharing Platform, Product as a Service, Product Use Extension and Resource Recovery, saying that these circular models assist business in its approach to waste, like "resources, capacity, lifecycles, and embedded value". (Lacy, et al 2020) In this part of the book, the authors find the following five enablers important for speeding up the adoption of the principles of the circular economy, namely "consumer engagement,

design, reverse logistics, disruptive technologies and ecosystems." (Lacy et al., 2020) The authors underline the importance of disruptive technologies in the strike of the circular economy (digital, physical, and biological technologies) and their involvement in enabling circular business models by increasing efficiency, innovation, data sharing, and a decrease in relying on resource-intensive materials.

In the second thematic whole entitled "Where Do We Need to Be? – Scaling Industry Impact", the authors introduce 12 new chapters, of which 10 chapters present the profiles of the major industries in terms of waste pools, obstacles, potential opportunities etc. as the means of providing and learning practices that can be helpful in overcoming problems in specific economic sectors. The fourth chapter of the book speaks about the reason why the circular economy is a story about ten Industries. The industries identified as major are as follows: Metals and Mining; Oil and Gas; ICT; Machinery and Industrial equipment; Electricity; Chemical; and FMCG; Household; Fashion Industry; and Personal Mobility (the industry profile). In this part, the authors highlight the fact that circular opportunities address the four types of linear waste: wasted resources, a wasted capacity, wasted lifecycles and wasted embedded values, suggesting that the linear way is not the only way to create value. Apart from presenting the ten major industries, this thematic whole also shows in one chapter (Fifteenth) how e-commerce meets the circular economy, considering the manners in which companies can reduce waste across distribution channels, offering products/services with greater revenues etc. This chapter resolves the dilemma whether "e-commerce channels or brick-and-mortar stores have more substantial environmental footprints." (Lacy et al., 2020)

In the third thematic whole entitled "How Do We Get There? – Making the Pivot", the authors introduce 8 new chapters, which are indicative of the necessity for synchronizing the two processes, one of which is *the transformation and growth of the core business*, whereas the other is *scaling new initiatives of the circular economy*, which requires the defining and valorization of the main point essential for the advancement of the circular maturity within the four categories holistically: Operations; Products and Services, Culture and Organization; and Ecosystem.

Within the scope of the *Operations* as one of the four main points, the authors suggest that 'the value lost' should be examined through operations and with respect to energy, emissions, water, and waste. Within the scope of the *Products and Services*, change in the product/service design, the lifecycle, the optimization of their usage, close product loops, and ultimately the elimination of waste are addressed. Within the scope of the *Culture and Organization*, the authors suggest that companies should (and must) introduce the circular economy principles into the fundaments of the organization by making changes in their respective policies, practices and procedures. Within the *Ecosystem* as the forth main point, the authors suggest that a strategic partnership should be established both in the public sector and in the private sector in order to create such an environment that will enable them to achieve a 'collective transformation.' At the same time, this also the final, 28th chapter of the book.

The book poses questions and gives integral answers to them: Is it possible to bring global production and consumption systems into compliance with sustainability? Is it possible to create a healthier planet with business growth? Is innovating possible without linearity with the circular economy with the achievement of a competitive advantage? And so on.

In a way similar to Lacy, Long and Spindler, other authors also contemplate the nature of enterprises and their complexity, the bases for the achievement of a competitive advantage, innovating, etc. Ilić finds that an enterprise's business doing is conditioned by the environment, and that the environment consists of all the elements (individuals, organizations and institutions) and factors (economic, political, legal, technological, sociocultural, ecological and other) that exert an influence (either real or potential) on the results of the business doing of the enterprise (Ilić, 2018). In their research study conducted in 2019, Rajnović et al. emphasize the complexity of the company and stress the obligation of a sustainable business of companies. (Rajnović et al., 2019).

Di Mariaabe et al. (Di Mariaabe et al., 2020) also show the sustainability of the waste management system imposed by the EU legislation, emphasizing the primacy of the integrated sustainability indicator (ISI) based on the environmental, social and economic lifecycle approach in analyses.

In the literature list, the authors present an imposing number of 644 bibliographical entries, annotations and quotations, covering the content of the three thematic wholes and indicating the fact that the text of the book is thought-provoking and significant first of all thanks to the fact that they used scientific apparatuses, regulation and business cases and trends (in the research study, more than 1500 circular case studies were analyzed through the Circular Program Award Initiative organized by the World Economic Forum). The book refers us to the practical steps that must be made so as to enable a linear organization to become a holistic circular organization. There are authors who also considered what was needed for an organization to change its course of action. Gedminaitė-Raudonė et al. remind us of the fact that the circular approach differs from the traditional linear model of production, finding that the aim pursued by businesses must change from that implying generating profits of products and services sold to that implying generating profits from the flow of materials and products over time. (Gedminaitė-Raudonė et al. 2019)

Although the authors are more prone to presenting the benefits of shifting from the linear to the circular economy, they also make a mention of the existence of certain risks accompanying this process in organizations. In a way similar to them, Jovičić et al. find that, when making a proposal for a new concept, such as shifting to the circular economy, a series of economic and other benefits are expected in a longer time period. A possible occurrence of short-term losses, however, should not be neglected. (Jovičić et al., 2019)

Conclusions

The book entitled "The Circular Economy Handbook, Realizing the Circular Advantage" presented in this scientific book review was written in the academic style, and its value reflects in the demonstrated richness of the authors' knowledge and their familiarity with several scientific fields and areas (social-humanistic sciences, interdisciplinary sciences, medical sciences). The authors Peter Lacy, Jessica Long and Wesley Spindler have demonstrated the ability to present the problems of climate change, waste management, uncontrolled growth within different scientific fields and practical current problems by drawing the so-called 'take, make, waste' mindset that exists in society and in the economy, by which the general value of the text is multiplied and its dual nature – scientific and professional – is presented (i.e. its scientific and professional contribution).

The linear path is implicative of the mentioned 'take, make, waste' model, and the book highlights that exactly at the moment when something is wasted – resources are wasted. Treating resources in nature badly is in contradiction to the basic economic principles that speak about the scarcity of resources and finding out a way/ways to use them for alternative needs. The essence of the circular economy lies in the manner in which resources would be retained in the manufacturing/production and consumption cycles as long as possible. In that manner, the living environment is also protected by saving money, resources and workforce, simultaneously with the significant savings that companies would have since they would be using the already used materials.

"The Circular Economy Handbook" shows guidance for systemic change within the holistic approach, referring to organizational and civil change from 'the linear to the circular', changing business models by means of technology as well, which its practical contribution is based on and which is justified by the noun 'handbook' used in the title of the book.

Conflict of interests

The authors declare no conflict of interest.

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THE ROLE OF THE MEDIA IN THE AFFIRMATION OF THE CULTURE OF FOOD SAFETY

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ARTICLE INFO	ABSTRACT
	Abraham Maslow's theory is one of the best-known and oft-cited theories in the West. It is known as a theory of the hierarchy of needs. By this theory, human needs are hierarchically organized in five levels. The hierarchy is depicted as a pyramid, with the largest, most basic needs at the bottom, and the highest needs, such as self-actualization on top. It is understood that physiological needs are at the first level, such as needs for air, water, food... The physiological needs of an organism are basic human needs, and their fulfillment is a basic precondition followed by the needs of a higher order. Healthy life habits such as a good diet contribute to physical, mental, and emotional health. Their influence can be far-reaching, regardless of age, gender, or physical capabilities. Education accompanied by a steady application of current dietary knowledge allows us to consciously influence life processes in our organism. Mass media has to take the leading role in the promotion of food safety culture, while not considering only technical questions.

Introduction

Today it is more than ever clear how much safe food is important for our survival. Generally accepted practices which were created to provide safety of food for human consumption are not efficient enough. It is hard to say that there is absolute reliability in the chain of growing, processing, preparing, selling, and/or catering food. The human factor is undoubtedly responsible for the fact that nearly one of 10 people in the world

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get ill every year by consuming food processed or prepared in an unhygienic way, according to estimates of the WHO.

The contamination of food is extraordinarily complex and can envelop several contaminating substances simultaneously. The modern man, who is in a specific disharmony with nature, uses very frequently and negligently many chemical substances in the application of modern agrotechnical means, with intent to increase yields, quality, and protection of food from pests. At the same time, a significant number of substances reach food from the polluted environment (soil, water, or air). Accumulation of chemical substances and other harmful agents in food (pathogenic microorganisms, radioactive substances), leads to frequent pollution with multiple harmful effects on humans and animals. We can outline several types of contamination by the nature of contaminating matters: chemical contamination, radioactive contamination, biological contamination, and physical contamination.

Mass media routinely subjugate questions of food safety, complaints from consumers and their associations, and sometimes obvious results of inspections to their interests and vast profits from paid advertising by multinational corporations. Dedication to public health is secondary. Because of such practice, a large number of people in the world have problems with obesity and comorbidities, such as diabetes or heart diseases. So-called fast food with a large number of calories, along with consumption of energy drinks and soft drinks, contributes to the accumulation of lipids, which can be devastating for the human organism. Such a strong influence of mass media on consumers must be diverted and envisioned to help to organize and to strengthen of positively sustainable and mature food safety culture. In that way, together with responsibility ethics, buyers/consumers, the environment, and most importantly, the lives of people and coming generations can be effectively protected. If consumers use food that is unsafe, it may lead to deterioration of health of consumers, leading to increasing economic costs for medical treatment, payment, security, absence from work and the like (Bjelajac et al, 2013).

Therefore, food safety culture is not a declarative topic, but an essential question of choice for the betterment of civilization. It includes the application of food safety standards, dedication of management through a vision of values, responsibility, adaptability, and consistency in the domain of human dignity. The basic goal of this paper is to define dimensions and critical content of food safety while stressing the necessity of the development of healthy food safety culture.

Methodology

In writing of this paper the following methods were used: analysis, for defining the factors of contamination of food, to define the terms that influence the integrity of food, the terms that are factors of food safety culture, the terms that are factors of media systems: descriptive method was used for describing the roles of various groups of factors that influence the state of affairs that are the subject of this paper; media content analysis method was used in the section about the role of media in affirmation

of healthy dietary choices; while the method of analysis of primary and secondary sources was used in gathering and interpretation of statistical data related to health disorders caused by contaminated and unhealthy food. The normative method was used in the description of certain legal regulations that tackle the effects the consumption of certain foods has on human health.

Food contamination

Under the term of food, all that is used for eating or drinking in a processed or raw state is implied. Food includes spices, colors, and all other substances (additives) that are added to food because of conservation, enrichment, or improvement of organoleptic attributes. Food can be plant-based (cereals, fruits, vegetables), animal-based (meat, fish, eggs, milk, etc.), mineral-based (table salt), synthetic (additives) (Jugović et al, 2017). In the total process of food manufacturing, in one or more phases, contamination of food used for human or animal consumption inevitably occurs, and depending on the phase or environment where the phases take place, food is exposed to contaminants to a larger or a lesser degree. It is understood that if the environment where food manufacturing takes place is more polluted (urban areas, industrial zones, etc.) the contamination risk is larger. Also, in environments where the contamination risk is higher food becomes polluted from several different sources, which poses an additional problem and health hazard. The transformation of rural areas to industrial also adds to the risk of pollution. For instance, in Serbia, annually between 6,000 and 30,000 hectares of agricultural land "disappear" due to urbanization, infrastructure construction and excavation sites (Počuča, Drašković, 2015).

By nature of contaminating matters, we can identify chemical contamination, radioactive contamination, and biological contamination (Jugović et al, 2017), while many scholars add another contamination category, the physical contamination of food.

Chemical contamination occurs by using chemical substances in the manufacturing process. The main chemical contaminants of food are additives, sweeteners, conserving agents, colors, pesticides, heavy metals (Jugović et al, 2017). The origins of chemical contaminants are various from the field to plate, namely soil, environment, disinfection byproducts, personal care products, air, water, and packaging material. Chemical contaminants inhibit almost all the mass-produced everyday use products such as disinfectants, plastics, detergents, deodorants, pesticides, and so on (Rather et al, 2017). Here we shall stress that the chemical contamination usually comes with intent, whether to increase quality and durability, whether to improve taste or color, which means that the greatest deal of this type of contamination could be avoided.

Radioactive contamination of food occurs due to the accumulation of radioactive elements on surfaces or withing solid, liquid, or gaseous matters where their presence is undesirable. Radioactive contamination can occur through natural radioactive contaminants or by radioactive products of human activity. In Serbia there are evident negative consequences due to the NATO bombing, and the use of depleted uranium

ammunition and contaminated land has caused an increase in the number of cancerous diseases (Bjelajac et al, 2017). We shall also say that there is the widespread practice of sterilization of food by irradiation, which began in the second half of the 20th century, and is used in more than 60 countries in the world, but it does not cause radioactive contamination of food.

Biological contamination occurs when food comes into contact with chemically harmful matters through biological agents, meaning living organisms. Agents of biological contamination are insects, mold, parasites, viruses, and bacteria, which contaminate food in various ways. Generally, the biological contamination of food can occur in any phase of the life cycle of food, depending on the biological agent that contaminated the product. Insects and parasites usually contaminate food during cultivation, while bacterial contamination most often occurs by improper storing of food. A working hypothesis of the origin of the COVID-19 pandemic is that the virus infected a person who handled the meat of the infected animal and sold it to the consumer. We can see that the consequences of biological contamination of food can be disastrous – from destroyed crops and economic damage due to harmful activity of insects and parasites, poisoning caused by bacteria-contaminated food, to pandemics of infectious diseases.

Physical contamination of food occurs unintentionally – by mistake, lack of attention, or defective equipment for manufacturing, preparation, or storage of food. It implies the presence of physical objects in food, such as metal, glass, plastics, insects, nails, etc. The danger for the human organism from physical contamination of food varies depending on the contaminant, but it can cause serious injuries or poisoning.

According to the World Health Organization, the frequency of food poisoning in industrialized countries in the past ten years has been between 10 and 15 percent per year, while the incidence of milk and dairy products poisoning is estimated at around five percent per year (Bjelajac et al, 2017).

Figure 1. Global burden of foodborne diseases

Source: The World Health Organization, 2015

The Institute for Public Health of Serbia, in its annual report on the safety of food and bottled water in the Republic of Serbia for 2018 states that 7,976 samples of food were tested for chemical contaminants. It was determined that 176 samples contained physical and chemical contaminants. The majority of contaminated samples were contaminated by a high content of additives and increased content of nitrates. Additional 7,523 samples were tested for microbiological contamination. Microbiological contamination was determined in 38 samples. The most frequent reasons for microbiological contamination were the presence of mold, yeast, an increased number of colony-forming aerobic bacteria (Institute for Public Health of Serbia, 2018).

Table 1. Results of testing of food for chemical and microbiological contamination in Serbia in 2018

Type of test	Number of tested samples	Number of contaminated samples	Percentage of contaminated samples
Chemical contamination	7976	176	2,2
Microbiological contamination	7523	38	0,5
Total	15499	214	1,4

Source: Institute for Public Health of Serbia, 2019

Still, in some cases, food that is not contaminated is not necessarily beneficial for health, on the contrary. Food can contain very large amounts of sugars or fats and not enough nutritive value, so the consumption of such food can lead to health problems, disorders, and diseases. While the developing countries are more hit by the harmful effects of contaminated food, developed countries are more hit by disorders and diseases caused by mass consumption of unhealthy food, such as obesity or diabetes. According to the data from American Centers for Disease Control and Prevention (CDC), the prevalence of obesity in adults in the USA was 42,7% in 2018, and that the share of obese persons grew from 30.5% to 42.7% in the period 2000-2018, while the prevalence of severe obesity grew from 4.7% to 9.2%. (Centers for Disease Control and Prevention, 2018). In addition to being a health problem, obesity caused by the consumption of unhealthy food poses an economic problem as well. The estimated annual medical cost of obesity in the United States was $147 billion in 2008 US dollars (Finkelstein et al, 2009). Additionally, obesity raises the risk for morbidity from hypertension, dyslipidemia, type 2 diabetes, coronary heart disease (CHD), stroke, gallbladder disease, osteoarthritis, sleep apnea and respiratory problems, and some cancers. Obesity is also associated with increased risk in all-cause and CVD mortality (Jensen et al, 2014).

The Importance of Food Safety Culture

A simple answer can be given to question what food safety culture is. That is a culture where all the individuals involved in the chain of producing and distribution of food (owners, managers, employees) reason and act in the spirit of standards that the food they produce or serve must be safe in their everyday work activities. The food safety culture is imperative that quality products must be safe for consumption, and food safety must be undoubtedly the main priority.

Foodborne diseases are a major public health problem worldwide. In Australia, approximately 25% of gastroenteritis cases were caused by contaminated food, and in 2010, 4.1 million foodborne gastroenteritis cases occurred. In 2010, contaminated food was estimated to be responsible for 30,840 gastroenteritis-associated hospitalizations, 76 associated deaths, and 5,140 non-gastrointestinal illnesses. (Kirk, et al, 2014). Therefore the representation of strong food safety culture makes people understand the importance of action in that direction. Minding that obligation always starts with the leading positions in the company management, and ends with the last link in the chain. Good food safety culture protects the consumers from foodborne diseases, preserves the reputation of certain brands, and protects the business from financial losses.

Figure 2. Elements of Food Safety Culture

Source: adapted from Wright, Leach, 2013, Nvolve Group

Safety culture within an organization is attributed to the values of both individual employees and the business as a whole. The success of an organization's safety program is based on trust and a shared vision of importance surrounding safety for the entire organization. Developing a Food safety culture has become a key focus within the food manufacturing industry in recent years. Companies are investing more time and money into food safety as it has a direct impact on auditing success and the company's bottom line. Elements of food safety culture are (Nvolve, 2017):

1. Business priorities - The extent to which an organization prioritizes food safety and their overall attitude regarding food safety.

2. Risk perceptions - The organization's perception and understanding of the risks associated with food safety.

3. Perception of food safety procedures - The organization's perception of the effectiveness and validity of food safety regulations.

4. Ownership of food safety - The level of responsibility that an organization accepts in relation to food safety.

5. Competence - The level of understanding an organization has regarding risk management procedures.

6. Leadership - The level of commitment that management has regarding food safety.

7. Employee involvement - The level of commitment the wider organization has toward food safety.

8. Employee communications - The level of communication across the organization and the freedom for employees to challenge procedures

We can see the importance given to the level of employee communication in the organization. Companies that have developed food safety culture permanently manage food safety training, and never consider it a routine exercise meant only to meet certain protocols. On the contrary, they do it because such an approach is an integral part of their sensitive work with food. Developed companies have advanced technologies at their disposal, so they can provide information on procedures used to maintain food safety to clients and/or regulators electronically.

We shall also have in mind the growing market for organic food, which is by definition produced without the use of chemicals than can end up contaminating food, such as pesticides, additives, etc. Consumers attach greater importance to these products especially in the food segment. The results of numerous studies confirm that the growth rate of organic foodstuffs by far exceeds the overall growth rate of the food market (Končar et al, 2019). Quality food is also of importance for overall tourism attractiveness, and it is a part of the basic tourism product (see: Vuković, 2018). In a study of satisfaction of hotel guests in Serbia, those whose motive for stay was business gave lower grades to selection of food and beverages in the hotels than those whose motive was tourism (Marinković, Sekulić, 2016), which means that in order to begin using of strategic potentials of our country, we shall cater both to food markets and consumers and visitors, whether for business or for leisure, but also by adding an endemic component in the tourism product we offer, and that is our local food and beverages, but per food safety and quality standards and procedures.

On one side, in our contemporary digital and integrated world, consumers are more aware of food safety than ever. Information on the quality and reputation of food brands is available by a one-click web search. On the other side, consumers are aware of the risks of unsafe food as well. They are concerned about the quality of food and import control measures. Mass media contribute to total confusion as they do not promote the companies with a strong food safety culture that uses these positive results of their work not only as a competitive advantage but for the good of mankind as well.

Mass media and affirmation of healthy dietary choices

According to Lorimer (1998), mass media are a separate set of activities with primary, non-derived function to identify or construct reality. Here we shall make a distinction between mass communication and mass media, and say that mass communication is a much broader term, and that mass communication is not necessarily done through mass media, but that mass media perform the function of mass communication. This century and its most recent decade were marked by ascension of the Internet and social media among the most significant means of mass communication, slowly pushing out the print media. In addition to basic content, mass media publish or broadcast, advertising is also particularly important for our study, so the influence of media on the affirmation of food safety can be divided into two categories:

- Influence through basic media content (articles, shows, reports, audio, and video clips, etc.)

- Influence through advertising content

When discussing media content, we encompass both print and electronic media. With print media, a very important role belongs to lifestyle magazines whose target audience are generally women, which represent an important source of information about nutrition health. These magazines often contain recipes, but few contain any information on food safety, and where information is available, it is brief and inadequate (Griffith, Price, 1994). In the era of information oversaturation, unchecked information is often published, so lifestyle magazines sometimes promote food and supplements whose nutritional value and influence on human health are not confirmed. This happens very often on social media, where influencers promote such products in the form of paid advertisements, with no one trying to check the validity of information because the profit is the motive for both the advertiser and the media or those who perform the function of the media. Print media that survived the advent of the Internet and migration to digital and online were able to do that basically because of their quality and credibility built over decades of work. Therefore, they have a bigger responsibility to provide enough relevant information about safety, quality, and nutritional value of food to their readers.

Electronic media were the ones that significantly increased the audience and the reach. First the radio, then the television, followed by the Internet which is a platform for what we call the new media – portals, blogs, podcasts, social media – not only encompassed the existing media audience but reached and created a new one by the development of technical capacities for their use. Electronic mass media have the greatest capacity for identifying and constructing realities. That makes their influence immeasurable and generally uncontrolled – since the audience grows together with the number of available content - which leads to mass non-critical acceptance of opinions communicated by the media, whether through basic program contents or advertising. Both the television and the new media that broadcast video content have the potential to inform, and then to promote values of food safety culture, not only through culinary or agricultural shows but values embedded in the rest of their programming, especially because there is a social consensus that the quality and

safety of food is a shared value of the mankind. The medium of television possesses advantages over the other media forms for the presentation of food hygiene information. Food hygiene is partly knowledge-based and partly skills-based, and television can be especially suited to demonstrating good hygiene skills and practices. Furthermore, the presenters are often people of "prestige" who have popular appeal and for whom the public have a liking. (Griffith, Price, 1994). We have a similar situation in the new media, which created thousands of new media personalities in whom the audience has trust. Compared to their power and potential for positive influence, neither traditional nor new media do not do as much as they could in giving all the relevant information about the hygiene, safety, and quality of food, nor in promotion of food safety culture.

A significant part of a total message broadcasted by mass media is done through advertising. Advertising is an invention of crucial importance for capitalist societies, and it is embedded in the very foundation of commercial mass media, as it allows the production and distribution of information and entertainment for a large segment of the population at a very low cost for the consumer (Lorimer, 1998). In the past, the effect of the product, and satisfaction of consumers, was supplemented by ads to increase or maintain the sales, but the advertisers now create new markets by launching new products. An advertiser creates a need and then convinces us that the product fulfills that need (Lorimer, 1998). Advertising has several forms – from print ads or advertising spots, PR articles, and social involvement of the advertised brands, to the physical placement of products in media contents.

Figure 3. Total revenue by publisher and magazine by type (subscription, sales, advertising)
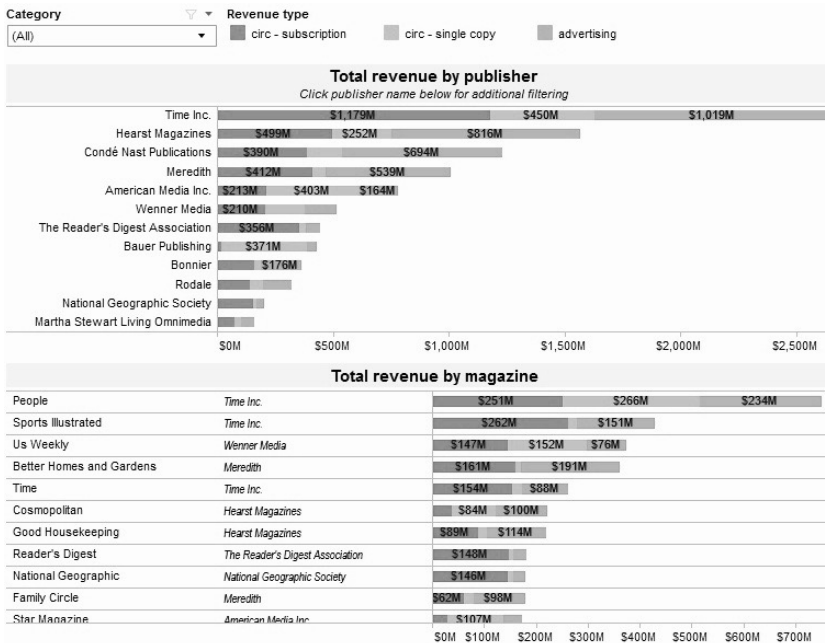
Source: Spyglass Intelligence, 2020

It is a fact that the media will advertise anything that is not explicitly forbidden and can bring revenue, and that fact is unchangeable. Why we are bombarded with "cannot miss" sandwich and pizza deals chasing us to our houses and even while reading the newspaper or watching the television? The answer is quite simple. We are obviously being conditioned to look at food as entertainment (Alkharfy, 2011). Food advertisers often use techniques known to enhance the appeal of advertisements to children and known also to mediate positive responses to the brands being promoted (Gunter, 2016). Before, tobacco manufacturers and ad agencies were unscrupulous in finding ways to improve the sales by advertisements, so the ads for cigarettes often included the depiction of children who smoke. By strict regulation of tobacco products, not only their advertisement was forbidden, but brand names and packaging of tobacco products were changed, with a clear warning of their harmfulness, which in certain countries include graphic depictions of diseases smoking can cause. So what is the state of affairs with food whose contents also cause serious health disorders? In 2016 the UK government decided to impose an additional levy, to take effect in 2018, on producing and importing soft drinks containing added sugar. A levy on soft drinks contributes to the government's plans to reduce childhood obesity by removing added sugar from soft drinks and encourages producers of added sugar soft drinks to reformulate their products to reduce the sugar content to encourage consumers of soft drinks to move to healthier choices (HM Revenue & Customs, 2016). In addition to obvious health benefits, the UK government expects an income of around 1,5 billion pounds in a three-year period (2018-2021). Additionally, retailers must display the information about the amount of added sugar as well as nutritive values of a product on their shelves, so the consumers would have clear information.

Discussion

In the past, since the dawn of mankind, to the modern age, food represented only sustenance to the people, which shall meet basic nutritional needs and provide survival. The choice of food was narrow and came down to whatever people were able to get – by hunting, fishing, collecting, or farming. In that age, the life expectancy was significantly shorter than today for both men and women, and it was in part because of the quality and diversity of consumed food or drinking water. By civilizational progress, we reached an understanding of the influence of consumed food on health, quality of life, and life expectancy. As certain foods or products harm health, some others have a beneficial effect, even so, they help in the treatment of some diseases, and in any case improve the general health of an organism, from digestion to immunity. That means that people once ate and drank what they had at disposal, while today they can consume food following their preferred diet and the results they aim to achieve, whether they are in a sense of health, aesthetics, or identity through diet (vegans, etc.).

Still, in that multitude of choices, the modern man often goes for the simplest solutions. The typical reason for that is the acceleration of modern life, where people often do not have time for a healthy meal full of necessary nutrients. People then turn to fast food –

whether they are employees, students, or pupils. Everything is known about deficiency of fast food, which means that the fast-food consumers are making an informed choice because they are aware of both the deficiencies and potentially harmful effects of such food and drinks.

A man is a reasonable and conscious being but sometimes makes choices contrary to reason and consciousness. A good example is the consumption of tobacco products. The consumers of tobacco products are consciously ignoring all the information on potentially lethal harmfulness of tobacco, which is impossible not to know as that information is dominantly displayed on the packaging of those products. A part of the reasons why people consume tobacco products is the addictiveness of nicotine, but that should be a reason more to avoid it, and not the justification for consuming it. It is similar to unhealthy food. We have mentioned that the British government introduced an additional levy on added sugar in soft drinks because of the direct connection of that with obesity and other health complications in children.

Media, as we said, have an exceptionally important role in the creation of consciousness of the audience, and as such, they have an enormous influence on dietary habits. Through their programming content, and largely through advertising, media popularize not only fast food and carbonated soft drinks but various unchecked dietetic products whose main function is to compensate for deficiencies created by the accelerated lifestyle and to aesthetically bring people closer to the idealized picture media imprinted in the minds of people through their systematic activity. That creates a certain vicious circle where people first create a problem for themselves by poor dietary choices and then try to remedy that by consuming products that are also potentially harmful, which cannot lead to a good solution.

Food safety culture is inexcusably neglected in the hierarchy of human priorities. When we say it is neglected, we do not try to precisely determine its position within the hierarchy – it is enough to know it is not among the basic ones, and priorities should follow the hierarchy of needs, where physiological needs are on the first level, and safety needs are on second (Maslow, 1943). It logically belongs there, as there is almost no reasonable and conscious being that would say that food safety is not important. When we say food safety, we include both its quality and its usefulness for the health and optimal functioning of the human organism. Generally, safety culture in the contemporary world is an art of living, and food safety culture as its subset should be embedded in the consciousness of every individual.

Conclusions

The choice of foods and drinks we will bring into our organism is upon each of us. But for that choice to be informed, as well as for many other things, people live in organized social systems, whose one of important roles is to make binding decisions in the best interests of citizens of that social system, as well as to be one step ahead from its citizens in the regulation of potentially harmful matters, both for the society as a whole and

every individual. In that sense, these social systems must care about public health, which often is a sum of the health of individuals. An individual will always have the right to do whatever he or she pleases, as it is one of the basic human freedoms, but countries and international organizations should at least make the making of unhealthy choices more difficult or expensive. In that sense, the British government set a good example by introducing an additional levy on products with added sugar, and it marks a good beginning of regulation of that field. These measures can be widened to other foods that contain substances harmful to health but do not contain enough nutritional values. The World Health Organization, as an umbrella organization for care about global health, failed in this case as well. International law precedes the local ones, and in that sense, the WHO will reach its potential and its role because of which the whole world finances it only when its recommendations become legally binding for all the member countries. Until then, while everything is on the level of informative recommendations, the world will not have a singular response, nor will it be capable to combat an increasing number of public health challenges brought by the modern society.

Conflict of interests

The authors declare no conflict of interest.

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INNOVATIONS IN RURAL TOURISM IN POLAND AND ROMANIA

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A B S T R A C T

The interest in rural tourism in Poland and Romania is the result of processes originating from economic and social factors reflecting the needs of both rural inhabitants and tourists. A significant growth in the field of rural tourism leads to implementation of innovative products in the development of tourist services. The aim of the study presented in this paper is to show the essence of innovation as a component of the contemporary tourist industry, and to present the type of innovations that occur in rural tourism in Poland and in Romania. The theoretical part analyses innovation in the field of rural tourism. The empirical part, in turn, presents case studies of tourist businesses in rural areas, taking into account the implemented innovations, in both Poland and Romania. The case studies are presented based on interviews with owners of tourist facilities.

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Introduction

The issue of innovation in contemporary markets mainly relates to factors such as increasing competitiveness or achieving success. The concept of innovation should be understood as "…implementation into service of new products, ideas or procedures. Therefore, it will be any positive changes implemented for use, which are seen as new from the point of view of the entity introducing them" (Panasiuk, 2014).

According to M. Idziak and W. Idziak (2015) innovations can be considered from two perspectives: business and social. The business approach divides innovations into *product* innovations, and means implementing either a new or significantly improved product or service, *process* innovations (the introduction of a new process), *marketing* and *organizational* innovations (the implementation of new marketing methods in the first case, or new organizational methods in the second)[6].

On the other hand, social innovations are primarily new ways of solving social problems and methods of social activation, as well as new models of functioning of social institutions. Moreover, the implementation of new forms of organization of free time activities, or educational and cultural activities, is also considered.

Recent years have been a time of the growing importance of innovation on the tourism market. Tourism contributes to the development of culture, tradition and beliefs of people (Durkalić, 2015). Innovation in tourism usually involves modifying already functioning tourist products and adapting them to the expectations and requirements of the buyer. Importantly, it is an activity designed to forestall competitors' actions. According to M. Wozniczko and D.Orlowski (2012) "Striving for raising innovation and competitiveness of tourist products is one of the classic premises in the process of tourism development."

According to J. Majewski (2015) the very popularity of the problems of innovation (as well as creativity) should, in the first place, be considered in two aspects. The first is in its close connection with European Commission policy, which regards innovation as one of the primary determinants of development, as well as an important condition for the allocation of funds. On the other hand, the second aspect lies in the current models of tourist consumption, in which, according to Majewski, "creativity and innovation have become simply fashionable." Importantly, while affecting the functioning of the tourism industry, both of these areas have become an essential element of the market, determining which product, and at what time, becomes innovative.

Krzyzanowska (2013) indicates the different ways of functioning of innovation in tourism. An innovative action will surely be creating a new, not-yet existing tourist product – e.g. a group of themed villages – as well as creating an institutional environment or undertaking marketing activities for existing elements of natural and

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6   The authors refer to the so-called Oslo methodology, the name of which comes from the title of a handbook of international standards in research on innovations in two sectors: industry and services.

cultural heritage. Moreover, an innovative activity may also be a tourist product in the form of a spot, e.g. an object, a trail, as well as an event, such as a cultural event or service, or an organized trip. According to Krzyzanowska, to talk about creating an innovative product in rural tourism, the common action of many private and local parties is necessary. This can be difficult, if only because of the fact that it requires an appropriate management strategy, as well as due to the necessity of incurring relatively high costs.

The entities whose activity forces innovations are not only tourist businesses, but also suppliers, competitors, employees, consulting companies and even consumers themselves (Panasiuk, 2014). However, it seems that from the point of view of the process of innovating in the tourism industry, the most important parties are the individual service contractors who, while creating their own tourist product, usually also make use of:

− Knowledge, skills and material resources associated with the interests of the owner, their passions, profession or business activity, as well as local traditions and customs;

− Owned properties;

− Finished products modelled on actions taken in other areas (Krzyzanowska, 2013)

The aim of the study presented in this paper is to show the essence of innovation as a component of the contemporary tourist industry, and to present the type of innovations that occur in rural tourism in Poland and Romania. Below, some of their many innovative actions are described, such as thematic villages, educational farms and networking of tourism products, supplemented with examples of good practice. Based on the interview questionnaire, being the research tool used for the purpose of the study, the empirical part describes the particular rural tourist facilities, taken into account the implemented product innovations. The research was conducted in 2018 in Poland and in Romania.

Thematic villages

An interesting example of innovation in rural tourism is the concept of thematic villages, the origins of which can be linked to implementation of the LEADER program. According to M. Mackowiak and P. Seelieb (2009), a thematic village is "a village in which development is subordinated to one, leading idea. The theme is based on a quality which is characteristic for the village, interesting, something of which the village is, or may become known." Thematic villages are slightly more vividly determined by W. Idziak (2008), who writes that they "created a new concept of its development, the subject for a new story, thanks to which the village community will begin to live a new life. This new story will lead to new events."

There is no one universal way to create a thematic village, because the process runs differently in places that have a clear specialization associated with crafts, agriculture or natural values, and in a different way in villages where no such thing exists. As far as

the aim of thematic villages, it is to create new opportunities for the local community to earn money. It is not, for example, about introducing new types of farming or cultivation, but rather the use of an existing basis for the creation of original ideas, thanks to which the village can become a more attractive place – for both its inhabitants, creating new earning opportunities, and tourists (Mackowiak, Seelieb, 2009).

The psychological aspect – especially in terms of the mentality of people, therefore the tradition of their joint activities, social activity, as well as the presence of leaders – is undoubtedly important from the point of view of new initiatives in the local environment, in this case – thematic villages (Idziak, 2005)

Currently, there are still many possibilities for using innovative tourist products (as they are broadly defined) in the form of thematic villages (Idziak, Idziak, 2015). The use of "symbolic and metaphoric values" is mainly indicated as a subject of specialization, as well as wide implementation of information technologies in the product, as well as in its logistics and management. New opportunities are also created by a modern approach to educational activities in thematic villages, including innovation in the range of forms and methods of education outside school. It is also worth noting the introduction of social innovations in the specialization of the village, related to the problem of social exclusion. Many examples indicate that the activities directly related to thematisation, and consequently to the creation of thematic villages, have a direct impact on the emergence of social inclusion processes in their local environment (Idziak, Idziak, 2015).

Educational farms

Educational farms (or educational enclosures) are an example of the functioning of innovative forms of entrepreneurship in rural areas in Poland. This concept encloses "agricultural farms holding livestock or crops intended for presentation to groups of children and adolescents invited within the framework of school programs, or opened as tourist attractions for families with children and adults travelling alone" (Bogusz, Kmita-Dziasek, 2015). One requirement to meet here is the realization of an educational program, the topics of which include several areas: crop and livestock production, processing of agricultural crops, ecological and consumer education, cultural heritage, traditional crafts and folk art.

Educational farms are part of the National Network of Educational Farms, in which membership is voluntary and takes place at the request of the farm owner and on the recommendation of an advisor from the agricultural consulting centre appropriate to the given voivodeship. Joining the network brings with it certain benefits, defined in the Network Regulations. These include:

– "the right to identify the educational offer with the logo of the Network;

– promotion of offers in the national Internet system;

– promotion at fairs and other promotional events and in media;

– access to substantive guides;

– participation in periodic training and advisory support;

– exchange of experiences on a social network website" (Kmita-Dziasek, 2015).

One of the assumptions upon which the activity of the National Network of Educational Farms is based lies in the dissemination of knowledge, both about the origin of food and the importance of agriculture. This is why a large part of the educational program offered by such farms is taken up by issues of environmental and consumer awareness, e.g. traditional food-making, processing, local and regional cuisine and customs associated with the preparation of dishes. Some of the farms belong to the Regional Networks of Culinary Heritage, within the European Network of Regional Culinary Heritage, while others carry out educational activities using products from the national List of Traditional Products for organic farming (Kielian, 2015).

It is worth noting that the interest in conducting educational activities as an additional activity largely applies to owners of agritourism farms. This is undoubtedly closely related to the specific nature of this type of entity. What's more, increased interest in recreation in the countryside also brings an increase in expectations about what's on offer, while agritourism ceases to be exclusively connected with a stay at a farm and the possibility of purchasing food from it (Kmita-Dziasek, 2015).

Network tourist products

Networking of tourist products is definitely an activity of an innovative character. The starting point for building a network in rural areas should be the belief that the inhabitants of a given region can benefit from the development of a network of rural tourist sites (Vinohradnik, Bogusz, 2011). A network tourist product, according to the definition approved by the Polish Tourist Organization (POT), is a "ready-to-sell, packaged and commercialised offer, based on a distributed structure of entities, attractions, destinations, service points and objects functioning as a single coherent concept, which has a joint, leading characteristic (brand)" (Kachniewska, 2015). With regard to the tourism industry in rural areas, the Agricultural Advisory Centre branch in Krakow defines a network product of rural tourism as an "offer ready to sell in rural areas, presented in tourist packages tailored to specific groups of recipients, based on a distributed structure of entities, attractions, destinations, service spots and objects, which function as a single coherent concept satisfying the needs of tourists and providing a guarantee of quality and uniqueness" (Vinohradnik, Bogusz, 2011). K. Vinohradnik and M. Bogusz (2011) point to the fact that the process of building a network of tourist products consists of four basic elements: an analysis of the attractiveness of a given area; the selection of an initial variant of the tourist product; determination of tourists' preferences and current trends in national and international tourism, and definition of the final variants of a tourist product, including the construction of their implementation program.

The Polish Tourist Organization emphasises several important features of a network tourist product, namely:

− Dispersed structure of the entities, both from the public and private sectors, as well as the social sector,

− The multiplicity and diversity of services, elements of infrastructure and tourist assets,

− Common (uniform) concept of functioning,

− Cooperation and agreement between partners,

− The existence of a "product leader",

− Product name – branding,

− Blurring of the administrative and geographical boundaries (Kachniewska, 2015).

The networking ultimately leads to creation of a brand, and a network product of rural tourism. According to A. Sieczko (2011), thanks to the brand the product begins to stand out from other products, since it is "unique, original and not anonymous." Additionally, it allows for identification of a given region and seller, as well as becoming an important element of communication between providers and consumers of tourist services. K. Vonohradnik and M. Bogusz (2011) define the brand as "the wholeness composed of the product, its artistic visualization, the identity and image of the manufacturer along with the emotions associated with the product or the manufacturer, certain characteristic and values." Referring the brand to the network product, the authors claim that networking should be considered a feature that distinguishes a specific tourist product as coming from a specific area.

Case studies from Poland and from Romania

Networking for development - The Transylvanian Highlands

The Transylvanian Highlands is an initiative formed in 2015 by 13 organizations: NGOs and Local Action Groups, including local administration bodies.

Their objective is to promote the natural and cultural heritage by developing an ecotourism destination within a Natura 2000 protected area, specifically the area called Podişul Hârtibaciului - Târnava Mare - Olt, placed in Transylvania region, between the cities of Mediaş, Sibiu, Făgăraş, Rupea and Sighişoara. This also contributes to the objective of increasing the sustainably managed forest areas, identified as a sensitive issue within Nature 2000 network in Romania (Niculae et. all, 2017).

Transylvanian Highlands acts as a facilitator for local networking, providing examples for best practices, animating working groups and promoting cooperation between all interested private organizations, but also between private and public bodies.

Their activities are addressed to a large range of stakeholders: tourism operators, pensions and other accommodation facilities owners, info centers, equipment rental

centers, tourist objectives administrators, local producers, craftsmen, local NGOs, mayors, local councils, other public institutions in charge with forest management, protected areas administration, public health and food safety, cultural sites and locals in general.

After four years of steadily increasing activity, the four persons team of Transylvanian Highlands managed to develop a network meeting ecotourism criteria (pensions, producers, crafts) and a tourism infrastructure by identifying and marking new tourist routes. Their network doubled during these 4 years and the destinations they promote became well-known outside the region.

Local traditions represent the backbone of all promotion activities, with an emphasis on architecture, gastronomy and also local customs, stories and traditional events.

The organization integrates all kinds of information, like tourist infrastructure in the area, producing leaflets with useful preventive advices (for carriages, for example), tourism statistics and area monitoring, promoting tourist destinations and events and creating various ecotourism packages.

They also are actively involved in raising awareness regarding ecotourism and cultural tourism opportunities for the local administration bodies and carry on regular educational activities for the local schools.

Educational farms – The Artistic Farm from Poland

The Artistic Farm is an agritourism, ecological and educational farm located in picturesque forest surroundings in the Malopolskie Voivodeship, in the south of Poland. There are many walking trails in the area, allowing to connect with nature and admire its beauty.

The owner, Maria Karas, together with her husband, have run this eco-agritourism farm since 18 years. The farm is certified as organic. It counts over 3 ha, including mainly meadows for the flock of 10 sheep whose wool is used during educational workshops, while the sheep themselves constitute an attraction for the visitors. Tourists can also admire the herbarium of local plant species, both arable and wild.

28 years ago, the owner started a regional band, Porebianie, often performing at events promoting the commune. The events such as dozynki (harvest home festival), local and national festivities are also a good chance to offer the farm's produce, and, consequently, promote local cuisine. The wide spectrum of the farm's activity allows for additional income, while pursuing the passion and hobby of the owner herself. The farm's agricultural production – in this case, ecological – is mainly herbs, which allows maintaining the farm's development despite of small acreage (3 ha) and engaging in non-agricultural activity, directly linked with primary agricultural production.

8 years ago the owners joined the Malopolska Herbal Village network, which was the first innovative product in the Malopolskie Voivodeship in terms of creating a network

of farms. Currently, the network includes 20 herbal farms. Apart from herbs, Maria Karas also practices handicrafts, adding herbs to tissue paper bouquets and decoupage. The owners also use herbs to produce soaps, creams, candles, wine based tinctures, as well as cosmetic oils of, among others, lavender, calendula and thyme.

When it comes to agritourism, the farm offers 4 guestrooms with board. The meals are usually made using local herbs.

The farm's produce is made for guests and for the purpose of educational workshops, as well as for sale during local events, shows and fairs. The farm is also a member of the National Network of Educational Farms and the owner organises educational workshops. The educational packages are offered to both children and adults, as well as handicaped people; briefly, they are adjusted to a particular group of visitors. Tourists can chose one of the four themes: 1. Familiar with herbs; 2. Artistic combinations – paper flower making; 3. Traditional methods of cabbage fermentation; 4. From sheep to wool.

The farm perfectly fits into the concept of multi-functional development of rural areas, because apart from its basic agricultural, ecological activity, it also develops additional non-agricultural offer such as handicrafts, agritourism and educational activities, being a local innovation.

Network tourist products – The Herbal Valley from Poland

Barbara Zych owns a multi-functional farm of 5.7 ha, called the Herbal Valley. It is located in the Malopolskie Voivodeship, in the south of Poland.

The farm features traditional orchards of 70 years of age, and ponies used for agritourism, introduced in 2008. The owner offers agritourism packages created with the help of the Bialy Dunajec Local Action Group and the Agricultural Advisory Centre in Krakow, as innovative activity in terms of rural tourism.

The farm is situated in the Roznow-Ciezkowice region. The guests are offered 3 bedrooms, a bathroom, well equipped kitchen and living room with 8 additional places to sleep. All meals are prepared by the owner, specializing in regional cuisine.

The farm is innovative and multi-functional because all these activities merge into one coherent whole: agritourism, tourist packages, cooking classes and possibility to shop at the Local Product Centre. It is also possible to buy the produce online, as a single command or in a subscription mode through the platform http://www.paczkaodrolnika.pl (Eng. Package from the farmer).

The farm is involved in agricultural production (fruit, vegetables, herbs, pulses) meeting the needs of the owner, as well as her guests. Apart from that, agritourism activities are offered. Barbara Zych offers 6 network tourist packages, each for a group of 6-7 people. Because the topics are specialised, such as herbal remedies, the packages are related with traditional and local products, for instance, Fasola Piekny Jas. The packages are offered to both adults and children, and they last from a couple of hours to a few days.

Since a dozen or so years, tourists are not searching for accommodation alone, which is why the, so called, packages are offered. Currently, tourism is the main source of income for Barbara Zych.

The owner also belongs to the Association being a part of the Local Product Centre, organising a variety of courses, e.g. cooking classes for tourists. The Centre was established in December 2015, and, currently, Barbara Zych is its Vice President. It belongs to the group *odrolnika* established in 2011 and dealing with direct sales of organic produce from the farmer to the consumer.

The farm fits into the concept of multi-functional development of rural areas, because apart from agricultural activity, it is also engaged in agritourism. What is more, it is innovative thanks to the introduction of network packages of rural tourism.

It should be stressed that the farm's agricultural activity is directly linked with the project *paczkaodrolnika* (online direct sales) and the activities undertaken in the Local Product Centre.

Conclusions

Rural entrepreneurship is perceived as one of the most important elements of the local labour market, which encompasses the entire local community, not only people working in agriculture.

In both Poland and Romania, areas with rich environmental and cultural landscape have specialised in rural tourism. As shown in the above case studies, currently, rural tourism is characterised by multi-functionality combined directly with innovative activities.

Tourist offer, provided by both individual farmers and networks of farms, stands out with the hosts' professional attitude towards their work and, as a result, high quality of tourist services.

To conclude, it should be emphasised that the assumption of the described product innovations, as well as the presented case studies, is to make use of both the agricultural potential of the given area and the landscape, natural and cultural values, while promoting the concept of multi-functional development and ecological attitude.

Conflict of interests

The authors declare no conflict of interest.

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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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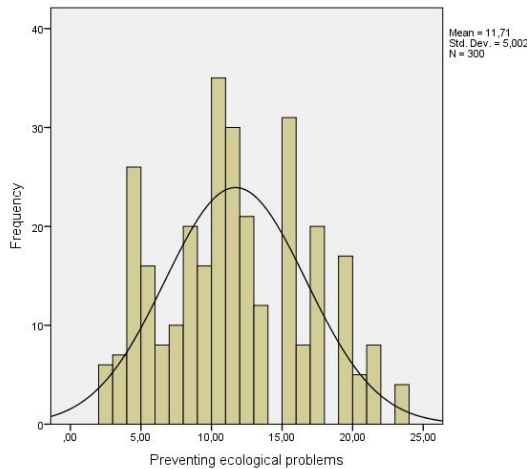
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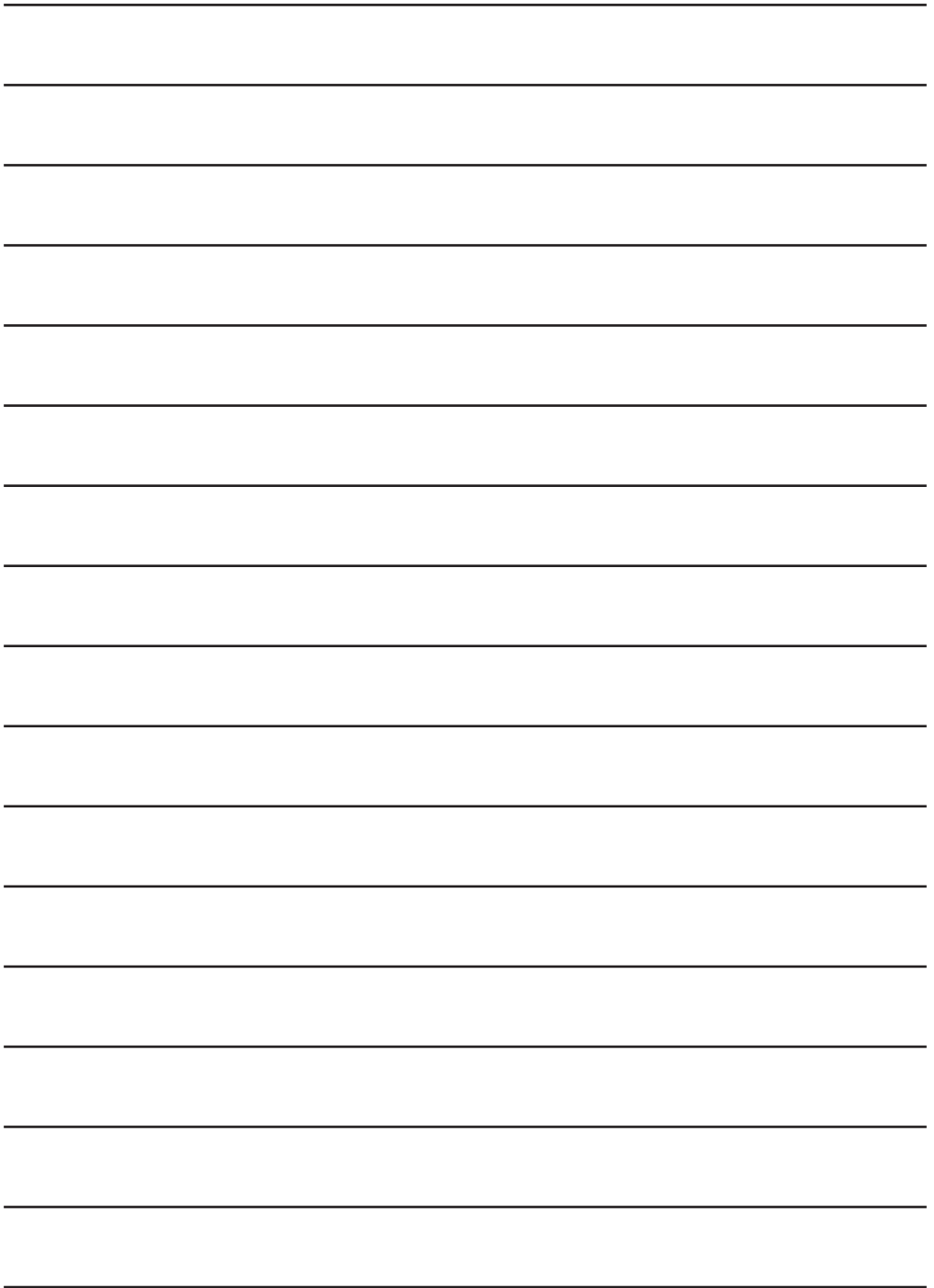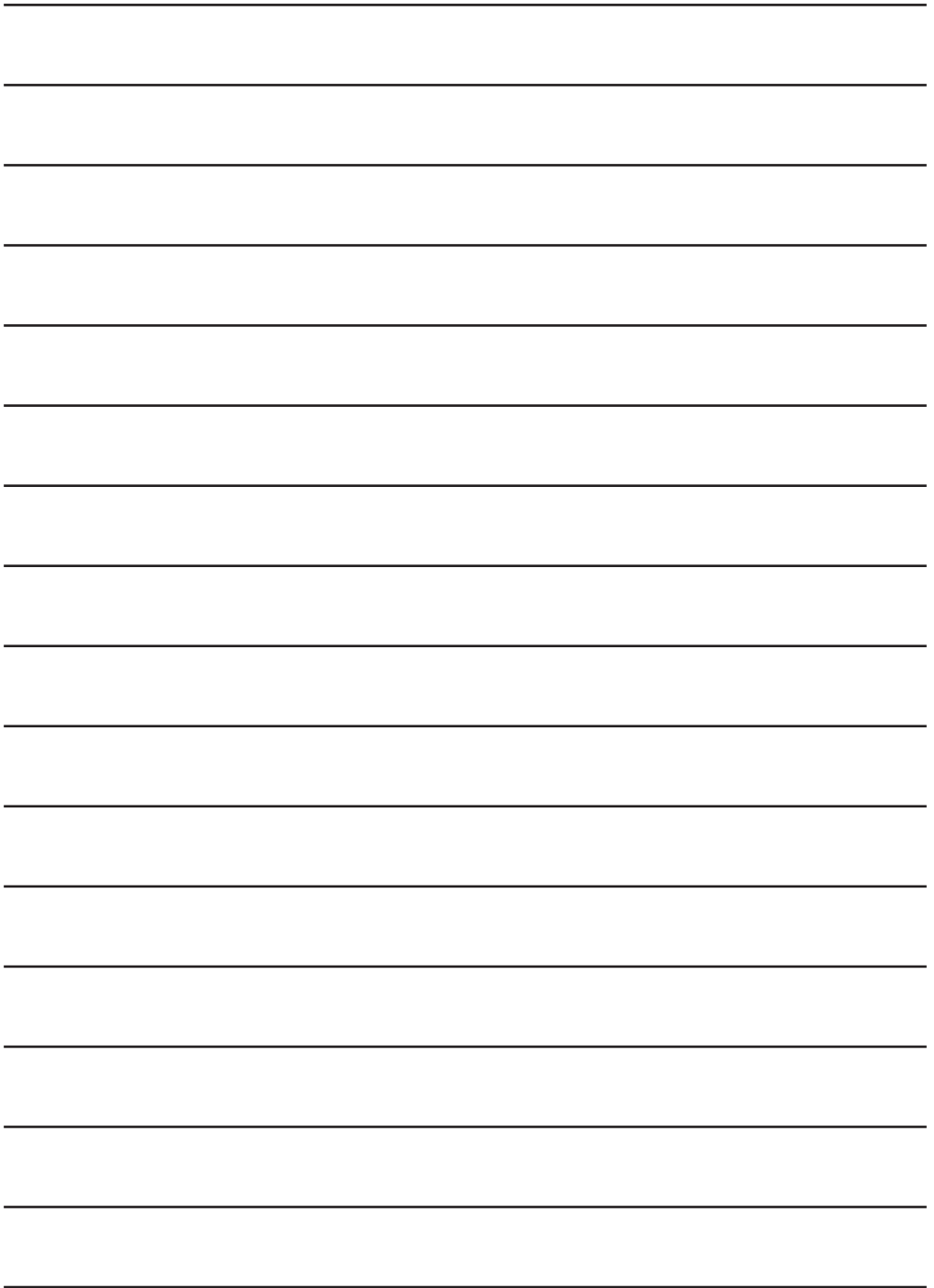
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