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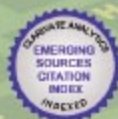


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IDENTIFICATION OF THE AREA GROUPS OF AGRICULTURAL HOLDINGS BENEFITING FROM THE REDISTRIBUTIVE PAYMENT SCHEME – A POLISH CASE STUDY

Adrian Sadłowski¹

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ABSTRACT

The aim of this paper was to answer the question of which area groups of Polish agricultural holdings had incurred loss on (and which had benefited from) applying the redistributive payment. Mathematical methods were applied. It was found that in the period between 2015 and 2019, holdings with a size of up to 6 ha and holdings with a size of over 55 ha incurred loss on the introduction of redistributive payment in its current form (some slight differences were identified as regards the threshold holding areas in individual years of the period in question). Thus, holdings with areas between 6 and 55 ha benefited from redistributive payment. The redistributive effects of the instrument are too weak in Poland to consider it a tool for accelerating positive structural transformations in agriculture.

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Introduction

According to Buckwell, Matthews, Baldock and Mathijs (2017), taking into consideration the assumed objectives, the main expenditures incurred under the European Union's Common Agricultural Policy, i.e. direct payments, are inefficient, ineffective and unfair, and therefore require further reforming. Exploiting the considerable potential of direct payments in the field of affecting the economic reality requires a proper design which would provide satisfactory effectiveness with acceptable costs and minimum side effects (Sadłowski, 2020).

According to Majewski and Malak-Rewliowska (2018) CAP instruments lead to an excessive concentration of subsidies in a relatively small group of large agricultural holdings. The authors classify the issue in the area of a negative impact of the Common Agricultural Policy on the allocation of funds, in addition to capturing the support addressed to farmers by producers of agricultural inputs and intermediaries in the food supply chain. Šlajs and Doucha (2014) point to the fact that in the Czech Republic the vast share of the support goes to a small group of large agricultural holdings which

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mostly operate extensively, have low employment levels and weak relationships with rural communities.

Redistributive payment, introduced in 2015, was meant to provide a fairer distribution of funds among farmers (Beluhova-Uzunova, Atanasov, Shishkova, 2019). In the view of Beluhova-Uzunova, Atanasov and Hrisov (2017) the instrument can help overcome structural imbalance by directing financial aid to sectors characterised by high added value. However, instruments which promote smaller holdings or decrease payments to large holdings may induce adaptive processes on farms, which consist in unproductive activities aimed at circumventing legal provisions (division of agricultural holdings), thus jeopardising the fulfilment of expected results (Forstner et al., 2018). According to Kulawik (2015) European Union Member States, while designing Common Agricultural Policy instruments at national levels, often place emphasis on redistributive objectives (sphere of equality) instead of effectiveness and environment-related objectives, as they treat the subsidies as a primary tool for solving income problems and issues related to internalising the external outcomes in agriculture.

Redistributive payment is a voluntary instrument for EU Member States. This means that a Member State decides whether to apply redistributive payment or not. The decision does not affect the amount of the so-called national ceiling, which is the total value of payment entitlements allocated to a given Member State to be used for the direct support scheme for farmers. Eight Member States, including Bulgaria, Croatia, France, Lithuania, Germany, Poland, Portugal and Romania, and two regions, Wales in the United Kingdom and Wallonia in Belgium, opted for the application of the redistributive payment scheme. As a result of a reform of the direct support scheme, redistributive payment is to become a mandatory instrument (whereas the equivalent of redistributive payment in the new scheme will be called “complementary redistributive income support for sustainability”). Moreover, Member States are going to receive greater power in the field of shaping the instrument at national level (Sadłowski, 2019).

Given the above, in the context of designing the instruments of the direct support scheme subject to the aforementioned reform, the experience of states where the instrument in question is being applied, as well as the economic studies in this field, are gaining an even greater significance. Poland’s experience might prove particularly valuable due to non-standard solutions applied in this area.

There are few research results on the redistributive payment in the relevant literature. This is especially because the experience related to using this instrument has been relatively scarce. In temporal terms, redistributive payments have been in use since 2015, and in spatial terms, they have been limited to eight EU Member States and two regions. As a result, source data that might be useful in studying this field represent short time series, and only refer to some EU Member States.

Based on an overview of studies into this area, the following groups can be identified:

- 1) *ex ante* simulations relying on hypothetical data, e.g. Matthews (2013), or real data, e.g. a variant analysis for Hungary by Potori, Kovács and Vásáry (2013), research concerning Bulgaria (Ivanov, Malamova, Sokolova, 2015);
- 2) impact assessments for the countries that have introduced redistributive payments;
 - variant analyses, e.g. for Germany by Hansen and Offermann (2016) or for France by Chatellier (2018),
 - measurement of actual impact, e.g. *ex post* assessment for Poland by Sadłowski (2018).

These studies differ in the research methods they use and their range. Redistribution impact has been usually measured by farm size or by region.

And so for example Hansen and Offermann (2016) stated that a full utilization of the scope for the redistributive payment in Germany could have slightly reduced income inequality, but, due to the limited correlation of land endowment and income level, would not constitute an efficient distributive policy instrument either. In turn, Sadłowski (2018), based on data for 2015 referring to Poland, stated that fundamentally the introduction of both redistributive payment and so-called voluntary coupled support (all forms of this support taken together) resulted in a decrease in the average aid per holding in the same group of provinces and at the same time an increase in this size in other provinces (compared to the situation in which the amounts for financing these instruments would be distributed under the single area payment).

Such publications in a vast part are a response to the call by Ciliberti and Frascarelli (2018) who assert that research in this area should in particular include quantitative and scenario analyses facilitating the measurement of the redistribution effect and the assessment of the impact of alternative solutions on support concentration levels, including cross-regional and cross-sectoral transfers.

EU legislation and solutions adopted in Poland

The individual Member States which have decided to apply redistributive payment are responsible for the financial matters and for the decisions on the form of the instrument, within the framework set out at EU level. A Member State can allocate a maximum of 30% of the national ceiling for financing the redistributive payment scheme. Under EU law, a principle was established under which the maximum permissible redistributive payment rate will not exceed 65% of the national average payment per hectare (calculated by dividing the 2019 national ceiling by the area covered by single area payment in 2015).²

² Article 41(4) and Article 42(1) of the Regulation (EU) No. 1307/2013 of the European Parliament and of the Council.

In the period between 2015 and 2019, the redistributive payment financing level ranged from 8.30 to 8.64% of the national ceiling (the data on the financing level in absolute and relative terms are listed in columns “b” and “c” of Table 2, respectively). In Poland the national average payment per hectare amounts to EUR 244.05/ha, which means that the redistributive payment rate cannot exceed EUR 158.63/ha. Given the existing financing level, which does not exceed 9% of the national ceiling, and the existing conditions of eligibility for redistributive payment, there is no actual risk of any linear reduction of the redistributive payment rate in relation to the said restriction. The redistributive payment rate has not exceeded the amount of EUR 43 per hectare so far (Information about redistributive payment rates in individual years is provided in column “d” of Table 2), which means that it has been nearly four times lower than the permissible value.

Moreover, Member States decide on the form of redistributive payment, defining the hectare range on a holding to be covered by the payment. The said range must fall between 0 and 30 ha or the average size of an agricultural holding in a given country³ (the greater of these two values being the upper limit). At the same time, Member States have been given the possibility to graduate the payment rate progressively or degressively within the defined hectare sub-ranges.⁴

The hectare range of (3;30] has been covered by the redistributive payment scheme in Poland. According to the adopted assumptions, support as part of the redistributive payment scheme is to be addressed to medium-sized holdings characterized by some potential for development, despite the fact that they do not benefit from the scale of production as much as the largest holdings (Ministry of Agriculture and Rural Development, 2015). Poland is the only country where the lower limit was set at a value other than 0. It was treated as a special type of progressive rate graduation, with a 0 rate for the hectare range of (0;3] (European Commission, 2016). This means that this support is provided to the agricultural area on a holding to which a single area payment was granted, and which is a surplus of over 3 ha, but does not exceed 27 ha. Thus, the maximum annual amount of support provided to a single holding as part of redistributive payment in a given year is the product of 27 ha and the payment rate for that year (the relevant data is presented in column “e” of Table 2), and it is granted to all holdings where the agricultural area covered by single area payments is at least 30 ha.

Plans are being made for the next financial perspective to depart from the voluntary character of the redistributive payment scheme. This means that once the planned reform is implemented, the instrument is to be applied in all EU Member States. The scope of decision-making in relation to the financing level and the forms of redistributive

3 The average size of agricultural holdings in individual EU Member States is listed in Annex VIII to Regulation (EU) No. 1307/2013 of the European Parliament and of the Council. It is 6 ha in Poland.

4 Article 41(4) and (5) of Regulation (EU) No. 1307/2013 of the European Parliament and of the Council.

payment is to be extended. In the proposed EU regulations⁵ no limit has been established in relation to the level of financing redistributive payment (the current limit is set as 30% of the national ceiling), while the permissible share of the redistributive payment rate in the national average amount of payments was set at 100% (it is currently 65%). Furthermore, no upper limit has been established for the eligible hectare range.

The main objective of this paper is to provide an answer to the question which area groups of Polish agricultural holdings have benefited (and which have incurred loss) on the application of the redistributive payment.

Materials and methods

Mathematical methods were applied in the studies, the results of which have been demonstrated in this paper. The methods helped identify the area ranges of agricultural holdings benefiting from redistributive payments in their current form (as compared to the situation where redistributive payment would not be applied, and the funds allocated for financing the instrument would be distributed as part of single area payment). The data from the Ministry of Agriculture and Rural Development served as the source material.

Each beneficiary of redistributive payment is at the same time a beneficiary of single area payment. As the allocation of a specific amount for financing redistributive payments automatically entails a reduced level of financing of the single area payment (exactly by the same redistributive payment amount), the application of redistributive payment is advantageous to only some of the beneficiaries.

S_{JPO} – single area payment rate (EUR/ha),

S_{RED} – redistributive payment rate (EUR/ha),

F_{JPO} – level of financing single area payment (EUR),

F_{RED} – level of financing redistributive payment (EUR),

P_{JPO} – size of agricultural area covered by single area payment (ha),

$(a; b)$ – the hectare range on a holding to which redistributive payment is granted.

The single area payment rate (EUR/ha) which would be applicable if redistributive payment were not applied can be calculated using the following formula:

$$S'_{JPO} = \frac{F_{JPO} + F_{RED}}{P_{JPO}} \quad (1)$$

The method for calculating the total and unit support amount for holdings falling within a given area group in the applied variant and the alternative “zero” variant (without redistributive payment applied) was shown in Table 1.

⁵ Proposal for a Regulation of the European Parliament and of the Council (COM(2018) 392).

Table 1. The amount of support granted as part of the single area payment and redistributive payment schemes depending on the variant applied and the size of holdings

Area group of holdings	"Zero" variant		Applied variant	
	Total amount $K' = f(x)$	Average amount per hectare $\bar{S}' = f(x)$	Total amount $K = f(x)$	Average amount per hectare $\bar{S} = f(x)$
$x_1 \in (0; 3]$	$K'_1 = x_1 \times S'_{JPO}$	$\bar{S}' = S'_{JPO}$	$K_1 = x_1 \times S_{JPO}$	$\bar{S} = S_{JPO}$
$x_2 \in (3; 30]$	$K'_2 = x_2 \times S'_{JPO}$	$\bar{S}' = S'_{JPO}$	$K_2 = x_2 \times S_{JPO} + (x_2 - 3) \times S_{RED}$	$\bar{S} = \frac{x_2 \times S_{JPO} + (x_2 - 3) \times S_{RED}}{x_2}$
$x_3 \in (30; \infty)$	$K'_3 = x_3 \times S'_{JPO}$	$\bar{S}' = S'_{JPO}$	$K_3 = x_3 \times S_{JPO} + 27 \times S_{RED}$	$\bar{S} = \frac{x_3 \times S_{JPO} + 27 \times S_{RED}}{x_3}$

x – size of holding (ha),
 K' – the amount of support granted to a given holding (EUR) if the "zero" variant is applied
 K – the amount of support granted to a given holding (EUR) in the applied variant
 \bar{S}' – average level of support per area unit on a given holding if the "zero" variant is applied,
 \bar{S} – average level of support per area unit on a given holding in the applied variant,
 S'_{JPO} – single area payment rate (EUR/ha) which would be applicable if the "zero" variant were applied,
 S_{JPO} – single area payment rate (EUR/ha) in the applied variant,
 S_{RED} – redistributive payment rate (EUR/ha) in the applied variant.

Source: Author's elaboration

In order to answer the question of what size should a holding have to receive support in the same amount, notwithstanding the variant applied, the following equations should be solved:

$$K'_2 = K_2 \quad (2)$$

$$K'_3 = K_3 \quad (3)$$

Therefore:

$$x_2 \times S'_{JPO} = x_2 \times S_{JPO} + (x_2 - 3) \times S_{RED} \quad (4)$$

$$x_3 \times S'_{JPO} = x_3 \times S_{JPO} + 27 \times S_{RED} \quad (5)$$

At the same time, the solutions to the equations allowed to mark out the limits of area ranges of holdings benefiting from or incurring loss on the application of redistributive payment:

- 1) Holdings with an area of $x \in (x_2; x_3)$ benefit from applying redistributive payment.
- 2) Holdings with an area of $x \in (0; x_2)$ and $x \in (x_3; \infty)$ incur loss on applying redistributive payment.

- 3) Holdings with an area of $x = \{x_2; x_3\}$ in the alternative variant without redistributive payment would receive support in the same amount as in the applied variant (therefore, the application of redistributive payment is neutral in terms of the amount received by the holdings with border areas).

In the years to come, the ranges may slightly differ (even without changing the criteria for redistributive payment) due to the structural transformations in agriculture. In this context, it should be stressed that the authorities making decisions on the shape of agricultural policy tend to indicate the preferred area group of holdings, rather than the hectare range of holdings, which should be prioritized, by covering the said holdings by support in the form of redistributive payment. However, the indication of hectare range is required for the design of the instrument at national level. This is the reason for the significance of simulation research in this field, aimed at providing the answer to the question of what hectare range should be established for the preferred area group of holdings to become the beneficiaries of the solution. Such simulation research can be performed with the use of the methodology described above. In addition, the methodology can be used to determine whether and how manipulating the levels of financing redistributive payment, the hectare range limits, or range graduation affects the location and size of the area range of holdings benefiting from the application of redistributive payment, and the average unit level of support of holdings in individual area groups.

Results and Discussions

The results of calculations performed in line with the algorithm presented above are listed in columns “f” and “g” of Table 2. Moreover, column “h” presents information about the size of hectare ranges of holdings benefiting from the application of redistributive payments in individual years. According to the data provided, the holding-size limits for redistributive effect purposes are relatively stable, so the size of the area range of holdings benefiting from the application of redistributive payment is subject to only minor changes.

Table 2. Redistributive payment in Poland – level of financing, support amount and area group of holdings benefiting from the application of the instrument

Year	Level of financing		Support amount		The area range of holdings benefiting from the application of redistributive payment (ha)		
	million euros	% of the national ceiling	EUR/ha	EUR/holding	from	To	range covered
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>G</i>	<i>h</i>
2015	280.42	8.30	40.07	to 1,081.89	5.9	54.5	48.6
2016	281.81	8.30	40.01	to 1,080.27	6.0	54.4	48.4
2017	289.80	8.49	41.13	to 1,110.51	5.9	54.5	48.6

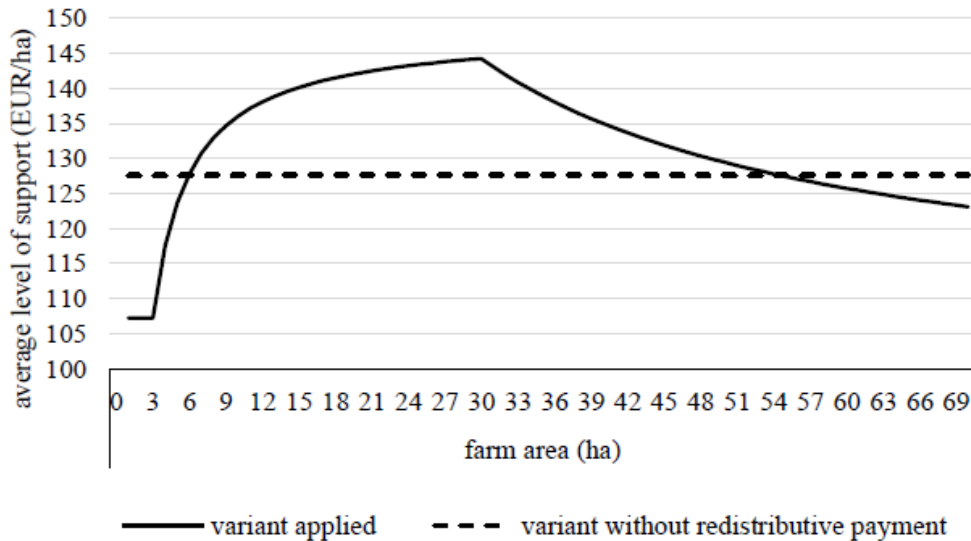
Year	Level of financing		Support amount		The area range of holdings benefiting from the application of redistributive payment (ha)		
	million euros	% of the national ceiling	EUR/ha	EUR/holding	from	To	range covered
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>G</i>	<i>h</i>
2018	293.93	8.57	41.62	to 1,123.74	5.9	54.6	48.7
2019	298.04	8.64	42.25	to 1,140.75	5.9	54.8	48.9

Source: Author's elaboration based on data from the Ministry of Agriculture and Rural Development (2019)

Generally speaking, in the period in question holdings with an area of up to 5.9-6.0 ha and holdings with an area of over 54.4-54.8 ha incurred loss on the introduction of redistributive payment in its current form, which means that they would have received greater support, if the payment had not been applied, and consequently the funds allocated for its financing would have been distributed as part of the single area payment scheme. In turn, holdings with an area of over 5.9-6.0 ha and under 54.4-54.8 ha benefited from the application of redistributive payment in its current form. As regards the holdings with threshold holding areas the application of this instrument would be neutral in terms of the amount of the support received. Therefore, the area range of holdings benefiting from the application of redistributive payment is broader than the hectare range of holdings eligible for redistributive payment, i.e. (3;30], and it is shifted to the right.

Holdings which benefit from the introduction of redistributive payments include those holdings where the total amount of support as part of single area payment and redistributive payment, divided by the agricultural land area on a given holding (i.e.) is higher than the single area payment rate, which would be applicable if redistributive payment were not applied (i.e. , which is always equal to for holdings belonging to any area group). Given this holding group, the graph of function is plotted above the graph of function . The graphic representation is shown in Figure 1 which refers to 2017 (the middle year of the period being the subject of the study). This was limited to one example only, because no significant differences in this respect were recorded between individual years of the period in question.

Figure 1. Average unit level of support as part of single area payment and redistributive payment depending on the variant applied and holding size (2017)



Source: Author's elaboration based on data from the Ministry of Agriculture and Rural Development (2019)

In the applied variant the average level of support per hectare of land is constant and equal to the single area payment rate for holdings with an area of up to 3 ha, which is demonstrated by the initial horizontal section of the solid line in Figure 1. As regards holdings exceeding the lower limit of the hectare range on a holding covered by redistributive payment, the average amount of support per hectare of land is higher and initially increases proportionally to the holding area, reaching its peak value for holdings with an area of 30 ha. As the holding size increases, the average amount of support decreases, and asymptotically approaches the horizontal line drawn at the level of the single area payment rate (i.e. EUR 107.23/ha). The graph of the function takes this shape for holdings with an area exceeding 30 ha and no higher than 1 398.9 ha. Holdings with an area over 1 398.9 ha are subject to the capping of payments⁶, which in Poland entails the principle of not granting single area payment in the amount exceeding EUR 150 000. Given the above, from the point of exceeding the threshold area, the graph of average amount of support per hectare of land asymptotically approaches the horizontal axis of the coordinate system.

As regards the variant without redistributive payment, the amount of financing single area payment would be increased by the amount which has been allocated for financing redistributive payment in the variant currently being applied. Taking into consideration

6 Given the fact that in Poland a reduction ratio of 100% is applied to the amount of single area payment exceeding EUR 150,000, the threshold holding size, the exceeding of which means that the said holding will be subject to the capping of payment, may be calculated by dividing EUR 150,000 by the single area payment rate (which amounted to EUR 107.23/ha for 2017).

holdings with an area of up to 1,175.5 ha⁷, the average amount of support per hectare of land (as part of single area payment and redistributive payment) would be equal to the single area payment rate of EUR 127.61/ha, due to the lack of redistributive payment (horizontal dashed line in Figure 1). Agricultural holdings exceeding the said area threshold would be covered by the capping of payments, which would result in the reduction of average amount of support per hectare of land as the holding area would increase (to the right of the area threshold, the graph of the function being analyzed asymptotically approaches the horizontal axis of the coordinate system).

The solid line (demonstrating the currently applied variant) runs over the dashed line (demonstrating the alternative variant) for holdings with an area of over 5.9 ha and under 54.5 ha. This is how a graphic representation of area groups benefiting from (incurring loss on) the application of redistributive payment was obtained.

Conclusions

Redistributive payment with a zero rate for the initial hectare range may potentially constitute an impulse for positive structural changes in agriculture, consisting in the growth of small agricultural holdings, and a weak impulse for “artificial divisions” of large holdings aimed at maximizing the amount of the received support. This results from the fact that the potential relative increase of the support granted to small holdings may be significant in relation to increasing the holding size. In contrast, as regards large holdings, and even more so large-area holdings, support in the form of redistributive payment is a small part of the total support amount and total income.

If redistributive payment actually played such a function, the flows of holdings from area groups which are not beneficiaries of redistributive payment to area groups receiving such support, assuming the stable conditions for eligibility for redistributive payment, and financing levels, would result in the reduction of redistributive payment rates, and consequently in the declining importance of this instrument as a stimulator of structural transformations. Given the above, to counteract the reduction of the redistributive payment effect it would be necessary to increase the financing level. In Poland, the redistributive effects of this instrument are too weak to perceive this instrument as a tool accelerating positive structural transformations in agriculture.

Conflict of interests

The author declares no conflict of interest.

7 The threshold holding size of 1,175.5 ha was calculated in the same way as in the previously discussed variant, by dividing PLN 150,000 by the single area payment rate. However, the single area payment rate is higher in the alternative variant (amounting to EUR 127.61/ha), hence the lower threshold holding size in the quotient.

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COMPARATIVE ANALYSIS OF THE ECONOMIC POTENTIAL OF THE SMALL AND FAMILY FARMS IN THE REPUBLIC OF SERBIA AND ROMANIA

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ABSTRACT

The authors provide an overview and the analysis of the situation of agricultural holdings in the Republic of Serbia and Romania, with special emphasis on the importance and role of small and family farms in creating economic and social sustainability. The paper analyses three thematic research areas – the roll and definition of small farms in the Republic of Serbia and Romania with their basic features the policy on agricultural, national and from foreign funds incentive measures, as well as statistical presentation of the state of agricultural holdings. The purpose of this study is to recognize how small and family farms are significant for the national economy and to compare the situation in the Republic of Serbia and Romania. Published papers and statistical data were used for the statistical review and comparative analysis of their advantages, potentials, and limitations of agricultural holdings in the Republic of Serbia and Romania.

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Introduction

Agriculture is one of the pillars of the economic development of the Republic of Serbia, and it is significant for the national economy in terms of economic, social and ecological value (Mihailović et al., 2013). Serbia has a great potential for the development of agriculture (conventional and organic), processing and trade of food, however, the problem is to turn its comparative advantages into competitive ones (Pejanović, 2016).

Agricultural holdings are created on agricultural land and imply private ownership of the land and other means of production. They display the connection between the land and the family as a source of labour, on the one hand, and consumers of a part of the products produced on the individual property, on the other hand (Simonović et al., 2018). Nowadays, a family farm is the basic economic-production unit in a village and, unlike other forms of organization in the economy of a state, it has encountered a lot of obstacles in the past, such as social and economic problems (Prodanović et al., 2017).

Small agricultural producers in Serbia play an important role in agricultural production and self-employment, creating a general environment in rural areas (Zarić et al., 2008). General public and practical agricultural policy focuses their attention on family farms. The vitality of small farms, as well as a large number of positive examples of their economic performance and rational management, imposed the need to redefine the importance, place and role of small farms in the strategy of agricultural development (Pejanović, 2007). Small family farms in Serbia provide numerous benefits to the society, such as food safety, high-quality agricultural products, employment and family income, at the same time preserving ecology and adapting themselves to local resources, as well as preserving tradition and cultural heritage.

The FAO underlines that family farms are the key to sustainable future in Europe and Central Asia. There are an estimated 500 million family farms in the world, representing more than 90 percent of all farms. They are essential to our way of life, producing the bulk of our food and serving as the foundation of agriculture and the rural economy. Family farmers hold the key to a more sustainable future. Building on the achievements of the International Year of Family Farming 2014, the United Nations declared 2019–2028 to be the Decade of Family Farming.

According to the press release sent by the Romanian authorities to Food and Agriculture Organization of the United Nations, Romania has a long tradition in family farming. The farm represents the pillar on which the Romanian society developed. Family farm activities are not limited to the agriculture. They also comprise important social activities for the community and family, preserve traditions and crafts, attract rural tourism and agrotourism, and help to protect the environment through extensive agricultural practices. Agriculture plays a significant socio-economic role in Romania and its transformation to a modern, vibrant, and market-oriented sector is central to fighting poverty, promoting social inclusion, and reducing the urban/rural development divide. Most of Romania's poor live in rural areas and earn their living from agriculture or agriculture-related activities (Romanian National Institute of Statistics, 2019).

Agricultural development is always framed by the support policy, not only by provided incentive measures, but also by its positive direction of agricultural production. Hence, analysis not only of the current position of small farms in Serbia, but also an assessment of its future development opportunities, presupposes a comparison of development flows and basic principles of support policy in Serbia with dominant development flows in Europe, with a particular focus on the neighboring countries.

After 2000s, the policy of incentive measures in Serbia was primarily focused on strengthening production, with a particular focus on the fields which contribute to the growth of the food sector and with positive impact to the export. Significant efforts were made to restore the production of meat, sugar, fruit and vegetables, whose volume during the period of the country's isolation and economic sanctions, as well as of the loss of earlier markets, has significantly reduced (Strategy, 2014: 40-41). During 2005, the *Strategy on Agricultural Development of Serbia* was adopted, by which agricultural policy was defined with the aim to contribute to the growth of competitiveness of family commercial agricultural holdings. In the implementation mechanisms, a shift was made from incentive policies on production and income to investment incentive measures (Chivu & Ciutacu, 2014). However, without clearly defined budgetary frameworks the objectives were only partly supported with the appropriate measures and funds. As Simonović et al. emphasized, the unpredictability and inconsistency were the main features of the reform of agricultural policy in Serbia in the period from 2000 to 2015 (Simonović et al., 2016). In order to make clear directions for future reforms, the Ministry of Agriculture and Environmental Protection urged the development of a new strategic document, which resulted in the adoption of the *Strategy on Agriculture and Rural Development 2014 to 2024*.

The purpose of this study is to recognize how small and family farms are significant for the national economy and to compare the situation in the Republic of Serbia and Romania. For better understanding the agricultural sector in Republic of Serbia (competitive and non-competitive advantages) we will do the comparative analysis of the economic potential of the agricultural sector in Republic of Serbia and Romania. Therefore, the paper is structured in four segments. In the first segment we presented theoretical background and importance of small and family farms. The methodology and data basis are explained in the second segment, the results and discussion are submitted in the third segment and the conclusions is the final segment of the paper with its contributes and the list of references.

Materials and methods

The study depends on secondary data, which are collected from the relevant institutions interrelated to the current study during the 2019 in the Republic of Serbia and Romania. Taking into consideration the object of the analysis (framework of the economic potential of small and family farms), the content analysis and comparative method will be used as the main toll, completed with support policy analysis and impact assessment (economic outcomes).

In the first place, the study depends on various statistical data and literary sources related to the object of the analysis, as well as statistical presentation of the state of agricultural holdings by using the data of the Statistical Office of the Republic of Serbia (SORS), the data of the Census of Agriculture in Serbia in 2012 and 2018, strategic documents in the field of agriculture, rural development and living standard in Serbia (*Strategy on Agriculture and Rural Development*, 2005; *Strategy on Agriculture and Rural Development 2014 to 2024*; *National Programme for Rural Development 2011-2013*; *National Programme for Rural Development 2018-2020*; *National Programme for Agriculture 2010-2013*; *National Programme for Agriculture 2018-2020*; Living Standards Measurement Study), as well as by taking into account the results of researches by domestic and foreign authors in this field.

At the level of support policy analysis, the text will compare the defined forms of support in Romania and Serbia, as indicators of a strategic visions for agricultural development and its relations to the small farms. The analysis of strategic development in Serbia was carried out on the basis of current laws, by-laws, official reports and on the *Strategy on Agriculture and Rural Development 2014 to 2024*. The support policy in Romania is analysed at the basis of the report: *Diagnosis of the Romanian Agricultural sector in the context of sustainable development, including especially small farms* (Muntean et al., 2019).

For achieving more reliable data and conclusions, authors were used comparative analysis based on the available statistical data and statistical surveys published by the Statistical Office of the Republic of Serbia, Romanian National Institute of Statistics and Eurostat.

Results and Discussion

Small and family farms in the Republic of Serbia. In terms of owned structure, the importance of individual holdings is immense. However, their possibilities are not fully realized, mainly because they are small and without adequate state support in the long run. Small family farms are based on family labour, that is, senilisation and deagrarisation, which can result in the reduced work potentials of our village (Simonović et al., 2018). According to Munćan and Božić (2017) analysis of the labour force and employment on family farms is very complicated, taking into account the specificities of agricultural production and a pronounced seasonality (a large number of workers engaged in a relatively short period of time).

A more detailed analysis of the ownership structure of agricultural holdings, based on the data from the Census of Agricultural 2012, points to significant differences between the three subgroups of all farms (small - up to 5 ha, medium - 5-20 ha, and large - over 20 ha). As the size of an agricultural holding is determined based on the agricultural land, the economic size of the holding is determined by the standard output (SO), that is, the value of the agricultural production according to production prices.

Due to the data from the Census of Agriculture 2012, the average economic size of agricultural holdings in the Republic of Serbia in 2012 was € 5,939 and according

to the organizational-legal form of agricultural holdings, the indicator amounts to the following values in these two sectors: in the sector of family farms - € 4,990; in the sector of legal entities and entrepreneurs - € 204,755. According to the official data from the Statistical Office of the Republic of Serbia, in this paper family farms up to 5 hectares are going to be considered as small farms in the Republic of Serbia, with the average economic size of agricultural holdings (standard output) amounting to € 4,990.

Small and family farms in Romania. Romania has an important agricultural potential. It holds 7.8% of the agricultural area used by EU-27, being close from this point of view to German agriculture (9.8%) and Polish (8.5%). The population's employment in Romania agriculture amounts to 21.2% of the EU-27 farm labour force. Romania has four times more labour force employed in agriculture than Germany. According to Page and Popa (2013) the large number of small-scale holdings is an important source of economic, cultural, social, and natural strength for Romania. Romanian farm sizes cover a wide spectrum, influenced by land use. Very large corporate farms are concentrated mostly in South and East. Although family farms are found in great numbers all over Romania, they are found in their highest numbers, and in the most typical traditional small-scale farmed landscapes, in the northern and central parts of Romania (Page, Popa, 2013).

Romania's agriculture is characterized by a high number of very small non-commercial farms and most of its farm holdings have a very small economic size. In 2013, very small (< € 2,000 output) and small farms (€ 2,000 – € 8,000 in output) accounted for 94.9 percent of all the farms in Romania, compared with 69.1 percent in the EU-28. Romania ranks first in the share of very small and small farms across European countries. Set of criteria used to determine a small farm in 2016 (Muntean et al., 2019): 1) Area of land (in EU – 5 ha; <10 mln of farms; in Romania: 3,053,088 farms – 91.58%), 2) Standard Output (in EU – 8 SO; ca. 10 mln of farms; in Romania: 3,188,660 farms – 93.18%, up to 15 SO: 114,168 farms – 3.34%); 3) Labour input (AWU, FWU) - determination of the threshold value, eg. 1 or 2 AWU; 4) Market share (level of self-supply) - “semi-subsistence farm” where less than 50% of the agricultural output is sold, with the remainder being consumed within the farm household (in Romania: 2,917,250 farms - 81% of farms 0-15 th SO). Criteria used in a survey in Romania: - Standard Output - less than 49,999 euro; - Small commercial farms that commercialize more than 50% of the agricultural production that they realize per year.

The Table 1 presents the differences between small and large agricultural holdings in Romania based on house holding, production, return, profit, agricultural land management and management of agricultural activities.

Table 1. How small farms function compared to larger farms in Romania

Small farms	Large farms
<p><i>House Holding</i></p> <ul style="list-style-type: none"> - It is based on the available resources: lands, crafts in the area, spontaneous flora products or berries - Structuring and sizing of the household according to the available labor force - Uses all available resources: vegetable debris as feed for animals, the resulting garbage is used as a fertilizer for the production of vegetal mass 	<p><i>Production</i></p> <ul style="list-style-type: none"> - Uses available resources but not only - The production activity is mechanized, automated, using technology - In the production activity is used the external human resource, employed on the labor contract or daily - Uses attracted financial resources
<p><i>Return</i></p> <ul style="list-style-type: none"> - The preponderant development of cost-effective activities; activities necessary for daily living or those with potential for the future. - The surplus goods resulting from household activities is generally sold in fairs or markets - Using subsidies, European funds, or Development programs - Bank loans are not used to a large extent - Low Profitability 	<p><i>Return</i></p> <ul style="list-style-type: none"> - Production is used in its own stores or in other partner stores - Profitability for greater access to bank financing - They can be part of associations that ensure better product traceability <p>It uses software type - Agricultural Farming Management - which assures the collection, reporting, reporting and forecasting of farm and farm management data. Management is an accomplished one</p>
<p><i>Making profit</i></p> <ul style="list-style-type: none"> - Profit is generally reinvested - In order to obtain profit - the association is the legal form used for profit or commercial purposes (ex: producer groups) 	<p><i>Agricultural land management</i></p> <ul style="list-style-type: none"> - using graphical and realistic land plots - interfacing the system with agricultural machinery - crop management (crop planning, rotation, main crops, precursors and intermediate plants) - Fertilization planning based on existing nutrients <p><i>Management of agricultural activities</i></p> <ul style="list-style-type: none"> - Managed production; human resource planning (working hours / man) - Planning, tracking and performing agricultural activities; Farm equipment management and fuel consumption <p><i>Profit</i></p> <p>Ensures the development of the farm</p>

Source: Muntean et al., 2019

Policy on agricultural incentive measures. According to the previously mentioned Report (*Diagnosis of the Romanian agricultural sector in the context of sustainable development, including especially small farms*), the following financial support schemes were available in Romania in 2019 from national and European funds: a) The

direct payment schemes (as support mechanisms for agricultural producers), which were: 1) The single area payment scheme (SAPS), 2) The redistributive payment, 3) The payment for agricultural practices beneficial for the climate and the environment, 4) The payment for young farmers; the coupled support scheme (vegetal and zootechnical sectors), 5) The payment for small farmers (underlined by the authors); b) The transitional national aid (TNA, granted for the vegetal and zootechnical sectors in the limit of the yearly budgets allocated to the Ministry for Agriculture and Rural Development), which were: 1) TNA 1 – arable crops, 2) TNA 2 – flax for fibre, 3) TNA 3 – hemp for fibre, 4) TNA 4 – tobacco, 5) TNA 5 – hops, 6) TNA 6 – sugar beet, 7) ZTNA 7 - cattle-milk, 8) ZTNA 8 - cattle –meat, 9) ZTNA 9 - ovine/caprine, 10) The coupled support; and c) The compensatory measures for rural development related to arable land (for engagement starting in 2015), which were: 1) Measure 10 - Agro-environment and climate, 2) Measure 11 – Ecological agriculture, 3) Measure 13 – Payments for areas confronting natural or other specific constraints.

These measures were accompanied by following non-financial measures: a) The reduction of rural school abandonment, b) the modernisation of the agricultural educational system, c) The solutions for the problems related to the functioning of the land market, including farm consolidation measures for crop lands, d) the development of local regional and national e-governing services.

By the Romanian National Rural Development Programme 2014-2020, the following strategic priorities were recognised (Muntean et al., 2019): 1) Support for the development of the small farms, 2) Support for the investments in the agricultural exploitations, 3) Support for the investments in the agricultural and forest infrastructure, 4) Support for the development of new products, processes and technologies, 5) Start up support for young farmers.

The central strategic document in the field of agriculture in Serbia is the *Strategy on Agriculture and Rural Development 2014 to 2024*. The strategy defines the vision of the development of agriculture and rural areas, which assumes the development of the knowledge-based agricultural sector, modern technologies and standards; management of rural areas in line with the principles of sustainable development, aiming to prevent the trend of population migration from these areas. According to the vision, the Strategy highlights four key principles: 1) *Sustainable agriculture*, within which agriculture is recognized as the most important industry in rural areas; 2) *Polycentric development, based on the respect for the diversity of production systems and types of agricultural holdings*, highlighting the equal position of all producers and other participants involved in the production chain in the agricultural sector and related activities; 3) *Modernization of bodies and organizations*, with special emphasis on the harmonization of the national system of agricultural policy management with the EU standards; 4) *Stability and consistency of the agricultural budget*, emphasizing the necessity of adjusting (that is, increasing) agricultural budget support to real needs in this sector (Strategy, 2014:60-61).

Another strategic document is the *Law on Incentives in Agriculture and Rural Development*, according to which the following types of incentives are defined: 1) direct payments, 2) incentives for rural development measures, 3) special incentives, 4) loans. Pursuant to Article 6 of the Law, the right to the incentives can be provided to agricultural holdings and family farms registered in the Register of Agricultural Holdings, local self-government units, other organizations; whereas non-commercial family farms are limited only to those types of incentives which are closely specified by the Minister. Based on the provision, small producers registered as non-commercial agricultural holdings have the access only to limited funds of incentive measures.

International assistance in Serbia in the field of agriculture has been intensified since 2001, and in the first ten years it was mainly implemented in the form of providing technical assistance (equipment, laboratories, vehicles, etc.) and employee training (primarily as a part of the preparation for the adoption of the EU procedures and regulations) (Strategy, 2014:50). The financial support from IPA I funds for agriculture and rural development in the period 2007-2012 was mainly used for the following activities: establishment of FADN⁶, support to the Directorate of National Reference Laboratories, support to food safety, improvement of animal welfare and control, for building institutional capacities, etc.

Unlike the support policy in Romania, which recognizes the special status of small farms in the strategic development of agriculture, the adopted support measures in Serbia, outlined in the Strategy for 2014-2024 does not specify the special status of any category of agricultural holdings determined by their type or size. Furthermore, the equalization of the status of agricultural holdings is particularly underlined by the second key principle of this strategy, which emphasizes the equal position of all producers and other participants involved in the production chain in the agricultural sector and related activities.

The legislative framework of agricultural policy and rural development policy in Serbia is based on two basic legal acts: the *Law on Agriculture and Rural Development*, which establishes the basic mechanisms for the creation and implementation of agricultural and rural development policy, and the *Law on Incentives in Agriculture and Rural Development*, which defines how to use the incentives, its users, the conditions for exercising the right to the incentives, and the amounts according to the type of incentive. The act does not recognize a special status of small farms, only the framework capacities that have to be fulfilled as the condition of participation in the competition.⁷ The financial basis for the implementation of the incentives is the Decree on the Allocation of Incentives in Agriculture and Rural Development for the current year. By analysing the regulations for 2014, 2015, 2016, 2017, 2018, and 2019, a special status of small farms in support policy also was not been underlined.

6 Farm Account Data Network

7 Payments for milk (at least 3,000 litres of delivered cow's milk per quarter, or 1,500 in difficult areas for agricultural activities); Incentives for plant production and production-related incentives (up to 20 ha of planted area with an appropriate culture), Incentives for fattening cattle (at least 5 herds), etc.

Among all foreign incentive programs in Serbia, the IPARD II EU Program is one of the most significant, being an instrument for pre-accession assistance in the field of rural development for 2014-2020 program period. According to the amendments to the IPARD Program in Serbia for the period 2014-2020 (March 21st, 2019), a special status of small farms was also not defined.

Comparative analysis. According to data published by the Romanian National Institute of Statistics (The Structural Agricultural Survey in 2016) and the Statistical Office of the Republic of Serbia (The Survey on The Structure of Agricultural Holdings 2018) the number of agricultural holdings in Romania (3,422,026) is 6 times higher than in Serbia (564,541). In both countries is noticed a decrease in the number of agricultural holdings in the last years (10.8% and 11.3% compared to 2012 and 2010 in Serbia and Romania, respectively). Likewise, the total area of utilized agricultural area in Romania (15,018,615 ha) is about 4 times higher than in Serbia (3,476,788 ha). In terms of category, in both countries the largest area includes arable land, 74% in Serbia in 2018 and 64.2% in Romania in 2014 (Table 2). (Survey on The Structure of Agricultural Holdings, 2018 and Muntean et al., 2019).

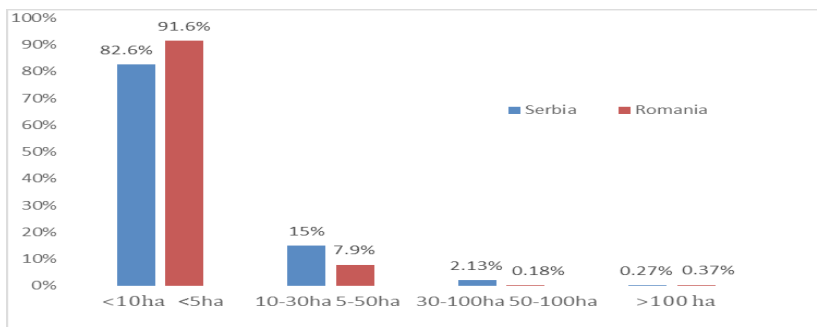
Table 2. Area of agricultural utilised area of farms by categories in Serbia in 2018 and Romania in 2014 (ha/%)

Category	Serbia (ha/%)	Category	Romania (ha/%)
Arable land	2,571,504/74	Arable land	9,641,950/64.2
Permanent grassland	676,724/19	Pastures	3,364,170/22.4
Permanent crops	206,357/6	Hayfields	1,591,973/10.6
Kitchen garden	22,203/1	Vineyards and orchards	420,521/2.8

Source: The data from The Survey on the Structure of Agricultural Holdings, 2018 and Muntean et al., 2019

On the other hand, average size of utilized agricultural area per farm in Serbia (6.2 ha) is higher than in Romania (3.65 ha). In both countries is noted an increase in the average size (13.5% and 1.4% compared to 2012 and 2013 in Serbia and Romania, respectively).

Figure 1. Area structure of the Serbian and Romanian Farms

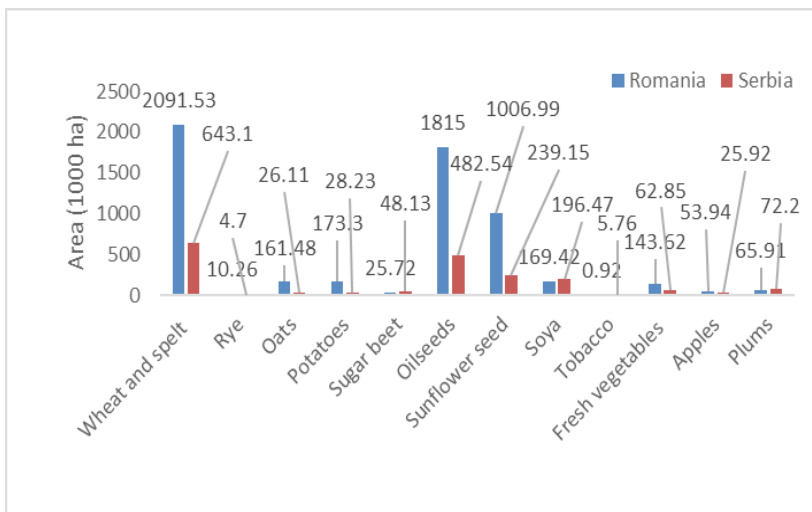


Source: The data from The Survey on the Structure of Agricultural Holdings, 2018 and Muntean et al., 2019

The largest number of farms have a small area under 5 ha (91.6%) and 10 ha (82.6%) in Romania and Serbia, respectively and only less than 0.4% farms have area over 100 ha (Figure 1). In Serbia 38.2% (217,682) farms used up to 2 hectares of agricultural land in 2018, this number was reduced by 27% from 2012. In Romania there are even 70.6% (2,415,716) of these farms in 2016, this number has not significantly changed since 2013 but increased in period from 2007 to 2013 which contrasts land concentration increase among several new members of the EU as well as with the EU average. (The Survey on the Structure of Agricultural Holdings, 2018 and Muntean et al., 2019).

Both countries have a very small number of young farmers (under 40 years), only about 7%. There is higher number of female farmers (33.6%) in Romania than in Serbia (19%).

Figure 2. Crop production area

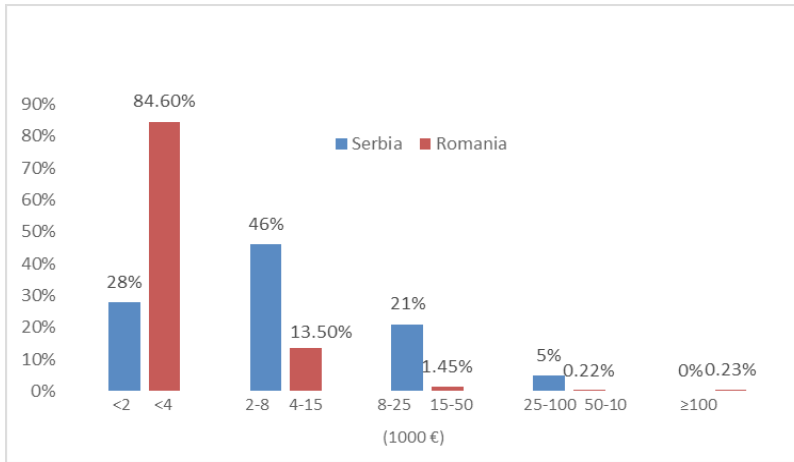


Source: Based on data from Eurostat

In both countries the largest areas are under wheat and spelt, oilseeds and sunflower seed and much smaller areas are sown with rye, oats, potatoes, sugar beet, soya, tobacco, fresh vegetables, apples and plums (Figure 2). Serbia, in comparison with Romania, has a larger area under sugar beet, soya, tobacco and plums. (Eurostat)

Contribution of agriculture to Gross Domestic Product in 2018 was 6.3% and 4.1% in Serbia and Romania, respectively. Value of agricultural standard output (SO) in Romania (18,554 million €) is about 3.5 times higher than in Serbia (5,338 million €) (Eurostat and The Survey on the Structure of Agricultural Holdings, 2018).

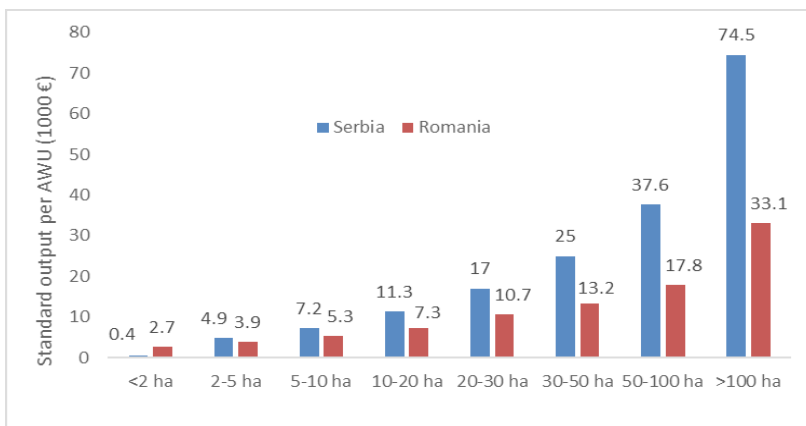
Figure 3. The structure of agricultural holdings in Serbia (2018) and Romania (2013), class standard output in euros (1000 €)



Source: Based on data from Eurostat and The Survey on the Structure of Agricultural Holdings, 2018

By standard output, the largest number (46%) of agricultural holdings (AH) in Serbia is in the category of small (2,000-8,000 €) and very small holdings (< 2,000 €) are the second most represented category (Figure 3). In Romania, the great majority of AH are in the category of < 4,000 € (84.6%), and only about 2% of AH are in the categories $\geq 15,000$ €. In Romania is negligible percent and in Serbia (using the EU classification) there are no AH which fall into the category of very large ($\geq 100,000$ €). Thus, in both countries large majority of AH belong to categories of small and very small holdings (Eurostat and The Survey on the Structure of Agricultural Holdings, 2018).

Figure 4. Agricultural standard output per annual working unit (AWU) and farm size in Serbia (2018) and Romania (2013) in euros (1000 €)



Source: Based on data from The Survey on the Structure of Agricultural Holdings, 2018 and Muntean et al., 2019

Fragmentation and size of farm operations are associated with low productivity. In Serbia and Romania, agricultural standard output per AWU is about 400 € and 2,700 € in farms of less than 2 ha and about 74,500 € and 33,100 € in farms of over 100 ha, respectively (Figure 4) (The Survey on the Structure of Agricultural Holdings, 2018 and Muntean et al., 2019). Very large farms produce more than 186 and 12 times per AWU than farms of less than 2 ha, in Serbia and Romania, respectively. Therefore, the farm size has a major effect on agricultural labor productivity.

Conclusions

Romania has 6 times higher number of agricultural holdings and 4 times higher area of utilized agricultural area than Serbia but more fragmented farmland with smaller average size of utilized agricultural area per farm. In both countries, the largest number of farms have a small area under 10 ha and according to standard output, belong to categories of small and very small holdings. In Serbia and Romania, the largest areas are under wheat and spelt, oilseeds and sunflower seed. Three main priorities were identified by the Romanian Government (FAO, 2019) in order to better support the family farms: promoting the family farm as a sustainable, inclusive growth model; creating an institutional framework to implement support measures; including family farms in the food supply chain.

The Republic of Serbia has a favourable factor and trade conditions for the development of intensive and competitive agriculture, but the agriculture in these farms is characterized by low marketability and lack of specialization of production due to limited human resources (knowledge and skills of farmers), physical resources (small land area, lack of facilities and/or equipment for storage), social capital (association of farmers, chambers of commerce, co-ops). To improve their economic performance and increase the competitiveness of their products, small farms in Republic of Serbia shall work together. Through stronger networking and supported by state, small and family farms will strengthen their potential to overcome internal limitations.

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Conflict of interests

The authors declare no conflict of interest.

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THE IMPACT OF TRANSPORTATION COSTS ON ECONOMIC PERFORMANCES IN CROP PRODUCTION

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ABSTRACT

Transport activity has significant implications for the other sectors' activities, including agriculture and agribusiness. Transportation costs represent a significant determinant of total operating costs, and therefore the selling price, which affects the competitiveness of products and the achieved business results. The aim of the paper is to point out the importance of respecting the financial effects of transport in the decision-making process of agribusiness management. The following methods have been used in the research: desk research, survey, direct costing method of calculation, sensitivity analysis and methods of descriptive statistics. Based on survey data conducted on farm of Central Serbia for the period 2016-2018, the paper analyzes the interdependence of transportation costs and gross margins in order to find out the factors that determine the decisions on production optimization as well as the business results of farm operations.

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Introduction

Transport is an activity that influences value creation in a business cycle. As such it permeates numerous business functions starting from the procurement of inputs, through the internal transport of semi-finished products and finished products to the warehouse, up to the delivery of final products to customers. In addition to its impact on production activity, transport is an integral part of logistics and marketing, which directly affects the competitiveness of products and businesses.

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Transportation costs represent a significant determinant of total operating costs, and therefore the selling price, which affects the competitiveness of products and as such they affect the achieved business result. Namely, in the case of some agricultural crops, the purchasing price is extremely low, while on the other hand, the transportation costs due to their height are a key component of the total production costs. For the above reasons it is necessary to minimize the transportation costs through the optimization model. This contributes to the optimization of total operating costs.

The paper analyzes the relations between transportation costs and gross margin at the farm level for individual crop production lines. The aim of the paper is to point out the importance of respecting the financial effects of transport in the decision-making process of agribusiness management. Therefore the transportation problem is realized as an important element for improving the competitiveness of agricultural producers and positioning their products at the local and global market.

Methods and Materials

Several methodological procedures were used in the paper: the desk research method, survey method, direct costing method, sensitivity analysis and methods of descriptive statistics. The study is based on empirical data on production value, total variable costs, transportation costs and gross margins per ha of sown area for individual crop lines (wheat, maize, sunflower and soybeans). The survey was organized by The Institute for Science Application in Agriculture from Belgrade, conducted in Central Serbia in the period 2016-2018. The survey included 409 farms in 2016, 613 farms in 2017 and 370 farms in 2018.

The role and importance of transport in agriculture and agribusiness

Transport represents one of the primary activities in the value chain of an enterprise. Apart from the impact on the production activity (transportation of necessary inputs to the factory for the purpose of processing and internal movement of semi-finished goods into the warehouse), transport is integral to the function of logistics and marketing (delivery of finished products to distribution centers, retailers or customers) (Stepien, 2016). According to the results of the realized research by some authors, transport costs account for 1/3 to 2/3 of the total logistics costs, hence there is significant potential for cost reduction in this area (Stepien, 2016). This is all the more important, given the fact that transport costs over time have a tendency to grow due to rising fuel costs, increasing ecological taxes, increasing employee salaries in transport, population growth, and hence demand for fresh and frozen foods, etc.

Additionally, the progressive growth in transport costs is conditioned by internal factors such as inefficient use of means of transport, inadequate planning, organization, implementation and control of transport activities. It is also necessary to bear in mind the fact that the efficiency of transport activities has direct implications on the price competitiveness of the products and the market position of an enterprise. Due to the

importance that in modern business conditions has for the long-term success of an enterprise, the issue of transport must be approached as an area of strategic importance.

Transport includes the physical transport of goods from the supply area, i.e. the location where the product is located in the stock, up to the place of demand or the location of the buyer (Lun et al., 2010). In other words, transport provides the transfer of goods from the place of production to the place of purchase / consumption. In this way, transport is a key component of the logistics process and as such is at the same time the biggest cost driver in the overall logistics chain.

Deciding on the transport domain is tangling the issue of transport and insurance. Transport activity assumes that a number of decisions have to be made, such as route selection, mode of transport, negotiation with the carrier (in cases where external production services are used), preparation of appropriate documentation etc. (Li et al., 2019; Djuričin et al., 2018; He & Li, 2019).

The specifics of the organization of transport in agriculture and agribusiness are derived from the characteristics of inputs and final products and as such are defined by the conditions that are necessary for the preservation of their quantity and quality. Transport adds value to biological assets and agricultural products in a way to ensure their availability to the buyers/consumers. In other words, the value of agricultural products on a remote farm, where they are in fact inaccessible to most consumers and value in the immediate vicinity of markets is not the same. This is not only due to the deterioration of certain products that have to be transported in the short term to the cooling chain, but also due to the fact that the location of a particular asset is recognized in the Statement of Financial Position when measuring its fair value.

The three key components of the transport system include the infrastructure (ports or terminals), vehicles used for transportation, and an organization system that is necessary to ensure that vehicles and infrastructure are used effectively and efficiently (Lun et al., 2010; Fan et al., 2020).

An enterprise can carry out transport on its own, in conditions when it has the means of transport and trained personnel or by providing the transport services externally. Research has shown that leaving most of the distribution activities, including transport, to other specialized firms additionally increases the already high amount of these costs. Efforts to optimize transport costs cannot be reduced only to the endeavors in transferring transport costs to other participants in the supply chain, since in modern business conditions competitive battle does not run between individual enterprises, but between the entire supply chain. This further requires mutual cooperation and support from stakeholders, and they are seen as business partners who should work together to make optimum solutions for all participants, not as a rivalry and confrontation (Sekerez, 2007).

Strategic management of transportation costs in agribusiness

Transportation costs include the depreciation of transport means, warehouses, material and energy use costs, salaries of employees engaged in transport operations, costs of external services such as transportation, loading, replacement, taxes and transport fees, and the like (Krakowiak-Bal et al., 2016). Energy costs participate with 40-50%, maintenance costs of about 25%, while the salaries of employees engaged in transport operations have a share of 20% of the total transportation costs.

Transportation costs can be classified in different ways. It is characteristic for the fixed costs that they are unchanged in total volume regardless of the volume of activity (Chivu et al., 2015). The fixed costs of transport include the cost of depreciation calculated using the application of time depreciation methods, then the costs of insurance and registration of transport means. Knowing fixed costs is important for determining the viability threshold, or for determining the minimum amount of activity (or revenue) that needs to be realized in order to make the company profitable. The variable transport costs include costs of fuel, lubricant and other means used for vehicle maintenance, toll costs, then salaries of employees who work on loading, unloading, transport, monitoring of transport, etc. Knowing the variable costs is important for deciding when there are more alternative solutions (Nielsen et al., 2015).

Considering the high share of transportation costs in overall logistics costs, it is necessary to devote considerable attention to improving the efficiency of transport activities, primarily through the process of analyzing past and current performances in order to review the current state of affairs and opportunities for improvement, thereby ensuring the efficient use of transport equipment and personnel. This assumes an analysis of whether available means of transportation correspond to real requirements and needs. In the case of oversize, i.e. the insufficient utilization of transportation means, the costs of unused capacity will be reported, which are treated as the expense of the period. Also, it is necessary to determine whether the loading space is effectively used, the time during which the goods are in transit, as these factors influence the number of deliveries that can be realized with certain transport equipment during the observed period, as well as the total transportation costs. Finding the best route should be based on an analysis of the network of road and river (maritime) routes, available lines of railways, air routes, in order to minimize distance, transport time and consequently incurred costs (Voortman, 2004).

For the purposes of perceiving the transportation cost drivers, some authors point to the possibility of applying more access (Bokor, 2010):

- The analytic hierarchy process (AHP) is used in cases where it is necessary to select one or more alternatives from the set of a multiple decision criterion analysis;
- Application of statistical techniques (regression and correlation) in the case when there are at disposal the time series on costs incurred activity and performance indicators over a number of years, in order to determine their connection, i.e. the cause-effect relationship;

- Brainstorming meeting attended by managers of individual departments;
- Interviewing logistics department managers.

Based on these approaches it is possible to identify two groups of cost drivers - *resources* (human resources, equipment, available vehicles, facilities, IT infrastructure) and *activities* (design, number of orders, machine hours, etc.). Also, cost drivers can be based on time, distance and volume: destination mix, source plants and warehouses, transportation routes, modes of transport, carriers, freight rate and the fuel surcharges. The passed kilometers, ton-kilometers, number of used stations and the like can be reported as performance indicators (Bokor, 2010). Furthermore, for each transport unit it is possible to identify the so-called carrying cost, i.e. the cost per km (based on distance) and cost per hour (related to the time duration of the transport), as well as the costs related to loading, unloading, and reloading (Gronland, 2011). The significance of the above identification of cost drivers is that each of them affects the amount of incurred costs, which at the same time represents the area for investigating the possibility of reducing costs (Betancor et al., 2005).

From the aspect of product or cost carrier, the costs of transport have the character of overheads, i.e. they are common to all products in an enterprise. Transportation costs in the production enterprise are covered through an internal account more accurately through the procedure for determining the service unit cost of the transport costs' place. Namely, the transport function has the role of an auxiliary cost place and, as such, provides services to other costs of the enterprise, both in production and non-productive cost places. The unit cost per one hour of transport service includes the fixed and variable costs, as well as the primary and secondary costs.

The allocation of transport costs to cost carriers is therefore carried out using appropriate keys such as mileage, tons-kilometers, tons of stored products. One of the possible approaches to covering transport costs is the *Transport costing method*, which is based on the inclusion of costs for each vehicle on a daily basis. The number of cost units is calculated in transport by multiplying four factors: number of vehicles, traveled distance, number of day and transported quantity. As potential targets for calculating transport costs, the following can be identified (ISCI, 2014):

- control of operating and running cost and reduce of waste of fuel and other materials;
- compared cost of running own vehicles with other forms of transport;
- facilitates quotation of hiring rates to outside parties who ask for the transport service.
- determination of cost of idle vehicles and lost running time.

Optimization of logistics costs permeates the strategic, tactical and operational decision making levels (Škerlić et al., 2016; Savić et al., 2019). The strategy is important for transport issues, since it enables the identification of business opportunities, provides

an objective insight into business problems, provides a framework for enhancing cooperation, minimizes the negative effects of risks and threats, improves the decision-making process and supports more efficient resource allocation. Developing a transport strategy involves the process of strategic analysis, strategy formulation, implementation and control of the strategy (Lun et al., 2010). Viewed from the perspective of transport, strategically important areas are the following: construction of distributive network, optimal distribution system planning, determination of optimal quantity of procurement, analysis of transport destinations, coordination of logistics network and distribution, inventory management, and more. The tactical decision-making level refers to the inventory management and product movement through the warehouse system (Elbert et al., 2020). Operational decisions in the domain of logistics relate to the acquisition of goods, the costs of their storage, as well as to the costs of missed sales due to the fact that it is not possible to meet the needs of customers (Salehi et al., 2017; Škerlić et al., 2016).

Factors that determine the amount of transport costs include total distribution capacity and total distance traveled. The capacity refers to the number and size of means of transport and has a direct impact on the costs of a fixed character. The total distance (expressed in kilometers) affects the number of vehicles that will be used for transport purposes and as such, this component of transport costs has a variable character (Abdallah, 2004). Furthermore, the factors that cause transport costs can be divided into factors that are related to the product itself (weight, size, value) and market-related factors (location of customers, whether they are located in the remote area or near the traffic port) (Voortman, 2004).

When solving a transport problem, it is important to have information about working time and the number of drivers in the observed enterprise. The information provided is used to evaluate the ability to carry out the transshipment of the required quantity of goods. Also, it is necessary to respect the frequency of trips, the speed at which a vehicle can cross a certain route, the capacity of the vehicle, the number of kilometers to be crossed, the time required to carry out basic logistics operations etc. (Xie et al., 2017; Abdallah, 2004).

Starting from the fact that transport has a significant share in the overall logistics costs, and therefore the total cost of doing business, profitable and sustainable business requires the management of transport costs. It is an effort to optimize them, i.e. transport costs should be reduced to a minimum, while there should be preserved the quality of goods that are the subject of transport. The following activities contribute to the optimization of transport costs (Voortman, 2004):

- determination of an effective transport route
- determination of an effective layout of the vehicle
- selection of the warehouse location.

The time during which the goods are in transit affects the number of deliveries that can be realized with certain transport equipment during the observed period, as well as the total transport costs of all shipments. Finding an effective route should be monitored through a network of available roads, the railway lines, air routes, in order to minimize time, distance, costs and improve the quality of the service. Part of the effort to solve the transport problem relates to determining the distribution schedule for individual vehicles. The real constraints that need to be respected are as follows: each stop may have volume to be picked up as well as delivered, many transport means can be used and they can have different capacity constraints (size and cubic), the maximum transport time before the break is 8 hours, the stop can only be downloaded or delivered within a certain part of the day, the takeover can only take place after the delivery, the driver may have a break in a certain part of the day (Voortman, 2004).

The mentioned restrictions indicate the complexity of the transport problem and the necessary efforts to solve it. Namely, in addition to the location of the customer, there should be considered the distance, the time when the customer wants the product to be available, the costs of a particular mode of transport, the seasonal character of sales, whether the customers are in the country or abroad (Gonzales-Lopez et al., 2000). Comparison of the costs of individual alternatives can reveal some hidden transport costs. Finally, when it comes to site selection, it is necessary to consider the following factors: whether the company defines a market positioning strategy, when it seeks to be as close to customers as possible, or for a production positioning strategy, when it seeks to locate production facilities near sources of raw materials. Also, it is necessary to respect factors such as the development of transport infrastructure, the quality and capacity of transport facilities, the availability of skilled labor in a particular area, land costs and construction restrictions in a particular area (Voortman, 2004).

It is important to note that reducing transport costs cannot be an independent business goal. Namely, it is necessary to observe the connection between the costs of transport, revenues and profits arising from individual deliveries. By accepting a large number of small deliveries, the volume of sales increases, i.e. the level of revenues, but at the same time it does not guarantee an increase in profit. Namely, increasing the average transport costs can introduce an enterprise into the zone of loss, why many enterprises are discouraging the delivery of relatively small volume of products. Management accounting support for the transport cost reduction is reflected in generating of information as an integral part of supporting various cost management and costing systems such as Activity Based Costing/Management, Target Costing, Kaizen costing, etc. These concepts in practice are applied in an integrated manner with the aim of creating and maintaining a competitive advantage (Malinić et al., 2011; Shi et al., 2019).

Knowing the amount of transport costs is also important for the decision-making process whether to organize the transport by ourselves or to engage specialized organizations. In the case of the internal type of transport, the constraints represent relatively high costs of maintenance of means of transport and the fact that the company can only use road transport in the mentioned case. In favor of using external transport services, a

high degree of specialization and the possibility of choosing between different types of traffic (Božić et al., 2017).

Results and Discussion

Due to the fact that family farms in Serbia do not have a legal obligation to keep accounting records, the analytical calculation based on variable costs (direct costing method) is most often used in calculating and analyzing economic indicators of family farms. It is a much more convenient method than the analytical calculation of the full unit costs, since it does not require the availability of fixed costs' data for particular production lines, as well as data on overhead costs. Direct costing method is also used for determination of optimal volume and structure of production on farms (Gogić, 2014). This calculation assumes that the variable costs and direct costs of production are the same value.

The general formula for the direct costing calculation based on variable costs is as follows:

$$PV - VC = GM$$

Whereas the meaning of indicators is as follows:

PV – Total production value in a particular production line;

VC – Total variable costs for particular production line;

GM – Gross margin (gross financial result).

The total production value (PV) is determined on the basis of the quantities produced on the farm in the particular line of production and their selling prices. In determining the PV of a particular production line, it is necessary to include both the value of the principal products and the value of the by-products obtained within the observed production line.

In this methodical procedure, the basis for calculating the variable costs are the quantities and prices of used raw materials in particular production. As a business result of operating a particular production line it is obtained the gross margin that represents the difference between the total production value and the total variable costs (Tasić, 2018). The gross margin per unit provides an opportunity for comparison of different production lines, as well as for selection of the most profitable production line in the given circumstances (Glenk et al., 2017). The aim of the direct costing calculation is to determine the contribution of the obtained products in covering the incurred costs, which primarily depends on the realized production values (Andrić, 1998).

Variable costs, among other things, include transportation costs. The fact that transport is a process that requires the involvement of labor, but also of transportation vehicles, storage capacities and other resources, suggests that the share of transport costs in total costs could be significant. For the purposes of direct costing calculation, it is necessary to have a record of transportation costs, which are mostly related to energy costs, which represent almost half of the total transportation costs in agricultural production (40-50%). Therefore, transportation costs are an important parameter that must be taken into account

not only because of the impact on the total costs of production and operating results, but also because of the environmental effects of transport activities and the possibility of additional costs arising on this basis (Daylan & Ciliz, 2016; Savić et al., 2020).

Table 1 shows the number of farms surveyed in 2016-2018 and on which the gross margin data were collected for selected crop production lines. Considering the fact that maize and wheat represent the most represented crops in the agricultural production in the Republic of Serbia, the largest number of households surveyed refers to these two crops.

Table 1. Number of surveyed agricultural holdings

Crop/year	2016	2017	2018.
Maize	121	286	201
Wheat	177	209	117
Sunflower	66	76	32
Soybean	45	42	20
Summary	409	613	370

Source: Farm survey

Based on the gross margin data collected for the selected crops, Table 2 shows data relating to production value, total variable costs, gross margin, transportation costs and share of transportation costs in the total variable costs. Based on the presented data, it can be concluded that during the observed period there were no significant fluctuations in the total variable costs as well as in the share of transport costs in variable costs. On the other hand, all the surveyed crops recorded fluctuations in production value by particular years, which can be explained by the influence of weather conditions as well as fluctuations in purchasing prices of products.

Table 2. Economic indicators of selected crops' production

Year	Value of production (din/ha)	Total variable costs (din/ha)	Gross margin (din/ha)	Fuel costs related to transportation (din/ha)	Share of transportation costs in total variable costs (%)
Maize					
2016	117,444.63	57,743.12	59,701.51	1,539.18	2.67
2017	84,452.47	59,466.44	24,986.03	1,541.50	2.59
2018	140,067.81	63,240.86	76,826.95	1,900.52	3.01

Year	Value of production (din/ha)	Total variable costs (din/ha)	Gross margin (din/ha)	Fuel costs related to transportation (din/ha)	Share of transportation costs in total variable costs (%)
Wheat					
2016	98,737.51	55,692.79	43,044.72	1,421.74	2.55
2017	95,538.09	55,685.32	39,852.77	1,531.19	2.75
2018	85,610.09	56,507.40	29,102.69	1,662.89	2.94
Sunflower					
2016	116,034.85	53,503.45	62,531.40	1,437.11	2.69
2017	100,850.00	55,937.01	44,912.99	1,459.00	2.61
2018	88,353.13	52,005.41	36,347.72	1,499.19	2.88
Soybean					
2016	136,644.44	56,324.46	80,319.98	1,578.33	2.80
2017	85,723.81	57,261.61	28,462.20	1,656.17	2.89
2018	130,540.00	63,851.25	66,688.75	1,862.22	2.92

Source: Farm survey

Figure 1. Amounts of total variable costs and gross margin in production value

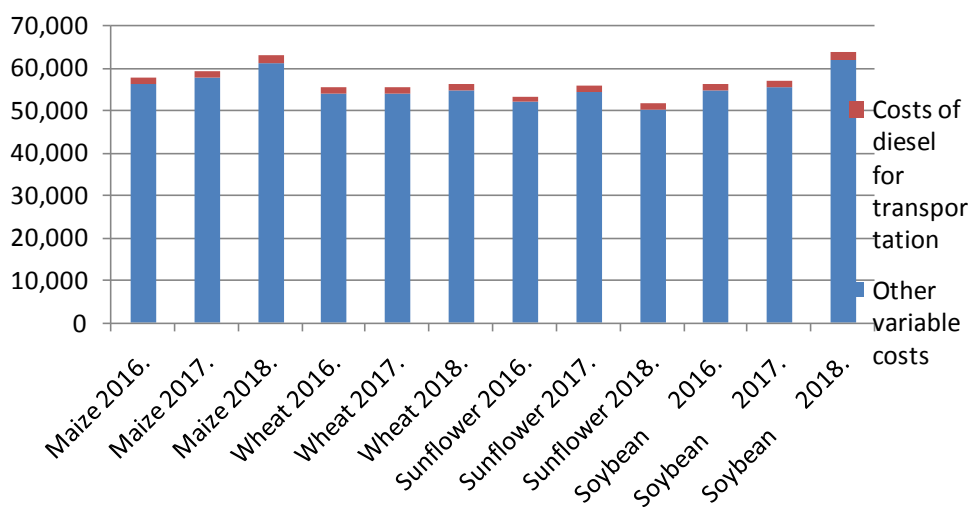


Source: Authors' presentation based on the farm survey data

Figure 1 shows the relationship between total variable costs and gross margin. Since production value has a pronounced volatility, as already has been pointed out, while variable costs tend to have a slight upward trend, the changes in gross margin can be explained primarily by changes in production value.

In the case of maize production it can be observed that the gross margin in 2016 was 59,701.51 din/ha, while this amount in 2017 was 24,986.03 din/ha, and in 2018 it was 76,826.95 din/ha. In the case of wheat, the gross margin tended to decline throughout the observation period, from 43,044.72 din/ha in 2016, to 39,852.77 din/ha in 2017, up to 29,102.69 din/ha in 2018. Sunflower had the largest gross margin in 2016 (62,531.40 din/ha), in 2017 that amount was 44,912.99 din/ha and in 2018 it was 36,347.72 din/ha. Soybean also recorded the highest gross margin in 2016 (80,319.98 din/ha), in 2017 it was 28,462.20 din/ha and in 2018 it was 66,688.75 din/ha.

Figure 2. Amounts of diesel for transportation cost in total variable costs of production



Source: Authors' presentation based on the farm survey data

Figure 2 shows the share of transportation costs related to the consumption of diesel fuel for the sowing and harvesting activities of particular crops in the total variable costs. This share did not vary significantly over the observed period and ranged from 2.55% to 3.01% of the total variable costs.

Based on the analyzed data it can be observed that the purchasing prices for maize and wheat were relatively stable in analyzed period, while the oscillation of the purchasing prices was expressed for sunflower and soybeans. The price range for sunflower was 26.95-30.68 din/kg, while the price of soybean ranged from 35.39-45.02 din/kg. It can be noticed in the case of sunflower that the purchasing prices have been reduced from year to year, while the transportation costs and total variable costs have been increased. These trends could explain the declining trend of gross margin over the analyzed period in the case of sunflower production.

Given the drastic decrease in the price of soybeans in 2018 (35.39 din/kg) compared to 2017 (45.02 din/kg), it is presented in the paper the sensitivity analysis of the gross margin in soybean production line, in order to look at the impact of the negative price

trend on the value of production as well as on the gross margin. The fact that in the observed period there was a tendency of increase in the price of diesel, both in absolute amount (from 136.50 din/lit in 2016 to 160.85 din/lit in 2018) and relatively as a share of variable costs, it has conditioned the need to consider the impact of diesel fuel costs used for transportation should be selected as the second parameter in the sensitivity analysis.

Table 3 there are given different scenarios resulting from a combination of changes (increase or decrease) in diesel costs for transport and production values, as well as the resulting gross margin amounts.

Table 3. Sensitivity analysis of gross margin in the case of soybean production

		Fuel costs related to transportation (din/ha)				
		-20%	-10%	Expected	+10%	+20%
Production values (din/ha)		1,489.78	1,676.00	1,862.22	2,048.44	2,234.66
-20%	104,432.00	40,953.19	40,766.97	40,580.75	40,394.53	40,208.31
-10%	117,486.00	54,007.19	53,820.97	53,634.75	53,448.53	53,262.31
Expected	130,540.00	67,061.19	66,874.97	66,688.75	66,502.53	66,316.31
+10%	143,594.00	80,115.19	79,928.97	79,742.75	79,556.53	79,370.31
+20%	156,648.00	93,169.19	92,982.97	92,796.75	92,610.53	92,424.31

Source: Authors' calculation based on the farm survey data

Based on the analysis, it can be concluded that the gross margin in soybean production is the lowest when the costs of diesel for transportation have been increased and at the same time the value of production has been reduced. The highest gross margin should be achieved in the case of reduced diesel costs for transportation together with simultaneous production value increase. The shown changes in production value can be explained by the dynamics of the yield per ha, as well as the volatility of purchasing prices. When it comes to the costs of diesel for transportation, they are determined by the market price of fuel, but also by the amount of fuel subsidies that the state gives to the farmers.

Conclusion

In addition to the risks arising from the specificity of agricultural production and climate changes, agricultural producers are increasingly exposed to the risks of market nature, above all the risk of changes in the prices of finished agricultural products and raw materials.

If the negative trend in the purchasing prices of cereals and industrial plants continues in several consecutive years, it could be raised the question concerning the economic effectiveness of production in the case of some crops. This will undoubtedly require changes in the production structure, i.e. making decisions on optimization of production

structure. In addition, given the fact that the purchasing prices of crops and the price of diesel fuel are determined by factors beyond the control of farmers, the farmers should do their best to adjust their operations by managing risk connected with the price changes of agricultural products and raw materials.

When it comes to generating revenue, risk can be mitigated, among other things, by signing the commodity futures contracts, while when it comes to the costs, the farmers need to assess whether they can fit into costs that allow the positive business result. In other words, given the volatility of price, the farmers should start from the lowest purchasing price of their products in the previous period and simultaneously project the movement of certain cost categories, in order to assess the possibility of profitable business within the stated frameworks.

When it comes to transportation costs, it is important to note that reducing transport costs cannot be an independent business goal. Namely, it is necessary to observe the connection between the costs of transportation, variable costs and gross margins. Management accounting support for the transportation cost reduction is reflected in generating of information as an integral part of supporting various cost management and costing systems.

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Conflict of interests

The authors declare no conflict of interest.

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BIOMASS VALUATION IN THE CONTEXT OF SUSTAINABLE AGRICULTURAL DEVELOPMENT IN ROMANIA

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ABSTRACT

Achieving a sustainable agricultural development in Romania represents a major challenge in adapting to new environmental conditions and ecological efficiency. Agriculture has proven over time to be a sustainable producer of biomass, able to offer both in terms of main production of energy crops, and through secondary production or byproduct. In this context the main aim of the manuscript is to assess and analyze the biomass valuation in the larger context of sustainable agricultural development in Romania. The results prove that biomass is an eligible candidate in valuing the agricultural potential and develop future mechanism in promoting renewables. Taking into consideration these aspects, the manuscript is in line with the current researches in field analyzing the biomass potential in developing new clean and sustainable energy production.

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Introduction

The evolution of contemporary societies is marked by a complex set of phenomena, of various natures and components, often with antagonistic manifestations and giving a long time, this can imprint in front of economic countries and a structural society as a whole, model and behavior. In this context, climate change is a significant challenge facing contemporary society and can be avoided inevitably and hard to fight. As it is already argued in literature (Karl, T. R., & Trenberth, 2003; Jordan, A. et al., 2018; Yeganeh et al., 2020), one of the phenomena with major impact on human civilization is climate change, which is occurring with increasing intensity, is a serious cause for concern for all inhabitants of the planet.

The difficulties and complexity of climate change require a proper understanding of both the need to achieve substantial reductions in greenhouse gas emissions but also to identify new, less polluting and environmentally friendly energy sources (Vasilescu et al., 2010). The continuation and endorsement of polluting processes and processes is tantamount to the future need to impose much harsher and more costly adaptation measures for future generations. As it is shown in literature (Armeanu, D et al., 2018), there is a massive link between environmental pollution and economic growth, and promoting renewables may increase the intrinsic economic growth.

As it is presented in (Christensen, J. H et al., 2013), climate change that is currently taking place globally is reshaping the world today, increasing the risks of instability in all its forms and at all levels. The data published in the last decades by the competent authorities, highlight the years with the highest temperatures in the history of meteorological or known records. Also, in the same study (Christensen, J. H et al., 2013) is shown that the trend is obvious and the global warming substantially changes the environment and increases the frequency and intensity of extreme weather events. That is why it is essential that decision-makers at the global, regional or local level mobilize and take immediate action to combat climate change (available at: Christensen, J. H et al., 2013).

Strategies for adapting to new environmental requirements and for promoting green energies, cleaner and more adapted to daily needs, must be compatible and complementary and at the same time generate credible and sustainable achievements at the level of society (Andrei & Andreea, 2018). Reducing greenhouse gas emissions to tolerable and at the same time economically efficient target levels requires orientation towards biomass and other energy sources that in the past have been exploited at a lower level than potential.

As (Allen et al., 2016) present, one of these actions could be the use of renewable energy resources. It is known that sustainable renewable energy sources contribute to climate change mitigation by reducing greenhouse gas emissions, environmental protection and the process of sustainable development (Allen et al., 2016). It is also well known the fact that the sustainable development of a country's national economy, and not only, requires a continuous and secure energy supply (Lehr et al., 2012). The growing demand for energy at the global, regional or local level makes energy supply a complex global problem, which could be solved on the basis of the use of renewable energy resources, such as energy obtained from biomass. Biomass is the biodegradable part of agricultural products, waste

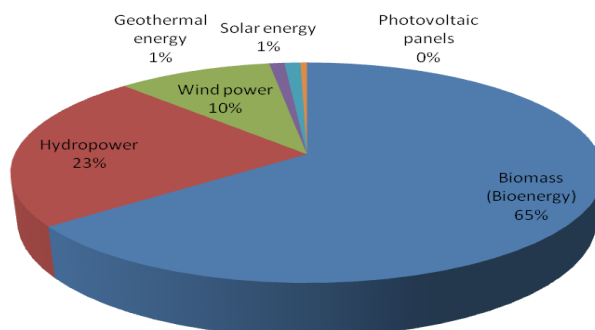
and residues, including plant and animal substances, forestry and related industries, as well as the biodegradable part of industrial and urban waste (available at: www.legex.ro).

However, there does not appear to be a unanimously accepted definition of biomass. There are bibliographic sources that claim that biomass is the set of non-fossil organic matter, which includes: wood, chaff, oils and vegetable waste from forestry, agriculture and industry, but also cereals and fruits, from which ethanol can be made (Gunaseelan, 2004; Dusmanescu et al., 2016). Biomass reserves are mainly wood waste, agricultural waste, household waste and energy crops (available at: www.revista.newprojects.org, Stoicescu M. et al., 2006). As it is presented in literature (Field, C. B et al., 2008; Abbasi, T., & Abbasi, S. A., 2010; Morato, T., et al., 2019), without any exaggeration, it can be said that biomass is one of the most important renewable energy resources, being available for use all over the world. Continuing with presenting the advantages as in (www.energie.gov.ro), the affordable cost and the neutrality of greenhouse gas emissions make biomass a promising energy resource for energy supply in the future, but also now, anywhere in the world, including in our country (available at: www.energie.gov.ro). As in the case of fossil fuels, the combustion of biogas, obtained from biomass, also results in CO₂. The difference between the two fuels is given by the origin of carbon in biogas, which is taken from the atmosphere by plant activity, thus ensuring a neutral balance on greenhouse gas emissions. Hence the neutrality of biomass in relation to greenhouse gas emissions.

In accordance with European Commission (2018), the new demand for wood biomass could further diversify agricultural activities today, on up to 10% of EU agricultural land (available at: <https://eur-lex.europa.eu>). This will provide new opportunities to explore abandoned land, as well as to reconvert the land currently used for biofuels resulting from food crops. This will improve agricultural productivity and incomes and, most likely, the value of arable land will increase accordingly.

For Romania, biomass is a renewable energy source, with encouraging prospects, both in terms of potential and in terms of use. Thus, in Romania, biomass represents 65% of the renewable energy potential (Figure 1).

Figure 1. Distribution of renewable energy sources, thousands of tone - 2020 estimate.



Source: Authors' interpretation, based on data from *The Biomass Master Plan for Romania = Master Plan Biomasa pentru Romania*

The biomass energy potential, estimated at approximately 7.6 million tons / year or 318,000 TJ / year, represents approximately 19% of the total consumption from primary sources in Romania (available at: www.add-energy.ro)

Collecting the organic fraction from the production of vegetables and fruits, from livestock farming activities carried out by rural populations and mixing them with selected biomass in organic landfills is a solution to ensure the raw material of the anaerobic digestion process (Pagés-Díaz et al., 2014). Also, this strategy contributes to the process of sustainable development based on a reduction of the amount of waste, but also a reuse of biomass and its recovery. Thus, waste becomes raw materials. Until recently, the simple solution of composting biomass was adopted, but unfortunately it only partially brought benefits. This process was lengthy, at least three months, could be applied in all seasons only in closed halls, the leachate obtained being difficult to treat. The composting plant processes for average communities in Romania that have in agriculture as the only source of income biodegradable waste, on 2 streams, cumulated up to 3 ÷ 6 t / day (Bernal et al., 2017). In most of the agricultural regions in Romania there is no separate system for collecting biomass and implicitly for processing the biodegradable fraction. Another major disadvantage is the lack of trained personnel in the field of composting, legislative gaps in compost quality, composting technique that is often not adequate to the quality of the raw material, the difficulty of ensuring the raw material in constant quantity. For example, during the season there are large amounts of plant biomass while in the off-season, the amount is very small and must be stored to ensure a complete batch of raw material necessary for the proper functioning of the composting process (Rashad et al., 2010).

The area for which this study was conducted is representative of the rural agricultural activity in Romania. The number of inhabitants is 2950, and the individual agricultural activity is developed both in the field of vegetables and fruits and in the field of cereals specific to the climatic zone of Romania: wheat, barley and corn. Biomass management resulting from such an area is currently a challenge for Romania. Therefore, there were chosen different options that are part of the Waste Management Plan at the level of each county and which should capitalize on this biomass in the medium and long term. Mixing plant biomass with biomass resulting from household waste from the population is a current solution that prolongs the life of ecological landfills, increases the use of green energy, reduces pollution thus contributing to the sustainable development of a region. The regionalization of these concepts of biomass use is a national solution that can be subsequently transposed from a successful recipe, at the level of each area, through specific customization (available at: www.mmediu.ro).

In the present paper were analyzed the possibilities of capitalization of biomass resulting from household waste and vegetable waste from a rural community in Romania with approx. 3000 inhabitants. It should be mentioned that the agricultural activity of this community is intense, agriculture being the only source of income for the population in this area. Also, the chosen area is representative for Romania due to the specifics of the production of vegetables and cereals. Thus the approx. 70 ha of

solariums represent the only activity and the only income of the inhabitants and, as such, their repeated exploitation leads to the generation of a quantity of biodegradable waste that are randomly deposited in the area or when they reach the ecological ramp thus unjustifiably occupying a large volume. The situation is similar in all associated localities (available at: www.mmediu.ro). The area where the project is located does not benefit from any system of selective collection of household waste and biodegradable waste. The typology of activities in the rural area and of the small entrepreneurs represented by vegetable growers in solariums lead to the obtaining of an important quantity of biodegradable waste, namely over 5900 tons of waste from these farms. For this waste there is no solution for taking over by the waste collection and transport operators or by the waste landfill operators. The non-existence of a fraction collection system actually derives from the lack of a biodegradable fraction processing solution in the county or in the region. Separate waste collection is an urgent need and should be applied especially in the area of collection of the organic fraction which is in large quantities and which represents an objective of the local authorities achieved to a small extent so far (Panaitescu et al., 2015, Marcikic et al., 2019). The paper discusses two scenarios, namely the technique of composting and fermentation applied to the chosen area. The application of fermentation techniques versus composting techniques makes this collection process attractive to the community and contributes to increasing farmers' incomes. In addition to incremental income, they gain important new social functions, such as energy suppliers and waste treatment operators. The biogas installations offer besides the obtained energy also a necessary component to the soil, namely the digestate which is a good fertilizer through the C / N ratio it has (Heo et al., 2004). Compared to the composting part, it also has the advantage of eliminating odors and occupying small production spaces (Anh et al., 2010, Cho et al., 1995). The advantages and disadvantages of performing one of the two scenarios and the combination of the two technologies are presented in the Table 1:

Table 1. The advantages and disadvantages of performing one of the two scenarios and the combination of the two technologies

Alternative	Benefits	Disadvantages
Anaerobic digestion	<ul style="list-style-type: none"> - reduced occupied space, leaving room for future developments (modularizations), necessary with the expansion of the collection area and the quantities collected; - optimal control of operating parameters; - non-existence of odors; - proven efficiency and viability; - training capacity in accordance with technological advances in the EU and in the world, important for the training of specialists in this field in Prahova; 	<ul style="list-style-type: none"> - high initial capital; - more complicated operation and technology, presenting difficulties considering the lack of qualified labor force in Balta Doamnei and in the neighboring communes; - the existence of a large number of "proprietary technologies", patents, which makes it difficult to bid, especially since there are few specialists in the Region and in the county to carry out the specifications and evaluations;

Alternative	Benefits	Disadvantages
Composting	<ul style="list-style-type: none"> - very low initial capital; - easy access to all composting areas; - handling 	<ul style="list-style-type: none"> - low odor control; - long composting time; - sensitivity to weather conditions (in the open field version);
The combination of the two technologies	<ul style="list-style-type: none"> - versatility, quality control of the compost; - very high capacity to train human resources; - high demonstration capacity 	<ul style="list-style-type: none"> - operation more complicated than the variants in unique technological lines - high initial investment

Source: authors' own design based on literature survey

At the end of the study, the possibility of building the two installations is discussed so that all the advantages given to the maximum capitalization of biomass can be capitalized

Materials and methods

In order to be able to perform a cost-benefit analysis that would be the basis of a sensitivity analysis, it was necessary to conduct field studies carried out by the authors during eight years in which both the annual increases of individual productions and the drastic decreases of individual productions caused by meteorological imbalances were taken into account: floods, hail, drought. Therefore, the picture was complete, allowing the choice of the most appropriate procedure for capitalizing on biomass. In order to find an optimal biomass processing solution, the authors proposed two scenarios:

1. biomass processing in a composting station
2. biomass processing in an anaerobic digester.

We started from the premise that both scenarios can be applied simultaneously, when the quantity and quality of biomass allows it, or a single scenario can be chosen if the cost-benefit analysis shows that one of the two is the most favorable. Also, in this paper are presented the results regarding the generation of compostable waste from the chosen area, waste that will later be mixed with plant waste generated by individual agricultural producers. During the entire study, the quality of biomass subjected to composting and fermentation was analyzed; the results obtained encouraging future investments. The analyzed parameters of biomass analysis resulting from plant residues mixed with biomass resulting from the sorting of household waste are presented in Table 2.

Table 2. The analyzed parameters of biomass analysis

No	Performed analysis	U.M.
MANDATORY INDICATORS		
1.	pH	pH Units
2.	N max	%
3.	ORGANIC MATERIAL	%
4.	K ₂ O	mg/l
5.	P ₂ O ₅	mg/l
6.	SALTS	g/l

No	Performed analysis	U.M.
7.	WATER CONTENT	%
8.	C/N	-
9.	IMPURITIES	%
OPTIONAL INDICATORS		
10.	EC	%
11.	Na soluble	mg/l

Source: authors' based on Zhang et al., 2007

The study of composting was performed through the furrow system, the duration of a composting process being three months.

The quality of the compost was monitored according to the composting phases, following the variation of the specific physico-chemical parameters. For each composting phase, presented in Table 3, daily measurements were made so that the parameters that did not have variations corresponding to the respective phase could be modified in due time without affecting the final quality of the compost.

Table 3. Composting phases and their general characterization

Composting phase	Temperature	Characteristics
A1. Mesophilic fermentation phase	20-40°C	Development of the microorganism population C: N can reach values up to 30
A2. Thermophilic phase	50-max.70°C	Decomposition reactions occur
A3. Maturation phase	Max. 22°C	Condensation and polymerization reactions, the degraded material is transformed into humus C: N can decrease to 15

Source: authors' based on Angelidaki et al., 2009

The composting process was monitored by analyzing the following parameters: pH, humidity, organic material content, nitrogen, C / N ratio, ammonium, nitrates, nitrites, P, K, Ca, Mg, Na, chlorine, sulfates, salinity, electrical conductivity and the content of impurities. The final stability of the compost was assessed by monitoring the appearance of pathogenic microorganisms, namely: salmonella, E. coli, C. perfringens, listeria spp. To ensure optimal aerobic activity, throughout the experiment the strings were aerated using a system to turn the furrows and aeration. The oxygen supply brought during the aeration process, which contributes to the dynamics of the microorganisms, allows the water content to decrease and does not allow the limit of 70 ° C to be exceeded. The biomass characteristics required for the composting process are presented in Table 4.

Table 4. Desired characteristics for composting processes

No.	Characteristics	Reasonable variation	The desired variation
1.	Carbon: nitrogen ratio	20:1 – 40:1	25:1 – 30:1
2.	Humidity	40 – 65 %	50 – 60 %
3.	Oxygen content	> 6%	16 – 18,5 %
4.	pH	5,5 – 9	5,5 – 9
5.	Apparent density	< 640 kg/m ³	
6.	Temperature	43 – 60 0C	54 – 60 0C
7.	Particle size	0,3 – 5 cm diameter	-

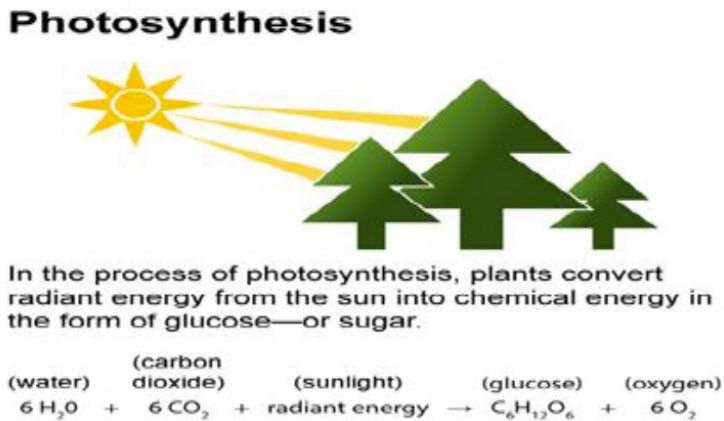
Source: authors' own analysis

In the process of anaerobic digestion, biogas results from the microbial degradation of biomass, formed by photosynthesis with the help of solar energy ES (Cho at al, 1995):



Biomass contains accumulated solar energy. Plants absorb solar energy in a process called photosynthesis (Figure 2). When biomass is burned, the chemical energy in the biomass is released in the form of heat. Biomass can be burned directly or transformed into liquid biofuels or biogas that can be burned as fuels.

Figure 2. Schematic of hephotosynthesis process



Source: authors' based on [www. eia.gov](http://www.eia.gov).

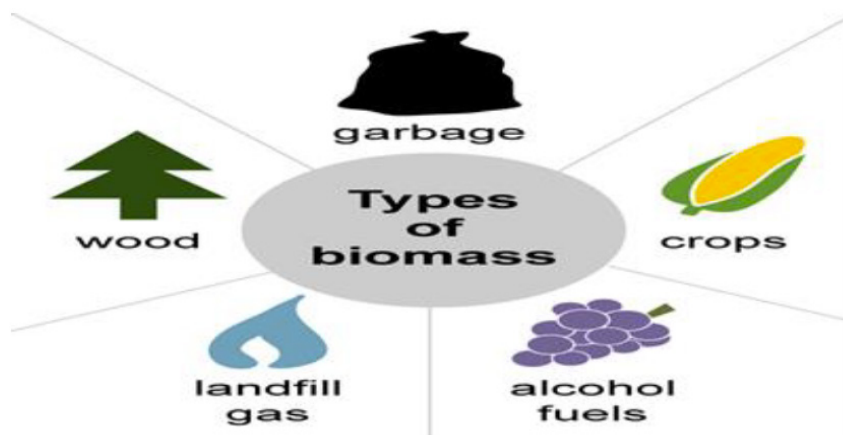
Biomass is represented by (available at: www.eia.gov):

- wood and waste resulting from wood processing;
- agricultural crops (cereals) and residual agricultural materials;
- garbage containing food, household and wood waste;
- manure.

The selection of biomass is done taking into account (available at: www.eia.gov):

- the organic material content must be adequate for the selected fermentation process;
- the nutritional value of organic material, therefore, the potential for biogas formation should be as high as possible;
- the substrate must be free of pathogens and other organisms should be made harmless before the fermentation process;
- the content of harmful substances and garbage must be low to allow the fermentation process to take place;
- biogas composition must be suitable for use for other purposes;
- fermentation residue composition must be usable for other purposes, for example as a fertilizer.

Figure 3. Types of biomass



Source: Authors' own adaptation based on The National Energy Education Project (public domain) (available at: www.eia.gov)

The cost-benefit analysis was based on an intensive collection of waste and biomass from the population, close to the national average. The financial model used was classic and is based on income and expenses. The calculation of the financial performances was made on the basis of the financial indicators and on the basis of the sensitivity evaluation (Cho at al. 1995). Economic variables include savings on landfilling (Lee at al., 2009). The internal rate of return (IRR) and the net present value (NPV) were calculated. The NPV indicator is calculated in the analysis at a discount rate of 5%, 8%, 10%, 12%, 15%. For the calculation of the indicators NPV, IRR, Benefits / Costs and ROI ("return on investment"), a total project budget estimated at valoarea was used. Net present value ("NPV") or VAN in Romanian language, is a measure of the volume of value created or added today by making an investment (Lajos, 2011).

- If $NPV > 0$, the investment can be made, there is profit generated
- If $NPV < 0$, the investment is not profitable, there is no profit generated

$$NPV = -I_0 + \sum_{t=1}^n \frac{NCF_t}{(1+k)^t} + \frac{RV_n}{(1+k)^n} \quad (2)$$

where: I_0 = initial investment;

NCF_t = net cash flow, to which are added the public benefits generated by the investment at time t ;

RV = residual value of the investment project;

n = duration of operation of the investment project;

k = discount rate.

Another important financial indicator is IRR (Tang et al., 2007):

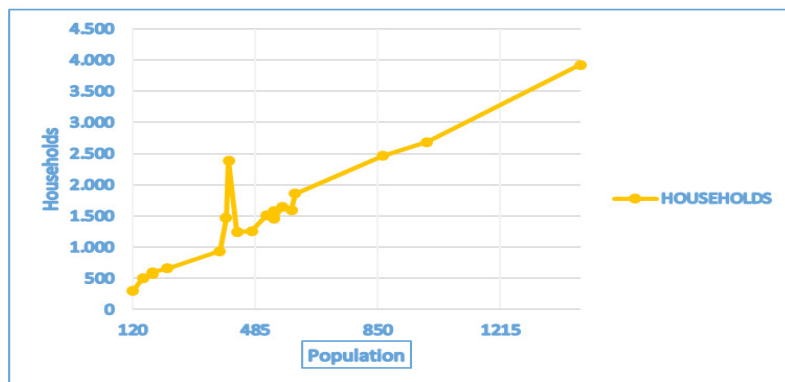
$$IRR = k + \left[\frac{NPV(k^+)}{NPV(k^+) + |NPV(k^-)|} \right] * (k^- - k^+) \quad (3)$$

IRR must be interpreted in the context of a numerical value higher than the inflation rate.

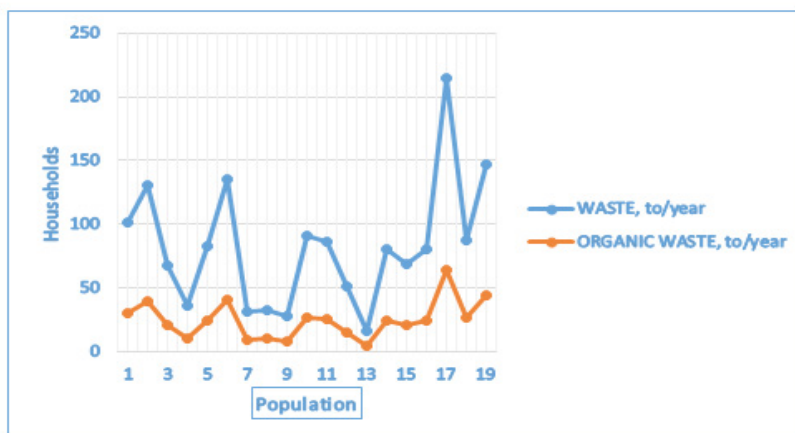
Results and Discussions

The amount of compostable waste produced by the population in the studied region was related to the number of households and the population. The classification of households as well as their number in relation to the number of inhabitants respected the rural agglomerations in the studied area. From these quantities was evaluated the total amount of organic waste, the basis of the process of co-composting and anaerobic digestion (Figure 4 and Figure 5).

Analyzing the Figure 4 and Figure 5 it is observed that there is a total waste available of 1570 t / year, out of which the total amount of organic material generated is about 500 t / year, compared to a total population of 29000 coming from 9700 t / year households. Thus, calculating the percentage of organic material in the total amount of waste generated, it is 31.8%. This percentage makes the authors' proposal to capitalize on biomass obtained from waste mixed with plant biomass so that it is viable and applicable on an industrial scale.

Figure 4. The amount the population in the studied region in relation to the number of households

Source: Author's own calculations

Figure 5. The amount of compostable waste produced by the population in the studied region in relation to the number of households and the population

Source: Author's own calculations

The analysis of the biomass subjected to composting, the biomass coming from the mixing of the vegetal waste with the biomass collected selectively in the ecological ramp is presented in the Table 5.

Table 5. Minimum and maximum values obtained from analysis of physico-chemical parameters of biomass used as raw material for composting and anaerobic digestion

No.	Analysis performed	U.M.	Values obtained
MANDATORY INDICATORS			
1.	pH	pH Units	6.8-8.5
2.	N max	%	0.3-3.4
3.	ORGANIC MATERIAL	%	7.1-39

No.	Analysis performed	U.M.	Values obtained
4.	K ₂ O	mg/l	42-240
5.	P ₂ O ₅	mg/l	41-768
6.	SALTS	g/l	1.6-2.8
7.	WATER CONTENT	%	22-44
8.	C/N	-	9-28
9.	IMPURITIES	%	1.2-11
OPTIONAL INDICATORS			
10.	EC	%	1.6-13
11.	Na soluble	mg/l	164

Source: authors' own analysis

In order to be able to process this biomass efficiently, the economic aspects of a composting plant must be discussed.

The appreciation of the investment of a composting station was reported at the existing prices in August 2020 on the specific market in Romania. Table 6 presents the cost estimates of this type of investment.

Table 6. Estimating the costs of building a composting plant

The construction works that will be carried out	Eur
Excavation	5000
Constructions: resistance (foundations, resistance structure) and architecture (exterior closures, partitions, finishes)	3214
Electrical installations	2790
Plumbing	300
Heating, ventilation, air conditioning, fire protection, radio-tv, intranet (exhaust / filter)	500
Natural gas supply installations	0,00
Telecommunication installations	400
Installation of technological machinery and equipment (composter and fan assembly)	2342
Technological machinery and equipment (front loader + rotary composter + fan)	188
Transport machinery and equipment (biodegradable transport garbage truck)	367
Equipment (containers for biodegradables + self-compacting container + measuring equipment)	1278
Water household	300
Pre-treatment plant and emission discharge installation	389
Fencing and protective curtain	318

Source: Author's calculations

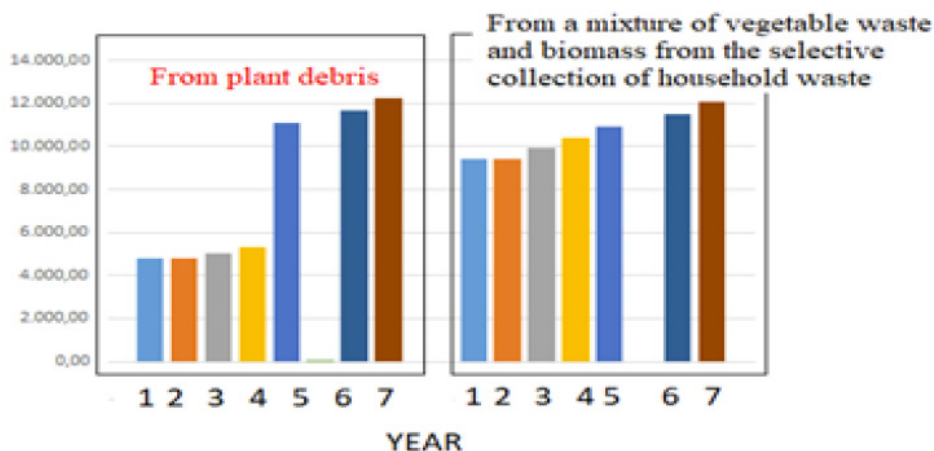
The NPV and IRR values are presented in the table 7.

Table 7. The values of the main financial indicators necessary to assess the return on investment

IRR	-7,17%	
NPV (5%)	-1.185.514,74 €	5%
NPV (8%)	-1.190.001,25 €	8%
NPV (10%)	-1.180.150,49 €	10%
NPV (12%)	-1.164.513,19 €	12%
NPV (15%)	-1.137.415,95 €	15%
NPV (5%)(V)	844.832,30 €	5%
NPV (5%) (Ch)	812.378,00 €	5%

Source: Author's own calculations

The results of the financial analysis show that the internal rate of return is negative and quite low (-7.17%), which is common in such investments. The sale of compost will bring estimated revenues according to Figure 6. The projection was made over a period of 7 years.

Figure 6. The sale of compost

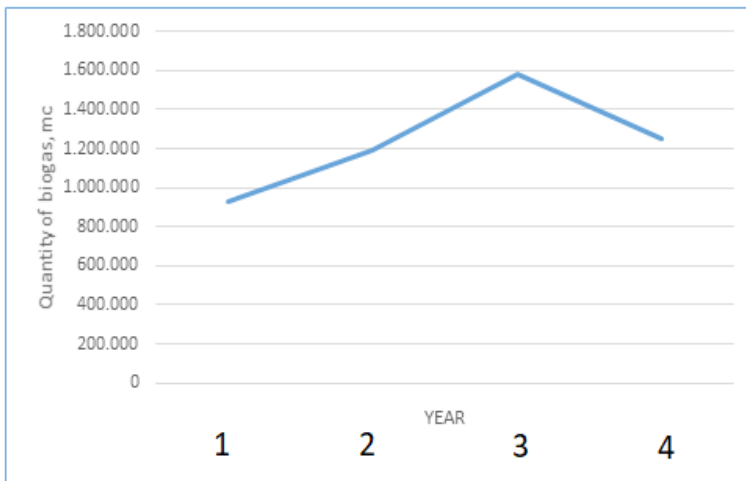
Source: Author's own calculations

The need for a selective collection period leading to low prices per ton of raw material is indicated. In this case, the waste collection operator must be motivated to be able to have the necessary quantities on time without additional costs. Analyzing the Net Present Value (NPV), it is observed that it is negative and close to the value of the investment. All these calculations show us clearly that the investment must be supported from national development funds and not from private capital as it is now being done at the level of the regions. In the European Union there are few such investments made entirely with private capital. Supporting these types of private equity investments will lead to failure in either operation or investment, which subsequently makes it unprofitable. The amortization of the investment can be made from the sale of the resulting compost and the extension of the operation period of the household waste

landfill. Compost generators could be the ones who would get back the compost needed to produce vegetables and fruits. So in this case the market is covered.

The scenario in which the anaerobic digestion process is applied, the estimated amount of biogas is presented in Figure 7 (annual averages were calculated). The concentration of methane in the estimated amount of biogas is between 22% and 49.6%.

Figure 7. The amount of biogas resulting during four years of operation



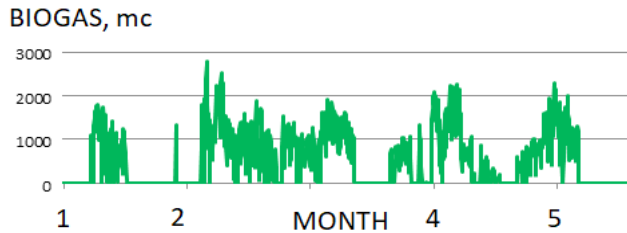
Source: Author's own calculations

The amount of biogas that will be consumed was calculated especially for the first five months of the year when there is large consumption both in the population and for greenhouse heating. The calculated values are presented in Figure 8.

The sensitivity analysis was done taking into account the risk factors induced by the compost sales market. The risk variables, from a financial point of view (which were analyzed above) are:

- the price obtained per ton of compost;
- the amount of vegetable waste generated;
- the percentage of transformation of vegetable waste into compost.

Figure 8. The amount of biogas that will be consumed in the first five months of a climate-normal agricultural year



Source: Author's own calculations

The separate collection of the organic fraction is another source of uncertainty, given the same lack of experience. In other EU Member States, experience has shown that it is quite difficult to obtain a suitable organic fraction for composting. The sensitivity analysis includes the sensitivity of the IRR (RIR) to the variation of vegetal waste quantity generated annually presented in Figure 9.

As the amount of vegetable waste is higher, a return of the RIR value to zero is observed, which is beneficial for the cost analysis of the proposed investment. Following the results obtained, it can be said that the most favorable scenario is the anaerobic digestion system.

The present value of operating revenues equals the present value of operating expenses, which demonstrates the sustainability of the project. A risk and sensitivity analyses were also developed, assuming, among other things, lower prices per ton of compost.

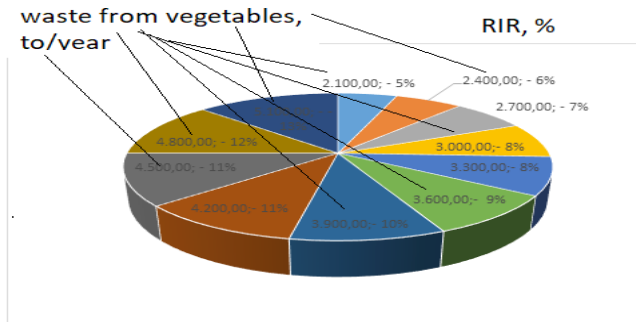
The simulated composting plant together with the anaerobic digestion plant that produces biogas will be located on an area of 21,000 square meters. The stratification of the foundation soil will be taken into account, which is necessary to have a complex clay layer on the surface (clays, dusty and sandy clays, clay powders). Also, sandy layers are interspersed, with thicknesses exceeding 6m.

At the end of this study, it was proposed to build the anaerobic digestion and cogeneration plant together with the biomass composting hall, the construction of which is underway.

The advantages of this investment are the following:

- The modular construction of the installations makes possible the economic operation in the conditions of a variation of biodegradable waste processed quantity;
- biodegradable waste is processed with the most suitable technology for the corresponding type;
- the management system is established with all components simultaneously: collection, transport, processing, marketing and sale of compost;
- the regional approach allows to ensure a sufficient flow of biodegradable waste for profitability.

Figure 9. IRR (RIR) sensitivity expressed in% reported to the variation of vegetal waste quantity generated annually experienced in to / year



Source: Author's own calculations

Following the constant operation of the chosen solution, it can be seen that after three years of operation, the chosen scenario leads to an increase in cash flow and overcoming the zero profitability barrier.

Conclusions

The paper presents a study of biomass processing in order to reduce the impact on the environment and the transformation of plant biomass and waste into raw materials. The scenarios were taken into account, based on the two processes applicable to the area representative for Romania are: composting and anaerobic digestion. The average percentage of organic matter determined in the present study from the two sources of origin provides the basis for the composting process. Sustaining an investment from private funds is not possible according to the economic indicators determined in the paper. The sensitivity analysis took into account the risk factors and showed that it is efficient to combine the two processes and to build two installations. Such an investment can lead to the rural development of the targeted area.

Conflict of interests

The authors declare no conflict of interest.

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RURAL TOURISM IN DEVELOPMENT FUNCTION OF RURAL AREAS IN SERBIA

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ABSTRACT

This paper analyzes past experiences and examples of good practice in the development of rural tourism, with particular reference to the potential of Serbia. The aim of this paper is multiple. Given that rural areas in Serbia face significant economic and demographic problems, rural tourism may be one of the answers to the question of how to revitalize rural areas. Tourism development in villages of Serbia can make an important contribution to job creation but also to preserving jobs for the population and increasing their interest in staying in the region and creating new business opportunities. In addition to building a positive image, economic prosperity, by investing more in this area, Serbia could solve the problem of population migration within its territory to larger cities, as well as the departure of young people from the country.

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Introduction

No matter how big, powerful and productive a country is, it is competing for its place in the world market every day. The stagnation and continuing slowdown in the global economy is largely due to the “competition” of many destinations to gain the confidence of tourists, consumer investors and producers. There is almost no destination in the world where tourists are not desirable, which is why the definition of xenophobia is changing (Prnjat, 2019). Today, there are numerous, specific ways of branding destinations, and when it comes to tourism, we can see a great expansion of selective forms of tourism. Well-known and already well-developed tourist destinations, due to increasing

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competition, are turning to the development of new attractions, such as: military tourism, rural tourism, congress tourism, health tourism, sports, educational, religious tourism, archaeological, urban, recreational, spa, eco and ethno tourism, gastronomy, dark tourism, “abortion and transplant tourism” (Colin, 2011), “slow tourism” etc ...For example, the concept of ‘*slow tourism*’ is relatively new and involves people travelling ‘slower’ and shorter but staying longer in a chosen destination where they use local modes of transport, enjoy local cuisine and visit local, cultural sites (Tomić et al. , 2018). Countries are trying differently to attract more tourists, foreign investors, to develop international partnerships, to stimulate exports, to better position their products and services, but also to position themselves through personally identifiable brands, as effectively, meaningfully and innovatively as possible and in their own way in the international environment (Cvijanović et al., 2018; Dašić, 2013).

Tourism is an important source of income and a significant factor in economic stability, because it contributes to an increase in foreign exchange inflows and job creation (Dašić, 2018). Over 3.5 million tourists visited Serbia in 2019. Comparing 2018 data, this is an 8% increase, with more than 1.8 million foreign tourists and as many domestic tourists (Bakić, 2020). What is interesting is that in 2019 the greater number of foreign tourists was recorded for the first time compared to domestic tourists. Also, the number of overnight stays (10,073,299) increased by 8% compared to 2018, and particularly important is the data on double-digit growth in the number of overnight stays by foreign tourists. In the Republic of Serbia in December 2019, compared to December 2018, the number of tourist arrivals increased by 15.0% and the number of overnight stays increased by 20.4%. (Republic Office of Statistics of Serbia, 2020). As before, the largest number of overnight stays of foreign tourists was realized in Belgrade, Novi Sad, Zlatibor, Vrnjacka Banja and Kopaonik.

Contemporary trends in world tourism are looking for places where nature is fully preserved or living environment minimally altered. Serbia’s chances in a picky market may be destinations with no disturbed ambient features of rural areas. Some phenomena of rural tourism include (Baćac, 2011): rural, wine, gastro, hunting and fishing tourism, tourism in national and nature parks, religious tourism, cultural tourism, rural camp, ethno villages, ethno collections, rural manifestations, folklore, adventure tourism, health tourism (spa), etc. With the development of tourism, certainly conditions for better development of rural tourism (rural tourism) will be created, which is underdeveloped in our region, given that a large part of the surface of Serbia is made up of rural areas (Živković et al., 2019).

Literature review

The number of tourists seeking relaxation in the midst of nature in rural, unspoiled areas is on the rise and the transition from mass tourism to alternative, special interest forms of tourism has been observed, mainly in Western and Northern Europe (Milojević & Mihajlović, 2019). Niche tourism and buying an “emotional” vacation in lesser known, unique destinations has become a lifestyle among highly educated, well-

travelled tourists (Maria-Irina, 2017). Growing global environmental concerns provide an opportunity in the form of a new market for “ecotourism”. Destinations such as the Maldives, Kenya and Belize, which used this trend and their natural resources to target the ecotourism market, doubled in the 1980s with their tourism business (Ignjatijević et al., 2020). On the one hand, a new generation of environmentally conscious and educated tourists is actively seeking a “pristine” environment as a holiday destination, and on the other, local authorities are trying to achieve sustainability (Moutinho, 2005).

When considering the terms village / countryside, and rustic/rural, it can be observed that there is a difference between the two terms, however, in certain cases, especially when viewed as adjectives, there are almost no differences in description or content. The rural area is often referred to as a countryside area which, in addition to villages, hamlets and other settlements, in the physical-geographical sense, covers the once narrower and wider area, which still creates some confusion in the use of the term village/countryside and rustic/rural. It is also present when rural tourism is to be defined. Rural tourism can be defined as a set of relationships and phenomena arising from the travel and stay of visitors in rural areas. (Njegovan, 2016).

Countryside tourism in Portugal, or rural tourism in this country, is characterized by an area of scattered and fragmented markets, which include Housing Tourism, Rural Tourism, Agritourism, Country Houses and Village Tourism. *Housing Tourism* consists of houses or residences of recognized architectural value of appropriate size, with care for quality furnishings and décor. *Rural Tourism* are rustic houses typical of a rural area, located in or near the village. *Agritourism* provides a special feature of allowing tourists to participate in agricultural activities or complementary forms of animation in which the owners live. *Country Houses* are private homes and shelters located in rural areas that provide hosting services, whether or not the owners use them as apartments. The fifth type, *Village Tourism*, was recognized in 2001 and is characterized by a hosting service provided in a set of at least five private homes in the village and integrated in a way, whether or not they are lawfully owned (Correia Loureiro, 2012).

New forms of communication, such as the Internet, social networks and applications that can be downloaded on smart phones or tablets, are the key to improving visibility and promoting the promotion of tourism opportunities in rural areas (Chiara Garau, 2015). According to the Tourism Development Strategy of the Republic of Croatia until 2020, the development of rural tourism should be based on enriching the supply of family rural households, primarily through the establishment of local and regional human-created attractions such as wine cellars, recreational facilities, viewpoints, theme parks and the like. Priority should be given to thematizing supply by grouping rural households (clustering) according to different topics (e.g. family, organic farming, riding programs, cyclotourism, etc.); separate standards are developed for each topic. It is necessary to create a basis for stimulating the development of rural tourism as an important part of the overall tourism offer, with the aim of shaping a competitive and recognizable tourism product. (Bartoluci et al., 2018).

In Montenegro, tourism is also seen as a means of tackling the social and economic challenges facing rural areas. The specific role of rural tourism for generating jobs and additional farm income has been identified. It is considered possible to raise the standard of living of people in rural areas in Montenegro based on tradition and the new role of agriculture and its connection with other sectors, especially tourism. (Morić, 2013). Rural tourism as part of the overall tourist offer in Macedonia is currently booming. Almost every tourist offer of all the travel agencies contains, among other things, visiting interesting rural tourist areas. Rural tourism is a type of tourism that has great potential. It can, in certain regions, extend the tourist season, which will increase the number of employees in this sector (Koteski, et al., 2017). In this line, it must be noted that rural tourism currently has strong advantages on the international market as it has already played a key role in development of some rural zones that were economically and socially depressed (Simpson, 2008; Chuang, 2010).

Material and method

The subject of this paper is to analyze and describe the development of rural tourism in recent years and to indicate the limitations and possibilities of its development in the context of the overall rural development of the countries in the region and the European Union with reference to the development and potential of rural tourism in Serbia. The aim is to point out the current state and potential for further strategic directions for the future development of rural tourist destinations in Serbia. For the purposes of this article, secondary information surveys have been conducted, including information available on the Internet and in contemporary literature on rural areas. The method of qualitative analysis of secondary data and descriptive (reproductive) synthesis and the comparative method were applied.

Results and discussion

Tourism as a driver of national economies

Tourism can enable higher employment rates, increase in income, decrease of spatial difference, basically economic development. This is also in line with EU cohesion policy objectives. In addition, some forms of tourism, such as ecotourism, contribute to nature conservation and address the sustainable tourism issues that the EU is so focused on. Within the EU, tourism is one of the largest economic sectors with 9% of employees and 9% of consumption share. It also represents one of the five export categories in 83% of all countries in the world and a major source of foreign exchange earnings in almost 38% of countries. Therefore, it has one of the main roles in the economy of many countries, as a source of employment and a way to fight poverty (Pavlović et al., 2009).

Some authors claim that there is a two-way positive relationship between tourism development and the economy. Tourism has a leading role, playing a growing role in achieving certain macroeconomic goals, such as: rural development, employment, positive impact on the country's balance of payments. It is stated that the share of

the economy, which is directly and indirectly related to tourism in GDP, is many times higher than the share of tourism branch in GDP, which according to the authors implies a positive effect of tourism on the overall economy of a country. Furthermore, it is argued that public opinion in Serbia has a positive attitude towards tourism as an activity, which automatically places tourism in an important economic branch in Serbia (Petković et al, 2011).

Further, the geographical position of the neighbouring Croatia makes the country very heterogeneous in climate, nature and cultural heritage. The Croatian tourism sector is primarily known as coastal tourism with its peak and supply in summer (sun and sea). The share of tourism activity in total GDP is increasing every year (Table 1). Thanks to the continental part and significant rural areas (about 93% of the total area), rural tourism is also becoming an important part of the country's tourism offer. Rural tourism can be seen as part of the solution for rural areas facing depopulation (deagrarization) and low income problems (Grgić et al., 2017).

Table 1. Earnings of countries in the region from tourism

Country	2017 (USD m n)	2016 (USD m n)	period
Albania	2,049	1,820	1995 - 2017
Austria	22,408	20,971	1995 - 2017
Bosnia and Herzegovina	894	773	1998 - 2017
Bulgaria	4,678	4,164	1995 - 2017
Macedonia	331	283	1995 - 2017
Montenegro	1,109	978	2007 - 2017
Romania	2,999	2,172	1995 - 2017
Serbia	1,705	1,460	2002 - 2017
Slovenia	2,952	2,627	1995 - 2017
Croatia	11,918 (2018)	10,703 (2017)	1999 - 2018

Source: European Union Tourism Revenue

When talking about good examples in the world, Namibia is certainly one of the countries that has achieved significant economic effects and improved image through rural tourism. This country was relatively unknown and perceived as a land of conflict, violence, insecurity, contagion, hunger and the like. One country, known for its turbulent history, in 2007 surpassed its big neighbour South Africa and became one of the most popular tourist destinations in Africa (Dašić, 2016). Another example is Kenya. The Government of this country, through the Ministry of Tourism and the Kenya Tourism Board, has worked continuously to develop the Western Kenya tourism circle, to become a well-known international and domestic tourist destination. Much of Western Kenya is made up of rural areas of the area, which means that most of the tourism activities and features that the region has to offer are based in rural areas of Western Kenya. Statistics show that about 60% of the population lives below the poverty line. The ironic part is that the area is endowed with natural resources that have been used mainly for economic activities such as agriculture and trade. Natural wealth has not

helped to reduce poverty in this area and it is considered that another economic activity, especially tourism, should be developed in order to improve the well-being of the area (Okech et al., 2012).

Rural tourism

Rural tourism involves and includes a range of activities, services and other amenities organized by local people on family farms in order to attract tourists and create added value for the tourism product (Đekić and Vučić, 2004). The guests are presented with the traditional hospitality and living values of the local population, which is why this type of tourism is a lever of economic development and raising living standards in rural communities, all based on the principles of sustainable development and conservation of natural resources.

For example, Albania is a small country, but has diverse resources. The presence of these resources makes the country have great potential for its further development. Thus, the tourism sector is making an increasing contribution to the country's economy. The statistics clearly show that the number of tourists has increased sharply in the last 15 years. As Albania has a diversity of natural resources ranging from the Alps in the north to the Ionian coast in the south, it has great potential for tourism development while still focusing on rural tourism. However, the current situation of rural tourism is quite weak and in its infancy. Entities currently offering rural tourism face many problems of different nature. The development of Rural Tourism is considered to have made an important contribution to job creation while retaining jobs for the population and increasing their interest in staying in the region and creating new business opportunities. It would also provide more opportunities for young people in rural areas and motivate them to stay and not leave the area to find the best opportunity to live in urban areas or abroad. (Nagy et al., 2017)

An important factor in the development of rural tourism is keeping the tradition in the villages. This refers to the reconstruction of the appearance of the place and the characteristic construction of tourist facilities. In order for the farm to provide additional services to tourists, it must be adequately equipped and organized. The tourist facilities are characteristic and traditional in appearance, while from the inside they can be modernly furnished. This type of tourism is often associated with the nostalgic/native feelings of individual tourists. It is a population that moved to the city, having no more ancestors in the countryside, but still very emotionally attached to the homeland. This type of tourist need very often grows into a residential form of tourism, where the residents of the city centres build country houses in their homeland (Štetić et al., 2014). Further, the villages that are historically and culturally significant are even more likely to succeed in tourism because tourists are quite interested in exploring different local customs and traditions (Blažević et al., 2018).

It is estimated that tourist trends will increase by 3-5% each year over the next few years. Tourists' expectations will also change with this increase. The visitors, also

referred to as new tourists, prefer holidays oriented to their interest and buy tourism products that are more based on nature, authenticity and experience. Rural tourism, as one of the new types of tourism, is increasingly popular in the tourism industry. Tourists who want to relax, be active and experience something different together in their holidays are looking for a different and authentic tourism of its kind. On the one hand, rural destinations that are struggling with poverty want to strengthen their local economies. Rural tourism is considered a suitable type for both parties. The support of other stakeholders, such as governments and organizers, should also not be forgotten in this concept. Well-managed communication between actors is vital. This cooperation will respond to the needs and well-being of tourists to the local community, as well as preserving the natural, historical and cultural environment. Rural tourism plays an important role for the sustainability of rural areas. (Gökhan, Reyhan, 2015).

Food or dining experiences are one of the important factors that influence tourists' perception of a destination in some models of destination attractiveness. A group of authors explored the use of food as a form of destination identity from the perspective of destination stakeholders. The results showed that stakeholders believe that food identity is a powerful tool in building the brand and image of the destination. Only in the countryside is the tourist able to follow the ritual process, which begins with the production of food and ends with the preparation of meals and setting them on the table. The opportunity to participate in all stages of this process is characterized by the specificity of this form of tourism "this is yours" (Lin, Pearson, & Cai, 2011). So consumers are willing to pay any price for products that offer them better health and well-being. Today, consumers are picky, informed and focused on health and healthy lifestyles. The average premium prices of healthy foods compared to traditional foods are shown in Table 2.

Table 2. Average differences in premium prices for healthy foods and beverages compared to traditional foods

Organic Food & Beverages	100% greater
Functional food and beverages	20-50% greater
„Better for you“ food and beverages	0-30% greater
Naturally healthy food and drink	10-40% greater
„Food intolerance“ products	30-60% greater

Source: Euromonitor International

Rural tourism is both an old and a new phenomenon. Serbia has great potential for the development of rural tourism. Natural beauty combined with culture, traditions, festivals, gastronomic specialties and music, may become a recognizable tourism brand, which could contribute to a significant profit inflow and improve the overall image of the country. However, the current level of competitiveness of Serbia in the field of rural tourism is not particularly high, despite the fact that all natural, cultural and social preconditions for its development already exist (natural resources, significant cultivation) land, large number of agricultural active population, traditional approach to

agriculture, lack of pollution, as well as the possibility of producing “healthy” foods, good potential for developing complementary activities such as hiking, recreation, hunting, fishing, horseback riding and participating in daily active country folk, traditional local culinary specialties, etc.). Rural tourism in Serbia must become the ‘major’ industry ‘and the generator of a dormant national economy. (Medojevic et al., 2011). The rural environment constantly has to reinvent itself without losing sight of its own identity and it does this in a permanently paradoxical manner. On the one hand, the need to survive based on sustainability, in general and respect for the environment, in particular. And on the other, setting in motion new activities that manage to attract people to settle on a permanent or temporary basis. The proposed activities are especially, although not exclusively, related to leisure and, therefore, rural tourism is a basic instrument for developing the rural environment. Throughout the process, fostering creativity, innovation and information and communication technologies are essential because they help the area to be connected and promote it as a smart rural area (Sanagustin-Fons et al., 2018).

Rural tourism in the function of mitigation of regional unevenness

Increasing attention is given to tourism development as it can contribute to the social and economic regeneration of rural areas (by supplementary income and employment, and by repopulation and eliminating the social isolation of the area). In this regard, tourism is seen as a way to overcome a number of problems in the development of rural areas around the world. Rural tourism is becoming the engine of economic development and raising the standard of living in rural communities, as it rests on the principles of sustainable development and conservation of natural resources. The main resource for the development of rural tourism is nature, and it is estimated that about three quarters of the world’s tourism demand is directed towards natural values and “pristine” spaces.

Due to the importance of rural areas, active support for the development and conservation of these areas is a major goal of national government and international organizations. Rural development policies should primarily have the task of creating a rural development plan at the national level, combined with the support it provides at the local level, which means that support must be decentralized (Fotiadis, 2011). Experience from the European Union confirms that territorial units are a better option for realizing value than it is a country. Croatia and the Czech Republic have a high chance of competing with key players, well committed to EU-28 rural tourist destinations. Bulgaria, Cyprus, Hungary, as well as Romania have interesting rural areas, unique traditions and attractive cultures, potential tourism providers with great opportunities for profit. However, a clear focus and strategic vision for implementing the necessary measures in the sector, and sufficient educational level of the population, adequate infrastructure, absorption capacity, necessary funding, and accurate reporting of rural tourism data remain important challenges in the areas of rural, agricultural and ecotourism in the new Member States (Maria-Irina, 2017).

The main strategic goals of Serbian tourism in rural areas should be: competitiveness on the international market, balanced regional development, self-employment and motivation of young people to stay in the countryside, constant protection, implementation and maintenance of high ecological standards for long-term sustainable valorisation of tourism potential of rural areas, development of overall offers for the tourist destination, raising the quality of accommodation for catering and tourist services, encouraging the production of organic food and local products as well as their placements through tourism, education of employees in rural tourism and increasing the share of rural tourism in the total tourist turnover.

Rural poverty is a burning problem in many countries, including Serbia. Some authors state that rural tourism in Serbia is developed in some parts of Vojvodina, central and western Serbia, but is still an under-recognized tourist product at the national level. The development of entrepreneurship in the field of tourism stands out as one of the most effective ways to solve this problem. Focusing on the fair distribution of tangible and intangible assets in the local community area involves adopting the concept of tourism development and entrepreneurship, which is based on Pro-poor Tourism. These include the development of micro-types of businesses, small and family-owned businesses, the development of the tourism business diversifying products and activities traditional to rural households, including a development principle that focuses on the interests of the poorest members of the local community. For this reason, relying on local resources to promote local capacities and increase the level of local community participation in development activities is the key to the success of strategies for the poor (Škrbić et al., 2018).

It takes hard work and effort to help the development of rural tourism in Serbia by education and to encourage all those who intend to run tourist services on their farms. It is also necessary to facilitate job orientation for those who already operate as rural family households in tourism (included in agritourism). It is necessary to further motivate the preservation of: ambient architecture, farmhouses, local specifics, traditions and customs, interesting old arts and crafts, biodiversity, small-scale agricultural production, original products. Further, it is necessary to enable the preservation of the vitality of the village and the attractiveness of the rural way of life, through tourism services, as a motivator for the development of rural areas. All of this needs to be done in the way it was done many years ago in France and other most developed tourist destinations in the world today (Đenadić et al., 2016)

In developed countries such as France, Italy or England, the trend of rural neglect in society has evolved in the opposite direction to migration processes in the Balkan Peninsula. A good example is the marketing concept of advertising in the Provence region of France in the last two decades of the twentieth century. When mass migrations of people from villages to cities and the extinction of smaller settlements in the southern part of France occurred in France in the 1960s, the French decided to pay attention to the reconstruction of desolate areas at the turn of the 1980s and into the 1990s. Young married couples were able to buy affordable homes and properties, and the state provided roads and telecommunications.

According to the 2002 Poverty Reduction Strategy for Serbia, about 45% of the total population lives in rural areas, covering almost three quarters of the country's territory. They have been in a state of economic and cultural stagnation for decades, dramatically increasing poverty. Opportunities for employment in non-agricultural activities are very limited. This encourages migratory movements, which are dominated by the most capable and most vital part of the population. In the next step, this specific spiral returns to the problem of even more severe economic backwardness and further deepening of poverty. About 58% of all the poor live in rural areas. Thus, the proportion of the poor among the rural population is 14.2%. This is more than the poverty of the entire population (10.6%). This means that every seventh inhabitant is poor. Accordingly, the relative poverty in rural areas is significantly higher, almost double, compared to urban poverty (7.8%).

In regional terms, rural poverty is most widespread in parts of Serbia, which are the most vulnerable in terms of overall poverty. Among the poor in rural areas, the majority (30%) are dependents (elderly without income, housewives, children). The rural poverty rate is highest in South-eastern Serbia and stands at 22.7%, followed by western (14.4%) and central (13.2%) Serbia. It is also high in Belgrade (12.2%) and Vojvodina (11.5%), the lowest in eastern Serbia and the depth of poverty is highest in south-eastern Serbia (5.0%) (Table 3).

Table 3. Rural poverty by regions in Serbia in 2002.

	Poverty rate	The structure of the poor	Depth of poverty
Belgrade	12,2%	7,7%	2,9%
Vojvodina	11,5%	21,7%	2,6%
Western Serbia	14,4%	15,9%	3,4%
Central Serbia	13,2%	19,0%	3,0%
Eastern Serbia	10,9%	8,7%	2,6%
South east Serbia	22,7%	26,8%	5,0%

Source: Strategija za smanjenje siromaštva u Srbiji

Rural regions in Serbia differ significantly in social, economic and demographic characteristics. The main problems and trends in which almost all rural regions are involved are migration, poor diversification of economic activities, large-scale agriculture, high unemployment, lack of employment opportunities, poor and underdeveloped infrastructure, low GDP per capita compared to urban regions and the unpolluted environment facing potential threats. In one study, which analyzed the potential for rural tourism development in Sirić Parish, Kosovo and Metohija, the authors argue that rural tourism would diversify the rural economy, provide additional income to the rural population, reduce unemployment, and reduce disparities in the economic development of rural and urban areas. Tourism is an opportunity for farms that mainly sell primary (unprocessed) agricultural products to sell the food products as tourist products on their properties (Ciutacu, 2009). The conclusion is that the directions that should be taken are: to finance the development of rural tourism and include: infrastructure, staff, tourism

activities and it is necessary to apply appropriate standardization and categorization of services, especially adequate conditions for accommodation, promotions and sales channels of agro-tourism products in the Republic Serbia, countries in the region and thus support the Serb population in Kosovo and Metohija; migration would be halted by creating the elemental conditions for the general, much higher standard of the rural population of Sirinić Parish (Maksimović et al., 2019).

There is an opportunity to harness the potential of Rural Tourism to support the overall development of tourism in Serbia. However, there are also many gaps and barriers that need to be addressed and removed. Among others, we identify the following major ones: road infrastructure in rural areas, the need for structured rural tourism experiences that include activities, accommodation, and artificial facilities; large seasonal issues affecting rural use and occupancy of tourism, which is extremely low (average 4% annual occupancy for rural units and 21% for other accommodation units); lack of international standards and quality of guarantee throughout the tourism sector, especially in the case of accommodation; awareness and development of human resources to understand and seize the opportunities that rural tourism provides in a sustainable way; organization between national, regional and local actors (public and private sector, civil society) in order to manage the development of rural tourism in an efficient and sustainable way (Erdeji et al., 2013). For example, rooms in spas and rooms in rural establishments are treated equally in Serbia. The traditional restaurant should be furnished in a national and traditional style with all the details that make the offer original and authentic. The diversification of accommodation in rural tourism imposes the imperative of recognizing new types of accommodation and incorporating them into statutory mandatory categorization that will guarantee guests adequate quality. In the coming years, Serbia must adapt regulations with the goals of the Master Plan as well as international standards, and classify rural accommodation and criteria for their standardization. Compared to the legislation of the countries of the region (Croatia, Slovenia, Romania), it is necessary to specialize accommodation facilities in rural tourism, to include them in the regulations, of course including all the traditional specificities that Serbia has (Vukosav et al., 2018). It is considered that a strong and efficient transport system, i.e. good transport infrastructure, regardless of the type (road, rail, navigation, air), provides increased interest of tourists but also ensures that the population gets to goods, services, work, entertainment and other people. Sometimes even modest achievements in terms of efficiency and improvement of transport infrastructure can provide significant benefits and brand certain destinations (Mitrović et al., 2004; Dašić et al., 2015).

Conclusions

Revitalizing life in general in rural areas is one positive effect that results from the development of rural tourism. Rural tourism in Serbia can become a driver and generator of a dormant national economy through the diversification of the rural economy. It can provide additional income to the rural population, reduce unemployment, the

population migration, improve the image of the state and reduce the disparities in the economic development of rural and urban areas, which are extremely large. Preserving and improving the environment, preserving natural landscapes and historic sites are also positive effects of rural tourism development. The development of rural tourism in Serbia is unfortunately still in its infancy, although there is a long tradition of tourism development, and large spatial differences in the development of this type of tourism and its geographical distribution are evident. In short, regardless of certain developments in this area, considering the achieved level of development of Serbia in the field of rural tourism, we can conclude that it is unsatisfactory. "The character of rural tourism development in Serbia must tend to keep the villages alive. The Serbian village must be sustainable. Rural tourism should be seen as a financial support for the survival of the village, because interest in rural life has been reduced or, more precisely, nonexistent. It would also be useful to brand and promote the individuality of each village such as Guča, Mokra Gora." (Medojević et al.).

Considering all of the above, we can draw a general conclusion. Creating a destination brand, specifically Serbia as a rural tourism destination, takes a holistic approach, while developing a marketing strategy for destination branding. Holistic marketing, as well as holistic brand management, recognizes that "everything is important." Relationship marketing, integrated marketing, internal marketing and social responsibility marketing are components of holistic marketing. The perspective of tourism in the future is a more comprehensive appreciation of the desire of modern tourists to "see and experience". Considering that one of the most important goals of the tourist economy is the expansion of the tourist zone, which provides satisfactory financial results, alternative forms of tourism are more invested in which enables the implementation of tourist activities throughout the year, while respecting the principles of sustainable development.

Conflict of interests

The authors declare no conflict of interest.

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THE IMPACT OF THE EQUITY CAPITAL AND TRADE CREDIT FINANCIAL SOURCES ON THE COMPANY'S PERFORMANCES SUSTAINABILITY

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ABSTRACT

The crucial aspect of mobilizing financial sources and savings to SMEs in the agribusiness sector and its supply chains towards sustainability and productive investment is of the most importance, what has motivated the research of this paper. Key findings of exploring the impact of two external sources of finance, trade credit and equity capital on the sustainability of the enterprises, are based on the literature review and the empirical research provided in Serbia in 2019. The positive influence of the researched sources of the financing as well as the conditions of this financing on the sustainability of these enterprises is confirmed. The contribution of the research results can be seen in the further improvement of the financial market framework for development of the external sources of finance, trade credit and equity capital in the context of entrepreneurial finance.

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Introduction

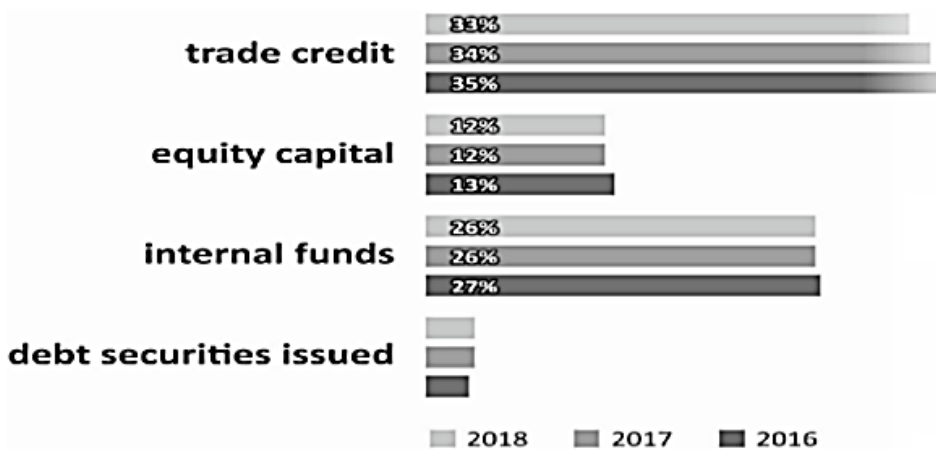
The organization of agricultural production and services, with a defined time agenda for the transformation of the inputs, commodity market flexibility, the uncertain nature makes problems, if the financial environment support is not following the specific needs of the sector activities. (Walker, 1991; Ahmed, 1989).

SMEs and entrepreneurs in Serbia see the lack of capital for their sustainability and development as one of the main obstacles (Rajan & Zingales, 2003; Petersen & Rajan, 1995), what is more obvious in the agribusiness sector.

This should therefore influence both the availability and demand for different types of external funding for SMEs in the agribusiness sector and rural entrepreneurs.

In the European Union, the needs of SMEs for equity financing and trade credit had increased, 33% of them applied for trade credit, Figure (1). Trade credit has been a relevant type of financing in the last three years: 2016, 2017 and 2018, followed by equity capital, debt securities and other internal funds.

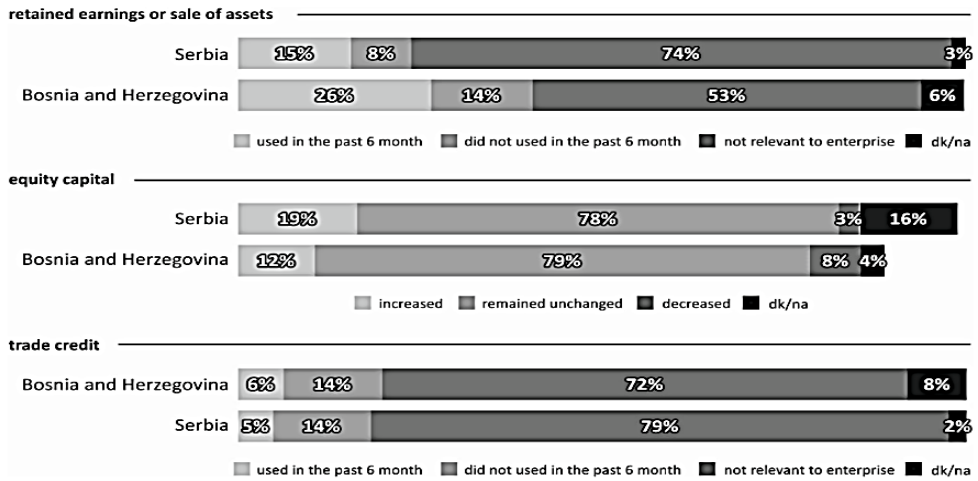
Figure 1. The relevance of types of financing for enterprises in the EU28 in 2016, 2017 and 2018.



Source: Eurostat

According to Eurostat data for 2018 the retained earnings or sale assets were used by firms in some SEE countries as Croatia, 22%, in Bosnia and Herzegovina, 25% in last 6 months in 2018, in comparison with Serbia, with 15%.

Trade credit is used less in these three countries in 2018 in comparison with EU firms (from 4 to 6%), debt securities are used at the same level, as well as the equity capital (Figure 2).

Figure 2. The use of trade credit and equity capital in 2018 by the enterprises in Serbia in comparison with Bosnia and Herzegovina.

Source: Eurostat

In formulating the research subject the issues of the equity financing and trade credit as external sources of financing are identified, as well as the legal and business circumstances, from a legal institutional perspective; formal contracts, bankruptcy laws to define and enforced property rights.

In financial markets, scholars have argued that stronger legal (minority) shareholder rights, liability rules, and requirements for information disclosure, have favored the development of strong public equity markets. It also hence stimulated firms to use these markets as a funding channel, but the SMEs in agribusiness sector often rely on private equity, which is heavily dependent on well-developed public markets for liquidity and exit (Bowles, 2003).

Owing to this greater supply and hence lower cost of outside equity, the SMEs will tend to be more in favor of raising (private) equity capital in less developed financial institutional framework, like it is in Serbian case (Băncescu et al., 2019). That has motivated the authors of the paper to research the practice of the Serbian SMEs in the agribusiness sector on the usage of these two external sources of finance in the sustaining their business (More & Basu, 2013; Meltzer, 1960).

The research results a presented so that, after the Abstract with the key aim of the research, the Introduction with some trends in the sector financing is given, and the Theoretical framework on the financial sources is presented. The section with the Methods and materials presents the dataset of the empirical research, the range of variables, the findings and discussion and testing approach. The paper concludes with an elaboration of the implications of the results of the research to the rural financial market development in Serbia.

Theoretical framework

Farms, entrepreneurs and SMEs in agrobusiness, together with logistics and trade firms in the supply chain are considered one of the core engine for future growth in Serbia. However, to fulfill this potential, SMEs and rural entrepreneurs need a sustained supply of long-term funding (Clive, Srinivasan & Udry, 1997; Conning & Udry, 2005), can be described as fragmented (Diamond 1996; Besley, 1994). SMEs, however, tend to excessively rely on internal and short-term financing sources (Schmidt-Eisenlohr, 2013; Ramey, 1992)

In theory and practice, short-term financing has been established as not suitable for supporting SMEs making long-term corporate investments, in sustaining their innovation programs, and in achieving consistent growth (Wu, 2001). This has led policy makers to encourage SMEs to take greater advantage of long-term financing, trade and equity sources (Smith, 1980; Myers & Rajan, 1998; Myers, 1977).

In the equity financing firm characteristics, including industry composition, firm size, ownership type, and growth rates determine SME willingness to take on equity finance and their attitudes towards this form of finance.

The constraints in the availability of equity finance are a major determinant of use by SMEs. Equity financing is known to be particularly important for SMEs with high growth potential. For SMEs, equity financing normally includes greater involvement of the financing provider in the firm compared to the bank lending that SMEs rely on as their main form of long-term financing (Garcia-Teruel & Martinez-Solano, 2007; Hart & Moore, 1991; Hawawini, Viallet & Vora, 1986).

Equity providers, primarily invest in the future potential of the firm and as partial owners have an interest in, and some control over, how this value is created. The forms of equity financing that SMEs more often access is private equity investments, because the equity investors, for example, might differ with the SME on the strategic direction of the firm and seek to impose their own vision. This close relationship and the associated risks are likely to place trust at the center of SME attitudes towards equity providers. Trust in this case can be taken to mean SME confidence that equity investors will perform their role in a manner that is not detrimental to the firm as non-financial factors, vital in determining SME attitudes to financing choices.

Formal institutional development, such as the financial system, the legal system, or regulatory quality, determine rules for accountability and liability in financial transactions has been posited as one important cross-country explanation in this regard (Madestam, 2013). Researchers drawing on cultural relativity theory have built on the profitability gaps in formal institution studies and argued that culture can also drive SME financing behavior.

Trade credit is a very important external source of financing for SMEs, giving goods instead of cash and the opportunity for the enterprise to pay its receivables according to the contract defined terms and time (Schwartz, 1974). Conditions of trade credit

include the loan maturity and interest rate (Blazenko & Vandezande, 2003; Bougheas, Mateut & Mizen, 2009). Collateral may also be implemented contractually (Frank & Maksimovic, 1998).

Trade credit advantages are in information acquisition visiting the buyer's premises more often, controlling the quality of the repayments, and permanent relationships with suppliers (Schwartz & Whitcomb, 1979; Mian & Smith, 1992; Ferris, 1981; Petersen & Rajan, 1994).

Materials and methods

The hypothesis of the research was that the equity capital and trade credit, as the sources of finance of an agribusiness enterprise further invested in fixed and working capital, innovation and human resource development have the impact on the sustainability of its performances.

In this research model, three variables are included: two independent and one dependent. Independent variables are 1. Equity capital and trade credit as sources of finance of business operations (abbreviated, FS), and 2. The conditions of financing business operations of the company (abbreviated, as FC) defined as investments of these sources in a fix, working capital, human resource and innovations. The revenue of the companies is defined as a dependent variable (abbreviated as, CR), which, according to the impact of independent variables can increase, sustain or decrease.

Basing on the dataset of the empirical research provided in Serbia (second quarter of 2019) on the 132 enterprises from the agribusiness sector, privately owned, as the sample, the practices of the usage of equity capital and trade credit financing as the sources of finance has been explored. The aim was to elaborate the impact of these financing on the sustaining business performances of SMEs.

The methodology used includes survey method with a questionnaire in a collection of empirical research data, methods of descriptive statistical analysis, regression analysis and multiple linear correlations

Among 132 interviewed companies, 87 (0.65909) work in agribusiness production and 45 (0.34091) in the supply chain sectors connected to the agribusiness, with the most activities on the domestic market, 105 enterprises from 132.

The level of the income of the enterprise in the previous year combined with the number of employees serves as two criteria for the SMEs according to the size. Data shows that the most of companies were small and micro, 53%, medium-size, 38%, and large 0,7% (which complies with the general structure of the enterprises in the agribusiness sector in Serbia.

So, 98 enterprises analyzed in the paper are privately owned (0.74242). Directors and owners were most of the respondents of the survey: 44 owners (0.33333), 59 directors (0.44697), 16 managers (0.12121) and 13 consultants (0.09848). These data show the representativeness of the sample, and valuable results.

Table 1. Sample description.

Indicators	Sub-Level	Count	Prob
The company's income in 2019	< from €100.000	49	0.37121
	from 100.001 to €500.000	44	0.33333
	from 500.001 to €2.000.000	27	0.20455
	from €2.000.001	12	0.09091
The origin of the income	Domestic market	105	0.79545
	Foreign market	27	0.20455
The conditions/purposes where the enterprise has been invested in the equity capital and trade credit	Fixed assets & working capital	91	0.68940
	Innovation & human resource development	41	0.31061
The sources of finance further investments impact on company's financial performances in 2019	Increase	53	0.40152
	Sustain	66	0.50000
	Decrease	13	0.09848

Studied selected sources of finance, equity and trade credit 68,9% companies further invested (*here treated as conditions of finance*) in the fiscal assets and working capital support, and 31% of the sample, in innovation and human resource development. This result outlines from the nature and time log of the resources, as well a from the basic reasons for borrowing (Slovin, Sushka & Polonchek, 1993).

Key findings

In the created model of the research is given the opinions of the representatives of the enterprises from the agribusiness sector on the use and impact of the external sources of finance, equity and trading on their sustainability. The results elaborated through the interpretation of Person's correlation, are given in Figure 3.

The findings show that the directions of all possible links between independent and dependent variables are positive, which supports the positive correlation between these variables.

The large variability is between the conditions of financing (FC), and equity capital and trade credit as the sources of finance (FS), which amounts to 0.5701 and is medium strong. With 32.50% can be predicted the conditions of financing in coordination with the internal sources of finance.

The variation between the independent variables – sources of financing (FS) and independent variable - the conditions of financing (FC) amounted to 0.6246 and is medium strong.

The variation between the independent variables – conditions of financing (FC) and dependent variable amounted to 0.6528 and is medium strong.

With 42.61% can be predicted the revenues of the company in coordination with the conditions of financing. The multiple correlation coefficient is 0.850. Multiple determination of r is 0.722. That means that 72.2% variability of independent variable FS and FC impacts the dependent CR variable, as it is displayed in Table 2.

Or, confirms the hypothesis of the research - that there is a positive impact of the internal sources and conditions of financing on the company's revenues/performances.

Table 2. Correlation of the research model

	FS	FC	CR
FS	1.0000	0.5701	0.6246
FC	0.5701	1.0000	0.6528
CR	0.6246	0.6528	1.0000

Because the score of statistical importance resulted to $p < 0.0001$, the hypothesis of the research $H_0: r^2 = 0$ can be confirmed (Table 3, ANOVA test).

Table 3. Test

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	31.961110	15.9806	70.0312
Error	129	29.436774	0.2282	Prob > F
C. Total	131	61.397884		<.0001*

In Table 4, is specified the size of the contribution of independent variables: FS, FC in the prediction of dependent variable CR. According to the findings, it can be concluded that the most contribution to the company's performances make: 1. conditions of financing - their further usage in development purposes, with 0.43958

The factor of the variance increase is 1.4814044.

The hypothesis of the research can be confirmed, as the trade credit and equity capital, and financial conditions of their further investment significantly affect the revenues of the company and its respective performances, the most in their sustainability.

Table 4. Coefficients for variables: FS, FC & CR

Term	Estimate	Std Error	t Ratio	Prob> t	Std Beta	VIF
Intercept	1.646881	0.223448	7.37	<.0001*	0	.
FS	0.3289618	0.065264	5.04	<.0001*	0.37401	1.4814044
FC	0.3717611	0.062753	5.92	<.0001*	0.43958	1.4814044

The multiple regression equation is defined by further formulas (1, 2):

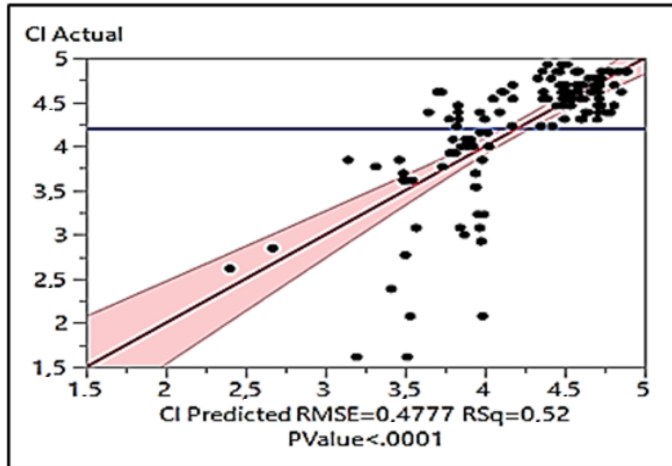
$$y = 1.646881 + 0.3289618 x_1 + 0.3717611 x_2 \quad (1)$$

or

$$\text{The company's revenues} = 1.646881 + 0.3289618 \times \text{Source of finance} + 0.3717611 \times \text{Conditions of finance} \quad (2)$$

The regression equations for the formed model is illustrated in Figure 3.

Figure 3. Multiple regression equation for the model FS, FC & CR



Conclusions

The practices on the usage, practice and terms of borrowing of the equity capital and the trade credit as external sources of financing for covering the corporate debt of SMEs have been researched. (Hill, Kelly & Lockhart, 2012; 2013).

As such, the commercial relationship between buyers and suppliers, the characteristics of the traded good, providers of the equity capital play a crucial role in determining their existence, cost, and how the contracts are enforced. Being able to receive these financial sources helps SMEs from the sector manage their liquidity needs, sustain business, or further invest in innovation and human resources development (Eck, Engemann & Schnitzer, 2015; Martínez-Sola, García-Teruel & Martínez-Solano, 2013; Mateut, Mizen & Ziane, 2015).

A major determinant of use by SMEs equity finance and trade financing is their availability. Equity financing is further known to be particularly important for SMEs in the agribusiness sector with high growth potential (Bodnaruk, O'Brien, & Simonov, 2016). For SMEs, equity financing normally includes greater involvement of the financing provider in the firm compared to the bank lending that SMEs rely on as their main form of long-term financing (Fazzari & Petersen, 1993)..

The conclusions are drawn from the literature and practices of SMEs, as well as from the opinion of the researched sample of the SMES on the impact of the trade credit and equity financing on the sustainability of the SMEs in the agribusiness sector in Serbia. The results of the empirical research imply a positive impact of the equity and trade

credit financing on SMEs sustainability, giving the advantage of the conditions of the financing. That confirms the value of the research results for further work on the issues of the entrepreneurial rural financing issues (Smith, 1987; Menichini, 2011; Love & Zaidi, 2010).

Financial stability governs the extent to which rural SMEs and entrepreneurs will trust their savings to financial institutions or actively participate in public markets (Wilner, 2000). Of particular relevance for SMEs, lower corporate gains taxes and quality of governance are identified in the literature as important drivers of greater preference of SMEs in the agribusiness sector in Serbia for, external equity and trade credit financing.

The limitations of the research are seen in not including the issues of the trust to be explored as a more relevant perspective on culture for SME attitudes towards equity and trade financing, as well as showing how trust is also linked to the institutional context (Uchida, Udell & Watanabe, 2013).

Future development of the institutional, legal and sources of finance of the rural financial market in Serbia, as well as its the capacity building, would be of great importance for the growth and sustainability of the SMEs in the agribusiness sector. (Franks & Sussman, 2005). It would have the positive influence on the increasing the private sector environment and cost-effectiveness of financial intermediaries in the rural financial market in Serbia.

Conflict of interests

The authors declare that there is no conflict of interest.

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APPLICATION OF QUANTITATIVE MODELS IN THE ORGANIZATION OF THE FINANCIAL FUNCTION OF AGRICULTURAL ENTERPRISES

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ABSTRACT

The role and content of the financial function can be seen through the identification of its tasks. They determine the volume and method of organization of the financial function in agricultural enterprises. Hierarchical priorities of tasks, their volume and complexity, the impact on business efficiency are just some aspects that affect its organization. Multi-criteria optimization methods can be used in choosing the organization and setting the model of job specialization within the organizational structure of the financial function of agricultural enterprises. By applying the individual methods that have been applied so far, not all requirements could be fully covered, so in this paper we applied a hybrid optimization model - DEMATEL-TOPSIS. The DEMATEL method was used for obtaining the weighting coefficients of the criteria on the basis of which the evaluation of alternatives was performed. The selection of criteria for evaluating the model was based on the analysis of the available literature. Evaluation and selection of models was performed using a multi-criteria method - TOPSIS. The paper presents the practical application and sensitivity analysis of the TOPSIS method.

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Introduction

The financial function is to some extent an independent whole in achieving its goals (Okunlola et al., 2019). However, it cannot be isolated and act separately because the execution of its tasks depends on cooperation with other business functions of the organization. The financial function in its tasks represents to a certain extent an independent whole, but it cannot exist independently and act separately, but the fulfillment of its tasks is conditioned by cooperation with other business functions of the organization (Vasilev et al, 2019). The execution of the tasks of the financial function of agricultural enterprises can be seen through primary and secondary tasks (Ilić, 2019; Rakić, & Adamović, 2019). The most common tasks are: obtaining and investing funds and matching them with the period of mobilization and availability of elections due to the specificity of agricultural production (Milašinović et al., 2019). These tasks are complemented by secondary tasks relating to: financial planning, maintaining financial records, liquidating documentation, financial control over the use of funds, depositing money, financial analysis and information, etc (Bolzem, 2015).

Agricultural enterprises seek to obtain rationally used funds, whereby the objective of the financial function is to shape: the purpose of the use of funds, the temporal dimension of use and the expected return on assets, taking into account the potential risk of investment in agricultural production (Zekić, 2015; Savić & Nešković, 2018). By establishing a functional link between the use and availability of funds, the task of the financial function is primarily reflected in their alignment to ensure the ongoing liquidity and solvency of the business (Ertz et al., 2019).

The establishment of equilibrium is reflected not only in the time availability of use, but also in the functional availability of the source of funds for agricultural production (Krstić et al., 2017; Jolović & Bobera, 2019; Grbić & Jovanović, 2020). In order to balance the availability of funds and their sources, a balance must be struck between short-term and long-term sources of funds (Akanbi et al., 2015).

The subject of this paper is precisely the possibility of optimizing the organization of the financial function of the agricultural enterprise using multi-criteria models (Ciutacu & Chivu, 2014). This aims at proposing a model that can be applied in organizations depending on the qualitative and quantitative characteristics of a particular agricultural enterprise.

Considering the secondary tasks of the financial function that are categorically more pronounced, compared to the primary tasks that are qualitatively more complex, some assumptions are made, which are the starting points of this research

The liquidation of financial documents is implemented before each payment due to the deposit of funds or settlement of liabilities (Vasić, 2015; Simić, Kosumi & Jialiang, 2019).. In addition, there is ongoing financial supervision over the use of funds, whether the funds are used in the intended volume and structure.

Both cash and non-cash records are required to carry out these tasks, which is certainly different from accounting records. The necessity of these records is reflected in the need

to familiarize the management with the real state of deposit accounts (not accounting), the status of approved but unused loans, the balance of reserved and non-committed funds, etc (Chomanov et al., 2020).

With such internal data provided, the financial function also obtains external data to provide permanent financial planning which is reflected in the presentation of the required volume of funds, the required time of use of these funds, potential sources and the cost of obtaining funds (Shripathi, K.P. 2018).

Materials and methods

Within decision theory, there are a number of multi criteria decision making (MCDM) methods that support us in solving the problem of choosing the optimal organization. Each MCDM method is characterized by a specific mathematical apparatus, which is why different methods often result in different results (Bergman & Lundberg, 2013; Đurković, et al., 2019; Mimović & Krstić, 2016).

Methodologically, DEMATEL is a multicriteria technique (Alberti et al, 2011; Bobar, et. al., 2015; Durkalić, Furtula & Borisavljević, 2019; Tang et al., 2020) that is based on decomposing a complex problem into a hierarchy and will be used in this model to derive weighting coefficients on the basis of which the evaluation of alternatives was performed. The TOPSIS method (Yang, et. al., 2008; Tsai, et al., 2010) will be used to rank alternatives based on the criteria obtained, comparing alternatives' distances from ideal solutions. The goal is at the top of the hierarchy, while the criteria, sub-criteria and alternatives are at the lower levels. DEMATEL holds all parts of the hierarchy in the relationship, so it's easy to see how changing one factor affects the other factors

The process of selecting an adequate model of organization of the financial function of an agricultural enterprise starts from the view that there is no universal model of structure, but one must constantly take into account the state of the relevant factors of its configuration (Jing, 2020). Based on the research conducted by Janićijević et al (2019), the criteria for selecting the optimal organization model of Table 1 were selected.

Table 1. Respondents' ratings of QR code for honey

No	Criterion name and designation	Criterion description
1.	Technology (C_1)	Features that increase with the increasing complexity of technology include: the number of levels in the hierarchy, the ratio of the number of production and non-production workers, the number of managers to the total number of employees, the range of control of senior managers, etc.
2.	Personnel (C_2)	Provision and availability of qualified personnel for financial functions in the agricultural sector.
3.	The size of the organization (C_3)	The growth of the organizational structure equally captures the dimensions of the overall structure. Consequential changes include the degree of formalization and the degree of decentralization.

No	Criterion name and designation	Criterion description
4.	Life cycle stages (C_4)	It is not an independent variable, i.e. there is no automatism of the transition from phase to phase that compels certain behavior, but rather there is a certain behavior that can be identified as characteristic at some stage of the life cycle.
5.	The environment (C_5)	The characteristics of the environment that most affect the Organization are heterogeneity, variability-stability, interdependence. The variability of the environment puts further pressure on the decision-making capacity at the top.
6.	Funding (C_6)	Possibility of financing the financial function and providing the resources needed to carry out financing in agribusinesses.

Source: Janićijević et. Al, 2019

A total of five models of organization of the financial function of an agricultural enterprise were considered: A_1 . centralization, A_2 . division of labor or specialization, A_3 . unit grouping or departmentalisation, A_4 . distribution of authority or decentralization, A_5 . network. Ten experts participated in the model testing process. Expert decisions were used to derive the criterion weights. Weight coefficients were obtained using the DEMATEL method.

Testing and model selection was conducted through two phases. In the first phase, the criterion was selected and the weights of the criteria were defined using the DEMATEL method. In the second phase, the TOPSIS method selected the optimal model (Falagario, 2012).

In the first step of the DEMATEL method, Saaty's scale was used to compare the criteria (Saaty, 1980). The scale shown was used to derive the offset matrices for the

criteria $Z = [z_{ij}]$. Since ten experts participated in the study, a total of ten averaged criteria matrices were obtained after implementation. Aggregation of expert opinions

was performed using the term $z_{ij} = \sqrt[k]{\prod_{e=1}^k z_{ij}^e}$ and is shown in Table 2.

Table 2. Aggregation of expert opinions

	C_1	C_2	C_3	C_4	C_5	C_6
C_1	1,00	0,56	2,28	3,11	0,38	7,44
C_2	2,09	1,00	3,51	3,03	3,00	5,01
C_3	0,44	0,32	1,00	1,25	3,14	2,20
C_4	0,32	0,33	0,80	1,00	3,09	1,25
C_5	2,61	0,49	0,33	0,29	1,00	1,37
C_6	0,13	0,18	0,43	0,82	0,73	1,00

Source: Authors' calculations

Table 2. is the starting point for obtaining the initial normalized direct link matrix

$$D = \begin{bmatrix} d_{11} & d_{12} & \dots & d_{1n} \\ d_{21} & d_{22} & \dots & d_{2n} \\ \dots & \dots & \dots & \dots \\ d_{n1} & d_{n2} & \dots & d_{nn} \end{bmatrix}$$

Based on expressions representing the elements of the matrix $d_{ij} = \frac{z_{ij}}{R}$ and

$R = \max \left(\sum_{j=1}^n z_{ij} \right)$ we get the matrix, D (Pamučar et al., 2018), Table 3. After obtaining the Expert Opinion Aggregation Matrix (Table 2), the normalized direct link matrix is calculated using the above expressions D .

Table 3. Aggregation of expert opinions

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
C ₁	0,06	0,03	0,13	0,18	0,02	0,42
C ₂	0,12	0,06	0,20	0,17	0,17	0,28
C ₃	0,02	0,02	0,06	0,07	0,18	0,12
C ₄	0,02	0,02	0,05	0,06	0,18	0,07
C ₅	0,15	0,03	0,02	0,02	0,06	0,08
C ₆	0,01	0,01	0,02	0,05	0,04	0,06

Source: Authors' calculations

Based on the elements of the matrix D and by applying the

expression $T = \lim_{m \rightarrow \infty} (D + D^2 + \dots + D^m) = \sum_{m=1}^{\infty} D^m$ where is

$$\begin{aligned} \sum_{m=1}^{\infty} D^m &= D + D^2 + \dots + D^m = \\ &= D(I + D + D^2 + \dots + D^{m-1}) \\ &= D(I - D)^{-1}(I - D)(I + D + D^2 + \dots + D^{m-1}) \\ &= D(I - D)^{-1}(I - D^m) \\ &= D(I - D)^{-1} \end{aligned}$$

the elements of the matrix of total impact T are determined. The total relation matrix is shown in Table 4.

Table 4. Total relation matrix

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
C ₁	0,1105	0,0561	0,1952	0,2708	0,1473	0,5705
C ₂	0,2125	0,0995	0,2971	0,2961	0,3387	0,5112
C ₃	0,0732	0,0385	0,0984	0,1195	0,2509	0,2146
C ₄	0,0703	0,0369	0,0848	0,1038	0,2424	0,1561
C ₅	0,1894	0,0471	0,0689	0,0847	0,1147	0,2086
C ₆	0,0274	0,0171	0,0360	0,0709	0,0708	0,0971

Source: Authors' calculations

To make a diagram of the cause-and-effect relationships, using the expression $D_i = \sum_{i=1}^n t_{ij}$, $i = 1, 2, \dots, n$ and $R_j = \sum_{j=1}^m t_{ij}$, $j = 1, 2, \dots, m$ we determined the sum of the direct and indirect interactions of the factors (Pamučar et al., 2018) (Table 5).

Table 5. Sum of direct (D) and indirect (R) effects of factors

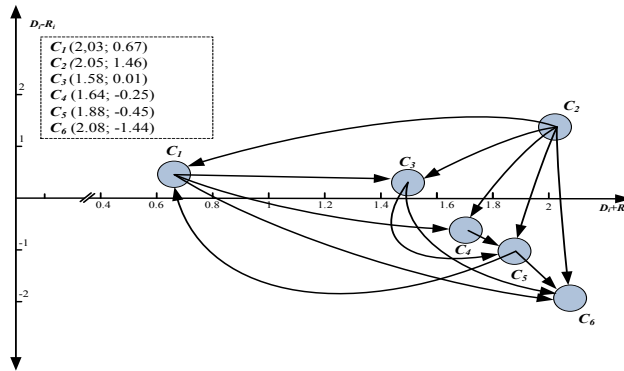
	D	R
C ₁	1,35	0,68
C ₂	1,76	0,30
C ₃	0,80	0,78
C ₄	0,69	0,95
C ₅	0,71	1,16
C ₆	0,32	1,76

Source: Authors' calculations

Based on the limit value (α) $\alpha = \frac{\sum_{i=1}^n \sum_{j=1}^n [t_{ij}]}{N}$ (Pamučar et al., 2018) the average of

the elements of the matrix T is calculated and a diagram of cause and effect relationships is drawn up in order to visually represent the complex relationships, Figure 1.

Figure 1. Diagram of causal relationships



Source: Authors' calculations

The presented diagram gives us information about the importance of factors on the system and the interaction of the presented factors. Factors of the matrix of the total relation whose value is greater than the limit value ($\alpha = 0.16$) are chosen for the purpose of showing cause and effect relationships.

After determining the relationship between criteria (factors) by applying the expression

$$W_i = \sqrt{(G_i + R_i)^2 + (G_i - R_i)^2} \quad \text{and} \quad w_i = \frac{W_i}{\sum_{i=1}^n W_i}$$

criteria weights are determined,

Table 6.

Table 6. Criteria weight coefficients (w)

	D+R	D-R	W	w
C ₁	2,03	0,67	2,14	0,173
C ₂	2,05	1,46	2,52	0,204
C ₃	1,58	0,01	1,58	0,128
C ₄	1,64	-0,25	1,66	0,134
C ₅	1,88	-0,45	1,93	0,156
C ₆	2,08	-1,44	2,53	0,205

Source: Authors' calculations

Weighting coefficients of criteria, pores of initial decision matrix

$$R = \begin{matrix} A_1 \\ A_2 \\ \cdot \\ A_3 \end{matrix} \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ \dots & \dots & \dots & \dots \\ r_{n1} & r_{n2} & \dots & r_{nm} \end{bmatrix},$$

represent the input parameters for the implementation of

the TOPSIS method, Table 7

Table 7. Initial decision matrix

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
A ₁	2,11	3,03	0,42	0,22	0,20	1,05
A ₂	1,83	2,87	0,33	0,28	0,16	1,20
A ₃	2,60	4,11	0,51	0,15	0,08	0,92
A ₄	1,68	2,43	0,23	0,30	0,22	1,53
A ₅	2,23	2,75	0,47	0,17	0,11	1,13
w _i	0,173	0,204	0,128	0,134	0,156	0,205

Source: Authors' calculations

After calculating the criterion weights (w_i) After the calculation of the weights, the conditions for evaluation and selection of the optimal alternative using the TOPSIS

method were met. By applying the expression of the criteria criter $x_{ij} = \frac{r_{ij}}{\sqrt{\sum_{i=1}^n r_{ij}^2}}$

the elements of the initial decision matrix are normalized (Pamučar et al., 2018).

By multiplying the normalized elements of the matrix $X = \begin{matrix} A_1 \\ A_2 \\ \cdot \\ A_3 \end{matrix} \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1m} \\ x_{21} & x_{22} & \dots & x_{2m} \\ \dots & \dots & \dots & \dots \\ x_{n1} & x_{n2} & \dots & x_{nm} \end{bmatrix}$

with weight coefficients (w_i) we get an aggravated noramlized matrix

$$V = \begin{matrix} A_1 \\ A_2 \\ \cdot \\ A_3 \end{matrix} \begin{bmatrix} v_{11} & v_{12} & \dots & v_{1m} \\ v_{21} & v_{22} & \dots & v_{2m} \\ \dots & \dots & \dots & \dots \\ v_{n1} & v_{n2} & \dots & v_{nm} \end{bmatrix} = \begin{matrix} A_1 \\ A_2 \\ \cdot \\ A_3 \end{matrix} \begin{bmatrix} w_1 x_{11} & w_2 x_{12} & \dots & w_m x_{1m} \\ w_1 x_{21} & w_2 x_{22} & \dots & w_m x_{2m} \\ \dots & \dots & \dots & \dots \\ w_1 x_{n1} & w_2 x_{n2} & \dots & w_m x_{nm} \end{bmatrix}, \text{ table 8}$$

Table 8. Difficult normalized matrix

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
A ₁	0,077	0,089	0,059	0,057	0,086	0,081
A ₂	0,067	0,085	0,047	0,073	0,069	0,093
A ₃	0,095	0,121	0,072	0,039	0,034	0,071
A ₄	0,062	0,072	0,032	0,078	0,095	0,118
A ₅	0,082	0,081	0,066	0,044	0,047	0,087

Source: Authors' calculations

By defining ideal solutions and separating alternatives from ideal solutions by

$$\text{expression } S_i^+ = \sqrt{\sum_{j=1}^m (v_{ij} - v_j^*)^2}, i = 1, \dots, n \text{ and } S_i^- = \sqrt{\sum_{j=1}^m (v_{ij} - v_j^-)^2}, i = 1, \dots, n$$

we obtain the final ranking of alternatives, which is shown in Table 9.

Table 9. Final ranking of alternatives

	S_i^+	S_i^-	Q_i	ranking
A_1	0,0581	0,0661	0,5321	2
A_2	0,0642	0,0564	0,4679	3
A_3	0,0858	0,0717	0,4555	4
A_4	0,0717	0,0858	0,5445	1
A_5	0,0784	0,0458	0,3686	5

Source: Authors' calculations

Applying the hybrid model, or a combination of DEMATEL and TOPSIS method, we get the solution to be the most optimal model, under number 4, which has the highest ranking among all alternatives. However, it should be emphasized that in this way the result obtained is only a possible variant, since the application of multicriteria optimization does not mean a rigorous solution, but an opportunity that can only be verified by the comparison of several different methods and scales of estimation.

The advantage of using multi-criteria optimization models is the possibility of software support in the specific example of using Visula Basic for Applications program, where after determining the weight of the criteria and inserting data, it is relatively easy to check the ranking alternatives with graphical representation.

Table 10. Calculating the rank of the proposed models in the software

Alternatives	Criteria (criterion weights)					
	K1	K2	K3	K4	K5	K6
	0.173	0.204	0.128	0.134	0.156	0.205
model 1	2.11	3.03	0.42	0.22	0.20	1.05
model 2	1.83	2.87	0.33	0.28	0.16	1.20
model 3	2.60	4.11	0.51	0.15	0.08	0.92
model 4	1.68	2.43	0.23	0.30	0.22	1.53
model 5	2.23	2.75	0.47	0.17	0.11	1.13

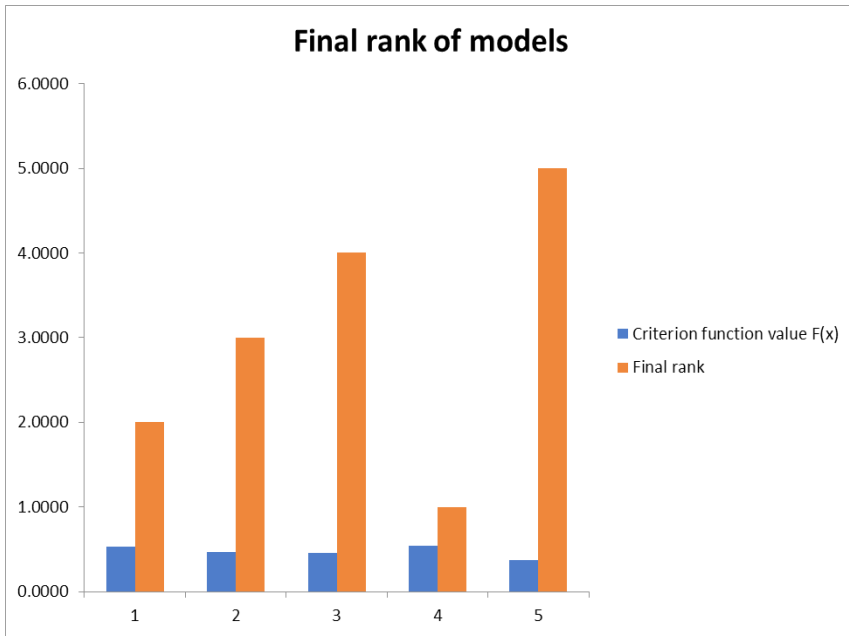
Source: Authors' calculations

Table 11. The final rank of the alternatives

Criterion function value $F(x)$	Final rank
0.5321	2
0.4679	3
0.4555	4
0.5445	1
0.3686	5

Source: Authors' calculations

Figure 3. Final ranking diagram of alternatives



Source: Authors' calculations

When applying the MCDM ranking, the alternative changes with the change in the weight coefficients of the criteria, that is, the relative importance we attribute to the particular criteria (Mongollon et al., 2020). Therefore, it is necessary to perform a sensitivity analysis of the solution.

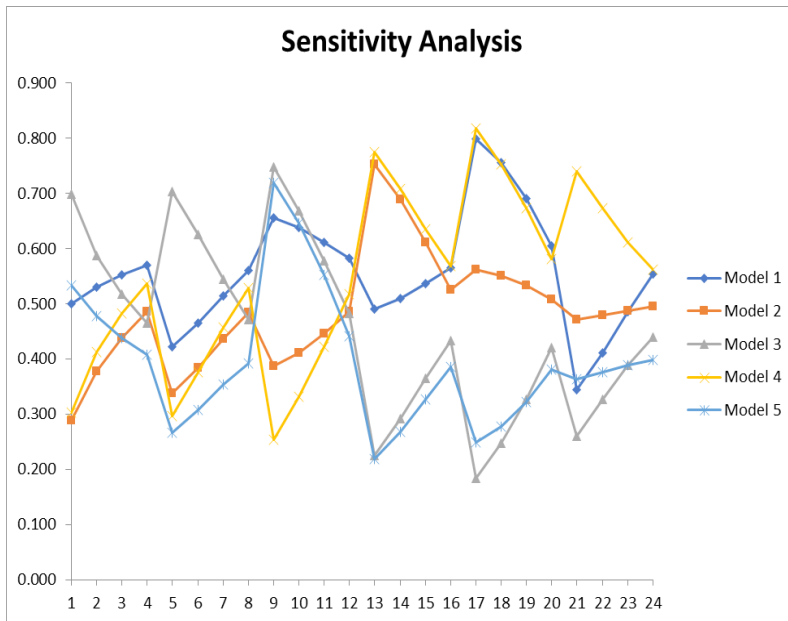
Table 12. Sensitivity analysis

	Criterion weight coefficient						Criterion function value				
	K1	K2	K3	K4	K5	K6	M 1	M 2	M 3	M 4	M 5
Variant 1	0.50	0.10	0.10	0.10	0.10	0.10	0.500	0.288	0.698	0.302	0.534
Variant 2	0.40	0.12	0.12	0.12	0.12	0.12	0.531	0.377	0.587	0.413	0.477
Variant 3	0.30	0.14	0.14	0.14	0.14	0.14	0.553	0.437	0.518	0.482	0.438
Variant 4	0.20	0.16	0.16	0.16	0.16	0.16	0.569	0.486	0.464	0.536	0.408
Variant 5	0.10	0.50	0.10	0.10	0.10	0.10	0.423	0.337	0.704	0.296	0.266
Variant 6	0.12	0.40	0.12	0.12	0.12	0.12	0.465	0.383	0.625	0.375	0.308
Variant 7	0.14	0.30	0.14	0.14	0.14	0.14	0.515	0.436	0.544	0.456	0.353
Variant 8	0.16	0.20	0.16	0.16	0.16	0.16	0.561	0.485	0.471	0.529	0.392
Variant 9	0.10	0.10	0.50	0.10	0.10	0.10	0.656	0.386	0.747	0.253	0.720
Variant 10	0.12	0.12	0.40	0.12	0.12	0.12	0.638	0.411	0.669	0.331	0.646
Variant 11	0.14	0.14	0.30	0.14	0.14	0.14	0.612	0.446	0.578	0.422	0.553
Variant 12	0.16	0.16	0.20	0.16	0.16	0.16	0.582	0.486	0.482	0.518	0.441
Variant 13	0.10	0.10	0.10	0.50	0.10	0.10	0.491	0.753	0.225	0.776	0.219
Variant 14	0.12	0.12	0.12	0.40	0.12	0.12	0.510	0.690	0.292	0.708	0.268
Variant 15	0.14	0.14	0.14	0.30	0.14	0.14	0.536	0.612	0.364	0.636	0.327
Variant 16	0.16	0.16	0.16	0.20	0.16	0.16	0.565	0.525	0.432	0.568	0.385
Variant 17	0.10	0.10	0.10	0.10	0.50	0.10	0.799	0.561	0.183	0.817	0.248
Variant 18	0.12	0.12	0.12	0.12	0.40	0.12	0.755	0.551	0.248	0.753	0.278
Variant 19	0.14	0.14	0.14	0.14	0.30	0.14	0.691	0.533	0.327	0.673	0.322
Variant 20	0.16	0.16	0.16	0.16	0.20	0.16	0.605	0.507	0.420	0.580	0.381
Variant 21	0.10	0.10	0.10	0.10	0.10	0.50	0.345	0.471	0.260	0.740	0.363
Variant 22	0.12	0.12	0.12	0.12	0.12	0.40	0.411	0.479	0.326	0.674	0.375
Variant 23	0.14	0.14	0.14	0.14	0.14	0.30	0.485	0.488	0.389	0.611	0.388
Variant 24	0.16	0.16	0.16	0.16	0.16	0.20	0.554	0.496	0.439	0.561	0.399

Source: Authors' calculations

Table 11 shows the different options for ranking alternatives depending on the change in weight criteria.

Figure 4. Graph of sensitivity analysis



Source: Authors' calculations

Sensitivity analysis was performed to assess how changes in the weights assigned to the criteria would change the range of alternatives. Scenarios 1 to 24, which correspond to different weights assigned to each criterion, and which represent different priorities given to the criteria are shown in Figure 4. The obtained results show that assigning different weights (priorities) to the criteria leads to different ranks, i.e. that the model is sensitive to these weights.

However, the sensitivity of the VKO method to changes in the weight coefficients of the criteria is not sufficient data on the basis of which we can draw a conclusion about the reliability of the results given by the VKO method. Comparative analyzes of authors (Rodrigues et al., 2014; Anojkumar et al., 2014; Liu et al., 2013; Wang, and Tzeng, 2012) can be presented in the literature, who try to discover those characteristics of the choice problem that condition equality, i.e. differences in the solutions of individual VKO methods. However, the same choice that suggests several methods is not a sufficient guarantee of rationality and quality of the obtained solution.

Conclusions

This paper presents the implementation of the hybrid DEMATEL - TOPSIS model in the decision - making process on the choice of the model of organization of the financial function in agriculture enterprises. The DEMATEL method was used to get the weighting coefficients of the criteria which served for the evaluation of alternatives. The criteria for selecting the model evaluation were made based on the analysis of the available literature. Model estimation and selection were performed using the multi-

critical TOPSIS method. The paper presents practical applications and sensitivity analysis of the TOPSIS method.

The organization of the financial function is one of the most important elements and affects on the success of the business of agricultural enterprises. It depends on the size, ie the scope of work of the financial function, organizational structure and the type and size of agricultural enterprises. Previous research has identified two basic forms of organization in the European and Anglo-Saxon conceptions. The European conception is based on the classical principles of organization of the authoritative system, while the Anglo-Saxon defines the division of decision making in the form of rights and responsibilities. It occupies one of the five key places in the functional scheme, which certainly differs depending on the factors we have analyzed in the paper. Although the financial function with its tasks is to a certain extent an independent function, it exists in cooperation with other segments of the business entity by providing support for the realization of their activities. In this regard, the proposed model allows us to choose the organizational structure of the financial function, depending on the potentials available and the requirements that lie ahead.

Conflict of interests

The authors declare no conflict of interest.

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PERFORMANCE AUDIT MODEL OF INCENTIVE MEASURES IN SALE CHANNELS IN AGRICULTURAL HOUSEHOLDS OF THE REPUBLIC OF SERBIA

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ABSTRACT

Today, in modern business, all organizations and farms, are required to maximize organizational performance in order to achieve appropriate market success. In order to raise organizational performance to the maximum level, continuous monitoring of business activities and their results is necessary. They are monitored by internal control, ie internal audit. Within their sales channels, farms often set up their holdings without a predefined sales plan with well-defined costs. A constant obstacle to the marketing of agricultural products, in addition to the low price, is the high cost of realization. For this reason, the state tries to support the development of farms and promote the sale of agricultural products through various incentive measures. In order to evaluate how much these measures really contribute to its development, it is necessary to conduct a research on this topic and, based on the results of the research, to devise a model of the performance audit of incentive measures for sales channels of agricultural products which are produced on agricultural households of the Republic of Serbia. The abstract should contain a maximum of 150 words. The abstracts should avoid any abbreviations and mathematical formulas.

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Introduction

It has long been proven, both in science and in practice, that successful management requires the rationality and cost management.

In order to manage costs at all times, it is necessary to establish accurate and correct records. How today various organizations keep their records is left to every responsible person in an organizational institution to decide (when organizations are not subject to International Accounting Standards).

What is common for all forms of organization is that every investment must be justified and has its own purpose. Source of finance structure is one of the most important parameters which contribute to enterprise's profitability. There are a number of theories about relations between financial indebtedness and profitability, regarding the activity of given enterprise (agricultural activity, especially primary agricultural production has certain characteristics) (Vučković et al., 2017).

The common thing to all forms of organization is that every investment must be justified and must have its own purpose. Agro-economic policy is an important part of the overall macroeconomic policy of every society (Milojević et al., 2019). Agricultural resources are of great importance for the Republic of Serbia. Since they are not used to their full extent, further investing in agriculture affects the overall economic development of Serbia (Milojević & Mihajlović, 2019). This represents a significant economic potential for the future of the Republic of Serbia. In order to take full advantage of it, the state's investment in the agricultural sector needs to be controlled or monitored. This can only be done in one way: objectively and independently.

The influence of internal audit (IA) competency and independence and financial reporting quality (FRQ) has been confirmed by several researchers (see for example, Abbott et al., 2016; Prawitt et al., 2009). Today, business need more rationalization and reductions of operating costs. In the context of the mentioned rationalization and reduction of operating costs, today is more than ever essential to have good sales channels. Sales channels, or often called distribution channels, are just one of the elements of a marketing strategy that is very significant in the new business environment (Živković et al., 2019). Delivery of products or services to the consumer is done through sales channels. They are the link between the manufacturer and the consumers. Their goal is to ensure that the product or service reaches the consumer in the manner and location they are looking for (Andrei & Darvasi, 2012). The only question is how to achieve the lowest possible cost and how to meet the requirements of the market. The role of traders in reducing search and transaction costs and in disseminating useful market information is widely recognized, both in farm (e.g. Banerji, Meenakshi, 2004; Miyata et al., 2009) and non-farm sectors (e.g. Sonobe et al., 2002).

Consequently, it is clearly concluded that every organization or farm, organizes its sales channels in the best possible way by providing the following answers:

- How to market a product?

- the answer to this question is - to choose the right way of delivering products and / or services between direct and indirect distribution. It must be said immediately that each of the chosen methods of delivery of products and / or services has its advantages and disadvantages. Only through a detailed analysis the decision makers can decide on the way that suits their product / service, and above all the performance of the organization, which is most relevant.

-Where to market a product?

- the answer to this question is - to choose the right location (place) where a particular product and / or service will be offered to consumers. Choosing a location is not a naive business at all, and it influences the success of marketing products / services to consumers, that is, end users a lot.

-When to market a product?

- the answer to this question implies - to determine the right time (not just working time, although it is primarily meant) for the placement of products / services to consumers, or users to whom they are intended. Today, the answer to this question is only one thing: 24/7 because consumers have become spoiled, so they want their product or service to always be available to them.

In order to have accurate and timely information regarding the sale of products on the market, it is necessary to conduct a marketing research. Of course, processing one or two surveys is not enough. In order to have accurate and complete information, it is necessary to do continuous research (Kovačević et al., 2019).

Empirical research has shown the importance of markets that work well for efficient capital allocation (Wurgler, 2000). In order to be successful, it is important to focus on consumers.

Thus, dealing with customer relationships effectively has become vital to a firms' survival in today's competitive markets (Yen et al., 2015). This "dealing" with them will not be enough unless we build a strong business relationship. Maintaining ongoing relationships with customers is crucial for sustaining a competitive advantage (Kim et al., 2006). The reasons for this are multiple, but the most significant is the fact that it is less expensive to retain customers than to acquire new ones (Kim, Cha, 2002).

Literature review

Accordingly, the importance of agricultural holdings to the prosperity of the Republic of Serbia is not small. Recognizing this, the Republic of Serbia offered to agricultural holders certain forms of subsidies as forms of assistance in order to achieve multiple benefits for both parties. The results of this research will show if it succeed in its intention.

Two thirds of agriculture production value comes from plant production. Maize is the most important product, constituting about 25% of the total value of agricultural

production. Thereby, the economic transformation process affected the livestock sector more significantly than the crop sector (Republic of Serbia IPARD Programme for 2014-2020, 2019).

In this regard, it is necessary to devise a way in which the said products will be marketed. Successful sales channels need to be designed.

In this volatile environment, channel teams are caught between the demand for better cost efficiency of channel sales and the need to drive partner engagement and productivity (8 Best Practices for Accelerating Revenue through Channels, 2018) .

In order to achieve the goal of maximum sale, it is necessary to devise methods to monitor the costs and results of their sales. Considering the lack of funds, which is widely represented in the field of agriculture, the state has recognized the importance of the private sector and has found a solution in integration with the public sector. Accordingly, it has decided to support its development through grants and to achieve multiple benefits for itself and the private sector.

Materials and methods

The management of an organization and agricultural household can be measured in many ways, but each of them aims at managing its costs. Accurate records represent the means by which this management can be accomplished. The way to achieve this is through adopted business rules, which can most often be based on the following methods:

- creating procedures and instructions,
- making the internal acts of business,
- implementation of financial management and control,
- establishing a solid control framework that can best identify, evaluate and eliminate risks in business, and more.

Every form of organizing that should have only one goal: justification of the investment or its performance. In order to achieve this, it is necessary to manage both the costs and the business.

Modern business terms tend to rationalize and reduce the cost of each farm so the sales channels play a big role. They represent one of the essential elements of a marketing strategy. In order to set up sales channels in the best possible way, that fully answers the questions of how, where and when to market the product, it is necessary for the farms to carry out continuous marketing research in practice. This is a way to find out the accurate and timely data that will be used to strengthen the internal control framework of the farm (Beke-Trivunac, 2019). Its strengthening is achieved by innovating the existing internal control and on the basis of the obtained facts by creating a completely new internal control in it. The assessment of the success of such an outcome is reflected in an internal audit, which is the next step.

Farm control system and sale channels

The basis of a positive internal audit outcome is a solid and well-established internal control framework. Good controls can be built only where there are firm foundation in the organization based on business responsibility and rationality of decision makers, which is also the most important conditions for good management of all elements of marketing strategy, especially in the context of this work through the sales channels of agricultural households of the Republic of Serbia.

Agriculture in Serbia is characterized by a traditional and extensive character, with an area that defines farms as small and medium in terms of their economic capacity and size. In order to properly manage the farm, the right decisions need to be made. Every decision making is based on information. Whether we will solve the problem or make it even bigger depends on the reliability, accuracy and timeliness of the information received. This leads to the conclusion that only after carrying out the qualitative external surveys, it is possible to establish good internal procedures that ensure accurate and timely reports on the basis of which the responsible person, ie. the holder of the farm, will conduct his business. Considering the prices, weather conditions, market laws, product placement, legal regulations, consumer requirements, data and information variable and not easily predictable, making decision without a secure basis like external research and recording with a properly defined internal procedure is no easy task for farmers. Based on the above, the need for such research came out.

There are households and family farms. In accordance with the Law on Agriculture and Rural Development (Official Gazette of the Republic of Serbia, no. 41/2009, 10/2013 - other law and 101/2016), Article 16, the family farm is the basic form of organizing agricultural production and depending on its economic strength is divided into:

- 1) commercial family farm;
- 2) non-commercial family farm (Law on Agriculture and Rural Development, "Official Gazette of RS", No. 41/2009, 10/2013 - other law and 101/2016, Article 16)

Regardless of the form of organizing farms, they are required to act rationally. All this influences the idea of taking steps and initiating certain measures in order to empower agricultural households through a particular financing model and become sustainable in the domestic and foreign markets.

In this regard, the goal of every farm (and family) is to create incentives. Article 9. of the same law states the following types of incentives:

- 1) direct incentives;
- 2) market incentives;
- 3) structural incentives (Law on Agriculture and Rural Development, "Official Gazette of RS", No. 41/2009, 10/2013 - other law and 101/2016, Article 6)

In relation to the previous, the legislation specified more precisely two things:

1. when renewing the registration of an agricultural holding, it is necessary to give precisely the sowing plan for the next period
2. all fertile land must be incorporated within the household that the holder wants to cultivate.

Research, presentation and analysis of research results

In order to manage his property well, each owner or property holder has to establish internal controls for his business. In order for them to be properly defined and implemented, it is necessary to analyze the household. Therefore, the purpose of this research is to assess, on the basis of a feasibility audit, whether the incentives provided by the local self-governments to the agricultural holdings of the Republic of Serbia have succeeded in assisting them and to what extent they have become their source of funding. In this way, the agricultural households is developing, which affects the development of the Serbian agricultural, local self-government and Serbian economy in width as well.

Therefore, a Questionnaire was prepared whose results, after analysis, will serve to provide a model for reviewing the feasibility of incentive measures as a function of the farm sales channel.

For the proposed analysis of the research, it is necessary to find out the risk points for which special measures need to be prescribed, identified and thus put under control. In order to justify this practical analysis, a questionnaire was formulated with 43 questions that were a combination of open and closed questions. As for the closed questions, most of them were answered through the rating scale, where the answers were collected and ranked as follows (1 - worst grade, 5 - best grade):

- 1 - (0-20%)
- 2 - (20-40%)
- 3 - (40-60%)
- 4 - (60-80%)
- 5 - (80-100%)

The questionnaire also contained several open-ended questions, where respondents - the householders - were expected to answer their own questions in a few words or sentences. The questionnaire was sent to exactly 48 farms, with complete data returned by 34 farms, which represents a response rate of 70.83%, and was considered significant in terms of the data obtained for processing, analysis and presentation of the survey results as well as the model proposal. The survey period was June - December 2019. The results were presented in the form of tables on the following pages.

Table 1. The questionnaire with answers

Ordinal number	Questions:
1.	To what degree are you aware of the incentives you can take to support the production and operation of your farm? 1 2 3 4 5
2.	In what extent did you use the incentives directly? 1 2 3 4 5
3.	Circle if and how much have you used the following forms of direct incentive? • Bonuses 1 2 3 4 5 • Production incentives 1 2 3 4 5 • Regress 1 2 3 4 5 • Non-commercial support for agricultural households 1 2 3 4 5
4.	Are you satisfied with the amount of direct incentives? 1 2 3 4 5
5.	Circle what form of direct incentive was successful in operating your own farm and in what extent? • Bonuses 1 2 3 4 5 • Production incentives 1 2 3 4 5 • Regress 1 2 3 4 5 • Non-commercial support for agricultural households 1 2 3 4 5
6.	Circle to what extent these incentives act as a stimulus to increase the production capacity of your farm. 1 2 3 4 5
7.	To what extent have you used market incentives? 1 2 3 4 5
8.	Circle if you and to what extent have you used the following forms of market incentives? • Export Incentives 1 2 3 4 5 • Storage costs 1 2 3 4 5 • Credit support 1 2 3 4 5
9.	Circle to what extent do you consider that the prescribed percentage obtained on export incentives as a return on the value of exported goods is sufficient? 1 2 3 4 5
10.	Circle the extent to which these market incentive measures act as a stimulus to increase the production capacity of your farm. 1 2 3 4 5
11.	Circle the extent to which these market incentive incentives act to stimulate you to become more competitive in the market? 1 2 3 4 5
12.	Circle the extent to which credit support as a type of incentive to encourage agricultural and food production really helps farmers? 1 2 3 4 5
13.	To what extent have you used structural incentives? 1 2 3 4 5

Ordinal number	Questions:
14.	Circle with what form of structural incentives and to what extent have you succeeded in operating your farm? • Rural development measures 1 2 3 4 5 • Improving protection and quality agricultural household 1 2 3 4 5 • Institutional support measures 1 2 3 4 5
15.	Circle the extent to which rural development measures have helped you achieve the following: • competitiveness in agriculture 1 2 3 4 5 • improving protection of the environment 1 2 3 4 5 • Conservation of biodiversity and programs of rural economics 1 2 3 4 5 • improving the quality of life in rural areas 1 2 3 4 5
16.	Circle the extent to which improvements to the protection and quality of households have helped you to achieve the following: • anti-erosion measures and measures of land inspection and testing 1 2 3 4 5 • land consolidation 1 2 3 4 5 • land reclamation 1 2 3 4 5 • recultivation 1 2 3 4 5
17.	Circle the extent to which institutional support measures have helped you: • agricultural research 1 2 3 4 5 • advisory services 1 2 3 4 5 • promoting agriculture 1 2 3 4 5 • market information system 1 2 3 4 5 • professional services 1 2 3 4 5
18.	How are you informed of incentive support measures ? • Directly in the relevant institutions 1 2 3 4 5 • Through regulations 1 2 3 4 5 • Through local governments 1 2 3 4 5 • From other farmers 1 2 3 4 5 • Via media 1 2 3 4 5 • Other: internet 1 2 3 4 5
19.	Evaluate to what extent is the public sufficiently informed about the incentives and how they are used? 1 2 3 4 5
20.	Circle the degree of use of the statutory acts you use in your daily work in the farm? • procedures: 1 2 3 4 5 • instructions: 1 2 3 4 5 • Regulations: 1 2 3 4 5 • Laws: 1 2 3 4 5 • other: 1 2 3 4 5
21.	Circle the degree of coverage of the farm work process by internal controls? 1 2 3 4 5
22.	Circle the degree of coverage of the internal control workflow process by the following standards? • Financial management and control 1 2 3 4 5 • COSO Model 1 2 3 4 5 • Independent - at logical order 1 2 3 4 5
23.	Circle the level of training on financial management and control of farm employees? 1 2 3 4 5

Ordinal number	Questions:
24.	Circle the level of training on ISO standards for farm employees? 1 2 3 4 5
25.	Circle the computer skills level of farm employees? 1 2 3 4 5
26.	How secure is your farm management when choosing the type of incentive? 1 2 3 4 5
27.	To what extent has the leadership of your organization defined the criteria for selecting a particular incentive measure? 1 2 3 4 5
28.	To what extent has your organization's management defined business risk? 1 2 3 4 5
29.	Evaluate the degree of assistance with incentives for agricultural machinery. 1 2 3 4 5
30.	Do you have a Risk Act? 1. Yes 2. No
31.	Circle in response if you have received any training on the use of incentives offered by the Republic of Serbia? 1. Yes 2. No
32.	How do you monitor the running costs of your farm? There is no established and accurate record. Accurate records are kept only by those who are in the system of VAT.
33.	Do you make any specific business reports for your farm? Mostly only those who operate in the VAT system and are required to do so by law.
34.	Write which ones? Rarely does anyone keep statistics, if not in the system of VAT; while larger farms keep a modest record of available funds, consumption, profits.
35.	What internal acts do you use in business? They are not made.
36.	Do you use any software to run your farm? No. Mostly these are handy records. Larger farms use the windows operating system (word and excel) for the most common reports.
37.	What software do you use for the business of your farm? Accountants only keep books for large farm holdings and those which are in the VAT system.
38.	To whom do you submit business reports for your farm? the Treasury Directorate, only the records required for the VAT system and the reports on earmarked assets.

Ordinal number	Questions:
39.	Do you provide incentive use reports? No. Only the Treasury Directorate shall provide a resolution that an incentive award has been made.
40.	To which institution do you provide reports on the use of incentives? Revenue Administration.
41.	Did you have any control, if so, which one? We have regular controls on the allocation of credit funds and how they are used.
42.	Do you have a farm business plan? 1. Yes 2. No
43.	Have you acted in accordance with Article 3 of the Ordinance on entry in the Register of agricultural holdings. Considering the renewal of registration, as well as on the conditions for the passive status of an agricultural holding, which stipulates that the holder of the agricultural holding is keeping a contract on assignment of agricultural land for use, unless the contract expires before October 31 for the current year? 1. Yes 2. No 3. Partly

Source: Authors

Analyzing the answers from the questionnaire as the results of the research, we came to the following findings:

1. Holders of agricultural households are aware of the incentive measures offered by the Republic of Serbia as assistance in the development of agricultural activities, though grade ranging from 3 to 4, which means that there are more those who follow the regulations and contribute to the effort in the development of agricultural holdings than those who do not;
2. It is also concluded that almost the highest grade (grade 4) of agricultural householders was rated when using these incentives;
3. The most used incentives were regresses (grade 5), followed by incentives for production (grade 4-5), then support for non-commercial farms (grade 3-4), and least bonuses (grade 3);
4. When it comes to the amount of incentive measures, the survey showed dissatisfaction (grade 1). The measures of direct incentives are well designed, but the level of their amounts did not help them to succeed in the operations of agricultural households;
5. In this regard, research has shown that agricultural households holders consider that such incentive measures have a poor effect on direct incentives (grade 2). This is due to the lack of incentive to increase their production capacity;

6. When it comes to market incentives, (respondents' ratings range between 3 and 4) which means that market incentives are used, but further analyzes will determine why they do not intersect in full;

7. Of all market incentives, the most commonly used market incentives are credit support (grade 4-5), while market incentives are used for storage costs (grade 3). We received answers regarding export market incentives from only a few respondents, so we did not include them in the analysis due to the validity of the research results. We will try to see the reason for this through the proposed model;

8. Market incentives, in the opinion of the respondents, act as a disincentive (grade 1-2) when it comes to market competitiveness and a potentially possible increase in production capacity;

9. Credit support (banks and other financial organizations) was rated more than satisfactory (grade 4-5);

10. Respondents rated the method of learning about incentive support measures as follows:

directly in competent institutions (grade 3-4)

o through regulations (grade 3)

o through local governments (grade 2)

o from other farmers (grade 4-5)

o via media (grade 4-5)

other: internet (grade 5)

confirming that the Republic of Serbia has found ways to inform the public and all market players sufficiently (in this case, agricultural households of the Republic of Serbia) about incentive funds and how they are used (grade 4-5);

- ^ The greatest assistance of the Republic of Serbia (in the opinion of the respondents - the holders of agricultural holdings) is in the form of incentives for the purchase of new equipment or restoration of outdated agricultural machinery (grade 5);
- ^ the survey showed that there are no established cost records, adopted internal acts, and no precise business plans for agricultural holdings (except for the sowing plan);
- ^ Article 3 of the Rulebook on Registration in the Register of Agricultural Holdings and Renewal of Registration stipulates that the owner of the agricultural holding is keeping a contract on assignment of agricultural land for use, unless the contract expires before October 31 for the current year? According to which the majority of respondents only partially acted while there were a number of those who had not done that yet. The implementation of this Article of the Rulebook is necessary to incorporate into the model of the performance audit of incentive measures that will be in function of improving the sale channel of agricultural households of the Republic of Serbia.

Presentation of the model of performance audit of incentive measures in the function of the sale channels of agricultural holdings of the Republic of Serbia with the given internal control proposals and recommendation

On the basis of the obtained results and detailed analyzes, a model of a performance audit for incentive measures in the function of the sale channels of agricultural households of the Republic of Serbia was developed and proposed, which contains the following steps:

- audit plan;
- identification of existing legislation;
- analysis of compliance of prescribed and adopted procedures, instructions and internal acts of agricultural holdings with legal regulations;
- recording of general performance and business situation of farms in the field in the Republic of Serbia;
- identification of risk points in the operations of farms;
- prescribing control measures for the risk points of agricultural holdings' operations, controlling and reducing the risk of doing business;
- implementation of measures in the internal acts and standards of business of farms;
- control of their implementation.

For each review, control or audit, regardless of its purpose, a plan must be drawn up. When it comes to the audit plan, there is a possibility that it may be altered during the engagement when any unplanned problems occur or when areas requiring smaller or larger audit work are identified during the assessment of the reliability of internal controls (Andrić et al., 2012).

In order to create a model for reviewing the performance of incentive measures in the function of the farm sale channels of the Republic of Serbia, it is necessary to point out some of the answers received from the Questionnaire, which at the same time represent their potential risk points:

- insufficient level of assistance for rural development measures in:
 - o competitiveness in agriculture (grade 1)
 - o Improvement of the environmental protection program (grade 1)
 - o Conservation of biodiversity and programs of rural economics (grade 1)
 - o improving the quality of life in rural areas (grade 1)
- insufficient degree of improvement of protection and quality of agricultural land:
 - o anti-erosion measures and measures of land inspection and testing (grade 1)

- o land consolidation (grade 1)
- o reclamation (grade 3) - average
- o recultivation (grade 1-2)
- insufficient level of institutional support in specific segments:
 - o agricultural research (grade 1)
 - o advisory services (grade 1-2)
 - lack of prescribed procedures and instructions as internal acts for working in the daily business processes of agricultural holdings (grade 1);
 - insufficient coverage of farm operations in internal controls according to the following standards (grade 1):
 - o financial management and control,
 - o according to the COSO model,
 - o even at its sole discretion (grade 3-4);
 - insufficient IT skills and technical support reflected through the underused of software packages and individual windows office programs (even word and excel).

Risk in business leads to uncertainty and it must be put under control. Risk management is the process of identifying, assessing, managing and controlling potential events or situations in order to provide a reasonable degree of assurance about the achievement of the organization's goals (Stanišić, 2015). Therefore, based on the results of the research, this takes into account the risk points of the farm business. Risk assessment should be carried out regularly, every 12 to 24 months (Singleton et al., 2006).

In accordance with the above model of the performance audit of incentive measures in the function of the sale channel of agricultural households of the Republic of Serbia, it is necessary to include the following elements that make up the subject of the audit procedure:

- Comply with the legal obligation to implement the sowing plan - it is essential that the sowing plan is fully complied, when restoring the farm.

Internal control 1.: in case of necessary modification of the sowing plan, it is necessary to fill in the form and submit it to the competent authority for inspection. It is necessary for the farm to always prepare an up-to-date internal report and submit the complete documentation to the accountant in charge of the farm.

- Comply with the legal obligation that all fertile land must be incorporated within a registered agricultural household.

Internal control 2.: for all fertile land for which incentives and assistance from the state are sought, it is necessary to be legally based and recorded in the farm records. Moreover, each parcel must have a proof of ownership (leasehold) or lease agreement.

It is therefore necessary to introduce an always up-to-date internal report with the following elements:

Table 2. Recommended internal report for agricultural households

Farm Number – Agricultural Household (AH)	Cadastral municipality	Legal binding document (entry no. / Lease agreement)	Parcel number	Name and surname of the owner of the parcel	Categorization of agricultural land	The crop from the sowing plan	Sowed crop	Name and surname of the farm owner (AH)- Agricultural household
1	2	3	4	5	6	7	8	9

Source: Authors

The attached table is the primary basis control for the fulfillment of the legal requirements regarding the status of the agricultural holding, whose up-to-date application provides daily insight into all the necessary information. It is important not to deviate from the basic conditions for the fulfillment of the active status of the agricultural holding and to prevent the possibility of obtaining government incentives.

- **Internal control 3.** : since there is no established record of the earmarked use of incentive funds (except for loans granted by banks), we propose to include the following binding records in the farm business:

Table 3. Recommended report for the agricultural households no.2

Purpose of Incentives	The amount of approved	Approval date	Number of users	Amount spent	Purpose of spent	Balance of the remaining funds (saldo)	Reason for unspent	Effect of utilization through the sale channels
1	2	3	4	5	6	7=(2-5)	8	9

Source: Authors

- **Recommendation 1** : Many computer based educational programs have been appeared lately. At the same time, “there are numerous benefits of computer training, videos and the Internet. They are:

determining your own pace (students can learn at their own pace), consistency of teaching (every student, whether they attend the course now or not, receives instruction of the same quality), portability (trainees can take the material with them, access it online or have it delivered to a branch) and price (the cost per attendee is further reduced

each time more employees from the same organization attend the course (Coderre, 2009)). All of this goes into the audit recommendation included in this model in order to increase the internal performance of the farm itself and increase the utilization and effects of the earmarked funds as well.

This method of recording funds enables the monitoring of the use of earmarked funds with the traceability of its documented basis. Apart from the farm as the beneficiaries of the incentive funds and the state as the donor, they have full insight into the performance of spending the funds.

Discussion

This paper represents the basis for future research regarding the implementation of a new control framework, with the help of which the operations of agricultural holdings and its costs are put under control. Consequently, this paper provides answers to the unresolved problems encountered in literature and practice and serves as a setting for new procedural rules and business controls created for the purpose of performance audit in agricultural households.

Concluding considerations

The global market competition requires each country to constantly improve the economic capacity of its own economic. One of the most expansive industries and the backbone of each country's economic development is agriculture.

Today, more than ever, healthy food is being sought, and in connection with the same a healthy agricultural product.

Healthy agricultural production requires the use of clear, precise and above all effective agro-economic measures and incentives, as well as adequate utilization of them, not only based through production but also through the sale of the same, ie. delivering them through sale channels to end users - consumers.

The analyzes that preceded this paper show that there are significant deviations from the incentive measures that have been given and the usefulness of the same through the farm sale channels. In this regard, it was also noted the necessity to conduct such a survey, which would provide clear answers regarding the required model of the performance audit of incentive measures in the function of the sale channels of agricultural farms of the Republic of Serbia, which would put incentives for agricultural holdings under greater control.

Recommended model given in point 4 of this paper and based on the presented risk points:

1. adherence to the sowing plan in order not to lose the active status of AH and all approved state incentives;
2. consolidation of fertile land in AH, as well as documenting the right to own it;

3. accurate records of the intended use of the incentive funds and the effects viewed through the sales channels;

and 3 (three) additional and significant internal controls and one recommendation were formed.

The recommendation is based on perceived ignorance, lack of interest and inadequate information of potential beneficiaries of incentive measures.

That is why one recommendation is given, which is a mandatory part of the model of the performance audit of incentive measures in the function of the sale channel of agricultural households of the Republic of Serbia, and relates to greater IT skills and literacy.

On the basis of all the above, we think and suggest that all agricultural enterprises operating in the territory of the Republic of Serbia, should implement this model or partially modified of performance audit. By doing that they would achieve better management of not only sale channels, but also better management of the overall marketing management strategy, and thus achieve greater market success.

In this way, in the context of their business, besides being able to look at the utilization of earmarked spending, farms can also see the effect of their utilization in terms of the sale channels of agricultural products.

It is evident that the benefits of this model are both for agricultural households as beneficiaries of purposefully given funds, and the state of the Republic of Serbia as the provider of those whose legal obligation it is.

Conflict of interests

The authors declare no conflict of interest.

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HUMAN RESOURCE MANAGEMENT IN THE FUNCTION OF IMPROVING THE QUALITY OF BANKS' BUSINESS AS A SUPPORT IN FINANCING AGRICULTURE IN SERBIA

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ABSTRACT

The paper presented a multidimensional model of correlation between human resource management practices and the quality of banks' operations as a support in financing agriculture in Serbia, tested twice which gives this analysis a longitudinal character – trend study. Considering that from the firstly surveyed research sample, Agrobank that had showed good results went bankrupt, this in some way brought into question the quality and validity of the tested model of correlation of human resource management practice and performance quality, so there was a need for its re-testing. The indisputable significance of this research is reflected in the fact that, based on the twice-tested multi-dimensional model of connection between these two entities, it was possible not only to examine how much but also the way in which these human resource management practices generate the quality of banks' operations, as well as the future trends of this practice.

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Introduction

The motive for the research within the business banking sector in Serbia lies in the specificity of this sector as an extremely serviceable, which is, by the nature of its activities, highly dependent on the quality of human resources. It is known that creating and maintaining benefits in the service sector depends on successful relations within the triangle: employees - clients – organizations. From the above it is clear that, in fact,

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the priority task is understanding the impact of the quality of these relations within the triangle on profits and other organizational results of the service organization. The importance of understanding these relations in the triangle becomes even greater when we consider that agriculture needs constant financial support and contacts with banks which become sensitive and risky because of the need to invest funds in production at once and on a large scale, in accordance with the nature of production, low turnover of funds and low profit generated by agricultural production, which makes impossible to create own sources of financing. (Pejanovic, 2013) The existing and new banking services development for agricultural financing depends first and foremost on the quality of the banking business which is by the extremely serviceable nature dependent on employees and its practice of managing.

Current scientific research has been addressing more and more the problem of identifying indicators of the positive effects of human resource management to the company's performance. The starting point of these research is the belief that today we can not only conclude that human variables constitute the basis of the competitive advantage of the organization, that they are the main source of survival and the driver of growth and development of organizations, but it is very important to answer the question what are the key indicators based on which we can demonstrate and prove the strategic importance of human resources and the human resource management practice for achieving business success (Dusmanescu et al., 2014). Most research that deal with the problem of proving the impact of human resource management practices on business performance have the transversal character. Although they provide data that show the contribution of human resource management practices to organizational performance, they provide very little or insufficient evidence of the modes of that contribution, the level of correlation, and developmental tendencies. In order to better understand and prove the contribution of human resource management to the performance quality, it is necessary to repeat the test on the same or similar sample.

Starting from the above as well the main theoretical stances of relevant authors who were researching the positive effects of human resource management practices to the quality of business operations, the multidimensional model of correlation between human resource management practices and the quality of banks' operations was created and tested twice. The research topic and objectives are based on the necessity of determining the role of human resource management more precisely and defining the directions of its further development with regard to the changes that have occurred in the operations of banks as a support in financing agriculture in Serbia. The purpose of this paper is to analyze and demonstrate the complex connections between the organizational performance of banks and the human resource management practice, accelerate the affirmation of this practice, and point to its strategic importance for the development of banks.

Theoretical Framework

„Empirical research investigating the relationship between human resource practices and organizational performance confirm the importance of human resources, their management and their influence on organizational value. However two different approaches exist: first, that there is a “direct” relationship between human resource practices and organizational performance and second stress an “indirect” relationship between human resource practices and organizational performance. In relation to the first research approach, three major perspectives emerge from the existing literature: universalistic, contingency and configuration. In relation to the second research approach, the general consensus developed among researchers is that human resource practices do not lead directly to business performance and it has long been recognized that mechanisms of link between human resource management and organizational performance and intermediate outcomes are central to a more complete understanding of how human resource management drives firm performance“. (Savaneviciene & Stankeviciute, 2010, p. 428)

“The human resources are often seen as a crucial strategic resource used by companies to achieve this objective. Having in mind that their people are their most valuable asset, companies and their managers need to search for the best ways to manage their employees effectively with an objective to achieve and maintain the desired market position”. (Ratković , 2015, pp. 355-356) “The complexity of the relationship between human resource management and organizational performance that involves mediating mechanisms is the most analyzed topic in the field of human resource management known as the black box problem. Many previous researches have explored the link between human resource management and organizational performance and demonstrated positive correlations, but only a few among them have successfully addressed the nature of this connection, how and why human resource management practices impact on performance”. (Peregrino de Brito & Oliveira, 2016) The researchers Savaneviciene and Stankeviciute in their extensive literature review, gave “the comparison of the black box models - (*Table 1*)”. (Savaneviciene & Stankeviciute, 2010, p. 431)

Table 1. Comparison of the black box models

Author	HR practices	Mediating variables	HR-related outcomes	More distal outcomes
Becker et al. (1997)	Not specified	Employee skills, Motivation, Job design, Work structures	Creativity, Productivity, Discretionary effort	Improved Operating Performance Profits and Growth Market Value

Author	HR practices	Mediating variables	HR-related outcomes	More distal outcomes
Guest (1997)	Selection, Training, Appraisal, Rewards, Job design, Involvement, Status and Security	Employee skills, Abilities, an appropriate Role and understanding of that Role	Commitment, Quality, Flexibility, Effort/motivation, Cooperation, Involvement, Organizational citizenship	Performance outcomes (productivity, quality, innovation; absence, turnover, conflict, customer complaints) Financial outcomes (profits, ROI)
Purcell et al. (2003)	Job security, Career opportunity, Performance appraisal, Training and Development; Recruitment/Selection, Pay satisfaction, Worklife balance, Job challenge/Job autonomy, Teamworking, Involvement, Communication	AMO framework: Abilities, Motivation, Opportunity to participate	Organizational commitment, Motivation, Job satisfaction	Performance outcomes
Wright, Nishii (2006)	Intended/Actual/Perceived HR practices	Line managers	Employee reactions (affective, cognitive, behaviour)	Organization performance

Source: (Savaneviciene & Stankeviciute, 2010, p. 431)

“Considering the analysis of the comparison of the black box models, primarily the quantity of boxes and the content of each box in the “black box”, Savaneviciene and Stankeviciute pointed out the following: 1) although the accurate assessment of human resource management and firm performance link requires reliable and valid assessment of human resource practices, different models comprise various practices. 2) Human resource related outcomes impact more distal performance outcomes: only when human resource related outcomes are achieved it is possible to expect higher performance, 3) despite varying models of “black box“, the similarity among all is that they all have their basis in a linear causal process. 4) hereby putting too many boxes in the model will not “open the black box”, and putting too much items in the boxes will not make the model more insightful and 5) any theoretical or empirical effort should at least specify some mediating variable(s), but not how many“, (Savaneviciene & Stankeviciute, 2010, pp. 431-432)“

Kalyani and Chong noticed that “the development of knowledge on human resource management has been focusing mainly on traditional manufacturing organisations, with little attention rendered to service-based organisations. A better understanding of how the human resource practices relate to the performance of the banking sector allows

banks to compete in this competitive environment through appropriate utilisation of the practices“ . (Kalyani & Chong, 2018, p. 16)

Human resource management and organizational performance link analysis is even more complex in financial sector. Masum, Azad and Beh characterized that “the impact of human resource practices on bank performance is too complex to be measured. To rationalize the necessary investments on human resource department, it is the contribution of human resource practice to the organizational performance of banks must be examined. In this study, the authors on a sample of 48 banks in Bangladesh proved that there is an positive impact of human resource practices on the performance of the banks” . (Masum, Azad, & Beh, 2015, p. 382)

Bartel analyzing the relationship between the human resource management environment and establishment performance to the service sector by examining the branch operations of a large Canadian bank highlighted that „with few exceptions, the prior industry studies focus only on the manufacturing sector, despite the fact that most employees work in service-producing industries. The human resource management environment can be an even more important determinant of productivity in the service sector than in the manufacturing sector, given the much larger share of total production costs accounted for by employment, and the much more extensive direct contact between employees and customers, in services” . (Bartel, 2004, p. 181) Bartel’s research showed “a positive correlation between the employees’ satisfaction with human resource management and branch performance measured by annual sales and capital stock” . (Bartel, 2004) Gulzar pointed out that “human resource management is very important for banks because banking is a service industry. Human input is the single largest input to the banking industry. The level of efficiency/productivity of this input is reflected in the quality of service offered by the banks to its customers, as also in its ultimate growth, productivity and profitability. The main purpose of his study was designed to explore and compare human resource management practices and their impact on organizational performance in Indian Public Sector Banks. The data were analyzed statistically and finding revealed that human resource management practices have huge impact on the organizational performance in banking sector” . (Gulzar, 2018, p. 89)

Ali, Lei and Wei in their research indicate that “given the tough competition in the service industry, it is increasingly significant for the banking sector to understand employee relations climate, and how human resource practices affect performance of the organization and employee relations climate that best fulfill the needs of the organization. The purpose of their study was to examine the mediating effect of employee relations climate between the bundle of strategic human resource management practices and organization performance in Chinese banking sector. The results of this study indicate that the bundle of strategic human resource management has a positive significant relationship with operational performance. Also, employee relations climate mediates the relationship between strategic human resource management and organizational performance” . (Ali, Lei, & Wei, 2018, p. 115)

Materials and methods

The afore mentioned approaches and research indicate that human resource management practices influence the knowledge, capabilities, skills and performance of employees who generate business success, and that the link between good human resource management practices and the performance quality is complex, and the analysis requires the introduction of intermediate variables. As two intermediate variables in this study were taken: the value of human resources and the employee satisfaction.

The idea of this research is to take into consideration the following relationships as the ground for designing this multidimensional model for evaluating the human resource management system as the generator of business bank quality in Serbia: firstly, the relationship between the quality of the human resource management system and the quality of the bank performance, respectively the research aim is to show that there is a statistically significant correlation between the quality of the human resource management practice and bank business performance; secondly, the relationship between the quality of the human resources management system and the value of human resources, respectively the research aim is to show that there is a statistically significant correlation between the quality of the human resources management practice and the competitiveness of human resources; thirdly, the relationship between the competitiveness of human resources and the quality of bank performance, respectively the research aim is to show that there is a statistically significant correlation between the value of human resources and the quality of the bank performance; fourthly, the relationship between the quality of human resource management system and employee satisfaction, respectively the research aim is to show that there is a statistically significant correlation between the quality of the human resource management practice and the satisfaction of employees with their jobs in the bank; fifthly, the relationship between employee satisfaction and the quality of human resources, respectively the research aim is to show that there is a statistically significant correlation between the value of the human resources and the satisfaction of employees with their jobs in the bank and sixthly, the relationship between employee satisfaction and the quality of performance, respectively the research aim is to show that there is a statistically significant correlation between the satisfaction of employees with their jobs in the bank and bank business performance. The six types of relationships defined in this way determine four research fields: the analysis of organizational performances, the value of human resources management, the competitiveness of human resources, and employee satisfaction, and quantitative and qualitative indicators are defined for each field.

Considering the longitudinal character, the study was carried out twice and represent the trend study. The first survey was conducted in the period January-November 2010 and the sample included human resource departments of twelve banks: Bank Intesa, Erste Bank, Hypo Alpe Adria Bank, Commercial Bank, Opportunity Bank, Čačanska Bank, Volksbank, OTP Bank, KBC Bank, Findomestic bank, Agrobank and Credit Agricole Bank. (Vemić Đurković, Jotić, & Marić, 2013) Key changes in the banking sector, first

of all, changes in the ownership structure of the surveyed banks, in the period from 2010 to the end of 2016: Bankruptcy of Agrobank, Volksbank was taken over by the Russian Sberbank, KBC Bank was taken over by Telenor Bank, Čačanska Bank was taken over by Turkish Halkbank, Hypo Alpe Adria Bank changed the owner and became Addiko Bank, and the Direktna Bank from Kragujevac took over Findomestik Bank. Considering that from the firstly surveyed research sample, Agrobank that had showed good results went bankrupt and that other five banks changed the owner and started operating under the different name, this in some way brought into question the quality and validity of the tested model of correlation of human resource management practice and performance quality, so there was a need for its re-testing. The second survey was carried out in the period from January to November in 2016 and the sample included human resource departments of eleven banks: Bank Intesa, Commercial Bank, Credit Agricole Bank, Erste Bank, OTP Bank, Opportunity Bank, Sberbank, Direktna bank, Halkbank, Telenor Bank and Addiko Bank. Considering that the items in the questionnaire required a high level of human resource management knowledge, the survey included human resource managers as part of a research sample, because it was assumed that this group of respondents would provide relevant answers to the questions asked.

In selecting banks for the research sample, in addition to taking into account the sample representativeness according to the criterion of assets balance, total number of employees and market share (at least one-third of banks in the banking sector), special attention was paid to the special requirement of the longitudinal study character to involve those banks that were included in the first survey of this model in order to get as valid data as possible. In both research processes, data were collected through the survey method using the questionnaire instrument. An alpha coefficient was applied for the reliability of the questionnaire. The type of diagnostic measure is the reliability coefficient that estimates the consistency of the whole scale, where the Cronbach Alpha is the most widely used measure. As in the first model tested, the questionnaire consisted of four parts. The first part was about the respondent's characteristics - gender, age, education level and years of service at the bank (Cronbach Alpha subscale .798). The second part was about questions related to the quality of human resource management practices. The quality of the represented human resource management practices of the observed banks in the study was analyzed on the following: competitiveness of the staff in the human resource department of the bank - gender, age, education level, education investment, years of service (Cronbach Alpha subscale .812), quality of organization of the work of the department - division of departments into sectors, outsourcing administrative activities, existence of clear, defined and adopted human resource procedures (Cronbach Alpha subscale .753), the quality of performing generic human resource management activities – planning - analytical processes, recruitment processes, human resource development and maintenance processes, process integration (Cronbach Alpha subscale .932) and evaluation of the importance of human resource management practice – strategic approach, financial investment in human resource management activities, formalized system of evaluation of work results (Cronbach Alpha subscale .868). Third

part was about questions related to the value of human resource which was analyzed on the following: demographic structure of staff - age, gender structure (Cronbach Alpha subscale .768), education of staff - average qualification structure of employees, investments in their education, qualification structure of new employees (Cronbach Alpha subscale .838) and indicators of the mobility of employees - the average length of service, absenteeism and fluctuation rate, number of new employees in the last three years (Cronbach Alpha subscale .898). Fourth part was about questions related to the drivers of human resources, employee satisfaction with the job which was analyzed on the basis of the human resources manager's perceptions and opinions of the analyzed banks about their employees' satisfaction factors. The following satisfaction factors were offered to them: salary, professional development opportunity, job challenge, job security, relationships with executives, interpersonal relationships, reward system and working conditions (Cronbach Alpha subscale .819). It can be stated that the reliability of the subscale in all four parts of the questionnaire is high since it is the lower bound for the Cronbach Alpha is .70. The analysis of the organizational performances of the observed banks was investigated on the basis of financial parameters (market share, ROA, ROE, capital adequacy and liquidity) and non-financial parameters (number of clients, branches, subsidiaries and ATMs, (non)possession of certificates, awards or recognitions for the quality of banking services and regular monitoring of client satisfaction) available in business reports on their websites for both research periods.

The initial idea of this research was to find a way in which the contribution of human resources management practices to the business performance of the observed banks could be analyzed in a multidimensional manner. The method used in this study consisted of suggesting a measure that would represent a (characteristic, average) value which as such looks at several indicators together. These measures used to represent a characteristic, average value of an entity from a sample are called the measures of central tendency. (Hedrih, 2006)

Based on this, as in the first model tested, "banks have been evaluated and the final result of the analysis is their multi-criteria ranking individually for each research field. In order to make an easier conclusion about whether and to what extent their interconnectedness exists, the multi-criteria ranking of banks, based on the use of percentiles and percentile ranks, is given in three groups: banks above average, average banks and banks below average. Repeated research on a similar sample made it possible to compare the ranks obtained from different periods of time, thus providing an opportunity to identify the developmental tendencies of human resource management practices in the banking sector in order to contribute to its quality of performance. Descriptive analysis, rating and ranking of banks by calculating summative scores and using percentiles and percentile ranks gave specific answers to two questions: firstly, which banks according to four defined groups of indicators (organizational performance, human resource management practice, human resource value, and employee satisfaction) are superior and other, what kind of differences are there among them according to the description of the characteristics of these indicators, then the Pearson correlation was used, which

was intended to show if the indicators used in the descriptive analysis are important for the performance quality, whether there is a correlation among them and what type of correlation it is” (Vemić Đurković, Jotić, & Marić , 2013, p. 103)

Research results and discussion

“Based on the percentile and used percentile ranks, the ratings and ranking were performed according to the financial performance for 2010 of the observed banks in three groups: banks above average (value - above C68 centiles): Bank Intesa, Commercial, Hypo and Erste Bank, average banks (value between C34 and C67 centiles): Agrobank, Volks, Čačanska and Credit Agricole Bank and banks below average (value below C33 cent): KBC, Opportunity, Findomestic and OTP Bank”. (Vemić Đurković, Jotić, & Marić , 2013, p. 99) For 2016: banks above average (value - above C68 centiles): Bank Intesa, Sberbank. Halkbank and Erste Bank, average banks (value between C34 and C67 centiles): Opportunity Bank, Direktna Bank and Credit Agricole Bank and banks below average (value below C33 centiles): Telenor, Commercial Bank, Addiko Bank and OTP Bank.

“Based on the used percentiles measures and percentile ranks, the surveyed banks were classified according to non-financial performance for 2010: according to three groups: banks above average (value - above C68 centiles): Bank Intesa, Commercial, Hypo and Erste Bank, average banks (value between C34 and C67 centiles): Agrobank, Volks, OTP and Credit Agricole Bank and banks below average (value - below C33 centiles): KBC, Opportunity, Findomestic and Čačanska Bank”. (Vemić Đurković, Jotić, & Marić , 2013, p. 100) For 2016: banks above average (value - above C68 centiles): Bank Intesa, Sberbank, Opportunity and Erste Bank, average banks (value between C34 and C67 centiles): Halkbank, Direktna bank, Credit Agricole and Commercial Bank and banks below average (value - below C33 centiles): Telenor, Addiko Bank and OTP Bank.

“The analysis of the multi-criteria ranking shows that there are not significant deviations, which means that those banks that have a larger number of clients, branches, employ more workers, enjoy some kind of recognition for the quality of banking services and monitorclient satisfaction with the banking service also have better financial results. By crossing the data, the final multi-criteria ranking and the classification of the observed banks into three groups was obtained for 2010: banks above average (value - above C68 centiles): Bank Intesa , Commercial, Hypo and Erste Bank, average banks (value between C34 and C67 centiles): Agrobank, Volks, OTP and Credit Agricole Bank and banks below average (value below C33 centiles): KBC, Opportunity, Findomestic and Čačanska Bank”. (Vemić Đurković, Jotić, & Marić , 2013, p. 100) For 2016: bank above average (value - above C68 centiles): Bank Intesa, Sberbank, Opportunity and Erste Bank, average banks (value between C34 and C67 centiles): Halkbank, Credit Agricole and Commercial Bank and banks below average (value - below C33 centiles): Direktna Bank, Telenor, Addiko Bank and OTP Bank.

Based on the percentile measures and percentile ranks, according to the quality of the represented human resource management practices the observed banks were put into three groups “for 2010: banks above average (value above C68 centiles): Hypo, Erste, Intesa and Commercial Bank, average banks (value between C34 and C67 centiles): Čačanska, Volks, Agrobank and Opportunity Bank and banks below average (value below C33 centiles): Findomestic, KBC, Credit Agricole and OTP Bank”. (Vemić Đurković, Jotić, & Marić , 2013, p. 101) For 2016: banks above average (above C68): Bank Intesa, Erste, Sberbank and Opportunity Bank, average banks (value between C34 and C67 centiles): Halkbank, Credit Agricole Bank and Commercial Bank and the banks below average (value below C33 centiles): Addiko, Telenor, Direktna and OTP Bank.

The results highlighted the difference in the quality of human resource management among the three groups of the observed banks. Those banks that have a more advanced human resource management have: more quality staff in human resources departments, better organization of their work, better approach to conducting main activities. Comparing the results of a descriptive analysis of the indicators of the development of the main human resource management activities in the surveyed banks from both research periods, it can be concluded that: there has been a significant development of the quality of human resource management activities, in particular the recruitment process, attracting people and developing the employer brand, integrated approach in conducting human resource management practices, there has been a growing appreciation of the importance of human resources management for the quality of performance. It is interesting to point out the fact that in the first survey the activity of education, training and development has been identified as the biggest challenge of this practice, but in the second survey it was the system of rewarding and evaluating work results and behavior, which leads to the conclusion that the bank wants to justify the investments through evaluation and reward and retain experts from this field. Many human resources management processes have been digitalized that have made human resource managers more efficient.

Based on the used percentile and percentile ranks, the rating and ranking according to “the quality of human resources put the observed banks in three groups for 2010: banks above average (value above C68): Hypo, Erste, Bank Intesa and Commercial Bank, average banks (value between C34 and C67 centiles): Čačanska, Volks, Agrobank and Opportunity Bank and banks below the average (value below C33 centiles): Findomestic, KBC, Credit Agricole and OTP Bank”. (Vemić Đurković, Jotić, & Marić , 2013, p. 102) For 2016: banks above average (value above C68 centiles): Bank Intesa, Erste, Sberbank, average banks (value between C34 and C67 centiles): Halkbank, Credit Agricole Bank, Opportunity and Commercial Bank and banks below average (value below C33 centiles): Addiko, Telenor, Direktna and OTP Bank.

Comparing the results of a descriptive analysis of the indicators of the competitiveness of human resources in the surveyed banks from both research periods, it can be concluded that there has been significant investment in the quality of employees, not only their technical competences, but also digital and interpersonal skills. There have

been significant changes in the quality of the structure of employees in the direction of recruiting skilled workers primarily in the field of information technologies despite the planned reductions. Special programs have been developed for the development and retention of key employees, which leads to a conclusion about the increased awareness of the importance of human resources for business success.

Based on the used percentile measures and percentile ranks, “the rating was done according to the differences in the satisfaction of the employees that put the observed banks in three groups for 2010: banks above average (value above C68 centiles: Hypo, Erste, Bank Intesa and Commercial Bank then average banks (between C34 and C67 centiles): Čačanska, Volks, OTP and Opportunity Bank and banks below the average (value below C33 centiles): Findomestic, KBC, Credit Agricole and Agrobank”. (Vemić Đurković, Jotić, & Marić, 2013, p. 103) For 2016: banks above average (value above C68 centiles): Banca Intesa, Erste, Sberbank, average banks (value between C34 and C67 centiles): Halkbank, Credit Agricole Bank, Opportunity and Komercijalna banka and banks below average (below C33 centiles): Addiko, Telenor, Direktna and OTP Bank.

“The descriptive analysis clearly highlighted the difference in the quality of the human resources driver between the three groups of observed banks for both the research period, for 2010” (Vemić Đurković, Jotić, & Marić, 2013, p. 103) and for 2016. Respondents in the survey were asked to indicate what the most common sources of satisfaction and discontent among bank employees are. The answers they offered were the following factors of satisfaction: salary, professional development, job challenge, job security, relationships with managers, interpersonal relationships, reward system and working conditions. Comparing the results of a descriptive analysis of the quality indicators of human resource drivers in the surveyed banks from both research periods it can be concluded that: there was a decline in employee satisfaction in the category of banks above the average. Still, full attention is not paid to the balance of private and business life of workers and there is a great tendency of overtime work. Communication and relations with superiors are elements that particularly affect the satisfaction of employees with the work so superiors need to pay close attention to this factor.

Comparing the results of Pearson’s correlation analysis “from 2010 and 2016, we can notice the trend of increasing the level of correlation between human resource management practice and the quality of banks’ operations in Serbia for all four research fields. The view of Pearson’s correlations for 2010 code N1 and for 2016, code N2, difference of correlation for both research period N3, is given in the next table (*Table 2*)”. (Vemić Đurković, Jotić, & Marić, 2013, p. 105)

Table 2. Comparing the results of Pearson's Correlations for both research periods

Variables	2010	2016	Difference
	N-1	N-2	N-3
Quality of HR practice and quality of business	$r = .749$ $p \leq 0,01$ – high correlation	$r = .757$, $p \leq 0,01$ - high correlation	$\leq .8$
Quality of HR practice and competitiveness of human resources	$r = .917$ $p \leq 0,01$ – high correlation	$r = .937$ $p \leq 0,01$ – high correlation	$\leq .20$
Competitiveness of human resources and quality of business	$r = .704$ $p \leq 0,01$ – high correlation	$r = .717$, $p \leq 0,01$ - high correlation	$\leq .13$
Quality of HR practice and satisfaction of employees with their jobs in the bank	$r = .917$ $p \leq 0,01$ – high correlation	$r = .927$ $p \leq 0,01$ - high correlation	≤ 10
Satisfaction of employees with their jobs in the bank and quality of business	$r = .865$ $p \leq 0,01$ – high correlation	$r = .868$ $p \leq 0,01$ - high correlation	≤ 3
Satisfaction of employees with their jobs in the bank and competitiveness of human resources	$r = .892$ $p \leq 0,01$ – high correlation	$r = .894$ $p \leq 0,01$ – high correlation	≤ 2

Source: (Vemić Đurković, Jotić, & Marić, 2013, p. 105) and authors' calculations

Pearson's correlations in this paper show that correlations between all indicators are significant, confirming that hypotheses in the study have been proven. It can be stated that those banks with higher quality human resource management practices produce higher value of human resources and have more satisfied employees and as such contribute to higher quality of business, organizational performance (financial and non-financial) than those banks with lower quality management practices human resources. High correlation of all investigated variables, tested twice, proves the validity and quality of the multi-dimensional model of the relationship between the human resource management system and the quality of banks' operations in our country. The results of the research shown in the correlation analysis show that the case of Agrobank (the bank that participated in the first survey and showed good results and went bankrupt) does not call into question the validity and quality of this model of correlation between the practice of human resources management and the quality of banks' operations. The existence of a good quality human resource management practice is an important factor for achieving business success, but not the only and sufficient. Management system, leadership, organizational cultures are just some of the important factors that influence organizational performance.

Conclusion

The purpose of this paper is to analyze and prove the multidimensional model of the contribution of the human resources management system to the quality of banks' operations as the main support in the financing agriculture in Serbia. The basic scientific contribution of this paper is in identifying, proving and presenting human resources and managing them as important factors for achieving organizational performance of

banks. A better evaluation of the contribution of human resource management activities has the following benefits: detecting deficiencies for which corrective measures can be identified; detecting good practices that need to be further strengthened; enabling the definition of more compatible goals and strategies of this practice with concrete operating conditions of banks; enabling easier demonstration of the contribution of this practice to the chief managers and owners of banks. The strategic future of the bank and further investment in it depends on the human resource management practice and how understandable and clear the importance of this practice for the success of the bank is to its chief managers.

The company may invest in development programs, teamwork, loyalty, good relationships, quality of human resource management activities, but since these investments are not included in the performance indicators of the company, the calculated financial indicators will greatly underestimate the real contribution of this employee management practice.

The key reason for measuring human resource management is to quantify its contribution to organizational success, that is, to demonstrate the link between human resource management and organizational performance, and the importance of this function for fulfilling organizational goals. It refers to determining how human resource practice activities effect on employees, and through them, on the efficiency and effectiveness of the organization, that is, on defining way and intensity in which human resource practice contributes to organizational success.

Conflict of interests

The authors declare no conflict of interest.

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SUPPLY AND PERFORMANCE OF COFFEE MARKETS IN GOLOLCHA DISTRICT OF OROMIA REGION, ETHIOPIA

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ABSTRACT

The objectives of the study were to identify performance of coffee market and factors affecting market supply of coffee by smallholder farmers. The data was collected through personal interviews from a total of 213 respondents. The result of Focus Group Discussion revealed coffee producers in the study area are exposed to low and volatile price. Based on two stage least squares model, we found that amount of coffee produced, sex of the household heads, educational level, family size, land allocated to coffee production and access to market information had positively and significantly influenced amount of coffee supplied to the market. Therefore, emphasis should be given on controlling illegal traders and enhancing market infrastructure, promotion of cooperatives, increasing level of coffee production and expansion of education facilities in the study area.

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Introduction

Agricultural sector has been the priority of Ethiopia since the early 1990s, when the Agricultural Development-Led Industrialization (ADLI) and related policy frameworks were adopted (FAO, 2014). Share of agriculture fell to 34.9 percent in 2017/18 from 36.3 percent during the same period (National Bank of Ethiopia, 2018). Despite its declining contribution to Gross Domestic Product over the years, agriculture remains the leading sector in terms of contribution to the country's overall economy. It is a major source of food for domestic consumption, of raw materials for the domestic manufacturing industries and of primary commodities for export. Moreover, the sector contributes 73% of employment, and supplies 70% of the raw-material requirements of local industries (Admit et al., 2016).

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Ethiopia is mainly characterized by low output rain-fed mixed farming with traditional technologies. The presence of an unproductive class, lack of capital, poor infrastructure, absence of access to markets, a shortage of skilled manpower, land degradation, population pressure, culture, deforestation, tenure regimes and policies, poor land management practices and varied but interrelated natural factors could be mentioned as important factors of rural poverty (Temesgen, 2017). Agricultural production in Ethiopia remains exposed to various risks (disease outbreaks, agricultural output price volatility and uncertainty in input-output price ratios), (IFAD, 2016). The major factor for the short fall in achieving the planned level of agricultural productivity is related to the coverage and quality of implementation of the agricultural extension system (NPC, 2016).

Ethiopia is the birth of *Coffea arabica*. It is grown by over 4 million smallholder farmers and employs 15 million people or roughly 15% of the country's population at different points along the value chain (Francom, 2018). Ethiopia produces and exports one of the best highland coffees in the world (Samuel and Eva, 2008). Total earnings from goods export grew by 3% in 2018 over the same quarter of last year on account of the rise in export earnings from coffee (19.1%), oilseeds (4.9%), leather and leather products (27.7%), fruits and vegetables (16%), meat and meat products (10.1%), flower (8.1%), electricity (23.8%) and other exports (35.1%). The share of coffee in total merchandise export earnings was increased from 27.5% in 2016/17 to 31.8% in 2017/18 (NBE, 2018). The area share of coffee under all crops in the country was increased from 4.94% in 2016/17 *meher* season to 5.09% in 2017/18 *meher* season (CSA, 2018). Coffee plays a vital role in both cultural and social life of Ethiopian community. Among coffee producing countries in the world, Ethiopia is the first in consumption of coffee (Melkamu, 2015; Alemayehu, 2014).

Coffee is backbone of the Ethiopian economy. But, Ethiopia has not yet fully exploited its position as the producer of some of the best coffees in the world. Coffee production in Ethiopia is constrained by lack of competitiveness, poor access to market, lack of infrastructure, inadequate access to services, low value addition, and in adequate technology transfer and research (Jose, 2012). Coffee sector is highly dependent on international prices and affected by the structure and workings of the world coffee market. Ethiopia is one of the countries mostly affected by the crisis in world coffee prices (Nicolas, 2007). Notwithstanding the severe price shocks that have been shacking its value chain, coffee remains a fundamental component of the Ethiopian economy and export. Nevertheless, the prolonged price decline has substantially weakened its production basis and prospects so that appropriate financial services are urgently needed to sustain rural communities (Bastin, Matteucci, 2007).

Oromia is one of the largest region in Ethiopia that shares largest area coverage of the country. It is known for high production of coffee and, 489799.36 ha of land were allocated and 3101927.33 quintals was produced with average yield of 6.33 quintals/ha in 2017/18 *meher* season (CSA, 2018). From top 25 coffee producing districts in Ethiopia, Oromia dominates with 18 coffee producing districts and the remaining top coffee producing districts are located in SNNP. Arsi zone is one of the Oromia region's

zone which has potential of coffee production. In 2016/17 *meher* season, 6606.55 ha of land were allocated for coffee production (CSA, 2017). Gololcha district is found on the 14th from top 18 coffee producing districts in Oromia (James et al., 2015).

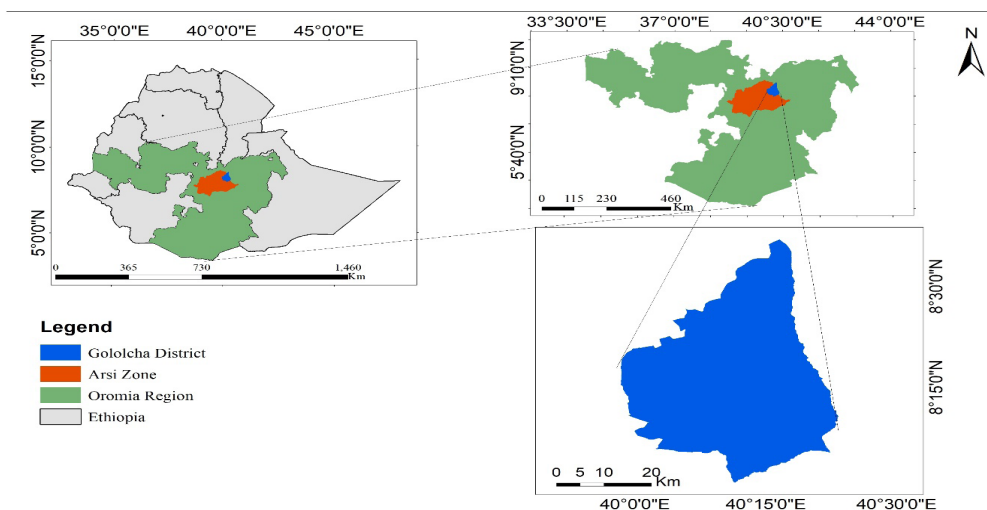
To improve coffee production and productivity in the area, development of well-performing marketing system which satisfies consumer demands with the minimum margin between producers and consumer prices is important. But, no attempt has been made to study performance of coffee marketing and determinants of market supply in the study area. The finding of the study can assist in developing improved market development strategies to benefit all stakeholders who are participating in coffee market in the study area.

Methods

Description of the Study Area

The study was conducted in Gololcha district. It is one of the districts in Arsi zone with potential of coffee production. Gololcha is located at about 281 km from Addis Ababa, the capital city of Ethiopia and 206 km from Asella, which is the capital town of Arsi zone. It is bordered by Aseko district in the north, Amigna district in the south, Shenan Kolu district in the east and Chole district in the west. The district has 23 rural *kebeles* and from this 20 *kebeles* are coffee producers. The altitude of the district ranges from 1400 to 2500 m.a.s.l. Generally, the district has a total area of 178102 hectares and is classified into two agro-ecologies, the midland and the lowland with a share of 25% and 75%, respectively. The average temperature of the district is 35^oc and the average rainfall is 900 mm/year. Total population of the district is about 201,247, of which 102,502 were males and 98,745 were females. The main rainy season of the district is in April, May, June, July, August and September. Major crops produced in the district are coffee, maize, sorghum, *teff* and groundnut (GDOoANR, 2018).

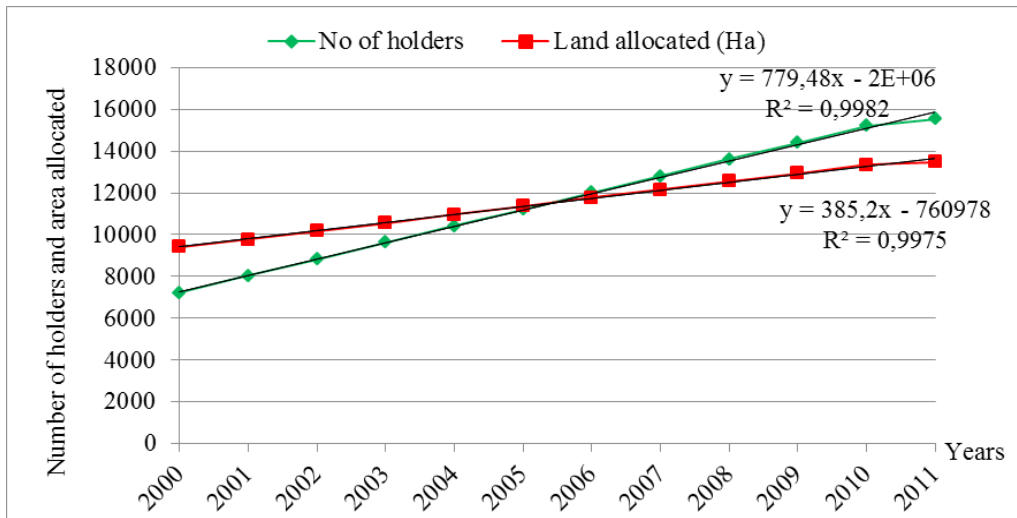
Figure 1. Geographical map of the study area



Source: Own sketch From Ethio-GIS

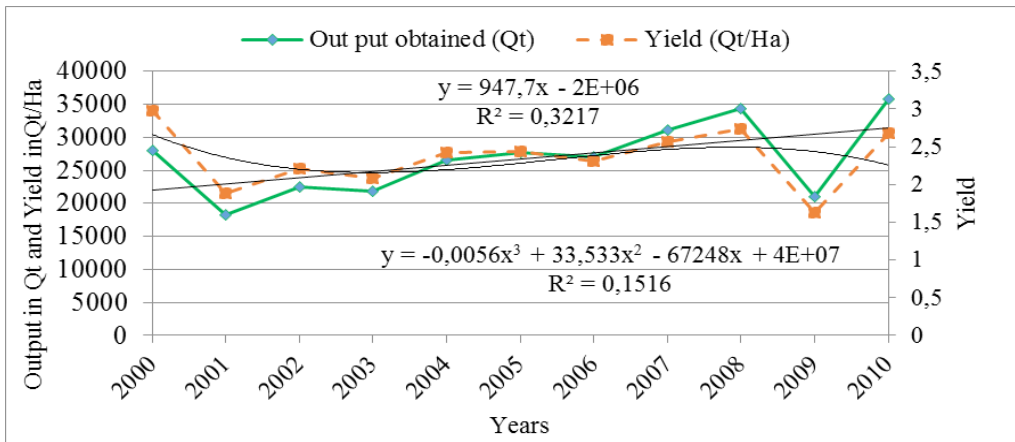
Trends of number of holders and area allocated: The trends of number of holders and area allocated was estimated in Figure 2 by using twelve years data taken from district coffee and tea marketing authority. The positive value of equations implied that the trend of number of holders and area allocated have increased over the last twelve years. In other words, the high values of R-square indicated that the trend line was best fit to data. Number of holders have increased from 7230 in 2000 E.C. to 15528 in 2011 E.C. This implies that the number of holders have increased by 114.77% in twelve years. Regarding land allocation, it has increased from 9417 hectares in 2000 E.C. to 13466 hectares in 2011 E.C., which indicated it has increased by 43% over the considered years.

Figure 2. Trend of number of holders and area allocated in Gololcha district



Source: own computation from district data

Total output and yield of coffee in the study area: Trends of total output obtained and yield in quintal per hectare of coffee clean been (green been) were estimated in Figure 3. The positive value of trend of output indicated that output has increased over the last eleven years and the negative value of trend of yield implied that yield has declined over the considered eleven years. The low value of r-square implies that the trend line of yield and output did not fit the data or there was high variation of output and yield over the past eleven years. Figure 3 also indicated that yield per hectare was 2.68 quintal in 2018 which is below national average. The national average reported by CSA (2018) was 6.19 quintals per hectare.

Figure 3. Trend of number of output and yield obtained in Gololcha district

Source: Own computation from district data

Sources and Methods of Data Collection

The study has used both primary and secondary data sources. Primary data was collected from sample respondents by using a structured interview schedule. Before data collection, the questionnaire was tested on some farmers to evaluate the appropriateness of the design, clarity and interpretation of the questions, relevance of the questions, to make sure important issues have not been left out and to estimate time required for an interview. Training was given for enumerators regarding the objectives of the study and particularly on the detailed contents of the questionnaire.

Secondary data on population size of the study areas, lists of coffee producers and traders, and agro-climatic condition of the study area were taken from unpublished documents of district agricultural and natural resource office, and coffee and tea development and marketing authority.

Sample Size and Sampling Procedures

Two stage random sampling technique was used to select coffee producing *Kebeles* and sample farm households. In the first stage, 4 coffee producing *Kebeles* were selected purposively from 20 coffee producing *kebeles*. In the second stage, from the total coffee producers, 154 household heads were selected randomly based on probability proportional to population size.

In addition to farm households, 17 wholesalers, 5 agent middle-men, 11 coffee boilers and 26 consumers were selected purposively. Wholesalers were selected based on their total amount purchase per year by depending on the data taken from the district and from total 22 licensed wholesalers in the district, the largest 17 traders were interviewed. Agent middlemen were selected depending on their availability to obtain information related to them.

Method of Data Analysis

Both descriptive statistics and econometric analysis were used

Descriptive Statistical Analysis

Descriptive statistics such as mean, maximum, minimum, standard deviation, frequencies, percentages, graphs and Garrett's ranking technique were used.

Ranking of constraints (Garrett's ranking)

Production and marketing constraints of producers, and marketing constraints of traders in selling and buying were prioritized by using Garrett's ranking technique. Following Nirmala and Suhasini (2013), percent position can be specified as the follows;

$$\text{Percent position} = \frac{100(R_j - 0.5)}{N_j} \quad (1)$$

Where; R_j = is the rank given by i^{th} item by j^{th} individual.

N_j = is the number of items ranked by j^{th} individual.

By using Garrett's table, percent position of each rank was converted into scores. Then, for each constraint, scores of individual respondents were added together and divided by total number of respondents.

Econometric Models

Factors affecting market supply: One of the assumptions of classical liner regression

model is the exogeneity of the independent variables, i.e., $E[\varepsilon^i / x_{j1}, x_{j2}, \dots, x_{jk}] = 0$. This states that the expected value of the disturbance at observation i in the sample is not a function of the independent variables observed at any observation. This means that the independent variables will not carry useful information for prediction of ε^i

(Greene, 2008). In this condition, the classical OLS method may not be applied because the estimators thus obtained are not consistent, that is, they do not converge to their true population values no matter how large the sample size (Gujarati, 2003). The method of instrumental variables (IV) provides a general solution to the problem of an endogenous explanatory variable (Wooldridge, 2002). To use IVLS, we must find an instrumental variable, namely, a random variable Z ; that is statistically independent of the error term (Dunning, 2008). Number of coffee mother trees owned and level of fertilizer applied were used as instrumental variables. Following Wooldridge (2010), as the name indicates, the method involves two successive applications of OLS and specified as the following;

Stage 1: Obtain the fitted values $\hat{X}k$ from the regression

$$x_k = \alpha_o + \alpha_1 x_{1i} + \alpha_2 x_{2i} + \dots + \alpha_{k-1} x_{k-1i} + \gamma_1 z_{1i} + \gamma_2 z_{2i} + u_i \quad (2)$$

Where; x_k = is level of output produced (endogenous variable)

α_o = is constant

X = is a vector of explanatory variables

Z = is a vector of instrumental variables (level of fertilizers and number of mother coffee trees owned).

U = is known as a random, or stochastic, error term and

The subscript i denotes i^h observation.

Stage 2: Run the OLS regression

$$Y_i = \alpha_o + \alpha_1 x_{1i} + \alpha_2 x_{2i} + \dots + \alpha_{k-1} x_{k-1i} + \hat{K} + u_i \quad (3)$$

Where; Y_i = is amount of coffee sold (ln)

α_o = is constant

X = is a vector of explanatory variables (SEXHH, EDHH, AREACOFE, QUANP, FARMEX, DMRKT, FEXCONT, TROWR, NONFRM and INFO).

$\hat{X}k$ = is level of output that,

U = is known as a random, or stochastic, error term and

The subscript i denotes i^h observation.

Results and discussion

Performance of Coffee Market in the Study Area

To determine market performance, marketing margin and associated marketing costs has been used and discussed as below.

Production cost of coffee in ETB/ha in the study area: Production cost and output obtained has been estimated by averaging production cost and output harvested by sampled households. As it is illustrated from Table 1, total annual production cost of households was 20012.03 ETB per hectare. Opportunity cost of land was estimated by annual market price (rental value) of one hectare in the area and it accounted for 59.96% of total production cost followed by harvesting cost (14.99%), cultivation cost (12.45%) and fertilizer cost (9.99%). Fertilizer cost was estimated by market price for inorganic, and cost of preparation and application for organic fertilizers.

Table 1. Estimated dry coffee cherries production cost (ETB per hectare) and output obtained (Kg per hectare) in 2017/18 production year in the district

No	Activities	Cost (ETB)	%Share of total cost
1	Cultivation cost (ha)	2492.32	12.45
3	Fertilizers cost (ha)	2000.00	9.99
4	Harvesting cost (ha)	3000.00	14.99
6	Tax (ha) (annual tax)	219.71	1.10
7	Opportunity cost of land (ha)/year	12000.00	59.96
Total estimated annual production cost in ETB/ha		20012.03	100.00
8	Average output in kg/ha (with husk)	912.6	
9	Total revenue (output * average price)/ha	35646.16	
10	Profit/ha in ETB	15634.13	

Source: Own survey

Marketing cost and profit: Marketing costs per kilogram in moving coffee bean from farm to the final market for different coffee marketing actors was estimated in the Table 2. Highest marketing cost was incurred by wholesalers. This was because, wholesalers were supplying coffee to the auction (ECX) market. The highest cost incurred by wholesalers was payment at ECX which was 43.55% of total cost. Wholesalers paid 16500 ETB per trip or per 51 quintals on average which includes tax payment to ECX (2%) from total sale, payment to commission men (1.75%) from total sale and 0.4 ETB per quintal per day for storage. All these costs accounted for 16500 ETB per 51 quintals on average. Transportation cost accounted for 26.34% of total marketing cost next to total payment at ECX market. It costs 10000 ETB per 51 quintals from Gololcha to Dire Dawa market. The other costs were cost of hulling (0.4 ETB per kg of dry cherries), sisal sack cost (0.5 ETB per kg of dry cherries) and load unload, filling cost, storage rent (opportunity cost if owned), broker cost and other costs accounted for 0.06, 0.03, 0.01, 0.01 and 0.08 ETB per kg of dry cherries, respectively. Municipality tax is tax paid at district and was 350 ETB birr per 51 quintals of green bean. Other costs include the estimate of personal payments made at different points in shifting the product from farmers to EXC market. High marketing cost for producers was transportation cost which was 35.71%, followed by sack cost (24.29%), load/unload cost (24.29%), and cost of drying and filling (10%). Similar to farmers, high proportion of marketing cost for agent middle-men was transportation cost which was 40.85% (Table 2)

Table 2. Marketing cost in birr per kg of dry coffee cherries for coffee market actors in the study area

No	List of costs per kg	Farmers	Wholesalers	Brokers	Cooperatives
1	Production cost	21.93	-	-	
2	Sack	0.17	0.5	-	0.5
3	Load/unload	0.17	0.06	0.16	0.06
4	Filling cost	0.07	0.03	0.06	0.03

No	List of costs per kg	Farmers	Wholesalers	Brokers	Cooperatives
5	Transportation cost	0.25	0.98	0.29	0.98
6	Storage rent		0.01		0.01
7	Broker		0.01		0.01
8	Municipality tax		0.03		
9	Hulling cost		0.4		0.4
10	ECX		1.62		
14	Other costs	0.05	0.08	0.2	0.16
15	Marketing cost	0.7	3.72	0.71	2.15
16	Average buying price per kg	-	39	37	40
17	Average selling price per kg	39.06	47	39	48
18	Total cost per kg	22.63	42.72	37.71	42.15
19	Market profit per kg	16.43	4.28	1.29	5.85

Source: Own survey

Production Constraints of Coffee in the Study Area

Data taken from District Coffee and Tea Development and Marketing Authority indicated that yield per hectare of clean bean was 2.68 quintals which is below national average. The yield per hectare of green bean reported by CSA (2018) was 6.19 quintals per hectare. The result from Table 3 depicted the problem of coffee production listed and prioritized by focus group discussion at four *kebeles*. According to the result, drought, diseases, lack of improved coffee varieties, lack of extension and technical support, lack of scientific research on appropriate shade, insect infestation and lack of post-harvest materials were major problems of coffee production in the study area.

Drought: Drought was a great challenge of coffee production in the study area. According to the result from focus group discussion, the new transplanted coffee seedlings are not surviving because of drought and the existing coffee mother trees on farm field are old. Additionally, coffee yield declines because of changing of climate. In the same manner, Moat *et al.* (2017) reported that challenge of coffee production in Ethiopia is the variability of weather pattern such as rainfall variability on the onset of the wet season, extension of dry season and more extreme (drier and hotter).

Diseases: Coffee berry diseases (*Colletotrichum kahawae*), branch die back (physiological disorder), coffee wilt diseases (*Fusarium xylarioides*) and coffee leaf rust (*Hemileia vastatrix*) were also other constraints of coffee production listed by focus group discussion. Coffee berry diseases can cause significant yield losses of up to 75% when not properly controlled and coffee leaf rust can cause yield losses in excess of 75% where outbreaks are severe (Mike and Phiri, 2006). According to Michiel *et al.* (2004) Dieback is caused by poor management, excessive crops as a result of light exposure without sufficient fertilization, heavy temperature fluctuations, nutrient deficiencies, or severe moisture stress and all these issues can be handled with proper management in the field. This implied that there is a poor management of coffee in the study area.

Lack of improved coffee varieties: The respondent also raised that there were no improved coffee varieties recommended by research for the study area. They were cultivating indigenous coffee landraces which are susceptible to diseases and pest. Their yielding conditions were also not consistent and highly vary from year to year. Similarly, Jose (2012) reported that coffee production in Ethiopia is constrained by lack of adequate technology transfer and research.

Lack of extension and technical support: Low government support on coffee production in the area was also another problem of coffee production. There was low support in terms of seedling dissemination and training provision on coffee production and management. Moreover, the respondents also added, the skill of experts and developmental agents were low in answering the problems coffee producers faced such as diseases. When the farmers ask how to manage diseases and other problems, developmental agents could not properly address the problems.

No appropriate permanent shade: Shade available in the area was simply locally available tree and their suitability has not been checked. The permanent shades available in the area were *Cordia africana*, *Acacia albida*, *Acacia seiberiana*, *Milletia ferruginia*, *Erthrina abyssinica*, *Ficus sycomorus*, *Ficus vasta* and *Croton macrostachyus* which were affecting coffee production. According to Jean (2004), one of the three major principles of sustainable coffee production is shade-grown coffee. The other two are organic coffee growing and fair-trade. Coffee shades have manifold ecological benefits by serving as windbreaks and shelterbelts, for aesthetic value in residential areas, and more importantly to protect the coffee plants from excessive sun and high temperatures (Molla 2015).

Insect-pest: The other problems reported by focus group discussion were insect-pest such as termite and stem borer. Termite and stem borer pose affect coffee production by feeding on the bark or skin of the tree and also by making tunnel or passageway of another fungal and bacterial diseases and causes yield loss.

Lack of post-harvest handling materials: Post-harvest handling materials such as lack of drying bed, high price of sisal sack (85 ETB per unit) and storage were also found to be other constraints of coffee production in the study area.

Table 3. Production constraints of coffee in the study area

No	Factors	Mean core	Rank
1	Drought	67.75	1
2	Lack of improved coffee varieties	57.75	3
3	Lack of extension and technical support	52	4
4	No appropriate shade	40.5	5
5	Insect (termite and stem borer)	41	6
6	Diseases (CBD, BDB and CWD)	64	2
7	Lack of post-harvest handling materials	27	7

Source: Own survey

Marketing Constraints of Coffee Producers in the Study Area

Table 4 revealed the problems of coffee marketing listed and prioritized by interviewed focus group discussion and discussed one by one as the follows.

Low and volatile price: The result from focus group discussion showed low and volatile price was ranked first from other coffee marketing constraints. Coffee producers in the study area are exposed to low price which could not even cover their cost of production. In the same way, Jose (2012) and Tesfu (2012) reported low price and low benefit shares of farmers are problems of coffee marketing in Ethiopia. Coffee producers are exposed to large fluctuation in market price (Berhanu, 2017; Alemayehu, 2014). Many farmers in sub-Saharan Africa face significant difficulty when trying to bring their products to market. They also complain about the low level of profit that they are able to earn from their products (Anne, Delmas, 2009).

Agreement of traders on market price: It is not allowed to farmers to sell coffee out of the district. But, within the district, they can sell their coffee to wholesalers, cooperatives and agent middle-men. The great problem of cooperatives was lack of capital (money cash) to purchase coffee all time and hence they did not purchase constantly but, temporarily. Traders were mostly the residents of the district and knew each other very well, and had agreement on market price and purchase by the same price. The participants on group discussion also added that traders had an agreement with agricultural office so that they kept silent when farmers appeal about the price. Traders kept their advantage only and are the owners of car within short period while farmers are poor.

High transportation cost: The area had low infrastructural (road) facility and there were transportation problem. Farmers supplied their coffee to market by donkey and human labor

Lack of information on coffee price: Survey result showed that around 44.8% of the respondent had access to market information while the rest had no access to information. Even for those who had access, the initial sources were traders. The result from focus group discussion also indicated lack of market information as the fourth in constraining coffee marketing.

Lack of fairness on the price paid for qualified and not qualified sundry coffee: The payment made for coffee was not as per quality. Traders have mixed qualified and not qualified coffee and the difference in price did not cover the cost of qualifying.

Presence of illegal traders, mixing of coffee with other coffee and unfair weight: Illegal traders purchase coffee cherries that did not dry very well and mix with others. They disseminate false information about price and thereby affect coffee producers. The result from group discussion also indicated government control on illegal traders is very low. Mixing of Gololcha's coffee with Bale and Chole which could drop market price was also another problem of coffee marketing. Traders were also cheating on weight by putting their legs or stones on weight.

Table 4. Marketing constraints of coffee producers

No	Marketing constraints	Mean score	Rank
1	High transportation cost	56.75	3
2	Low price	68.5	1
3	Lack of information on coffee price	53	4
4	Traders agreement on price	64.75	2
5	No significant price difference between qualified and not qualified coffee	48.25	5
6	Presence of illegal traders	43.25	6
7	Mixing of coffee with other coffee	32.75	7
8	Unfair weight	29.75	8

Source: Own survey

Marketing Constraints for Traders

Constraints in buying: Table 5 portrayed, quality issue was the first factor in buying coffee. Poor quality of coffee such as being wet had affected traders in purchasing of coffee from farmers. Similar to farmers, traders also added that presence of unlicensed traders had declined quality of coffee in the area. Mixing of coffee (qualified and not qualified, Golocha's coffee with other coffee such as Bale and Chole) aggravated with low control of government especially starting from the last five years, had declined quality of coffee in the study area. In line with the expansion of drought and alternative bearing of coffee, the supply of coffee was inconsistent and characterized by high fluctuation. Table 5 further indicated that capital and price fluctuation were also constraints of traders in purchasing coffee. Because of price fluctuation, traders faced difficulty in determining purchase price.

Table 5. Marketing constraints in buying

No	Factors	Mean score	Rank
1	Inconsistency in supply of coffee (low supply)	12.95	3
2	Coffee quality	50.45	1
3	Presence of unlicensed traders	15	2
4	Price fluctuation	3.41	5
5	Capital	6.14	4

Source: Own survey

Constraints in selling of coffee: Price fluctuation was found to be the first challenge in selling of coffee for traders. Grading system given by ECX and price attached was unfair. For example, if a kg of 2nd grade is sold at 97 ETB, a kg of 4th grade is sold at 94 ETB. But, the cost of supplying 2nd grade coffee is greater than the difference. They paid 2% tax of total sell at ECX and perceived it unfair. In addition to tax, traders paid for commission men from 0.5% to 2% of total sell and 40 cents per quintal per day for storage. In general, they paid 16500 ETB per trip or per 51 quintals on average.

Sampled traders also added that Sisal sack or “*jonina*” was not returned after they sell coffee. The price of one sisal sack was 85 ETB and at one trip, they supplied 60 sisal sack (net contents of 85 kg) to Dire Dawa city. Therefore, they lost 60 “*jonina*” or sisal sack or 5100 ETB at one trip only. Transportation cost was also another problem in selling coffee which was 10000 ETB per trip from wholesalers’ store to Dire Dawa city. The end ranked problems of coffee selling was shortening of selling days at ECX market. Traders should sell their coffee within 20 days after they enter ECX market. If not, traders were penalized and re-enter to market as new and sell within 7 days only.

Table 6. Major constraints in selling of coffee

No	Factors	Mean score	Rank
1	Price fluctuation	40.32	1
2	High tax by ECX	6.36	5
3	Unfair grade at ECX	20.91	2
4	Sisal sack or “ <i>jonina</i> ” will not be returned	16.23	3
5	Shortening of selling day	3.50	6
6	High transportation cost	8.82	4

Source: Own survey

Opportunities of Coffee Production in the Study Area

Even though coffee has production constraints discussed above, it has the following opportunities. Mechara Agricultural Research Center has sown 60000 improved coffee seedlings in the district which will be disseminated in the coming summer season. In addition, the center is conducting a research on Arsi coffee landraces to release recommended coffee varieties for the area. The establishment of Coffee and Tea Development and Marketing Authority at country and district level can also be other opportunities for coffee production in the study area.

Econometric Model Results

Factors Affecting Amount of Coffee Supplied to the Market in the Study Area

Before interpreting output from OLS model, Tests for heteroscedasticity, omitted variables and multicollinearity were conducted.

Presence of heteroscedasticity was tested using Brush pagan test and the result indicated that there was heteroscedasticity problem. According to Gujarati (2011), sometimes, instead of estimating regression we can regress the logarithm of the dependent variable on the regressors which may be linear or in log form. The reason for this is that the log transformation compresses the scales in which the variables are measured, thereby reducing a tenfold difference between two values to a twofold difference. To overcome the problem of heteroscedasticity, functional transformation (ln amount of coffee sold) was used and then after, no heteroscedasticity problem existed. The presence of multicollinearity problem was tested using variance inflation factor (VIF). The results of all VIF values range between 1.1 and 2.21 with a mean of 1.38 which indicates that

there is no serious multicollinearity problem among independent variables. Ramsey RESET test was used to test omitted variable and the result showed there were no omitted variables.

Durbin score and Wu-Hausman test were used to test endogeneity problem by using estat endog STATA command after ivregress 2sls and the result indicated that we are 95% confident that the model had endogeneity problem. The value of minimum eigenvalue statistic which is 49.34, is greater than any value of 2SLS size of nominal 5% Wald test and LIML size of nominal 5% Wald test. This implied that the null hypothesis which states that the instrumental variables are weak is rejected.

Table 7. Tests for multi-collinearity, heteroscedasticity and omitted variables

estat hettest		
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity		
Ho: Constant variance		
Variables: fitted values of log of amount of coffee sold		
chi2(1) = 1.04		
Prob > chi2 = 0.3080		
estat ovtest		
Ramsey RESET test using powers of the fitted values of log of amount of coffee sold		
Ho: model has no omitted variables		
F(3, 139) = 0.30		
Prob > F = 0.8263		
estat vif		
Variable	VIF	1/VIF
Level of output	2.21	0.45
Level of education	1.74	0.58
Land allocated to coffee	1.55	0.65
Family size	1.44	0.69
Sex	1.32	0.76
Farming experience	1.3	0.77
Means of transport ownership	1.14	0.88
Distance to the nearest market	1.14	0.88
Access to information	1.11	0.9
Frequency of extension contact	1.1	0.91
Access to non-farm income	1.1	0.91
Mean VIF	1.38	

Source: Own survey

Therefore, two stage least squares was used to identify determinants of amount of coffee market supply. The P-value of F for the overall significance of the model which is (Prob> F=0.0000) indicates that the model (included explanatory variables) are jointly significant at 1% or in other words, the null hypothesis which states that all

regressors have zero impact on amount of coffee sold is rejected. It indicated that there is at least one regressor that is significantly different from zero. The value of coefficient of variation indicates that 49.1% of variation in ln of amount of coffee sold in 2017/18 is explained by included explanatory variables (Table 8). From eleven hypothesized explanatory variables, six were found to be significant and discussed as below.

Amount of coffee produced (QUANP): It was hypothesized that amount of coffee produced has positive and significant effect on quantity supplied to the market. Similarly, the result from the model indicated that the quantity of coffee produced affects amount of coffee bean supply to the market positively and significantly at 1% probability level. The result from Table 8 indicated the amount of coffee supplied to the market increases by 3.01% for every one additional quintal of coffee produced, other explanatory variables kept constant. The rationale behind this was that coffee is market-oriented crops and the more produced, the more supplied to the market. Similarly, the study conducted by Samuel (2016), Tadele *et al.* (2016) and Mohammed (2011) indicated the amount of coffee, *teff* and wheat produced had positively and significantly affected market supply, respectively.

Sex of the household heads (SEXHH): It was hypothesized that male headed households are more likely to supply more than females headed households. The result of the study also confirms this and showed that it has positive and significant influence on amount of coffee supplied at 1% level of significance. It also showed being male household head increases the amount of coffee supplied to the market by 47.2% as compared to female household head, controlling for other independent variables. From the survey result, male headed households have sold around 598.8 kilograms of dry coffee cherries while female headed households sold around 253.2 kilograms on average in 2017/18. The reason could be of that female headed households are busy in home and stay at home for child care. The result of the study is not consistent with Nasir (2016) who reported that sex of household heads (being male), had negatively and significantly affected amount of sundry coffee supplied to the market. But, it is consistent with Tadele *et al.* (2016) who identified that sex of the household heads had influenced quantity of *teff* marketable surplus positively.

Educational level (EDHH): Level of education influenced market supply at 5% level of significance. For each additional year of education, coffee market supply increases by 3.42%, keeping other variables constant. Educated farmers might be better in adoption of technology, coffee production management and application of fertilizers such as farmyard manure. This might help them to increase production and thereby quantity supply. The result is in line with Jemberu (2017), and Wogayehu and Tewodros (2015) who identified that educational level affects significantly and positively the amount of chickpea and haricot bean supplied, respectively.

Family size (FAMSZ): It was hypothesized that family size affects coffee market supply either positively or negatively. But, the result of the study indicated that family size affects the amount of coffee supplied to the market positively at 1% level of

significance. It implies that, for every additional family member (in men equivalent), the amount of coffee sold increases by 6.27%, other variables kept constant. The rationale behind is that those households who have more family members had more total labor available which in turn could help to increase amount of coffee bean available for sale. Moreover, households with large family size might need to expend more for children schooling and other expenses. The study is consistent with Nasir (2016) who found family size had positively and significantly affects amount of sundry coffee supply. But, it is inconsistent with Agegnehu (2016) and Sultan (2016). According to them, high family member results in high proportion of rice and wheat consumption and low market supply respectively.

Land allocated to coffee production (AREACOFE): Land allocated had influenced positively and significantly the amount of sundry coffee bean sold at 5% level of significance. The positive coefficient under land allocated to coffee production showed that for each additional hectare of land, amount of coffee supplied to the market increases by 12.1%, controlling for other variables. Similarly, Bekele *et al.* (2017), Adisu (2016) and Jemberu (2017) reported that land allocated had positively and significantly affected the amount of sales of potato, onion and chickpea, respectively.

Access to market information (INFO): The result of the model indicated that access to market information had positively and significantly affected the amount of coffee supply. The positive and significant value of coefficient under access to market information implied that access to market information increases the quantity of supply by 22.2%, keeping other variables constant. The rationale behind this could be access to market information might enable farmers to receive accurate price level and encourage to sell more. The result of the study is in line with Wendmagegn (2014) who found that access to market information had significantly and positively influenced coffee market supply.

Table 8. Determinants of amount of coffee bean (with dry husk) supplied to the market

Variables	Coefficient	Robust Std. Err.	t-value
Level of output	0.0301***	0.00966	3.11
sex	0.472***	0.124	3.81
Educational level	0.0342**	0.0164	2.09
Family size	0.0627***	0.0218	2.87
Farming experience	-0.00389	0.00544	-0.72
Land allocated to coffee production	0.121**	0.0491	2.45
Access to non-farm income	-0.0410	0.139	-0.30
Means of transport ownership	-0.00803	0.0892	-0.90
Frequency of extension contact	0.0154	0.0277	0.56
Access to market information	0.222**	0.0924	2.40
Distance to the nearest market	-0.00623	0.0116	-0.54
Constant	0.256	0.182	1.41
Observations		154	

Variables	Coefficient	Robust Std. Err.	t-value
F(11, 142)		21.340	
Prob > F		.0000***	
R-squared		.491	

Note: *** $p < 0.01$, ** $p < 0.05$ and * $p < 0.1$, and dependent variable is amount of coffee supplied (ln) 2017/18

Source: Own survey

Conclusions and Recommendations

In this article, we assessed performance of coffee market and analyzed factors affecting market supply of coffee by smallholder farmers. The data was collected through personal interviews from a total of 213 respondents.

The study identified drought, diseases outbreak, lack of improved coffee varieties, lack of extension and technical support, inappropriate shade, insect manifestation and lack of post-harvest materials were among the major constraints of coffee production. Therefore, strengthening coffee research to improve farm productivity, reducing risk, improving shade tree practices by using improved recommended shade tree species, Practice stumping old coffee tree for recycling its life or re-plant and using of improved coffee variety are found to be important for the study area. Low and volatile price, agreement of traders on market price, lack of fairness on price paid for qualified and not qualified sundry coffee, presence of illegal traders, high transportation cost, mixing of coffee with other coffee and unfair weight were also found to be major marketing constraints of producers in the study area. Thus, controlling of illegal traders and enhancing of market infrastructure is found to be important.

Sampled traders reported that coffee supplied by the farmers had no quality. Hence, improving harvesting techniques by only harvesting red cherry at the farm level, improving drying techniques through drying coffee on plastic sheet, improving packaging materials (use only sisal sack) and store coffee after it well dried in appropriate warehouse only for a short period are also important. Grading system, price attached to each grade and tax paid at ECX market were reported to be unfair by sampled traders. Therefore, further research should be conducted on coffee market condition at ECX level.

The result of two stage least squares showed that amount of coffee produced, sex of the household heads, educational level, family size, land allocated to coffee production and access to market information had positively influenced amount of coffee supplied to the market. Therefore, enhancing information access, increasing level of coffee production (through extension of improved varieties, fertilizer application, irrigation, pruning and other agronomic management) and expansion of education facilities were other crucial issues to increase coffee market supply.

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Conflict of interests

The authors declare no conflict of interest.

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PROFITABILITY ANALYSIS OF APPLE PRODUCTION IN THE REPUBLIC OF SERBIA

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ABSTRACT

The subject of this paper is profitability analysis of apple production in the Republic of Serbia. The financial profitability analysis was performed in companies operating in the territory of Vojvodina, Central and Eastern Serbia. This analysis was performed through the calculation of liquidity and profitability ratios. In the Republic of Serbia, 26658 hectares have apple orchards, which indicates that the cultivation of this fruit is highly represented. The aim of this paper is to determine whether apple production is a profitable activity in the Republic of Serbia, selecting three companies based on the analysis of profitability ratios.

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Introduction

Fruit growing as an area of plant production has a great potential for development in Serbia due to favorable climatic conditions for cultivation as well as growing demand for fruit in the domestic and world markets. However, fruit production in modern conditions is becoming increasingly complex, given the extremely high requirements in terms of fruit quality and the method of production (Milić, Lukač Bulatović, 2005).

Together with the food industry, the agricultural sector, in the strategy of economic development of the Republic of Serbia, represents the strategic potential of the Serbian economy (Stošić, Domazet, 2014). Fruit growing is a renewable resource, it contributes

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to sustainable development in the country, supports tourism and participates in preserving the environment (Sojkova, Adamičkova, 2011). No other branch of agriculture can bring as much profit as fruit growing, especially in hilly and mountainous areas (Keserović, 2004). However, fruit production can be considerably profitable only if the quality of products and fruit growing technologies are in line with market demands (Lukač Bulatović, Vukoje, Milić, 2017). The importance of fruit production also reflects in the fact that it employs a high percentage of labor per area unit. In addition to having a positive effect on the employment rate, fruit production is important due to the positive nutritional value of apples.

Primary agricultural production and operations of agricultural enterprises in the Republic of Serbia are characterized by specific data that are reflected in seasonal activities, high production costs, slow working capital and long-term tying of funds (Vuković, Pijanić, Kalaš, 2018). In the past, the fruit production in Serbia was characterized by outdated assortments, semi-intensive and extensive plantations with inadequate planting material, low levels of cultural and pomological practice, poorer and uneven fruit quality and lack of adequate storage capacities (Lukač Bulatović, Nikolić Đorić, Đurić, 2019). In recent years, modern methods of cultivation and production with the application of technology have become more common in fruit growing. The key task of fruit production is to grow, store and satisfy the fruit market in sufficient quantity and quality to meet customer needs (Kudová, Chládková, 2008).

Our country has an excellent natural environment for growing almost all types of fruit trees (Šoškić, 2008). That is why the development of fruit tree production is backed by tradition. Serbia is located in a favorable area of northern latitude, with a climate which has four seasons and four climatic areas, very suitable for agriculture. The level of yield does not depend entirely on weather conditions, but implies a set of many factors that must ensure the traceability of certain activities and processes (Grujić, Roljević Nikolić, Subić, 2020). It includes inadequate application of agrotechnical measures, unfavorable climatic conditions in certain stages of vegetation and so forth. Plantations should be grown with high quality and productive varieties of fruit species, which can achieve optimal production output and optimal economic results in the available agro-ecological conditions of the environment (Vukoje, Milić, 2009). Fruit growing is significant for the Republic of Serbia, as it makes up one tenth of the total agricultural production in the country. The most important fruit species in the fruit production of Serbia are apples, plums, raspberries and cherries. Fruit production of the Republic of Serbia has an advantageous development perspective due to favorable natural conditions for the growth of all continental fruit species and due to the growing demand for fruits and fruit products on the domestic and international market (Maksimović, 2018).

According to the data provided by the Republic Bureau of Statistics, the areas under orchards in Serbia amount to 183602 hectares. The largest areas under orchards are located in western Serbia, Šumadija, Podunavlje (Grocka and Smederevo) and in parts of southern Serbia. Relative to the total area under orchards, the largest part is under plum and apple orchards (*Table 1*).

Table 1. Areas under stone fruit in the Republic of Serbia, 2018. (in hectares)

Fruit species	Areas (ha)
Apples	26658
Pears	4977
Quinces	1947
Plums	72923
Sour cherries	19579
Peaches	5176
Apricots	6040
Cherries	4335

Source: Statistical Office of the Republic of Serbia, 2020

The research presented in this paper comes down to the profitability analysis of apple production in the Republic of Serbia. The analysis includes a presentation of liquidity and profitability ratios of apple production in three representative companies in the Republic of Serbia. Another aspect of this research is a comparative analysis of the profitability coefficients of apple production on their plantations. The companies were selected randomly, however, the criteria were that the companies are to operate in different regions of the Republic of Serbia (Vojvodina - Northern Serbia, Central Serbia and Eastern Serbia). Also, the authors defined a general hypothesis which reads: *“Apple production in the Republic of Serbia is profitable.”*

Materials and methodology

Several research sources were used for this paper. The situation and trends in apple production in Serbia in the period from 2010 to 2018 will be reviewed based on statistical data taken from available statistical publications. The profitability analysis of apple production will be based on the analysis of liquidity and profitability ratios. Three agricultural companies from three different regions of Serbia (Vojvodina – Northern Serbia, Central Serbia and Eastern Serbia) will be used for the analysis. The coefficients analysis will be based upon their financial statements (balance sheet and income statement) for the 2017 and 2018 business years. Appropriate coefficients will be calculated for each company and their individual analysis will be presented. Finally, a comparative analysis of individual coefficients will be conducted and appropriate conclusions will be drawn. The authors selected the three companies by using the method of random selection, taking into account that the companies operating in the territory of different regions – Vojvodina-Northern Serbia, Central Serbia and Eastern Serbia are represented.

On the territory of Vojvodina - Northern Serbia, this research analyzes the profitability of production of the medium-sized company “Ćirić Agro mdž doo”. This company was founded in 2012 in the village of Titel near Novi Sad, with capacity to produce 15 types of top varieties of apples. The company has the most modern equipment for packaging and sorting fruit. In addition, the company owns the largest cold storage facility in Serbia, with a capacity of 22,000 tons. In addition to fruit growing, “Ćirić Agro mdž doo” is engaged in seed and intensive farming production on an area of over 2000 hectares.

“Greeny doo” from Arandjelovac is the second company analyzed in this paper. It operates in the territory of Central Serbia. It currently grows a total of 85,000 apple trees of the following varieties: Golden Delicious, Red Chief, Jonagold, Granny Smith, Gala and Fuji. This company was founded in 2004, and its main activity is cultivating and storing apples. In 2012, the range of the company “Greeny” was expanded to the production of cherries and strawberries. The company has a fruit storage refrigerator with capacity of 2800 tons. In addition to fresh fruit, this agricultural company has supplemented its produces with the production of apple and beet juice. By size, it is classified as a small business.

When it comes to the region of Eastern Serbia, the randomly selected and analyzed agricultural company dealing with the production of apples is “Terra Optima”. This company operates in the vicinity of Sokobanja. Founded in 2013, it organizes its production on a plantation area of 23 hectares. It focuses on the production of apples and different types of nuts. The apple varieties it produces are: Fuji KikuFubrax, Golden Delicious Reinders, Red Delicious Superchief and Granny Smith. This company is registered as a micro enterprise.

Research Results and Discussion

Current state of apple production in the Republic of Serbia

Apart from plums, apples are the most important fruit species grown on the territory of the Republic of Serbia. The development of fruit growing in general, as well as the production of apples, has a great impact on the input industry development. Good examples for it are plant protection products, mineral fertilizers, agricultural machinery, packaging, warehouse construction, etc. (Ivanović, Jeločnik, 2009). Favorable climate and soil conditions in Serbia are an excellent prerequisite for the development of this production. (Statistical Office of the Republic of Serbia, 2018).

Also, organic production represents the future and an opportunity to achieve above-average earnings. This type of production is also interesting in the production of apples. In Serbia, they continue to experience organic production as a recreational business, although there is a clear direction, methods and legislation as well as extraordinary agro-ecological conditions. Willpower and coordination are needed activities, at all levels of agricultural policy, to the condition was improving. In the future, attention should be paid to the production of organic apples. (Pešić, 2020).

According to the results of the research conducted by the Statistical Office of Republic of Serbia, the most common apple types in the Republic of Serbia are varieties of the group “Ajdaared”, with 41% in the total land area planted with apples, the second group consists of “other varieties” with 20%, and the third most represented variety is “Zlatni delišeš” (Golden Delight), which is represented by 14% in the total land area planted with apples. In 2018, the average number of trees per hectare in the Republic of Serbia was 1688, and the total area under apples was 460404 hectares. Based on the data available on the website of the Food and Agriculture Organization of the

United Nations (available at: <http://www.fao.org/faostat>), 239945 tons of apples were produced in the Republic of Serbia in 2010. The largest percentage increase in apple production in the Republic of Serbia compared to 2010 was recorded in 2013 (91%) and 2018 (92%), which also represents the largest amount of apples produced in tons in the observed period (*Table 2*).

Table 2. Apple production in the Republic of Serbia, 2011-2018. (t)

Year	Production in tones	Percentage of change compared to 2010 (%)
2011.	265576	11%
2012.	243987	2%
2013.	458409	91%
2014.	336313	40%
2015.	431759	80%
2016.	400473	67%
2017.	378644	58%
2018.	460404	92%

Source: FAO, 2020

In modern economies apples are usually marketed throughout the wholesale to a fruit packers or processors (Jeločnik, Subić, Kovačević, 2019). The production of apples, as well as other fruit species, does not only serve to meet the nutritive needs of the population. The produced fruit is also used as a raw material in the processing, pharmaceutical and other industry branches. Meanwhile, processors use apples to produce apple sauce, or juice, spirits and cider, as well as to can, dry or freeze them, etc. (Crassweller, Kime, Harper, 2017). Aside from that, fruit as an export product is of great importance in increasing the country's foreign exchange incomes. As world top-ten apple producers could be listed: China, USA, Poland, Turkey, India, Iran, Italy, Russian Federation, France and Chile, among them, China is real super star, with total production (almost 44.5 million t) higher than half of total world production (Khushboo, 2018). In 2018, 144,750 tons of apples were exported from Serbia, which was 26.7% less compared to the previous year (*Table 3*). According to the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia, of the total export of apples, most apples are traditionally exported to the Russian Federation, about 86%, while other export countries are Italy, Bosnia and Herzegovina, Montenegro, Macedonia, Great Britain and others, and the yield of apples in the same year was 17.8 tons per hectare. (available at: <http://www.minpolj.gov.rs/dokumenti/izvestaji-sa-trzista/>). Based on the data from the Republic Bureau of Statistics, the purchase price in Serbia was 51.21 Serbian dinars per kilogram in 2018, which is a 40% increase compared to the purchase price of apples in 2013 (*Table 4*).

Table 3. Export of apples from the Republic of Serbia, 2010-2017.

Year	Export in tones	Export value (mil.dolars)
2010.	107007	46,419
2011.	130182	65,799
2012.	61642	41,480
2013.	115938	53,025
2014.	135982	81,307
2015.	187366	104,097
2016.	232223	127,103
2017.	197601	124,678
2018.	144.750	101,004

Source: FAO, 2020

Table 4. Purchase prices of apples, 2013-2018.

Year	2013.	2014.	2015.	2016.	2017.	2018.
Purchase price din/kg	37,28	40,76	42,93	46,09	54,96	52,21

Source: The Statistical Office of the Republic of Serbia, 2020

Based on data of credit approval in agriculture, presented on Agropresswebsite - The Association of Agricultural Journalists initial investment per hectare of sour cherries range from 10-15,000 euros, including modern cultivation technology. On the other hand, cultivation of cherries requires greater investments, 60,000 euros per hectare, while the initial investment for growing blueberries is 30-50,000 euros per hectare. Contrastingly, growing apples appears to be one of the most common fruit species for cultivation in Serbia as it requires an initial investment of 50-60,000 euros per hectare, which includes an irrigation system, hailstorm protection system as well as frost protection system. However, based on the same research there were additional results which indicate that there are other, more affordable planting systems. For example: 5,000 euros / hectare for extensive plantations, semi-intensive plantations for 10,000 euros / hectare, modern dense plantations without an irrigation and drainage system for 20,000 euros/ hectare. This research indicates that the payback period for investments in apple orchards is 4.4 years (available at: <https://www.agroklub.rs/vocarstvo/jabuka-zahteva-ulaganja-ali-ima-dobre-prinose-i-kvalitet-ploda/43786/>).

Liquidity Indicators

The financial analysis serves as a compass as well as a reliable guideline for the choice of the appropriate developmental course which is intended to enhance the progress of a company (Draganac, 2016). Financial information is used to meet the following needs of agricultural enterprises for decision-making, as well as for financial reporting purposes (Mitrović, Knežević, Veličković, 2015).

Liquidity is defined as the ability of an enterprise to cover its immediate debts and obligations. It is the ability of a company to respond to its financial obligations on time and in full. Liquidity is associated with the ability of a company to transform its assets into cash, because cash is absolutely liquid and is used as a measure of liquidity of other assets of the company. The presented indicators that indicate the liquidity situation of the three companies are the current liquidity ratio, the accelerated liquidity ratio, the current liquidity ratio and the financial stability ratio.

The current liquidity ratio of the “Ćirić Agro mdž doo” company indicates that every Serbian dinar of short-term liabilities in 2017 was covered with 0.94 Serbian dinars of current assets of the company. Current liquidity is some kind of precondition for ensuring that company is able to meet their short-term obligations (Vuković, Jakšić, 2019). Current liquidity has increased to 1.80 the following year. The accelerated liquidity ratio in this company also increased in 2018. Namely, in 2017, this coefficient was 0.29 and he said that every dinar of short-term liabilities was covered with 0.29 dinars of liquid assets that the company owns. In 2018, that coefficient was increased to 1.80. The accelerated liquidity ratio of this company also increased in 2018. Namely, in 2017, this coefficient was 0.29 and it indicated that every Serbian dinar of short-term liabilities was covered with 0.29 Serbian dinars of liquid assets that the company owns. In 2018, that coefficient was increased to 1.80. The current liquidity ratio indicates the ability of a company to immediately settle its financial obligations. For this company, this ration was 0.03 in 2018, while in 2018 it increased to 0.09. The financial stability ratio indicates the ratio between long-term assets and capital with addition of long-term liabilities. The lower the value ratio, the more liquid company is. In the case of company “Ćirić Agro mdž doo”, in 2017 this ratio was 1.00, therefore in 2018 there was a positive change in the coefficient of financial stability and it was 0.90 (Table 5).

The current liquidity ratio in the company “Greeny Arandjelovac” in 2017 was 3.25, which means that each Serbian dinar of short-term liabilities was covered with 3.25 dinars of current assets of the company. This coefficient increased slightly in the following year, amounting to 3.51. The accelerated liquidity ratio in 2017 indicates that every Serbian dinar of short-term liabilities is covered by 1.03 Serbian dinars of the company’s liquid assets. This coefficient has slightly decreased in 2018 and amounted to 1.02. The current liquidity ratio indicates that the company “Greeny Arandjelovac” in 2017 had more cash and cash equivalents and was more willing to meet its current financial obligations compared to 2018. Namely, this ratio was 0.21 in 2017 and 0.08 in 2018. The coefficient of financial stability in 2017 was 0.75. It did not change much in 2018 and amounted to 0.76 (Table 6).

When it comes to “Terra Optima” company, the current liquidity ratio increased in 2018 and amounted to 0.39. A decrease in short-term assets was recorded in this company in 2017, bringing it down to 0.11. The accelerated liquidity ratio indicates that this company had a reduced amount of liquid assets in 2017 compared to 2018. This is the reason for this ratio to increase from 0.12 to 0.18. The current liquidity ratio is at a very low level in both observed years. In 2017 it was 0.002, and in 2018 it was 0.003.

The reason for this is the low level of cash and cash equivalents in the company. The coefficient of financial stability was lower and amounted to 1.39 in 2017, while it was 1.42 in 2018. This indicates that “Terra Optima” was more liquid in 2017 (Table 7).

Table 5. Liquidity indicators of apple production of producer “Ćirić Agro mđž doo“, (2017-2018)

Coefficient / year	2017.	2018.
Current liquidity ratio	0,94	1,80
Accelerated liquidity ratio	0,29	0,39
Current liquidity ratio	0,03	0,09
Coefficient of financial stability	1,00	0.90

Source: Author’s calculation based on the financial statements data of apple production in “Ćirić Agro mđž doo“

Table 6. Liquidity indicators of apple production of producer “Greeny Arandelovac“ (2017-2018)

Coefficient / year	2017.	2018.
Current liquidity ratio	3,25	3,51
Accelerated liquidity ratio	1,03	1,02
Current liquidity ratio	0,21	0,08
Coefficient of financial stability	0,75	0,76

Source: Author’s calculation based on the financial statements data of apple production in “Greeny Arandelovac“

Table 7. Liquidity indicators of apple production of producer „Terra Optima“ (2017-2018)

Coefficient / year	2017.	2018.
Current liquidity ratio	0,11	0,39
Accelerated liquidity ratio	0,12	0,18
Current liquidity ratio	0,002	0,003
Coefficient of financial stability	1,39	1,42

Source: Author’s calculation based on the financial statements data of apple production in „Terra Optima“

Based on the liquidity ratio analysis, it turned out that the company “Greeny Arandjelovac” has the most liquidity, the coefficient of accelerated liquidity is more than 1 only in this company (1.03 and 1.02), which is not the case with the other two companies. The current liquidity ratio should be at least 1, however, this is not the case with any of the three analyzed companies. Based on the current liquidity ratio, which should be 2, the company “Greeny Arandjelovac” operates with most liquidity (3.25 and 3.51). The coefficient of financial stability in both observed years is the lowest in the same company, which indicates this is the business with superior liquidity (0.75 and 0.76).

Profitability Indicators

Profitability is a basic performance indicator that measures the success of a company's business and contributes to its better reputation (Tomašević, Jović, Vlaović-Begović, 2019). It is defined as the ability of a company to make profit from all business activities. Profitability is also the ability to earn on the basis of investment (Adjirackor, et al). Profit is the main motive of any organization and profitability ratios help evaluate the success of an enterprise.

Profitability ratios measure the ability of a company to create profit in relation to their expenses. Recording a higher profitability ratio compared to the previous period of financial reporting is an indicator of improved financial situation. Profitability ratios can also be compared to the same ratio of a similar company to determine how profitable the business is relative to competitors. The coefficients used in the profitability analysis of the three firms are the net profit margin, the rate of return on assets (ROA) and the rate of return on equity (ROE).

The net profit margin represents the percentage of income that remains as freely available profit. It gives a final picture of how profitable the company is after taking into account all expenses, including interest and taxes. The reason that the net profit margin is used as a measure of profitability is that it includes everything in the analysis. It is a coefficient used to calculate the percentage of profit that a company produces from its total revenue. It compares net profit to the total income of the company.

Another coefficient for measuring profitability is the rate of return on assets (ROA). Return on Assets (ROA) is an indicator that showed the efficiency of the company at generating profits from each unit of shareholders equity, in order to explain to what extent does the company use investments in order to earn a profit (Alshatti, 2015). The higher the ratio, the better the company uses its assets and has a higher return on assets. It represents the ratio between net profit and total assets. Companies that operate in capital-intensive industries, and have a high volume of fixed assets, will generally have a lower ROA because the amount of the denominator in the calculation formula is immediately increased. Therefore, this ratio is mainly used to measure the profitability of companies operating in the same industry.

The third analyzed profitability ratio is the rate of return on equity. Return on equity is an important measure of a company's profitability. Higher values of this ratio are favorable, meaning that the company generates income on invested equity. However, the analysis of this coefficient must be approached seriously. If the ROE increase happens while the shareholder equity decreases, it results with the use of borrowed funds (debt), which means that the company operates with higher risk.

Indicators of profitability of apple production of the producer "Ćirić Agro mdž doo" are shown in *Table 8*. The net profit margin in 2017 was 0.15, and in 2018 this coefficient increased to 0.30. This means that in 2017, this company produced 15% of the profit from its total income - it earned 15% of the total income that remained as a profit after

deducting all costs, interest and taxes. The following year, this percentage increased to 30%, because the amount of total revenues increased in the same year. The rate of return on assets (ROA) at the company “Ćirić Agro mđž doo” was 0.04 in 2017, and 0.09 in 2018. The ratio is higher in 2018, which is a good indicator of profitability. This is the result of a decrease in the amount of total assets and an increase in net profit. The ROE coefficient was 0.06 in 2017 and 0.12 in 2018. This means that this company returned 6% of the invested capital in 2017, while in the following year it returned 12% of the invested capital.

Profitability coefficients of apple production for the producer “Greeny Arandjelovac” are presented in *Table 9*. The net profit margin in 2017 was 0.03 and in 2018 it was 0.02. Therefore, in 2017, this company produced 3% of the profit from its total income, and in 2018, that coefficient was reduced to 2%. The rate of return on assets (ROA) at this company was 0.08 in 2017 and 0.06 in 2018. The coefficient decreased, due to the fact that the total assets increased in 2018 compared to 2017. The ROE of the company “Greeny Arandjelovac” in 2017 was 0.09, meaning that this company returned 9% of the invested capital. The following year, this ratio was 0.07 (2018), which means that this company returned 7% of the invested capital.

Indicators of profitability of apple production produced by “Terra Optima” are shown in *Table 10*. Namely, the net profit margin of this company in 2017 was 0.01 and 0.02 in 2018, which means that the company earned 1% of the total revenue in 2017, and the following year 2%. The second analyzed coefficient of profitability of this company is the rate of return on assets (ROA). It was 0.08 in 2017, and the following year it was 0.06 due to the increase in total assets. The company’s ROE dropped slightly in 2018. Namely, in 2017, this company returned 4% of the invested capital, and the following year, the rate of return on capital was 3%.

Table 8. Profitability indicators of apple production of producer “Ćirić Agro mđž doo“ (2017-2018)

Coefficient / year	2017.	2018.
Net profit margin	0,15	0,30
Return on Assets (ROA)	0,04	0,09
Return on Equity (ROE)	0,06	0,12

Source: Author’s calculation based on the financial statements data of apple production in “Ćirić Agro mđž doo“

Table 9. Profitability indicators of apple production of producer “Greeny Arandjelovac“ (2017-2018)

Coefficient / year	2017.	2018.
Net profit margin	0,03	0,02
Return on Assets ROA)	0,08	0,06
Return on Equity (ROE)	0,09	0,07

Source: Author’s calculation based on the financial statements data of apple production in “Greeny Arandjelovac“

Table 10. Profitability indicators of apple production of producer „Terra Optima“ (2017-2018)

Coefficient / year	2017.	2018.
Net profit margin	0,01	0,02
Return on Assets (ROA)	0,003	0,002
Return on Equity (ROE)	0,04	0,03

Source: Author's calculation based on the financial statements data of apple production in „Terra Optima“

Comparative profitability analysis

Table 11 provides a comparative analysis of the profitability indicators of the three analyzed companies for 2017. Based on the data from Table 14, it can be stated that the company “Ćirić Agro mdž doo” achieved a net profit margin of 0.15, which is higher compared to the other two companies. The company “Greeny Arandjelovac” achieved a net profit margin of 0.03. The company “Terra Optima” had the best results in 2017, with a profit margin of 0.01. In addition, the analysis of this company indicates the lowest values for the remaining two profitability ratios. Namely, in 2017, the rate of return on assets was 0.003, and the rate of return on equity was 0.04. In 2017, the rates of return on assets (ROA) and equity (ROE) were the highest in the company “Greeny Arandjelovac”, the first was 0.08 and the second 0.09. In 2017, “Ćirić Agro mdž doo” company had a 0.04 rate of return on property, while the rate of return on capital was 0.06.

Table 11. Profitability indicators, 2017.

Company / coefficient	Net profit margin	Return on Assets (ROA)	Return on Equity (ROE)
Ćirić Agro mdž doo	0,15	0,04	0,06
Greeny Arandjelovac	0,03	0,08	0,09
Terra Optima	0,01	0,003	0,04

Source: Author's calculation

Table 12 presents a comparative analysis of profitability indicators for the analyzed companies for 2018. Namely, “Ćirić Agro mdž doo” recorded the highest net profit margin in 2018 - it amounted to 0.30 or 30%, while in the companies “Greeny Arandjelovac” and “Terra Optima” recorded the same margins which amounted to 2 %. In 2018, the company “Ćirić Agro mdž doo” had the highest rate of return on assets (ROA) compared to the other two companies (0.09). In the case of “Greeny Arandjelovac”, the ROA coefficient was 0.06, while the lowest value for the asset return rate in 2018 was recorded in the company “Terra Optima” (0.002). The rate of return on equity in 2018 was also the highest in the company “Ćirić Agro mdž doo” (0.12), while “Greeny Arandjelovac” had 0.07, and “Terra Optima” had 0.03.

Table 12. Profitability indicators, 2018.

Company / coefficient	Net profit margin	Return on Assets (ROA)	Return on Equity (ROE)
Ćirić Agro mdž doo	0,30	0,09	0,12
Greeny Arandelovac	0,02	0,06	0,07
Terra Optima	0,02	0,002	0,03

Source: Author's calculation

Conclusion

Based on the conducted analysis, the net profit margin for 2017 and 2018 in two out of the three analyzed companies was lower than 10%. Only one of the three analyzed companies recorded a net profit margin of more than 10% (15% in 2017 and 30% in 2018), which means that only one out of three companies was profitable and that only one company produced apples in 2017 and 2018 with profit. This indicates that apple production is not a profitable activity in the Republic of Serbia and that the hypothesis "Apple production in the Republic of Serbia is profitable" has been refuted. However, it must be noted that the hypothesis cannot be fully refuted, due to the fact the conclusion was made only on the basis of analyzing three randomly selected companies operating in different regions of the Republic of Serbia. The criteria for selecting the companies was the coverage of the entire country.

Conflict of interests

The authors declare no conflict of interest.

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FACTORS IMPORTANT FOR ACHIEVING THE COMPETITIVENESS OF INDUSTRIAL AND AGROINDUSTRIAL PRODUCTS

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ABSTRACT

The subject of research in this paper is the business success of an organization aimed at assessing selected factors relevant to creating sustainable competitiveness of industrial and agroindustrial products in the target market. The research was conducted on the basis of a specially designed questionnaire on a sample of one hundred organizations operating on the territory of Serbia. The premise is that the factors that affect the competitiveness of industrial and agroindustrial products of different organizations have different effects on the results of their business activities and the perception of their importance for improving the quality of business. Numerous factors determine the level of competitiveness of products of organizations, which imposes the need for the evaluation and adaptation of the existing business concept to the arising changes. Namely, relevant analyses show that national organizations cannot be competitive if they do not meet the key requirement - the production of quality products in accordance with the standards of the modern world market, as indicators of the current situation show. The methods used in this research are the hypothetical-deductive, the analytical-deductive and the comparative method, the historical and the statistical-descriptive method, and the method of comparative statistics (ch2 test, ANOVA). The results of the research show that the key factors for increasing the level of competitiveness of industrial and agroindustrial products of domestic organizations are competitive price, good design, high functionality, fast service, quality marketing, etc.

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Introduction

Competitiveness is a key prerequisite for the business success of any modern organization (Ćurčić, 2018). It involves the ability of an organization to produce goods and services that meet international market criteria. At the same time, competitiveness reflects a high and sustainable level of revenue. Organizations on the market should offer modern, quality and cheap products, quality servicing, modern design, etc. In this sense, organizations are forced to continuously increase business efficiency, to innovate the organization (Pascu, Lieshout, 2009) and the industrial and agroindustrial products, to improve management and employees, to entrepreneurially shape and use new opportunities, to protect the environment, etc. In this way, organizations need to increase their competitiveness and enable their own survival, growth and development in an international environment.

Certainly, there are successful strategies to increase the competitiveness of industrial and agroindustrial products. They are associated with generating quality products, with high marketing costs, with the cost of introducing a new product to the market (Porter, 1980), etc. Competitive strategy of the competitiveness of products, in addition to marketing, includes other functions and considerations, such as in what kind of markets the organization should compete with rivals, with what kind of goals and marketing programs. That is why it is important to continuously review the factors that are important for achieving the competitiveness of industrial and agroindustrial (Marković, Krstić, Rađenović, 2019) products. Organizations working in the same or similar environments can compete using a variety of competitive methods (Namiki, 2011) thanks to the dissimilar strategic orientations of their management and other internal specific capabilities. It is also striking that organizations of different sizes operating at different levels with the ability to innovate products primarily in high-tech industries generally have better performance (Worley et al. 2014) than others. Therefore, managers of innovative organizations should focus on a strategy of success - targeting consumers who are constantly changing their needs for perceived industrial and agroindustrial products or a quick response to their service requirements.

An organization can create and deliver more value to a customer/consumer by offering lower prices for the same or similar product, or it can offer more benefits to customers, which justify higher prices of products (Kotler, Vong, Sonders, Armstrong, 2007). Organizations that emphasize low prices in the function of achieving competitiveness primarily have two alternatives at their disposal. One is to target consumers looking for affordable prices for industrial and agroindustrial products with a special need for short delivery time, and the other is to serve customers in niche markets who are looking for affordable prices. The decision on which market segment to focus depends on the competence of the organization and the available resources (Vukajlović, Ćurčić, 2016).

Quality product - the basis of long-term business success of an organization

The path to the competitiveness of an organization is expressed through the quality of its products. Poor quality, small number of products adapted to new international standards, limited series, unattractive design and packaging, outdated technology and high product prices are the main reasons why Serbian products cannot compete with the products of global market leaders, but also with companies coming from newly industrialized countries (Miletić, Ćurčić, Aničić, 2017). In order to achieve business success in both domestic and international markets, organizations face the challenge of creating a competitive product/service. Today, the customer/consumer expects exceptional quality of products (Končar, et al., 2019), i.e. the fulfillment of all their needs and desires, and at the same time they are ready to pay only the price that is more affordable than the competition's. The characteristics that determine the quality of products are the basic competitive instrument for differentiating a particular manufacturer from the products of its competitors.

Creating a competitive industrial product is one of the most important tasks of an organization that participates in shaping a given offer (Grubor, Milićević, Đokić, 2018). Taking into account the constant changes in the needs of market demand, it is necessary to offer a product/service which will have added value for the customer/consumer. That is why it is important that the organization knows the consumers (Miletić, Miletić, Ćurčić, 2018) to whom it places products and to take care of satisfied consumers because the success of business is based on it. Loyal customers/consumers, which will be dedicated to a particular product or brand of product, should be obtained and kept (Yeung, Ramasamy, 2007). Only the best survive on the market, not the biggest. Therefore, the organization must strive to offer consumers a product that will have the best possible market properties, because in this way the product gains in value. A quality product must have properties that put it in a special place when it comes to the beneficial effects for the customer, which is why it is necessary to continuously check the level of quality of business excellence and the performance and attitudes of users (Jelić, 2016).

If the management of the organization notices that there is a problem with lower sales of its industrial and agroindustrial products, it must start managing organizational changes of products. An organization can see such an impact the moment consumers stop being interested in its product. The reason for consumers no longer buying the product may be poor quality, high price, poor design, inferior packaging or poor service. It is important that the company, institutional support (Simonović, Petrović, Ćurčić, 2019) has a well-organized product policy that will take care of the continuous process of their innovation. Policy is important for the growth (Walas-Trębacz, 2018), development and performance of the organization because it is concerned with the development of a new product, redesign of the product, marketing and product placement.

The development of creative (Kokeza, 2016) competitive products in the process of identifying market requirements and needs has a special place. It is based on a

systematic analysis of the needs of current and potential customers in order to design a product/service that best meets their expectations. The development of competitive products implies not only the ability to design something successfully (Chang, 2012), but also the ability to successfully produce the designed product in accordance with the idea and standards of high quality and rational use of available resources (Mullins et al., 2008). In the process of shaping an idea into a product, the tolerance of uncertainty is an acceptable characteristic and it is an important factor of competitiveness (Maričić, Djordjević, 2015). The purpose of design in this process is the realization of an idea that is most often caused by the need to solve a particular problem of customers/consumers.

The product, i.e. the value (Haavisto, 2014) that arises in response to the articulated needs of consumers should ensure the long-term business success of the organization, especially in increasingly competitive markets.

What is decisive today is the fact that knowledge becomes a product, and corporate intellectual property is more valuable than physical resources. Not only must a modern organization continuously create knowledge, but it must also increase value (Brenson, 2010).

Research methodology

The research for the purpose of rating selected factors of importance for creating sustainable competitiveness of industrial and agroindustrial products of a national organization was realized as an empirical transversal study. The premise of the research is: Factors that affect the competitiveness of products of different organizations have a different impact on the results of their business activities and the perception of their importance for improving business performance.

The research was conducted on the basis of a specially prepared questionnaire on a sample consisting of 96 organizations operating in Serbia, out of which 42.7% were micro organizations, 25% were small organizations, 15.6% were medium-sized organizations, while the percentage of large organizations was 16.7%. Of the observed organizations in the sample, 18.8% operate at the local level, 22.9% at the national level, 26% at the regional level, while 32.3% of organizations operate at the international level. The largest number of organizations exist for more than 15 years (38.5%), the percentage of organizations operating from 8-15 years is 31.3%, organizations operating from 4-7 years take up 19.8% of the sample, while the smallest percentage of organizations have been operating up to 3 years (19.4%). Most organizations perform service-based activities (61.5%), followed by organizations that perform both service and manufacturing activities (22.9%), and the fewest are those with exclusively manufacturing activities (15.6%).

The purpose of the questionnaire was to collect primary information about the factual situation in the national business environment, i.e. to assess the factors of importance for achieving competitiveness of industrial and agroindustrial products of the organization. The factors important for achieving a competitive position were evaluated by respondents with grades from 1 to 5, where each factor was evaluated in relation to

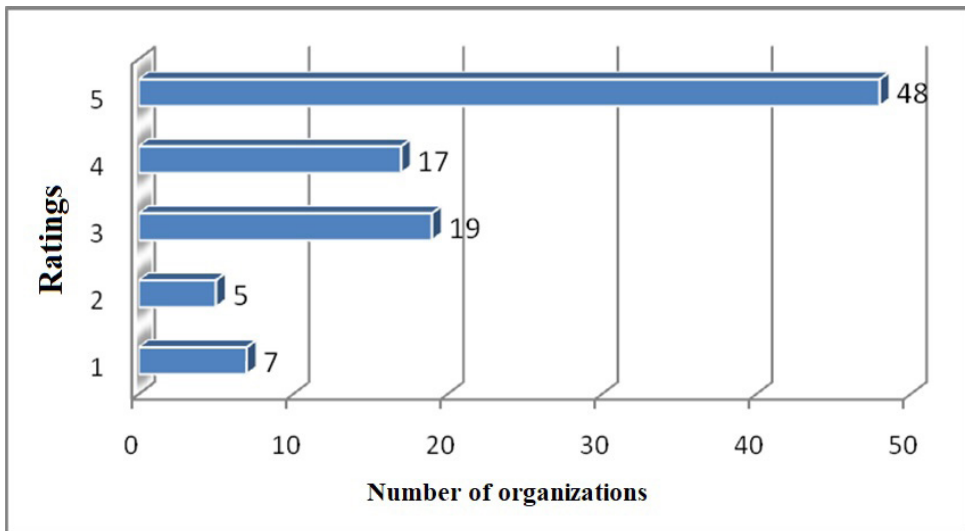
their level of significance (1 - the least important among the abovementioned factors, 5 - the most important factor).

The hypothetical-deductive method, the analytical-deductive method, the comparative method, the historical and statistical descriptive method, and the method of comparative statistics (ch2 test, ANOVA) were used in the paper.

Research results

Considering the assessments of factors important for achieving competitiveness of industrial and agroindustrial products of the organization, the survey results show that half of the organizations in the sample (50%) rated the importance of competitive price as a factor important for the competitiveness of their organization's products with grade 5. 19.8% rated the price with a rating of 3; 17.7% of organizations rated the price as a factor of importance for the competitiveness of products/services with a score of 4; the lowest score of 1 was given by 7.3% of organizations, and grade 2 was given by 5.2% of organizations. Absolute values of price ratings as a factor of importance for the competitiveness of products are given in Figure 1.

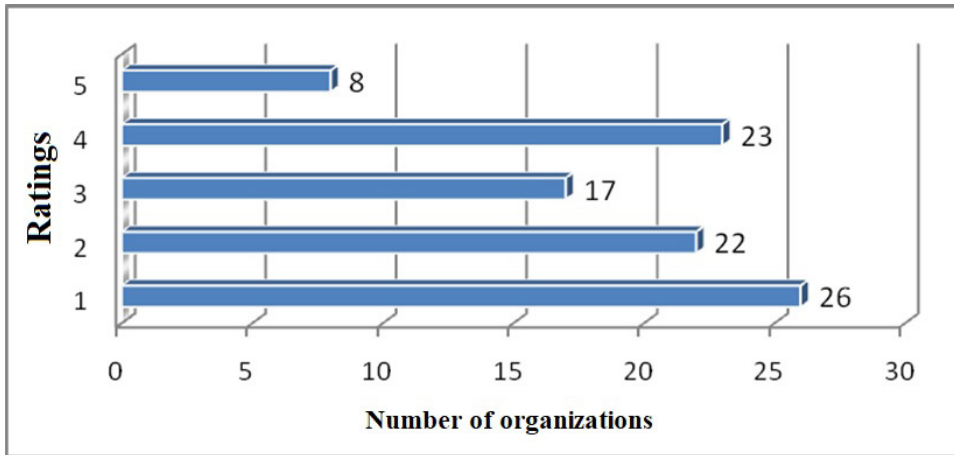
Figure 1. Absolute values of the ratings of price as a factor of importance for the competitiveness of products of an organization



Source: Ćurčić, 2018

Good design as a factor of importance for the competitiveness of products was rated by the highest percentage of organizations (27.1%) with the lowest score of 1; grade 2 was given by 22.9% of organizations; grade 3 was given by 17.7% of organizations; grade 4 was given by 24% of organizations, while the highest score of 5 was given by 8.3% of organizations. Absolute values of the ratings are presented in Figure 2.

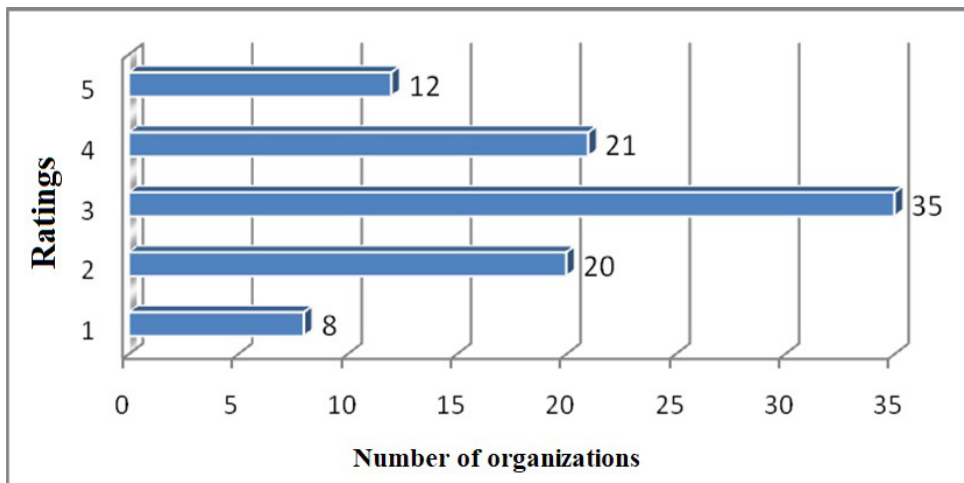
Figure 2. Absolute values of the ratings of good design as a factor of importance for the competitiveness of an organization's products



Source: Ibidem, 145

Good functionality as a factor of importance for the competitiveness of products was rated by the highest percentage of organizations (36.5%) with grade 3, grade 4 was given by 21.9% of organizations, grade 2 was given by 20.8% of organizations, the highest grade 5 was given by 12.5% of organizations, while the lowest grade 1 was given by 8.3% of organizations. Absolute values of the ratings of good functionality as a factor of importance for the competitiveness of products of the organization are presented in Figure 3.

Figure 3. Absolute values of the ratings of good functionality as a factor of importance for the competitiveness of an organization's products

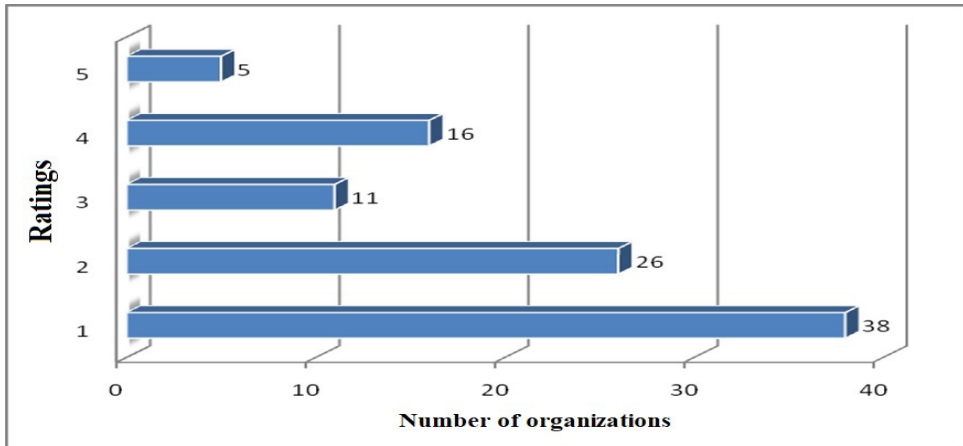


Source: Ibidem

The largest percentage of organizations (39.6%) rated fast service as a factor of importance for the competitiveness of products of the organization with the lowest

grade 1, grade 2 was given by 27.1% of organizations, grade 3 was given by 11.5% of organizations, 16.7% of organizations gave the rating of 4, while the highest score of 5 was given by 5.2% of organizations. Absolute values of the ratings of fast service as a factor of importance for the competitiveness of products are presented in Figure 4.

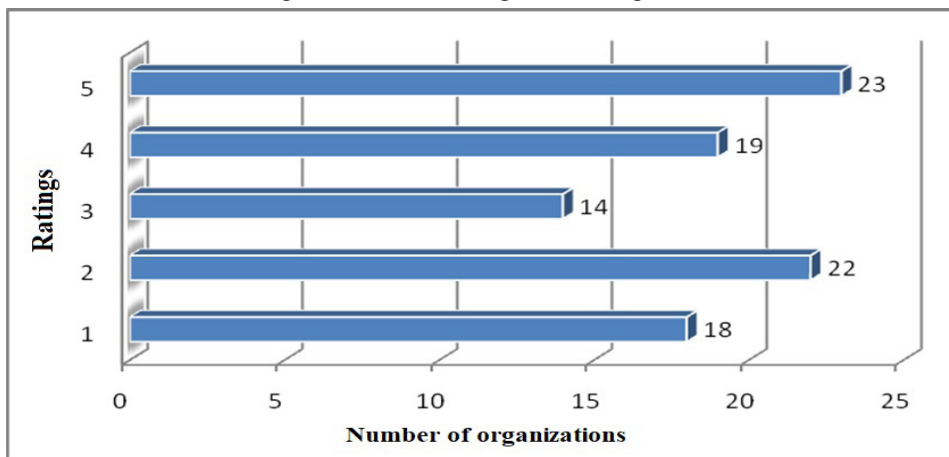
Figure 4. Absolute values of the ratings of fast service as a factor of importance for the competitiveness of an organization's products



Source: Ibidem, 146

The highest percentage of organizations (24%) rated good marketing as a factor of importance for the competitiveness of products with the highest score of 5, grade 4 was given by 19.8% of organizations, grade 3 was given by 14.6% of organizations, grade 2 was given by 22.9% of organizations, while the lowest grade 1 was given by 18.8% of organizations. Absolute values of the ratings of marketing as a factor of importance for the competitiveness of products are presented in Figure 5.

Figure 5. Absolute values of the ratings of marketing as a factor of importance for the competitiveness of an organization's products



Source: Ibidem, 147

Table 1 presents the mean values of assessments of the importance of factors for the competitiveness of products of the organization. From the table it can be seen that the most important factor in the competitiveness of products/services is the price with an average rating of 3.98, followed by good marketing with an average rating of 3.07, then good functionality (3.09), good design (2.64), and the least significant was fast service which was rated with an average score of 2.21.

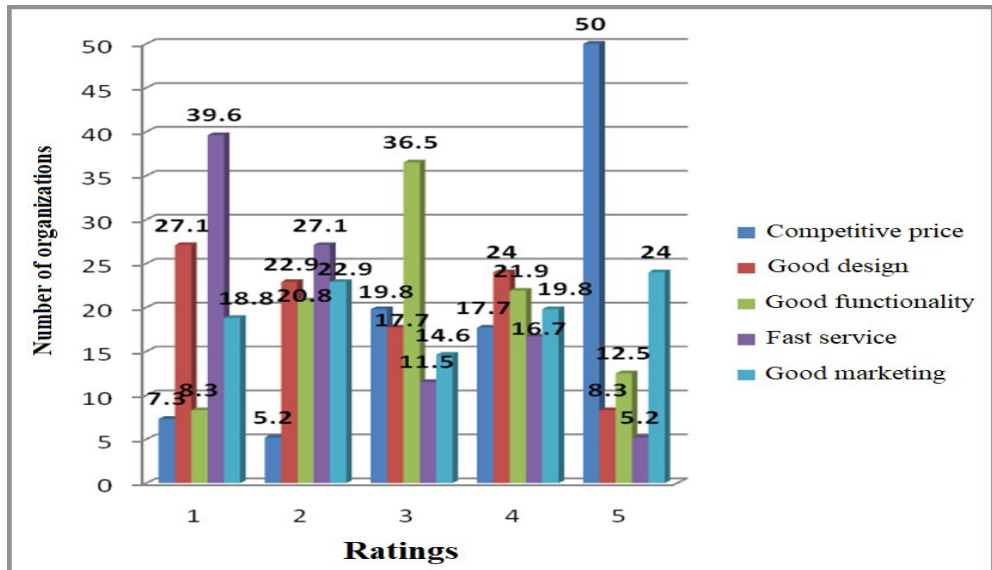
Table 1. Mean values of the ratings of factors relevant to the competitiveness of products of an organization

	Competitive price	Good design	Good functionality	Fast service	Good marketing
Mean values	3.98	2.64	3.09	2.21	3.07

Source: Ibidem

Figure 6 presents the percentage of individual factors important for achieving competitiveness of products of an organization. It can be concluded that the highest number of organizations (50%) gave the highest grade 5 (the most significant factor), while the least significant factor was rated 1 by 39.6% of organizations. It can be seen that good functionality received the rating of 3 from the highest percentage of organizations (36.5%).

Figure 6. Percentage share of the ratings of the importance of factors for achieving competitiveness of products of an organization



Source: Ibidem, 148

Factors important for achieving competitiveness of products of organizations were analyzed using the ANOVA test with a significance level of 0.05 (there is a statistically significant difference for the values of Sig ≤ 0.05). A subsequent Tukey test determined among which organizations there is a particular difference in ratings.

Thus, from Table 2, we can see the differences in the ratings of factors important for achieving competitiveness of products of an organization that differ in organizations of different sizes (micro, small, medium and large): 1) Significance of product quality and after-sales service for product competitiveness (Sig = 0.012 < 0.05); 2) Competitiveness of products of the organization in relation to domestic ones (Sig = 0.024 < 0.05); 3) Education of management/employees in the field of creating opportunities for the competitiveness of products (Sig = 0.019 < 0.05).

Table 2. Differences in ratings of competitiveness factors of products of organizations of different sizes

		Sum of Squares	df	Mean Square	F	Sig.
Significance of price for product competitiveness	Between Groups	2.399	3	.800	1.557	.205
	Within Groups	47.258	92	.514		
	Total	49.656	95			
Significance of product quality and after-sales service for the competitiveness of products	Between Groups	10.782	3	3.594	3.882	.012*
	Within Groups	85.176	92	.926		
	Total	95.958	95			
Competitiveness of your products in relation to domestic ones	Between Groups	9.113	3	3.038	3.294	.024*
	Within Groups	84.845	92	.922		
	Total	93.958	95			
Competitiveness of your products in relation to foreign ones	Between Groups	4.536	3	1.512	1.118	.346
	Within Groups	124.422	92	1.352		
	Total	128.958	95			
Marketing activities in your organization directed at increasing the competitiveness of products	Between Groups	1.205	3	.402	.336	.800
	Within Groups	110.128	92	1.197		
	Total	111.333	95			
Level of state support in the competitiveness of domestic products	Between Groups	1.875	3	.625	.443	.723
	Within Groups	129.750	92	1.410		
	Total	131.625	95			

Source: Ibidem, 171

Table 3 presents the differences in the importance of product quality and after-sales service for the competitiveness of products of organizations of different sizes. It can

be seen that a significant difference in ratings occurs in organizations that are small and large in size ($\text{Sig} = 0.021 < 0.05$), as well as in organizations that are medium and large in size ($\text{Sig} = 0.019 < 0.05$).

Table 3. Differences in ratings of the importance of product quality and after-sales service for the competitiveness of products of organizations of different sizes

Significance of product quality and after-sales service for the competitiveness of products						
(I) Organization size	(J) Organization size	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence	
					Lower Bound	Upper Bound
Micro organization	Small organization	-.319	.247	.571	-.97	.33
	Medium organization	-.436	.290	.441	-1.20	.32
	Large organization	.598	.284	.159	-.14	1.34
Small organization	Micro organization	.319	.247	.571	-.33	.97
	Medium organization	-.117	.317	.983	-.95	.71
	Large organization	.917(*)	.311	.021	.10	1.73
Medium organization	Micro organization	.436	.290	.441	-.32	1.20
	Small organization	.117	.317	.983	-.71	.95
	Large organization	1.033(*)	.346	.019	.13	1.94
Large organization	Micro organization	-.598	.284	.159	-1.34	.14
	Small organization	-.917(*)	.311	.021	-1.73	-.10
	Medium organization	-1.033(*)	.346	.019	-1.94	-.13

Source: Ibidem, 174

Table 4 shows that the competitiveness of products of an organization in relation to domestic ones differs in organizations of micro and small size ($\text{Sig} = 0.024 < 0.05$).

Table 4. Difference in rating of the competitiveness of an organization's products in relation to domestic ones of different sizes

Competitiveness of products of an organization in relation to domestic ones						
(I) Organization size	(J) Organization size	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence	
					Lower Bound	Upper Bound
Micro organization	Small organization	-.713(*)	.247	.024	-1.36	-.07
	Medium organization	-.263	.290	.800	-1.02	.49
	Large organization	-.588	.283	.168	-1.33	.15
Small organization	Micro organization	.713(*)	.247	.024	.07	1.36
	Medium organization	.450	.316	.488	-.38	1.28
	Large organization	.125	.310	.978	-.69	.94

Competitiveness of products of an organization in relation to domestic ones						
(I) Organization size	(J) Organization size	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence	
					Lower Bound	Upper Bound
Medium organization	Micro organization	.263	.290	.800	-.49	1.02
	Small organization	-.450	.316	.488	-1.28	.38
	Large organization	-.325	.345	.783	-1.23	.58
Large organization	Micro organization	.588	.283	.168	-.15	1.33
	Small organization	-.125	.310	.978	-.94	.69
	Medium organization	.325	.345	.783	-.58	1.23

Source: Ibidem, 175

Table 5 presents the differences in the ratings of the competitiveness of an organization's products in relation to foreign ones by observing organizations that operate at different levels of business. The results show that differences occur in organizations operating at the local and regional level (Sig = 0.013 < 0.05), as well as in organizations operating at the local and international level (Sig = 0.008 < 0.05).

Table 5. Differences in ratings of product competitiveness of organizations in relation to foreign ones

Competitiveness of your products in relation to foreign ones						
(I) Level of business of an organization	(J) Level of business of an organization	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence	
					Lower Bound	Upper Bound
Local level	National level	-.263	.346	.873	-1.17	.64
	Regional level	-1.044(*)	.337	.013	-1.93	-.16
	International level	-1.057(*)	.323	.008	-1.90	-.21
National level	Local level	.263	.346	.873	-.64	1.17
	Regional level	-.782	.318	.074	-1.61	.05
	International level	-.795(*)	.304	.050	-1.59	.00
Regional level	Local level	1.044(*)	.337	.013	.16	1.93
	National level	.782	.318	.074	-.05	1.61
	International level	-.013	.293	1.000	-.78	.75
International level	Local level	1.057(*)	.323	.008	.21	1.90
	National level	.795(*)	.304	.050	.00	1.59
	Regional level	.013	.293	1.000	-.75	.78

Source: Ibidem, 181-182

Table 6 presents the differences in the ratings of the level of state support in the competitiveness of domestic products of organizations operating for different periods of time. It can be seen that there are differences between organizations that have operated from of 8 to 15 years and over 15 years (Sig = 0.030 < 0.05).

Table 6. Differences in ratings of the level of state support in the competitiveness of domestic products of organizations operating for different periods of time

Level of state support in the competitiveness of domestic products						
(I) Length of business of an organization	(J) Length of business of an organization	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence	
					Lower Bound	Upper Bound
Up to 3 years	From 4 to 7 years	.311	.445	.898	-.86	.08
	From 8 to 15 years	.400	.416	.772	-.69	-.04
	Over 15 years	-.386	.406	.777	-1.45	.01
From 4 to 7 years	Up to 3 years	-.311	.445	.898	-1.48	1.98
	From 8 to 15 years	.089	.334	.993	-.79	.85
	Over 15 years	-.697	.322	.141	-1.54	.90
From 8 to 15 years	Up to 3 years	-.400	.416	.772	-1.49	2.04
	From 4 to 7 years	-.089	.334	.993	-.96	1.04
	Over 15 years	-.786(*)	.280	.030	-1.52	.96
Over 15 years	Up to 3 years	.386	.406	.777	-.68	1.91
	From 4 to 7 years	.697	.322	.141	-.15	.90
	From 8 to 15 years	.786(*)	.280	.030	.05	.77

Source: Ibidem, 188

Table 7 presents differences in the ratings of the level of state support in the competitiveness of domestic products in organizations engaged in different activities. The results show that differences occur in organizations that deal with service and those that deal with both service and manufacturing activities (Sig = 0.041 < 0.05).

Table 7. Differences in ratings of the level of state support in the competitiveness of domestic products of organizations of different activities

Level of state support in the competitiveness of domestic products						
(I) Organization's activity	(J) Organization's activity	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence	
					Lower Bound	Upper Bound
Service	Manufacturing	.199	.331	.820	-.59	.99
	Both service and manufacturing	-.704(*)	.286	.041	-1.38	-.02
Manufacturing	Service	-.199	.331	.820	-.99	.59
	Both service and manufacturing	-.903	.383	.053	-1.82	.01
Both service and manufacturing	Service	.704(*)	.286	.041	.02	1.38
	Manufacturing	.903	.383	.053	-.01	1.82

Source: Ibidem, 193

Correlation analysis

The aim of the correlation analysis was to describe the strength and direction of the relationship between two variables (organization size, business level and business length with factors relevant to raising the level of competitiveness of an organization's products). Pearson correlation coefficients (r) can have values from -1 to +1. The sign indicates whether the correlations are positive (both variables decrease and increase together) or negative (one variable decreases while the other increases and vice versa). The absolute value of this coefficient (when the sign is ignored) shows the strength of the connection, namely (Cohen, 1998): small correlation $r = 0.10$ to 0.29 ; medium correlation $r = 0.30$ to 0.49 ; large correlation $r = 0.50$ to 1.0 .

Table 8 presents the correlation of factors for achieving competitiveness of products (competitive price, good design, good functionality, fast service, good marketing) with the ratings of the competitiveness of organizations.

Table 8. Correlation of factors relevant to the competitiveness of products

		Compe- titive price	Good design	Good function- ality	Fast service	Good marke- ting
Significance of price for product competitiveness	Pearson Correla-tion	.205(*)	-.175	-.040	.162	-.133
	Sig. (2-tailed)	.045	.089	.698	.116	.196
	N	96	96	96	96	96
Importance of product quality and after-sales service for product competitiveness	Pearson Correla-tion	-.164	-.204(*)	-.012	.215(*)	.150
	Sig. (2-tailed)	.110	.046	.906	.036	.145
	N	96	96	96	96	96
Competitiveness of your products in relation to domestic ones	Pearson Correla-tion	.023	-.072	-.091	.232(*)	-.086
	Sig. (2-tailed)	.825	.483	.377	.023	.402
	N	96	96	96	96	96
Competitiveness of your products in relation to foreign ones	Pearson Correla-tion	-.025	-.149	.048	.088	.039
	Sig. (2-tailed)	.805	.147	.644	.393	.703
	N	96	96	96	96	96
Marketing activities in your organization directed at increasing the competitiveness of products	Pearson Correla-tion	.084	-.244(*)	-.283(**)	.288(**)	.126
	Sig. (2-tailed)	.417	.017	.005	.004	.219
	N	96	96	96	96	96

		Compe- titive price	Good design	Good function- ality	Fast service	Good marke- ting
Education of management/ employees in the area of possible market share increase and creating competitiveness of products	Pearson Correla-tion	-.002	-.154	.020	.294(**)	-.133
	Sig. (2-tailed)	.987	.134	.846	.004	.198
	N	96	96	96	96	96
Level of state support in the competitiveness of domestic products	Pearson Correla-tion	-.106	.008	.011	.118	-.033
	Sig. (2-tailed)	.305	.938	.912	.253	.749
	N	96	96	96	96	96

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

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

Source: Ibidem, 198

The results show that there is a negative correlation of low strength between marketing activities in organizations directed at increasing the competitiveness of products and good functionality ($r = -0.283$), as well as a positive correlation of low strength between marketing activities and fast service ($r = 0.288$). The results suggest that increasing marketing activities in the organization directed at improving competitiveness reduces the importance of functionality, and it increases the importance of fast service as a factor important to improve the competitiveness of products in the organization. Also, there is a positive correlation of low strength between the education of management/employees in the area of possible market share increase and fast service ($r = 0.294$). The results suggest that increasing the education of the management increases the importance of fast service as a factor of importance for the competitiveness of products.

Discussion and conclusion

The aim of the research was to identify factors important for achieving competitiveness of industrial and agroindustrial products of a national organization and to discover the differences in the ratings of the factors important for increasing the level of competitiveness of products of organizations of different sizes and activities in relation to both domestic and foreign industrial and agroindustrial products.

The results of the research show that the most important factor for the competitiveness of an organization's products is competitive price, followed by good functionality, effective marketing, functional design and finally fast service.

The importance of price for the competitiveness of products was rated with a mean value of 4.34, i.e. almost half of the organizations rated the price with a score of 5, so it is concluded that organizations consider the price to be extremely important for the competitiveness of products.

The mean value of product and after-sales service quality ratings for product competitiveness is 4.15. Most organizations rated the importance of product and after-sales service quality for the competitiveness of products/services with a score of 5, so based on the results, it can be seen that the quality was rated as important for the competitiveness of products.

It can be concluded that, in the organizations that participated in the sample, the most important factors for the competitiveness of their products (mean value over 4) were price and the quality of products and after-sales service.

The results show that marketing activities in the organization directed at increasing the competitiveness of products were rated with a mean value of 3.42. The largest number of organizations, 28, rated marketing activities with a score of 3 and 4. It can be seen that marketing activities directed at increasing the competitiveness of products/services are rated slightly above average.

The competitiveness of the products of the surveyed organizations in relation to domestic ones was rated with a mean value of 3.85. The largest number of organizations rated the competitiveness of products with a score of 4, so it is concluded that the competitiveness of products in relation to domestic ones was rated as significant.

The competitiveness of products in relation to foreign ones was rated with a mean value of 3.29. The highest percentage of organizations rated the competitiveness of products in relation to foreign products with grades 3 and 4, which is an average score.

It can be concluded that the competitiveness of an organization's agricultural and industrial products is higher nationally than internationally.

The level of business (local, national, regional and international) significantly affects the differences in the competitiveness of products, primarily functional design, fast service and good marketing are factors that differ in importance for the competitiveness of products.

The results of the research show that there is a lack of expected state support in creating the competitiveness of domestic industrial and agroindustrial products, i.e. the largest number of organizations rated state support with the lowest score of 1, while the mean value of the score is 2.06.

After researching the differences in the ratings of factors important for competitiveness, the results show that regardless of the size of the organization, activity and length of business, the assessments of factors important for the competitiveness of products of the organization do not differ. The level of business, on the other hand, significantly affects the differences in the competitiveness of an organization's products.

The results indicate that it is necessary to focus on increasing after-sales service and design rather than on price competitiveness. Also, the state must make greater efforts to create competitiveness for organizations and their products/services.

It can be concluded that Serbian companies cannot be successful without fulfilling the most important condition, which is to offer quality products that meet the requirements of the international market. Even more so, since the quality, price, the technological and ecological level, and the required degree of safety are at the core of industrial and agroindustrial product competitiveness.

The practical implications of the paper are reflected in the fact that the management of organizations from the industrial and agro sector in the Republic of Serbia can focus their efforts on established factors and create their strategies so as to enable the improvement of the competitiveness of their products and/or services. Therefore, the results are especially important for defining a development strategy in all areas of the Serbian economy, especially in the agro-industry.

Conflict of interests

The authors declare no conflict of interest.

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EFFECT OF QUICK RESPONSE CODE ON AGRI FOOD CONSUMPTION

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ABSTRACT

By adopting a quantitative research methodology this paper seeks to explore the characteristics and applicability of the QR codes in agri-food products. The research was conducted in Serbia with a sample 308 respondents. The statistical analysis methods employed were correlation and factor analysis using SPSS statistical program. The findings indicate that younger, more educated population in the proposed content of the QR code of honey; value the information on the certificate of honey quality, the chemical composition of honey and the influence of honey ingredients on the body with information on how to identify real honey, in relation to counterfeit, as the most useful to consumers. The results of this research have been further applied for the development of a QR code for a traditional food product, the Fruška Gora linden honey with a geographical indication.

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Introduction

Nowadays, the global flows of international trade in agri-food products undoubtedly indicate that the issue of availability and flow of food safety information has become one of the most important issues in both developed and developing countries. Numerous studies address the factors of demand (Ignjatijević et al., 2018), that is, consumer preferences (Ignjatijević et al., 2019; Vapa-Tankosić et al., 2018) and point to the fact that when buying a particular food product, the customer is influenced by different factors. Product quality is certainly not the only factor influencing the purchasing decision, so the customer evaluates previous experiences, makes comparisons with another product of the same brand or other brands, ie consciously or unconsciously collects product information (Đekić, 2006; Ilić, 2019). In modern conditions of agricultural production development, new technologies are gaining importance (Praća et al., 2017; Krunić, Matić, Đukić, 2019). Food safety is considered one of the most important issues in the production and processing of food products. Internationally, the balance of control shifts from classic health control to integrated safety systems with a focus on prevention and proactive action, emphasizing the importance of interventions in farmed areas (farm-to-table control), with a view to ensuring the best possible hygiene, food quality and safety (Kljajić et al., 2006). In many official documents, agriculture is defined as a very important industry for each Member State and for the European Union as a whole. Vapa-Tankosić and Stojsavljević (2014) point out that it is characteristic of the EU common agricultural policy that it seeks to compromise between strong centralization and a unified policy, while respecting both the needs of the local community and the historical heritage (Živković et al., 2019). In the first years of the Union's existence, much of the EU budget was earmarked for the implementation of the CAP. Today, this CAP budget is around € 55 billion a year, which is 40% of the total EU budget, approximately 0.5% of EU GDP.

In 2000, the European Commission laid down the general principles on which the Food Security Policy in Europe should rest (White Paper on food safety, [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM % 3A132041](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3A132041)). These principles include: a strategically integrated approach across the entire food production chain; clearly defining the roles of all actors in the chain (from producers, through farmers, through to European institutions, Member States and consumers); the principle of traceability (that each of the stages that a product has undergone can be reached at any time); a coherent, effective and dynamic policy; the principle of risk analysis (consisting of risk assessment, risk management and risk communication); the greater role of scientific institutions and applying the precautionary principle when managing risk. (Jovanović, Milenković, & Damnjanović, 2017)

Controlling food-related risks involves considering every step in the chain, from raw material to food consumption, as hazards can enter any point in the chain until the food reaches the consumer. Golan et al. (2004) state that businesses have three primary goals in developing, implementing, and maintaining a traceability system: to improve inventory management; to facilitate the monitoring of food safety and quality; and to

differentiate and sell foods with subtle quality attributes. The benefits can be reflected in cheaper distribution systems, reduced costs of withdrawal of goods and expansion of product sales. The Law on food safety of the Republic of Serbia (Official Gazette of the Republic of Serbia, no. 41/2009 and 17/2019) defines traceability as the ability to trace food, feed, animals used to produce food or ingredients intended for incorporation or is expected to will be incorporated into food through all stages of production, processing and distribution - "from field to table". The food safety begins, first, at the level of primary production and ends with the consumption of food by the final consumer. This system "determines the responsibility of all participants in the entire integrated food production, processing and distribution chain. At the same time, this system respects and encourages the production of traditional foods and foods of geographical origin" (Vesković Moračanin et al., 2014; Pantić, Jovanović, Issa, 2019).

The aim of the research is to look at consumers' attitudes towards QR code for honey and to create the QR code for honey of geographical indication in accordance with the research findings. The paper is structured as follows: after the introduction and a brief review of the literature, the authors have presented the methodology and research findings. In the end, suggestions on the conceptual design of the QR code are offered, explaining its possibilities. The concluding observations summarize the findings of the research. The results of the research will help to increase the recognition of honey, improve the process of honey promotion and enable professionals to better understand the current situation regarding the behavior of honey consumers, and possible solutions in implementing QR code on the market.

Literature review

Beekeeping is a very important sector in European agriculture. In the period 2017-2019, €216 million will be spent on national apiculture programs in 28 EU Member States, an increase of 9% over the 2014-2016 budget period with an increase in the number of incentive measures by from 6 to 8 (Vapa Tankosić et al, 2018). In recent years, the EU honey market has shown a steady increase in demand. In the traditional approach to selling honey products, consumers who buy honey products, trust the certification mark of the honey on the packaging. If such a honey product also contained a QR code, the consumer would have additional information and potentially control safety mechanism. QR code is a barcode or two-dimensional bar code created in 1994 by Denso-Wave. According to Tarjan et al. (2012) the use of QR code on product packaging simplifies the transmission of product information. The QR code was designed and developed primarily as a symbol (Wara and Dugga, 2014), and the version 6 of the QR code (41x41 modules) is mainly used because it is easy to read in most mobile applications and can store sufficient data (Rinkalkumar, 2014). Function patterns allow smartphones or cameras to recognize a QR code (Lin et al, 2013). The findings of Hossain et al (2018) demonstrate that sharing information via QR codes will influence customers to share information with other customers in the online community, while embedded QR codes can be very helpful for advertisers to share and influence customer satisfaction

and its purchase intention. According to Narang, Join and Roy (2012), the QR code currently provides additional information or additional incentive, engaging consumers to consider a product or service. They conclude that the QR code shortens the sales cycle and provides insight into consumer behavior, response rates, and demographics; monitoring online interaction etc. A QR code user can make purchases and payments almost simultaneously, which shortens the sales cycle and has a positive effect on advertising effectiveness (Meydanoglu, 2013). As Burghelea and Aceleanu (2014) point out, in this era of technological change, there are significant challenges in terms of consumer behavior. QR codes are among the new technologies that can have a significant impact on the purchasing decision-making process and can contribute to improving the shopping experience of the modern consumer.

The findings of Albastroiu and Felea (2015) have shown that in Romania the main reason for scanning QR codes was to access information on products or services (but were also using QR codes to buy products, to access contact information or to get discount vouchers and coupons). The degree of use and the intention to use QR codes in the future was varying according to the age of Romanian respondents, because most users were young (aged 18 to 24 years), while the most important aspect is that consumers were positive about the characteristics of the QR codes and understood the role played by codes in the individual shopping process and in improving shopping experience for users.(p.564).

Particularly those QR codes embedded on product packaging or labels, or those found in commercial spaces (shelves, cabinets, posters, etc.) are considered particularly effective in providing timely product information (Atkinson, 2013; Milojević, & Mihajlović, 2019). According to Atkinson (2013) scanning a QR code for a user can point to: detailed product information, an online store, social media pages, coupons or prize vouchers, information about events and events. In the same way, QR codes found in the store (in display cabinets, on billboards, shelves, flyers, and brochures on display at the store or offered to those who have purchased it at the store) may refer customers to coupons/vouchers, sweepstakes, contests, events, mobile applications that can be downloaded online, contacts and other clues regarding the geographical location of stores from the same retail chain, etc (Bakić, 2020). In this way, users can obtain information that will facilitate the choice of the product, but can also improve their shopping experience.

The QR code application is used also in the labeling of food products GMO content (Barham, 2002). The research by Hallman and Aquino (2005, p.220) has shown that their focus group respondents only read labels when they evaluate a new product or if they notice that something has changed on the label of a product they usually buy. The respondents read labels to primarily look to the ingredients panel and to the nutritional panel for fat content, sodium content, or calorie information and none of the participants even noticed the addition of a GM food (Chivu, 2019). Today, QR code benefits businesses and consumers, with unparalleled technological ability to quickly offer more content to consumers that focus on a certain company or brand

(Brokaw, 2012). The findings of Hugue et al. (2015) demonstrate the use of a QR code for product authentication purposes that may be applicable to small and large organic product manufacturers as the QR code enables product safety and consumer protection from the demand side, while protecting the organic agricultural producer from the supply side.

Materials and methods

The aim of the research is investigate the consumers' attitudes towards the QR code content for honey. The subject of this research is also the applied data analysis for the creation of the QR code for a traditional food product such as honey that is, for Fruška Gora honey with a geographical indication. The survey was conducted in the territory of Serbia in several places, from March 2019 to June 2019. Of the distributed 400 questionnaires, 308 were returned usable, with a response rate of 77%. The data was processed in the SPSS statistical package. The statistical analysis methods employed were correlation and factor analysis using SPSS statistical program.

Results and discussion

The sample consists of 308 respondents, of whom 59% are female and 41% male. Regarding the age structure, the largest number of respondents belongs to the younger generation, ages 18-24 (32.1%) and those aged 25-34 (37.2%). Given that QR code is a relatively new term and represents a form of innovation in the food industry, the research results are in line with the expectation that most users of QR code belong to younger age groups. In the sample, 72.4% of respondents have higher education, while 25.6% of respondents have completed secondary education.

Table 1. Respondents' ratings of QR code for honey

Question no.	Consumer attitudes	mean score
4	Chemical composition of honey, nutritional properties	4.03
3	Certificate of Honey Quality	3.97
5	Information on how to distinguish real honey versus counterfeit	3.81
15	Announcement of future sales events, promotions	3.45
20	A link that directly connects honey producers with consumers for getting more information, comments, suggestions	3.40
14	Current sales promotions	3.37
17	Information on geographical origin, characteristics of geographical origin	3.34
19	Doctor's advice on honey consumption, as well as tips for diabetics	3.25
18	Detailed information on honey producers, success, awards	2.95
6	Recipes for cakes and other honey desserts	2.84
1	Honey producers images	2.84
8	Use of honey in cosmetics	2.70
16	Video clip showing the process of honey production	2.69
9	A fun game for kids about honey and bees	2.68

Question no.	Consumer attitudes	mean score
2	Pictures of hives/apiaries	2.60
7	Consumptions statistics	2.42
10	Video about the life of bees	2.41
11	Video of the terrain where bees collect honey	2.31
13	Beekeepers Association Website	2.27
12	Literature on honey	2.08

Source: Authors' calculations

This percentage of respondents' participation showing a dominant share of the higher educational profile and it can be concluded that in this random sample the younger population of the higher educational profile is dominant, which again indicates a better knowledge of the younger and more educated population of technological changes and trends. The results of a survey on consumer useful information in a QR code on a food product - honey are shown below in the *Table 1*. Respondents rated the existence of the manufacturer's image as additional information in the QR code on honey with a mean score of 2.84. The results indicate that the honey producer's image is not particularly meaningful information that they want to obtain by scanning the QR code on the honey. A similar result is obtained when asked about the existence of a hive/apiary image as additional information in a QR code on honey, and the respondents rated with a mean score of 2.60. Therefore, respondents do not consider the image of hives/apiary as additional information via a QR code on honey. Honey Quality Certificate, has been rated with the mean score of 3.97 while the information on honey composition has been rated with the mean score of 4.04. Therefore, the respondents consider the certificate and information on the chemical composition of honey, that is, information on the effect of honey on the organism, to be desirable, as additional information in the QR code on honey. With the mean score of 3.81 the respondents rated the importance of information on how to identify true honey in relation to counterfeit. The respondents consider this information as important, as they did in the previous two answers: certificates and the chemical composition of honey/information on the effect of honey ingredients on the body, which also indicates that there is a connection with the respondents' view of the importance of food quality information. The respondents' attitude towards cakes and other recipes as additional information in the QR code on honey is rated with the mean score of 2.84, which indicates that respondents are quite indifferent in this regard. The respondents rated information on preferences in honey consumption with the mean score of 2.42, and use of honey in cosmetics with the mean score of 2.70. Thus, respondents indicated that information about preferences in honey consumption and honey use in cosmetics were not among the priorities when it came to additional information on honey provided by the QR code.

The respondents rated the existence of a fun game in the QR code with the mean score of 2.68, which is in line with the demographic indicators of the respondents. As the sample is dominated by the younger population, it can be said that this result is expected due to

the fact that younger populations have not yet formed their families, that is, the majority are respondents who do not have children. The respondents were not interested to watch a video about the life of the bees (2.41) and the video of the terrain where bees collect honey (2.31) as additional information in the QR code on the honey. Respondents rated with the mean score of 2.08 the importance of literature, books on honey, the honey production process with the mean score of 2.69, and the information on the beekeepers association website with the mean score of 2.27. Nevertheless, the respondents rated the existence of information on current actions/promotion with the mean score of 3.37. Compared to the previous answers offered, there is a growing consumer interest, that is, the respondents rated the current actions/promotions with higher scores as they would like to have additional information on promotions. Respondents in large numbers believe that announcement of actions/novelties/promotion is a desirable piece of additional information on honey. Information on geographical origin and characteristics of geographical origin, with appropriate additional information, were considered by the respondents important and rated with the mean score of 3.34 and the information on the producers' achievements and awards information was rated with the mean score of 2.95. Finally, respondents rated doctors' advice on honey consumption and advice for diabetics as additional information on honey via QR code with the mean score of 3.25, and we can say that doctor advice on consumption of honey, as well as advice for diabetics, recorded positive views by the respondents. When asked about the importance of having a link to a manufacturer, the respondents rated a link linking producers to consumers for more information about honey via QR code to get additional information, comment, suggestions and praise with the mean score of 3.40.

In the continuation of the research, a correlation analysis was carried out in order to establish the correlation of particular QR code information on FLM honey. The authors used the Correlation Strength Scale (Cohen, 1988, pp. 79–81): small $r=0.10$ to 0.29 mean $r=0.30$ to 0.49 and large $r=0.50$ to 1.0 . Below we present correlations that are large and statistically significant. The results of the study show that a large (strong) correlation exists between the bee image and the producer image ($r=0.577^{**}$); Nutritional characteristics of honey and honey quality certificates ($r=0.659^{*}$); Information on the quality of honey, that is, on the originality and existence of certificates and nutritional properties $r=0.632^{**}$ and 0.568^{**}); Information on honey consumption tendencies is in direct strong correlation with recipes for honey use and the use of honey for cosmetic purposes (0.506^{**} , 0.572^{**}); The honey consumption tendencies is positively correlated with the image of the apiary (0.504^{**}). Videos about the life of bees, as well as a video of the terrain where bees collect honey, are correlated with honey tendencies consumption. The video on honey production is correlated with the use of honey in cosmetics (0.564^{**}), games for children ($r=0.534^{**}$), videos about the life of bees ($r=0.535^{**}$) and a video of terrain where bees collect honey ($r=0.501^{**}$). The manufacturer's website is strongly correlated to the video on honey production ($r=0.507^{**}$). Announcement of actions, novelty and promotion is correlated with current sales ($r=0.807^{**}$). Information on the success of beekeepers, rewards are

strongly correlated with information on the geographical origin of honey ($r = 0.556 *$). Novelties announcements and sales actions are strongly correlated with doctors' advice on the importance of honey ($r = 0.499 **$) and a video clip on honey production ($r = 0.552 **$). The strong correlation of the link of beekeepers with the ability to provide doctors advice on the benefits of using honey ($r = 0.515 **$) is very interesting.

Table 2. The final pattern matrix obtained in the factor analyses

Pattern Matrix ^a		
	Component	
	1	2
Video_clip_of_life_bees	,898	
List_literature_and_books_on_honey	,880	
Video_clip_of_the_pasture_bees_collect_honey	,875	
Beekeepers_Association_website	,783	
Child_game_honey	,750	
Tendencies_consumers_honey	,667	
Use_of_honey_in_cosmetics	,658	
Video_clip_of_production_honey	,608	
Recipes_about_use_in_nutrition_honey	,516	
Apiary_picture	,454	
Producer_image		
Nutritional_characteristics_honey		,855
Certificate_of_quality_honey		,837
Real_honey_information		,744
Announcement_new_action_promotion		,672
Current_Actions_and_Promotions		,671
Geographic_origin_honey_information		,566
Link_for_connections_to_producers		,472
Success_information_and_beekeepers_awards		,463
Pharmacy_medicine_tips		,457
Percentage_of_variation_Cumulative	39,476	13,046
Cumulative_Percentage	39,476	52,52
Initial_Eigenvalues	7,895	2,609
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.		
a. Rotation converged in 8 iterations.		

Source: Authors' calculations

In the proceeding part we started from the assumption that consumers' perceptions of QR code on honey do not differ significantly, so we performed a unified factor analysis. In order to examine the latent structure of the Questionnaire to measure respondents' perception of QR code, a factor analysis, principal component method (PCA) was applied. As the Kaiser-Meyer-Olkin measure of sample adequacy was satisfactorily

high (KMO= .880), Bartlett's test of sphericity was significant ($\chi^2=3599.64$, $p<.000$). Principal component analysis revealed the presence of four components with characteristic values over 1, explaining 39,476%, 13,046%, 7,228% and 5,439% of the variance. Two factors were retained based on Cattell's scree criteria. This two-component solution explained a total of 52.52%, with the contribution of the first component being 39.476% and the second component being 13.046%. For easier interpretation of these two components, oblimin rotations were performed and many large factor weights were obtained. There is a mean positive correlation between the two factors ($r = 0.392$). Taking into account the saturations shown in the matrix of the assemblage (Table 2), the obtained factors are grouped into 2 units: first factor - the visual identity of the beekeeper, bee pasture and honey; the second factor combines information on honey quality, beekeepers' competences and actuality in honey distribution and promotion.

In the final part of our research, the empirical results have been applied in the development of a QR code for a traditional food product, the Fruška Gora linden honey with a geographical indication. Since only a few food products on the Vojvodina market have a QR code, which are mainly products of high quality and tradition, Fruška Gora linden honey. In this way, consumers will be able to track the information on Fruška Gora linden honey through an application that is easily accessible on smartphones. This will allow the honey to be differentiated from other types of honey on the market and provide added value to consumers. The QR code has been created for Fruška Gora linden honey. When the QR code is scanned, a drop-down menu with 5 links opens. The site of the Beekeepers Association "Jovan Živanović" enables to obtain information on registered producers, pictures of beekeepers and pastures and other similar information. A brochure is another, very significant segment of code, which integrates information contained in another group of factors (obtained by previously mentioned factor analysis). Within this second group of factors is the information on current promotions and sales, which form the third segment of the QR code under the heading Manifestations. The fourth segment of the QR code refers to a video about producers of organic products in Vojvodina and products with geographical origin - Fruška Gora linden honey. The fifth link takes to the Facebook page where all the formal and informal information about the honey is located, with a possibility of establishing direct communication between beekeepers and consumers.

Figure 1. QR code for Fruška Gora linden honey



Conclusions

In the last decade, there have been major changes in online food safety monitoring tools and technologies. As a result, manufacturers are forced to develop innovative strategies for online communication channels to further secure their revenue, retain existing and attract new consumers. Such strategies can be implemented by tagging the product with a QR code. QR codes have been used in the markets of developed countries for a long time and are slowly becoming an integral part of the product in the markets of developing countries. Younger populations with higher educational status are more inclined to research novelties, more easily adapt to changes and follow trends, both technological and life-changing. Consequently, their habits and lifestyles are more easily adapted in regard to older populations, and they tend to change their habits and lifestyles as well as their diet. Today, young brand ambassadors are promoters of a particular lifestyle with a great influence on their friends, acquaintances and followers on high-speed social networks. This is why companies are focusing on social networks as a marketing tool for communication with consumers, but also for young people who promote the products of these same companies through social networks. Young, educated people pay attention to healthier lifestyles but also to learning and gathering additional information. On the other hand, they are adept at managing smartphones, various applications, and the QR code for them is an easy and interesting opportunity to gather additional information about a product, brand, company and the like.

The research results indicate that the respondents attach importance to the quality of the food products and that the information provided on the packaging is important to them. For this reason, the subject of research in this paper was the analysis of the application of a QR code for a traditional food product, Fruška Gora linden honey with a geographical indication. Evaluating which additional information on honey QR code the respondents consider the answers concerning the quality of honey, the chemical composition and the distinction of real honey with respect to counterfeit have proven to be most valuable to consumers. This confirms that young people are more focused on healthier lifestyles and gathering additional information about the products they consume. We can conclude that it is quite feasible to implement new information technology proposals and take advantage of these new opportunities in order to disseminate information on safe and nutritional products to the consumers. A credible and cost-effective production and marketing system can provide increased product safety and quality and thus can bring the product closer to consumers and offer them an enhanced quality system, production process controls, or added security. The information in the QR code can be crucial for consumers in deciding whether or not to buy a particular agri-food product.

Conflict of interests

The authors declare no conflict of interest.

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TRANSFORMATION OF AGRICULTURAL LAND DISTRIBUTION PATTERNS IN RUSSIA

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ABSTRACT

In the conditions of degrading resources of fertile arable land, pressing demand for food from a growing world population, and progressing urbanization and industrialization, agricultural land distribution patterns are becoming more vulnerable to a variety of socioeconomic, environmental, and food security challenges. In the context of this trilemma, there is a need to understand the extent to which farming systems will be able to cope with increasing competition for land with other uses. In this study, the authors developed an approach for predicting the likely influences of non-agricultural lands on agricultural landscapes. In the case of diverse agricultural landscapes in Russia, farming systems were mapped based on a share of agricultural land categories in the land fund across 82 administrative entities. The establishment of a rating system and application of correlation analysis allowed revealing the mismatches between the cadaster-based spatial distribution of farming systems and actual inter-category relationships. The proposed framework is applicable internationally for the study of land-use patterns and simulation of agricultural land distribution systems under the influence of non-agricultural land uses.

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Introduction

While a higher share of agricultural lands in a land fund usually leads to the agricultural development of a territory, higher crop yields, technological innovations in farming, and better livelihood opportunities for rural people (Erokhin, 2018), it may also aggravate depletion of natural resources and misappropriation of the land fund (Yerseitova et al., 2018). Automatically, a higher share of agricultural lands brings neither higher performance to farming systems nor a better configuration of land categories within a land fund for agricultural production. The spatial patterns of farming systems are not static over time due to geophysical, climatic, and environmental processes and well as human interventions that alter land properties (Diogo, 2018). Often, governments, farmers, and other shareholders respond to land distribution patterns pictured by land cadaster, making decisions in the absence of accurate information on the efficiency of spatial allocation of agricultural land and interrelations between various categories of land within a land fund (Cocklin et al., 1987). In case land distribution and correlation tendencies are misinterpreted, the costs of government interventions and stakeholders' activities may be very high.

The causality between land-use change processes and socioeconomic factors has not been adequately explained. Margules and Pressey (2000) developed the spatial framework to identify and classify ecologically significant geographical units capable of reflecting the interaction of various environmental components for the effective use of agricultural land. Irwin and Geoghegan (2001) and Benke et al. (2011) established the models to determine the optimal configuration of land categories for different objectives by applying mathematical optimization techniques. Novkovic et al. (2010) defined a quantitative model for the determination of the size and quality of agricultural land optimal for the utilization in agricultural production. Koomen et al. (2015) investigated the applicability of land-use models to the understanding of correlations between economic development, land accessibility, spatial planning, and local biophysical conditions to be able to forecast the possible future state of the land system. Most of the constructed models, however, apply to only one set of criteria variables (most commonly, a share of agricultural land in a land fund) without further testing for alternative territorial specifications of land use patterns (Diogo, 2018). Furthermore, the influence of non-agricultural land on farming systems has remained underinvestigated. Instead of exploring the correlations between the categories of agricultural, urban, infrastructure, and industrial land, agricultural landscapes have commonly been considered out of non-agricultural context (Stacherzak, 2019). This deepens the problem of proper understanding of agriculture-to-urban land transition and land loss in agriculture due to the pressure from other land categories.

Therefore, there is a knowledge gap concerning agricultural landscapes in terms of how the interactions between various land categories and land-use types may be influenced to optimize the allocation of fertile and productive agricultural lands for better performance of farming systems. For instance, in Russia, the distribution of agricultural land is very fragmented. Agricultural lands only represent 12.96% of the total national

land fund (cropland at 7.16%, rangeland at 3.99%, hayfields at 1.40%, fallow at 0.28%, and perennial plantings at 0.11%) (Erokhin et al., 2020). As agricultural land systems are facing a complex food-economy-environment trilemma in the context of increasing competition for land (Verburg et al., 2013), there is a need to understand better the determinants of such patterns and their behavior in terms of inter-category relationships within a land fund. A more explicit focus upon the optimization of land fund structure at a regional scale is required to be able to identify major land-related processes that determine land system dynamics and agroecosystem productivity in particular locations (Moss, 1985). With this background, this study aims to reveal how land categories interact within a land fund in diverse agricultural landscapes and how differentiation of interplays between agricultural, urban, industrial, and other types of land can contribute to the understanding of agricultural land systems and their determinants.

Materials and methods

For the purpose of this study, the authors modified the methodology framework previously employed by Erokhin et al. (2020) for revealing inter-category correlations within a land fund at regional scales across Russia. The array included five categories of agricultural land (arable land (L_1), fallows (L_2), perennial plantings (L_3), hayfields (L_4), and rangelands (L_5)) and nine categories of non-agricultural land (woodlands (L_6), forest ranges (L_7), water reserve lands (L_8), residential and industrial lands (L_9), lands under transportation and communication infrastructure (L_{10}), wetlands (L_{11}), disturbed lands (L_{12}), barren (L_{13}), and other not specified lands (L_{14})).

The selection of land categories was based on the reports of the Federal Service for State Registration, Cadastre, and Cartography (Rosreestr) and the Federal State Statistics Service of the Russian Federation (Rosstat). According to Russia's cadaster system, these categories are mutually exclusive and exhaustive, each location within the administrative entity is classified into one and only one land category.

As the study aims to reveal how the acreage of agricultural land is affected by other land categories in various land distribution patterns, an assessment scale was applied. To establish a relevant ranking framework, it is critical to align categorization of land funds (land cadaster data) with functional scales. In agriculture, correlations between lands are hardly identified as categorical data and thus can not be effectively linked with the fragmentation of agricultural production across territories. In this study, land cadaster structure was ranked based on the parameter of land activity, i.e. the contribution of a land category to the total land acreage per territory (Equation 1).

$$A_{jLi} = \frac{S_{jLi}}{S_j} \quad (1)$$

where A_{jLi} is the activity of land category L_i in territory T_j ; S_{jLi} is the area of L_i in territory T_j ; S_j is total land acreage of territory T_j .

To exclude bias factors' effects and make the approach applicable internationally, this study proposed a scale differentiating the values of R_j in terms of the degree of land activity. Simple averaging of the highest (R_{jmax}) and the lowest (R_{jmin}) ranks resulted in the average value (R_{javer}). The upper and the lower limits of R_{javer} were derived by simple averaging of R_{jmax} and R_{javer} and R_{jmin} and R_{javer} , respectively. The type of agricultural land activity in a territory was identified by falling of R_j into one of the categories: high, above average, below average, and low (Table 1).

Table 1. Scale to measure the degree of agricultural land activity

Type of activity	Scale
Type I: high	$\frac{R_{jmax} + R_{javer}}{2} \leq R_j \leq R_{jmax}$
Type II: above average	$\frac{R_{jmax} + R_{javer}}{2} > R_j \geq R_{javer}$
Type III: below average	$R_{javer} > R_j \geq \frac{R_{jmin} + R_{javer}}{2}$
Type IV: low	$\frac{R_{jmin} + R_{javer}}{2} > R_j \geq R_{jmin}$

Source: Authors' development

Land distribution patterns are continuously changing in response to affecting natural, climate, anthropogenic, and socioeconomic factors and consequent variations in land cadaster structure. To understand the correlations between, first, the four types of land activity and, second, land categories within each type, this study employed factor analysis. Since the synergies between land categories are represented as changes from one type of land activity to other, correlation analysis is deemed appropriate to reveal how land structure adjustments affect the activity of land categories L_{1-5} . Correlation matrixes were built separately for the four groups of territories earlier ranked by the type of agricultural land activity. The idea is to reveal which land structure adjustments affect categories of agricultural land in different types of land activity patterns.

When conducting a correlation analysis for land systems, most scholars faced a challenge of how to find an appropriate measure to decide on the significance of synergies between the factors (land categories). Werts et al. (1976), Omar et al. (2015), and Sangngam (2014) tested various solutions, among which the coefficient of correlation variance seemed to be the most appropriate for dealing with interdependent multitudes of land categories across a variety of territorial land systems and land activity types (Equation 2).

$$C_{cv} = \frac{\sum R_{ji}}{R_{max} \times L \times T} \tag{2}$$

where C_{cv} is the coefficient of correlation variance; $\sum R_{ji}$ is the sum of R_i ranks of T_j territories included in the group; R_{max} is the highest possible rank of T_j on A_{Li} ($R_{max} = 81$); L is the number of land categories included in the array ($L = 14$); T is the number of territories included in the array.

The study was performed based on land cadaster data derived from 82 administrative entities of Russia grouped in eight districts (Table 2). The municipal areas of Moscow, Saint-Petersburg, and Sevastopol were excluded from the array as those in which agricultural land's portion of total land funds was of negligible importance. The consideration of the Crimea Republic as a part of the array was determined by the position of the territory as being de-facto controlled by Russia. These results do not reflect the authors' attitude to the international status of the area.

Table 2. Administrative entities included in the study

Federal district	Number of territories	Administrative entities
Central	17	Belgorod, Bryansk, Vladimir, Voronezh, Ivanovo, Kaluga, Kostroma, Kursk, Lipetsk, Moscow (oblast), Orel, Ryazan, Smolensk, Tambov, Tver, Tula, Yaroslavl
Northwest	10	Karelia, Komi, Arkhangelsk, Vologda, Kaliningrad, Leningrad, Murmansk, Novgorod, Pskov, Nenets
South	7	Adygeya, Kalmykia, Crimea, Krasnodar, Astrakhan, Volgograd, Rostov
North Caucasus	7	Dagestan, Ingushetia, Kabardino-Balkaria, Karachaevo-Cherkessia, North Osetia Alania, Chechnya, Stavropol
Volga	14	Bashkortostan, Mari El, Mordovia, Tatarstan, Udmurtia, Chuvashia, Perm, Kirov, Nizhny Novgorod, Orenburg, Penza, Samara, Saratov, Ulyanovsk
Ural	6	Kurgan, Sverdlovsk, Tyumen, Chelyabinsk, Khanty-Mansi, Yamal-Nenets
Siberia	12	Altay Republic, Buryatia, Tyva, Khakasia, Altay, Zabaikalsk, Krasnoyarsk, Irkutsk, Kemerovo, Novosibirsk, Omsk, Tomsk
Far East	9	Yakutia, Kamchatka, Primorye, Khabarovsk, Amur, Magadan, Sakhalin, Jewish AO, Chukotka

Source: Authors' development

Cadaster data were obtained from the Federal Service for State Registration, Cadastre and Cartography of the Russian Federation (2020) and the Federal State Statistics Service of the Russian Federation (2016, 2020). The data for 81 territories were generalized from 2010 through 2018, while those for the Crimea Republic were averaged since 2015.

Results

The ranking of Russia's territories on a parameter of agricultural land activity rather predictably resulted in the higher scores for the southern and central parts of the country than for Siberia and the Far East. Concurrently, however, some less apparent findings were yielded.

First, the territories that comprise the South Federal District, an agricultural granary of the country, demonstrated weaker orientation of land fund structure toward agricultural specialization compared to the Central and Volga districts and some regions of Siberia. Specifically, for Krasnodar and Rostov, the territories with a considerable portion of arable land in the structure of the land fund, R values were well below the district average. In some arable farming regions of the Russian South and Center, high L_1 and L_5 grades were negated by low L_{8-10} and L_{12} scores.

Second, the aggregated ranking of the Siberia Federal District surpassed the level of land activity of the Northwest and Ural districts and nearly reached that of the South district. In Omsk and Novosibirsk, the above-average R values were due to high L_4 and L_{12-14} . The Altay was rated high for the contribution of arable land, fallow, hayfields, and rangeland to the land fund, as well as for the low portion of disturbed land.

Third, the Far East is the least agriculture-oriented macroregion in Russia with the national lowest ranks of agricultural land activity and the highest spatial constraints for the allocation of the agricultural land uses. In Chukotka, Magadan, and Sakhalin, where land funds are predominantly comprised of woodlands and wetlands, the L_{1-5} scores were the lowest among 82 territories included in the study. Nevertheless, in the southern part of the macroregion, some agricultural land categories were ranked higher than those in Russia's South and Center (L_2 in Primorye, Khabarovsk, and Amur and L_4 and L_5 in Jewish AO).

Following from the obtained ranks, four R_j intervals were identified each of which included T_j territories according to the degrees of agricultural land activity (Table 3).

Table 3. Types of T_j territories on agricultural land activity scores

Type of activity	R_j intervals	ΣR_{ji}	T	T_j territories and their R_j scores	C_{ev}
Type I: high	661-770	8,502	12	Orel (770), Kurgan (765), Penza (744), Omsk (731), Ingushetia (700), Tula (698), Kaluga (693), Altay (689), Mordovia (682), Orenburg (681), Tambov (677), Novosibirsk (672)	0.6251
Type II: above average	553-660	20,130	33	Ryazan (660), Saratov (659), Karachaevo-Cherkessia (656), Tyumen (654), Stavropol (644), Astrakhan (642), Chuvashia (634), Dagestan (634), Volgograd (632), Voronezh (631), Kursk (621), Ulyanovsk (618), Samara (617), Lipetsk (616), Kalmykia (615), Crimea (610), Kabardino-Balkaria (608), Bryansk (605), Nizhny Novgorod (605), North Osetia Alania (604), Mari El (601), Udmurtia (599), Bashkortostan (594), Chelyabinsk (594), Kirov (591), Smolensk (585), Tomsk (582), Zabaikalsk (580), Chechnya (579), Khakasia (577), Pskov (566), Kostroma (561), Belgorod (556)	0.5379
Type III: below average	401-552	14,476	30	Perm (550), Altay Republic (549), Rostov (549), Tatarstan (544), Vladimir (523), Jewish AO (523), Adygeya (520), Sverdlovsk (513), Moscow Oblast (509), Ivanovo (506), Tver (501), Tyva (497), Amur (494), Kemerovo (491), Krasnodar (489), Vologda (487), Buryatia (481), Kaliningrad (480), Karelia (462), Primorye (458), Khabarovsk (457), Irkutsk (455), Yaroslavl (448), Novgorod (446), Kamchatka (440), Khanty-Mansi (436), Arkhangelsk (429), Sakha Yakutia (420), Krasnoyarsk (411), Komi (408)	0.4255

Type of activity	R_j intervals	$\sum R_{ji}$	T	T_j territories and their R_j scores	C_{cv}
Type IV: low	250-400	2,264	7	Leningrad (394), Magadan (383), Nenets (327), Chukotka (323), Sakhalin (320), Murmansk (267), Yamal-Nenets (250)	0.2852

Source: Authors' development

Based on the categorization of the territories, the per-group coefficients of correlation variance C_{cv} were computed. The checking of the correlation matrixes against C_{cv} allowed to reveal the strongest correlations between L_{1-5} and L_{6-14} land categories for four types of territories.

Type I territories make a modest contribution to Russia's national agricultural output. They are relatively small administrative entities adjacent to big agglomerations of Moscow in the central part of Russia and Novosibirsk in Siberia. In such low-scale semi-urbanized farming systems, the most substantial effect on the activity of agricultural land categories is caused by non-agricultural land under infrastructure, primarily transportation and communication (the strongest correlation with L_1 , L_3 , and L_4). (Table 4). One of the side effects caused by intensive industrial and infrastructure construction is the extension of barren, which, in turn, affects the acreage of fallow and rangelands. Strong correlations were also revealed between agricultural land categories and wetlands, water fund lands, woodland, and other forest range.

Table 4. Correlation matrix for Type I territories

Y	X												
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	R_{11}	R_{12}	R_{13}
R_2	0.029												
R_3	0.507	0.226											
R_4	0.547	0.085	0.714*										
R_5	0.039	0.580	0.126	0.107									
R_6	0.724*	0.299	0.095	0.167	0.358								
R_7	0.682*	0.081	0.392	0.472	0.052	0.575							
R_8	0.523	0.362	0.744*	0.759*	0.197	0.205	0.434						
R_9	0.443	0.270	0.587	0.469	0.018	0.041	0.369	0.757*					
R_{10}	0.795*	0.021	0.804*	0.836*	0.089	0.434	0.640*	0.752*	0.504				
R_{11}	0.630*	0.414	0.682*	0.773*	0.430	0.459	0.398	0.876*	0.650*	0.782*			
R_{12}	0.422	0.391	0.421	0.204	0.019	0.250	0.234	0.570	0.528	0.534	0.505		
R_{13}	0.028	0.719*	0.083	0.028	0.765	0.186	0.020	0.300	0.276	0.133	0.411	0.059	
R_{14}	0.112	0.619	0.045	0.035	0.714	0.112	0.021	0.211	0.140	0.183	0.327	0.111	0.956*

Note: * strong correlation, $C_{Ri} > C_{cv}$ (0.6251 for Type I territories)

Source: Authors' development

Type II group is the biggest among the four defined in this study. On the one hand, the territories are very diverse. As the Type II belt stretches from the most southern part of the country (Dagestan) to the 58° north latitude (Pskov) and from the western

borders of Russia (Bryansk) to the Far East (Zabaikalsk), it covers a great variety of climate zones, landscapes, and types of farming systems. On the other hand, Type II territories bear similarities to each other. Similar to Type I, most of Type II territories are urbanized and industrialized areas, in which arable farming systems (notably, L_1 and L_3 land categories) are affected by the spread of infrastructure and communication construction (Table 5).

As the Type II belt concentrates in the western and central parts of Russia, it predominantly comprises densely populated territories (Belgorod, Voronezh, Lipetsk, Kursk, Samara), in which the correlation between arable and residential lands is the highest. In many of Type II territories, the contribution of woodlands and other forest range to the structure of the land fund is essential. As the analysis demonstrated, it reflected in high correlations between L_6 and rangelands and arable land. In the southern areas of the Type II belt, where climate and soils favor the development of horticulture and viniculture, C_{cv} emphasized a strong correlation between cadaster categories of perennial plantings and arable lands.

Table 5. Correlation matrix for Type II territories

Y	X												
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉	R ₁₀	R ₁₁	R ₁₂	R ₁₃
R ₂	0.190												
R ₃	0.702*	0.229											
R ₄	0.310	0.054	0.096										
R ₅	0.205	0.418	0.388	0.020									
R ₆	0.583*	0.450	0.603*	0.165	0.753*								
R ₇	0.554*	0.078	0.451	0.065	0.159	0.154							
R ₈	0.031	0.216	0.042	0.327	0.140	0.267	0.324						
R ₉	0.866*	0.158	0.837*	0.158	0.337	0.526	0.456	0.069					
R ₁₀	0.765*	0.020	0.718*	0.053	0.017	0.283	0.580*	0.159	0.644*				
R ₁₁	0.454	0.374	0.565*	0.225	0.608*	0.408	0.061	0.036	0.556*	0.394			
R ₁₂	0.200	0.094	0.152	0.299	0.143	0.199	0.511	0.458	0.151	0.331	0.042		
R ₁₃	0.114	0.327	0.124	0.247	0.697*	0.334	0.276	0.242	0.126	0.221	0.479	0.147	
R ₁₄	0.004	0.347	0.290	0.044	0.480	0.564*	0.337	0.106	0.253	0.176	0.599*	0.270	0.806*

Note: * strong correlation, $C_{Ri} > C_{cv}$ (0.5379 for Type II territories)

Source: Authors' development

The Type III belt includes three locuses of territories. The eastern one, Siberia and the Far East, occupies over half of the territory of Russia but concentrates only 12.3% of its agricultural land. Among the categories of agricultural land, rangelands prevail in the structure of land fund in all territories of the eastern locus except its most southern parts (Krasnoyarsk, Irkutsk, Kemerovo, Primorye, and Amur). The acreage of rangelands strongly correlates with that of woodlands, other forest range, and wetlands (Table 6).

Table 6. Correlation matrix for Type III territories

Y	X												
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉	R ₁₀	R ₁₁	R ₁₂	R ₁₃
R ₂	0.060												
R ₃	0.502*	0.036											
R ₄	0.425	0.329	0.549*										
R ₅	0.423	0.051	0.418	0.273									
R ₆	0.729*	0.311	0.625*	0.117	0.711*								
R ₇	0.394	0.376	0.338	0.477*	0.628*	0.361							
R ₈	0.260	0.370	0.237	0.177	0.039	0.311	0.211						
R ₉	0.610*	0.038	0.568*	0.406	0.405	0.624*	0.368	0.252					
R ₁₀	0.602*	0.020	0.468*	0.351	0.483*	0.595*	0.388	0.197	0.966*				
R ₁₁	0.354	0.175	0.413	0.196	0.649*	0.478	0.241	0.007	0.578*	0.576*			
R ₁₂	0.300	0.148	0.624*	0.816*	0.170	0.137	0.404	0.077	0.381	0.725*	0.120		
R ₁₃	0.909*	0.069	0.550*	0.405	0.079	0.156	0.343	0.385	0.584*	0.599*	0.037	0.720*	
R ₁₄	0.232	0.175	0.249	0.418	0.129	0.112*	0.190	0.291	0.326	0.354	0.169	0.727*	0.832*

Note: * strong correlation, $C_{R_i} > C_{cv}$ (0.4255 for Type III territories)

Source: Authors' development

Second locus, the northern one, includes the territories of Russia's Northwest, Ural, and Center (north of Moscow). In these territories, the contribution of arable lands to the structure of the land fund is considerably more substantial compared to that in the eastern locus. Similar to Type I and Type II territories, northern areas are highly industrialized but less populated. Commonly, extensive industrial development and exploration of underpopulated regions tend to trigger the emergence of disturbed land focals and degradation of agricultural lands. The analysis revealed strong relationships between L_{12} and L_3 , as well as between L_{13} and L_7 . The southern locus is the smallest among the three, but the one to be recognized as a breadbasket of the country. It includes the territories in which arable land dominates in the structure of the land fund (58.5% in Rostov and 52.8% in Krasnodar). At the same time, due to one of Russia's highest rates of population density and resort and transport infrastructure concentration in Krasnodar, Rostov, and Adygeya, the study demonstrated the correlations between the acreage of arable land L_1 and perennial plantings L_3 and residential and industrial lands L_9 and lands under transportation and communication infrastructure L_{10} . The L_3 - L_1 relationship earlier revealed for Type II territories was confirmed, but for Krasnodar, the analysis allowed to identify a stronger correlation between perennial plantings and hayfield.

Type IV comprises the territories with the lowest activity of agricultural lands. Climate conditions and soil qualities do not favor farming. The share of agricultural lands in the total land fund is meager compared to Type I-III territories. The scarcity of agricultural lands triggers inter-category competition. In Type IV territories, the strongest correlations were identified between various categories of agricultural lands, specifically, arable land L_1 and L_3 and L_5 , as well as hayfields L_4 and L_3 and L_5 (Table 7). Agricultural lands are also affected by barren (in Chukotka, Magadan, and Nenets), woodlands (in Leningrad and Murmansk), wetlands (in Murmansk), and water fund lands (in Yamal-Nenets).

Table 7. Correlation matrix for Type IV territories

Y	X													
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉	R ₁₀	R ₁₁	R ₁₂	R ₁₃	
R ₂	0.110													
R ₃	0.984*	0.270												
R ₄	0.236	0.223	0.954*											
R ₅	0.900*	0.121	0.275	0.943*										
R ₆	0.701*	0.269	0.604*	0.275	0.265									
R ₇	0.201	0.841*	0.261	0.195	0.207	0.581*								
R ₈	0.216	0.277	0.235	0.280	0.070	0.222	0.194							
R ₉	0.221	0.411*	0.246	0.285	0.842*	0.257	0.064	0.501*						
R ₁₀	0.253	0.232	0.280	0.278	0.258	0.146	0.193	0.222	0.258					
R ₁₁	0.075	0.021	0.127	0.492*	0.279	0.221	0.102	0.212	0.089	0.074				
R ₁₂	0.282	0.285	0.273	0.220	0.462*	0.217	0.521*	0.097	0.230	0.267	0.010			
R ₁₃	0.981*	0.263	0.993*	0.234	0.248	0.564*	0.274	0.281	0.249	0.974*	0.034	0.234		
R ₁₄	0.934*	0.162	0.864*	0.187	0.840*	0.279	0.564*	0.070	0.222	0.799*	0.042	0.696*	0.857*	

Note: * strong correlation, $C_{R_i} > C_{cv}$ (0.4255 for Type IV territories)

Source: Authors' development

Discussions

Following from the results, it seems clear that inter-category relationships within a land fund vary depending on land activity patterns. A share of agricultural land in a land fund is not directly connected with land activity. In the territories, where agricultural land categories dominate in the structure of a land fund, the agricultural land activity could be depressed by non-agricultural lands. In urbanized and densely populated territories, the high activity of agricultural lands is predominantly affected by residential and industrial lands, as well as the lands under transportation and communication. In the industrialized but underpopulated territories, where the agricultural land activity is lower, disturbed lands and barren strongly influence the categories of arable land and perennial plantings. The more moderate agricultural land activity, the stronger inter-category linkages within the fund of agricultural land as a possibility to extend farming patterns at the expense of non-agricultural categories is limited by climatic and geographic factors.

Inter-category relationships within a land fund are commonly studied from a perspective of farming systems, which are defined as an aggregation of individual land-use systems that have broadly similar land resource bases and constraints, and for which similar land distribution patterns would be appropriate (Van de Steeg et al., 2010). Previous studies, for instance, Moll et al. (2007) and Pan et al. (2004), convincingly demonstrated that spatial distribution of farming systems could be affected by various factors operating at both national and regional scales, allocation of arable and other categories of agricultural lands being one of the decisive ones. Echoing Bichler et al. (2005) and Bakker et al. (2011), this study demonstrated that in Russia, spatial

distribution patterns largely featured natural factors and were mediated by landscape context. The analysis verified that agricultural land was spread unevenly throughout the country and demonstrated regional belt-type concentrations with southern areas being more focused on agricultural production.

Without addressing the spatial distribution of farming systems, it is difficult to explain the aggregate impact of land fund changes at larger out-locus scales. However, a rather clear conclusion that the allocation of land categories within a regional land fund depends on natural factors is challenged by the alternative approaches to the assessment of land fund structure. Actual land distribution patterns may be significantly different from those expected from a knowledge of the natural conditions and shares of individual land categories in a land fund. This finding supplements geographic studies of Hägerstrand (1968) and Rounsevell et al. (2003) who have focused on the exploration of landscape-induced influences (climate, soils, topography) of spatial land distribution on the allocation of agricultural lands. According to Van de Steeg et al. (2010) and Diogo et al. (2015), the spatial distribution of farming systems is determined by not agro-climatic parameters alone, but also population density, degree of urbanization, level of economic and industrial development, and environmental conditions. This study demonstrated that land activity framework was able to adjust the observed allocation of agricultural land as an outcome of socio-economic factors, which is an improvement compared to previous approaches of Tilman et al. (2002), Bichler et al. (2005), and Yerseitova et al. (2018), who tended to explain particular configurations of land categories within a land fund by natural conditions.

In the case of “inactive leaders” (the territories with a high share of arable land in a land fund but low agricultural land activity), many of the differences between spatial-based and activity-based farming systems patterns could indeed be explained by the variations in socio-economic conditions. This well correlates with Van de Steeg et al. (2010) and Gärtner et al. (2013) who empirically confirmed that the functioning of farming systems in agriculture-based economies strongly correlated with such parameters of the external environment as rural development, proximity to economic and market centers, urbanization, and demand for agricultural land from non-agricultural industries. The problem of the emerging conversion of agricultural lands to urban uses is widely recognized. Prishchepov et al. (2013) and Brown et al. (2005) alert to a growing threat of urban development to farming systems and expect the further concentration of arable lands in smaller and more fragmented locuses proximate to urban areas. While in some cases, urban expansion may promote the establishment of farming belts around cities, it nevertheless causes shrinkage of arable land and leads to farming systems fragmentation. Most of the changes in agricultural lands due to urbanization take place on fertile arable soils (Elnaggar, 2013) and irrigated lands (Baker et al., 2014), which brought together make up a considerable amount of agricultural land loss. In return, the increase in agricultural land categories resulted from land reclamation occurs on soils that are lower in their fertility.

As this study revealed a diversity of more robust and weaker correlations between agricultural lands and various types of urban land categories (residential, industrial, transportation, communication) across Type I-III territories, it should be recognized that inter-category changes in a land fund cannot be simplistically taken as a process of losing agricultural lands to urban development. Instead, there are transitions between agricultural and non-agricultural lands, as well as conversions of agricultural land categories to other uses and vice versa. The authors found that in Type II territories, agricultural lands were more affected by urban development than those in Type I and Type III (an exception is a southern locus in the Type III belt). These results support the findings of Yeh and Huang (2009) and Su et al. (2011) that the proximity to urban development can be a powerful predictor of agricultural landscape changes. With agricultural lands gradually fragmenting and diminishing due to urbanization, many areas in Russia may soon face a reduction in farming opportunities. According to Deng and Li (2016), the expansion of urban and transport infrastructure not only triggers agriculture-to-urban land transfer but also leads to the overexploitation and degradation of remaining agricultural lands. One of the reasons why farming systems are facing higher volatility due to land degradation issues is industrialization. In a situation of spreading degradation of fertile soils due to the increasing industrialization, the overexploitation of the remaining agricultural lands will most likely cause further agricultural land abandonment and fragmentation of arable lands in smaller focals with lower productivity. Nefedova (2013) reports that over 47% of the total area of Russia (northern and eastern parts of the country) is characterized by a low level of land reclamation and extremely fragmented agricultural land distribution. The Type IV territories, they are remote areas distant from populated places and isolated from large productive agricultural regions. In the Russian North and Far East, low activity of farming lands is coupled with the prevalence of hayfields in the structure of the agricultural land fund.

There have been many approaches to studying inter-category relationships in high-fragmented land distribution systems, most deeply investigated being land use, human activities, economic factors, and urban sprawl. Yet, few studies have ever addressed fragmentation as an attribute of land-constrained farming systems from a perspective of land fund structure and land activity. For instance, Qiu et al. (2020) and Li (2010) showed that fragmentation might have a significant positive effect on the diversification of farming systems and crop rotation. In the case of low-active agricultural land patterns, however, the high correlation between the categories of arable land, rangelands, hayfields, and perennial plantings rather speaks for inter-category competition for scarce land resources than diversification. This is consistent with the observations of King and Burton (1982) and Tan et al. (2006) that fragmentation results in the decreasing productivity of agricultural lands.

A pressure on arable land from other agricultural categories actualizes an issue of optimization of agricultural land fund structure for agricultural production. Although it is not that relevant in the northern Type IV territories due to the climate and soil conditions, it is critical in low-scale semi-urbanized farming systems (Type I), densely populated Type II territories, and Type III territories in which arable land dominates

in the structure of a land fund. There have been many models developed to build and assess land fund structure at a regional level with respect to the optimization goal, including RAUMIS, GROWA/WEKU, LUPolib, and SEAMLESS. However, following Vayssières et al. (2011) and Van de Steeg et al. (2010), the authors' findings show that land-use models should account for a diversity of spatial location factors and different degrees of correlations within categories as well as between agricultural and non-agricultural lands depending on the type of agricultural land activity.

Conclusions

In this study, the authors attempted to develop an approach for predicting the likely influences of non-agricultural lands on agricultural landscapes, as well as for identifying inter-category relationships between various categories of agricultural land. In the case of diverse agricultural landscapes in Russia, there were identified the interactions between fourteen categories of land within a land fund. Farming systems were mapped based on two approaches: a share of agricultural land categories in a land fund and a rating of "land activity" of agricultural land categories. The sequential employment of the alternative approaches allowed the authors to adjust agriculture and non-agriculture oriented ranking systems to a common basis. It resulted in a finding that the mapping of the farming systems based on the simple contribution of agricultural land to a land fund did not appropriately picture the activity of agricultural land categories. The proposed framework can incorporate complex interactions of a variety of land categories and resulting correlations between them, being therefore suitable for the understanding of land-use patterns, simulation of agricultural land distribution systems, and extrapolation of current trends into the future. The use of readily available land cadaster data makes the approach suitable for a diversity of locations. For the purposes of this study, the authors aggregated internationally-reported classifications determining the allocation of land between agriculture, urban, and nature and Russia's cadaster reports that detail a wider range of agricultural and non-agricultural land categories. Depending on the information available in national cadaster reports, an array of land categories may be easily adjusted. Therefore, the approach proposed in this paper can potentially make a contribution to enable the analysis of land distribution systems in diverse agricultural landscapes at a regional scale internationally. However, the capacity to build reliable models of future transformations of a land fund will depend strongly on a proper understanding of the changes arising from urban, industrial, and socioeconomic development and environmental effects of those processes.

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Conflict of interests

The authors declare no conflict of interest.

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ECONOMIC ASPECTS OF MILK PRODUCTION AND TRADITIONAL DAIRY PRODUCTS ON AGRICULTURAL FARMS IN THE REPUBLIC OF SERBIA

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ABSTRACT

Serbia has favorable natural conditions for the development of livestock production, especially the cow's milk production. Average milk production is 1.5 billion liters per year and the dominant share is produced on small farms. Only 35.1% of the total amount of milk produced in Serbia is processed. The subject of this research are economic aspects of milk production and processing into skimmed cream and white cheese on family farms. For that purpose, the model for the production of traditional milk products on family farms was developed and analysed, by using the method of analytical calculation based on variable costs. The results have shown that the difference between the production price per liter of raw vs. processed milk was € 0.24, while between the selling price of raw and processed milk per liter was € 1. Farms with up to 15 dairy heads should consider milk processing, i.e. finalization of products.

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Introduction

Republic of Serbia has favorable natural conditions for the development of livestock production, especially the cow's milk production. According to official statistics, there were a total of 424,155 dairy cows in Serbia in 2018. In terms of the number of dairy cows, Serbia is the leader in the region (Milić et al., 2019). Milk production is mainly produced by family farms with less than ten dairy cows. More than 59% of producers have one to two heads and an average daily milk delivery of 19.4 liters per farm. The

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second group of producers (35%) has three to nine heads, while almost 95% of milk producers are small family farms with a maximum of 9 dairy cows. One of the main limiting factors for increasing the number of cows on the majority of family farms in the Republic of Serbia is the fragmentation of households, i.e. limited resources for the production of animal feed. Milk processing into recognizable traditional products enables achieving better economic results since milk is valued through final products that have added value. Traditional dairy products are biologically valuable foodstuffs that can be sold in green markets or on the family farms. They can also play a significant role in the development of rural tourism, as they could significantly complement the tourist offer of our country.

Considering pronounced migration tendencies between the village and the city and the large number of abandoned villages in Serbia, the question that arises is: what are the possibilities to increase income on farms and to make rural life economically sustainable. According to the data of the survey regarding the structure of agricultural households, there is the estimation that the total number of inhabitants in Serbia will fall to the level below 7 million (Survey on the structure of agricultural holdings, 2018, 2019). The process of population outflow is happening in two directions, i.e. by increasing the number of inhabitants in urban areas to the detriment of rural areas, but also by the mass leaving of young people abroad. If we observe the negative trend of the share of rural population in the total number in the Republic of Serbia from World War II to present, it can be expected in the 2021 Census, the share of rural population will be at the level of about 35% (Mitrović, 2015). Another important thing is the fact that the population reproduction is higher in rural areas. Therefore, the pronounced migration from villages to cities affects the population aging. Western Europe faced this phenomenon much earlier, and today it fills the empty areas by migration.

If we analyze the production value by activities in the Republic of Serbia for the period from 2000 to 2017, it can be concluded that crop production is dominant activity (52%), which, as a rule, represents extensive production and does not require hiring a large number of employees (Popescu & Andrei, 2011). Cattle breeding is represented only by 13.2%. According to the survey from 2018, the total number of agricultural farms is 12% lower as compared to the number of farms from the 2012 Census of Agriculture.

Despite the fact that the economic size was higher in 2018 (€ 8,610) by 45%, compared to the results of the 2012 Census, the economic size or value of production generated by farms in EU countries is 4 times higher than on farms in Serbia (EUROSTAT, 2016). Many authors consider that 15% of this production value remains as profit and work compensation, which would mean, for example, that a farm with a production value of € 20,000 per year has a balance of € 3,000 per year, which, when divided by 12 months is € 250 per month, i.e. a minimum average month salary. When observing indicators by regions in Serbia, the data on the average economic size show that the highest incomes are achieved in farming, as well as that these farms are located in the region of AP Vojvodina. On the other hand, the largest number of farms engaged in

livestock production is located in Šumadija and Western Serbia. The total amount of processed milk in Serbia is 524.1 million liters per year, which is only 35.1% of the total amount of raw milk produced in Serbia in 2018 (about 1.5 billion liters) (Ministry of Agriculture, Forestry and Water Management, Veterinary Directorate, 2019).

By introducing adequate technology, a significant amount of milk can be processed into traditional milk products within family farms, such as various types of cheese and other dairy products that can be successfully valorized on the market. This can significantly increase the value of milk and thus the profitability of milk production (Popović Vranješ et al., 2017). Traditional dairy products are characterized by original technology and specific properties, determined by the areas where milk is produced. They are recognizable on the market, which provides the opportunity to create significant added value (Popović Vranješ, 2015).

Milk processing into traditional dairy products can be considered as a form of diversification of agricultural production, as well as creation of added value on farms. Diversification of the rural economy and the income of the rural population, engages additional activities, which may or may not be related to the production or processing of food on the farm, can have a positive effect on the overall economic growth and the preservation of rural areas. Diversification provides additional income on the farm, thus improving standards of living, reducing household vulnerability in terms of income. One of the main causes of rural poverty in Serbia is the high dependence of the rural economy on agriculture and insufficiently diversified economic structure (Janković and Novakov, 2019). Furthermore, some authors (Chaplin, Davidova and Gorton 2004, according to Janković et al., 2014) define diversification as a process of reducing dependence on agriculture. Depending on many factors on farms, but also in the local community, the region and society as a whole, it is possible to expect a greater or less degree of diversification on farms/households in rural areas. Davis and Pearce (2000) (according to Janković et al., 2014) emphasize the following influencing factors: household characteristics (availability of additional labor, gender patterns and constraints, decision-making responsibilities), education, and skills (which appear to have a significant impact on employment out of farm, rather than participation in on-farm activities); access to finance (which may or may not always be linked to land and farm size), infrastructure (which can stimulate growth and employment - access to jobs), social capital (as vertical and horizontal networks and different conditions for their access, due to different socio-economic status).

In this research economic aspects of milk production and processing into skimmed cream and white cheese on small family farms were investigated. Also, the aim of the research was to analyze the possibility of increasing farm income through the milk processing into traditional products.

Materials and methods

The research included the analysis of economic indicators of milk production and milk processing into skimmed cream and white semi-fat cheese in mini plants on family farms in 2017. Data on production and economic results of mini dairies were collected through the field survey. In order to gain insight into the current state of the dairy sector in Serbia and the world, data from the publications of the Statistical Office of the Republic of Serbia, STIPS and EUROSTAT were used.

Analytical calculation based on variable costs (Direct costing method) is a fast and efficient indicator for comparing different production lines and selecting the most cost effective one (Tomić et al., 2013). It enables the current economic analysis of the production, i.e. the assessment of economic sustainability of the production technology and the achieved results (Subić et al., 2015; Nielsen et al., 2015). This is more suitable procedure compared to the analytical calculation of the full unit costs, which requires to separate fixed costs for individual production lines, as well as to express not only direct but also overhead costs. Therefore, analytical calculation of the full unit cost is complicated, since family farms don't have legal obligation to keep accounting records.

The subject of this research are the economic aspects of production and processing of milk into skimmed cream and white semi-fat cheese in mini plants on family farms with a capacity of up to 200 liters milk processing per day. Both productions were tested on the basis of the analysis of production capacities and business results of the representative farm which is exclusively engaged in raw milk production.

The aim of the research is to calculate the raw milk production costs per liter, as well as the production costs of processed liter of milk into traditional milk products – skimmed cream and white semi-fat cheese, and assess the economic efficiency of both productions.

The method of analytical calculation based on variable costs (Direct costing method) was used in the analysis, since this method is most often used when analyzing economic data on small family farms that do not have the obligation to keep accounting records.

The general scheme of analytical calculation based on variable costs is the following (Andrić, 1998; Gogić, 2014):

$$PV - VC = GM$$

whereas the following means:

PV – Total production value in specific production;

VC – Total variable costs for each production line;

GM – Gross margin (gross financial result).

Results with Discussions

Based on the analysis of field research results, and by using the gross margins as a methodology tool, a farm model was set up and used for the analysis of economic efficiency in milk production and processing. The farm model was formed on the basis of the average values of 242 farms in the surveyed sample. The farms from the sample are located throughout Serbia, more precisely in 68 municipalities.

Table 1. Starting indicators in the model

Number of dairy cows	12	Cows
Average age of dairy cows	5	Years
Average milk yield	4,211	lit/head
Average euro exchange rate	121.34	RSD
Production year	2017	

Source: Authors' calculations

Table 2 shows the structure of production value and variable costs in milk production.

Table 2. Gross margin of the variable costs in milk production

Description	Quantity	Unit	Unit price (€)	Total (€)	Per head (€)
A. Production value					
Milk sold to the dairy	50,536	lit	0.23	11,661.51	971.79
Male calves sold	6	head	593.37	3,560.24	296.69
Female calves sold	2	head	461.51	923.03	76.92
Heifers sold	2	head	1,500.00	3,000.00	250.00
Culled cows	2	head	803.53	1,607.05	133.92
Milk premium	50,536	lit	0.06	2,915.38	242.95
Subsidy for milking cows	12	head	206.03	2,472.39	206.03
Manure				988.96	82.41
Production value (Total A)				27,128.56	2,260.71
B. Variable costs					
Feed				11,940.85	995.07
Labour				2,707.27	225.61
Energy and fuel				540.03	45.00
Contract work				765.00	63.75
Other				385.76	32.15
Variable costs (Total B)				16,338.91	1,361.58
C. Gross Margin (A-B)				10,789.66	899.14

Source: Authors' calculations

In the structure of production value, the most important elements were: annual milk production per dairy cow (4.211 liters), as well as the total amount of milk produced during the lactation period (for 12 cows 50,536 liters delivered to dairies). The following elements were the value of calves, heifers, weaned cows and manure.

The prices shown in the calculation of the gross margin calculation were the current prices on the market, at the time of the survey. Thus, the average price of male calves was € 593.37 per piece, female calves € 461.51, heifers € 1,500, culled cows € 803.53, manure € 82.41 per 10 tons. In total value of production, incomes realized on the basis of subsidies, that belong to the milk production line were also calculated. The structure of these subsidies consisted of incentives for quality breeding dairy cows of € 206.03 per cow and a premium for delivered milk of € 0.06 per liter.

The structure of the value of production was as follows: income from milk sold about 43%, livestock sale 33.51%, subsidies 19.86% and manure 3.64%.

The structure of variable costs consisted of the costs of animal feed, hired labor, energy and fuel, costs of services (costs of veterinary services, insemination costs and selection costs), as well as other costs (costs of straw for bedding, medicines used, issuing milk tickets, selling tickets, costs of consumables - detergents, disinfectants, towels, small tools).

The costs of animal represent the largest percentage of the variable production costs in the calculation of the gross margin with about 73%, or in absolute sum € 11,940.85. This costs consist of three items: feed for dairy cows, feed for heifers and concentrated feed for calves. Hired labor is the next item that burdens the gross margin calculation the most - with 17%.

Table 3. Critical values in milk production

Description	€(lit)/head
Expected yield/average milk production (EY)	lit 4,211
Expected price (EP)	€ 0.23
Subsidies (s)	€ 448.98
Variable costs (VC)	€ 1,362
Critical price: $CP = (VC - s) / EY$	€ 0.22
Critical yield: $CY = (VC - s) / EP$	lit 3,968
Critical variable costs: $CVC = (EY \times EP) + s$	€ 1,418

Source: Authors' calculations

The calculation of critical values provides insight into how profitable milk production can be, and at what point it becomes unprofitable. From this research it is clear that the level of workload is extremely low, i.e. 0.01 €. Critical values are calculated only for milk production, without taking calculating income from the sale of livestock, which makes 33% of the total income. Sensitive analysis performed in order to determine critical values confirmed the results obtained by the calculations shown in Table 3.

Table 4 shows the structure of production values and variable costs in milk processing into traditional milk products - cream and white cheese.

Table 4. Gross margin of the variable costs in milk processing into traditional milk products - cream and white cheese

Description	Quantity	Unit	Unit price (€)	Total (€)	Per head (€)
A. Production value					
White cheese	11,623	kg	2.47	28,736.61	2,394.72
Skimmed cream	3,790	kg	6.18	23,425.91	1,952.16
Curd	35,123	lit	0.01	347.35	28.95
Male calves sold	6	head	593.37	3,560.24	296.69
Female calves sold	2	head	461.51	923.03	76.92
Heifers sold	2	head	1,500.00	3,000.00	250.00
Culled cows	2	head	803.53	1,607.05	133.92
Subsidy for milking cows	12	head	206.03	2,472.39	206.03
Manure				988.96	82.41
Production value (Total A)				65,061.54	5,421.80
B. Variable costs					
Feed				11,940.85	995.07
Labour				4,512.12	376.01
Energy and fuel				1,337.36	111.45
Contract work				765.00	63.75
Other				385.76	32.15
Costs of transport				741.04	61.75
Rental costs at market stalls				1,279.05	106.59
Packing for cheese products				1,778.32	148.19
Rennet				191.58	15.97
Salt				114.32	9.53
Variable costs (Total B)				23,045.40	1,920.45
C. Gross Margin (A-B)				42,016.14	3,501.34

Source: Authors' calculations

The value of production in Table 4 consists, among others, of the value of skimmed cream and white cheese, as well as whey. The average market price of white cheese is € 2.47, multiplied by 11,623 kg of cheese produced thus the value of € 28,736.61 is obtained. The average market price for skimmed cream is € 6.18 which is multiplied by 3,790 kg of produced cream and makes € 23,425.91. Annual production of whey is 35,123 liters, which is multiplied by the market price of € 0.01 which gives a value of € 347.35.

The processing costs shown in the gross margin calculation are: rennet, salt, market packaging, electricity, water, labor involved in milk processing, transportation to the market and stand rental.

The costs of rennet, salt and packaging amount to € 2,084.22. Costs of milk processing, and the costs of water used in processing are added to the amount of fuel and energy (Table 2.). These costs are defined farms in the sample, engaged in processing. Concerning transportation, it was calculated that the producer takes the products to the green market twice a week, so that annually he/she travels about 600 kilometers from

the farm to the nearby green market, which multiplied by the price of diesel of € 1.29 per liter amounts € 741.04. The cost of renting a stand varied depending on the place surveyed. The figure of 329.65 € was taken for the annual stand renting. Daily cost of stand renting, which is paid extra, averaged around 10 €, so it was taken that the total cost of stand renting was € 1,279.05.

The costs of the labor engaged in milk processing are calculated as given in Table 2, with additionally engaged labor that is temporarily hired for work in processing, as well as in product placement. The survey of farms engaged in processing, have shown that, on average, 6 hours of work per day were spent for milk processing and marketing of dairy products, which amounts to € 1,804.85 annually.

Tables 5 and 6 show the calculations of critical values in the production of white cheese and skimmed cream.

Table 5. Critical values in the production of white cheese

Description	€(kg)/head
Expected yield/average milk procession (EY)	kg 969
Expected price (OP)	€ 2.47
Subsidies (s)	€ 188.86
Variable costs (VC)	€ 1,920
Critical price: $CP = (VC - s) / EY$	€ 1.79
Critical yield: $CY = (VC - s) / OP$	kg 701
Critical variable costs: $CVC = (EY \times OP) + s$	€ 2,581

Source: Authors' calculations

Table 6. Critical values in the production of skimmed cream

Description	€(kg)/head
Expected yield/average milk procession (EY)	kg 316
Expected price (OP)	€ 6.18
Subsidies (s)	€ 188.86
Variable costs (VC)	€ 1,920
Critical price: $CP = (VC - s) / EY$	€ 5.48
Critical yield: $CY = (VC - s) / OP$	kg 280
Critical variable costs: $CVC = (EY \times OP) + s$	€ 2,141

Source: Authors' calculations

Production of traditional dairy products, in this case skimmed cream and white cheese, can withstand market turbulence. The price of cream can be reduced by 0.7 €, while keeping the positive value of the margin. The situation with white cheese is similar - the load or price drop can go up to 0.68 €. Sensitive analysis, which was also conducted in order to confirm the calculation of the critical values, gave similar results.

Table 7. Comparative analysis of milk production and processing

Row. no.	Comparative analysis of milk production and processing	Amount (€/lit)
1.	Parameters of milk production and processing	
1.1.	Production price per liter of milk	0.21
1.2.	Production price with premium	0.29
1.3.	Financial result per liter of milk sold	0.08
2.	Parameters of production and sales of processed milk	
2.1.	Production price of processed milk	0.46
2.2.	Prices of the sold processed milk	1.29
2.3.	Financial result per liter of processed milk	0.83
3.	Difference	
3.1.	Difference in the price of produced and processed milk	0.24
3.2.	Difference in price of raw and processed milk	1.00
3.3.	Difference in financial result	0.75

Source: Authors' calculations

A comparative analysis of milk production and processing with the given parameters, shows the financial result per liter of sold/processed milk. In *milk production*, the average production price per liter of milk from the surveyed sample was € 0.21, while the selling price per liter of milk, including premium, was € 0.29, which gives the financial result per liter of milk sold of € 0.08. In milk processing, i.e. *production of skimmed cream and white cheese*, the average production price per liter of processed milk is € 0.46, and the average selling price per liter of processed milk for these two products is € 1.29. The financial result per liter of processed milk in this model is 0.83 €.

The difference between the production price of raw and processed milk per liter is € 0.24, the difference between the selling price of raw and processed milk per liter is € 1, and the difference in the final financial result per liter of processed milk is € 0.75.

Conclusions

The main actors of milk production in Serbia are small family farms with a maximum of 9 dairy cows. One of the main limiting factors for increasing the number of cows on family farms in the Republic of Serbia is the fragmentation of households, i.e. limited resources for animal feed production.

By introducing adequate technology, a significant amount of milk can be processed into traditional milk products within family farms, such as various types of cheese and other dairy products that can be successfully valorized on the market. This can significantly increase the value of milk and thus the profitability of milk production.

Traditional dairy products are characterized by original technology and specific properties, determined by the areas where milk is produced. They are recognizable on the market, which provides the opportunity to create significant added value.

Achieved production results of raw milk production on a small farm, obtained in this research (Table 2.), lead to the following conclusions:

- positive gross margin was achieved (€ 10,789.66 / basic herd, i.e. € 899.14 / milking cow, i.e. € 0.21 / liter of raw milk);
- achieved value of production after selling milk, cattle and manure is 1.66 times higher than variable production costs;
- the feed costs comprise the largest share in variable costs (73 %).

Achieved production results of skimmed cream and white cheese production on a small farm (Table 4.), lead to the following conclusions:

- positive gross margin was achieved (€42,016.14 / basic herd, i.e. € 3,501.34 / milking cow, i.e. € 0.83 / liter of milk);
- achieved value of production after selling milk, cattle and manure is 2.82 times higher than variable production costs;
- the feed costs comprise the largest share in variable costs (52%), followed by the processing costs (28%).

By comparing two productions - raw milk production and production of traditional dairy products, on annual level and by observing the results shown in Table 7, it can be concluded that the sales prices of dairy products are significantly higher than raw milk prices, as well as that a better financial result is achieved in the production of dairy products. Particularly, when comparing the production price of raw milk of € 0.21 and the selling price of € 0.29, it is questionable whether the difference in the financial result of € 0.08 can cover fixed costs in milk production. On the other hand, it is clear that the difference in the financial result per liter of processed milk of € 0.83 can certainly cover fixed costs. The total difference in the financial result is 0.75 € per liter of processed milk, i.e. 75 € cents per liter of milk remains a positive financial difference in the case when the agricultural producer processes own milk into traditional dairy products, in this case skimmed cream and white cheese. When the obtained result is multiplied by the total amount of milk produced, an income of € 37,902 ($0.75 \text{ €} * 50,536 \text{ lit}$) is obtained.

The results of the research clearly show that the economic efficiency of milk processing into traditional dairy products is on a very high level.

The achieved economic results in milk processing cover the fixed costs of production and that there is also a surplus that can be used for new investments on the farm. It should be noted that this type of production of traditional dairy products is ideal for farms that have a basic herd of about 12 milking cows.

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Conflict of interests

The authors declare no conflict of interest.

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APPLYING MARKETING CONCEPTS IN CHEESEMAKING BUSINESS ENTITIES IN THE REPUBLIC OF SERBIA

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ABSTRACT

Main objective of the research is to identify role and position of marketing in business practice in micro, small and medium-sized enterprises (MSME) in the Republic of Serbia. Since cheese is a value-added product, cheesemaking takes a significant position in country's food chain and represents a significant revenue generator for every participant in the production cycle. Lack or insufficient usage of marketing decreases the possibilities of efficient and effective use of resources and minimizes cheesemakers' competitive advantage. The research has been conducted in the form of a questionnaire by using a random sample of 39 business entities in the territory of the Republic of Serbia. Research results indicate that marketing is at a peripheral position in the business practice of the analysed business entities. Main precondition for marketing concept implementation is introduction of marketing function and formalized process of marketing planning integrated into corporate planning system and supported by each level of management structure.

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Introduction

Global cheese consumption is increasing. Positive publicity, presence and market penetration of big cheesemakers into new markets, availability and wide range of cheese assortments, development of fast food industry, frozen food products, etc. affected the changes in consumers' eating habits and therefore the general increase in cheese demand. On the other hand, production and placement of cheese made in

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the Republic of Serbia is faced with changing opportunities and numerous challenges both in domestic and international market. Expected abolition of restrictions on dairy production in the EU as well as disrupted economic relations between the European Union and Russia resulted in higher delivery of dairy products at a lower price into the market of neighbouring countries. Placement of cheese produced in the Republic of Serbia was additionally aggravated because of Croatia had left CEFTA in 2013 and presence of wide range of different top cheese manufacturers' products in member countries' markets. Degree of marketing implementation in business practice is one of key factors of modern market operations that differentiate the offer and determine the level of competitiveness and profitability. Strategic choices, in the form of intentions, occur before strategy implementation in both individual and collective conscious of company decision-makers (Gagné, 2018). Defining objectives, the possibilities of attaining those objectives, market performance and growth dynamics of cheesemaking business entities largely depends on the decision-makers and executors' perception of marketing role and significance.

Micro, small and medium-sized enterprises (MSME) represent the most efficient segment of economy in nearly every country. These enterprises are becoming competitive with large enterprises, successfully participating in global economy trends, applying new and innovation technologies (Ožegović, et al., 2012). Despite still being chiefly focused on the local market, small and medium-sized enterprises have an increasingly important role in the international exchange too (Pavlović, 2009). These companies generate the largest contribution to increasing employment, gross value added and trade thus being considered as the frame for national economic growth and development (Erić et al., 2012).

Demand is the main factor that affects changes in production. It is affected by demographic characteristics, world population growth, changes in consumers' eating habits and increased cheese consumption on daily basis. Other factors that also affect adjustment of the offer are introduction and development of new products intended for target groups such as vegetarians, luxury consumers, teenagers as well as consumers with specific health issues. Level of marketing concept comprehension, including perception and implementation of the most efficient marketing mix elements for catering to needs and wishes of target consumers determines the capacity of business entities to deliver value. Higher level of delivered value in comparison to competition will affect the increase of market share as the final outcome as well as growth rate of cheese placement in terms of value and quantity and, eventually, the total growth and development of cheesemakers in the Republic of Serbia. A fundamental characteristic of agriculture in all countries in the world is the domestic production to ensure their needs and then to surpluses for export; objective which can only be achieved by allocating additional funds for investment required for development and modernization process of permanent production agriculture (Cicea, et al., 2010), with marketing included as its constitutional part.

In order to create and maintain competitive advantage, in the request of many market challenges such as the presence of numerous foreign brands and local cheeses, low purchasing power of buyers, insufficient quantities of milk from domestic production, high standards regarding food safety, requirements and propositions of distributors and retailers, limited financial resources, etc., strategic marketing planning and use of instruments marketing become imperative on the road to market affirmation and increasing market share (Mugoša, 2018). The paper aims to identify the role of marketing and its position in business practice in micro, small and medium-sized enterprises (MSME) in the Republic of Serbia. Perceiving business entities' marketing implementation and methods they put marketing mix instruments to use leads to a better understanding of framework of interventions needed to strengthen their business competence and competitiveness.

Material and methods

Survey research by use of a questionnaire was conducted for the purposes of obtaining empirical data. Veterinary Directorate of the Republic of Serbia provided the data on legal and business entities; micro, small and medium-sized enterprises. Geographic segmentation of available data was used to identify business entities according to their administrative divisions. A great number of business entities from the records (nearly 260 recorded legal and business entities) went out of business in the meantime. Therefore, it was necessary to turn to Veterinary Directorate's district units for assistance in order to determine currently active cheesemakers. Hence, 24 out of 29 district units have been contacted, while the research was carried out in 19 administrative districts of the Republic of Serbia. Altogether 39 legal entities from 19 administrative districts of the Republic of Serbia participated in the survey. The greatest proportion of interviewed business entities belongs to three administrative districts: 8 respondents in Zlatibor District (20.5%), 6 respondents in South Banat District (15.4%) and 3 in Pirot District (7.7%) who take up 43.6% of the total number of respondents. Foundation dates of the respondents' business entities indicate that medium-sized enterprises have been in business for the longest period of time (18.6 years on average) followed by small enterprises with 15.4 years and micro enterprises being in business for the shortest amount of time which is 11 years on average.

An overview of educational background indicates significant participation of university degree marketing decision-makers. The most significant internal factors affecting company marketing strategy are the following: availability of funds, managerial skills, level of education and expertise, personal skills and entrepreneurial inclination (Lakhanya, 2015) as well as marketing and sales experts which has been noticed particularly in micro enterprises (Jones, et al., 2013). Average age of marketing decision-makers is 46.2. The oldest decision-makers are located in medium-sized enterprises with an average age of 47.3 followed by slightly lower average age of decision-makers in small (46.7) and micro enterprises (45.3). In the respondent structure, micro legal entities with 18 respondents take up 46.4%, small legal entities take up 38.5% which is

equivalent to 15 respondents and finally 6 respondents from medium-sized legal entities belong to the remaining 15.4%. Average volume of annual cheese production of micro enterprises is 94.3 tonnes followed by 207.44 tonnes made by the small enterprises and 727.6 tonnes coming from the medium-sized enterprises.

Annual budget for investment in marketing does not exceed 500 EUR (equivalent to Serbian dinars) in case of one-third of manufacturers who responded to this question, whereas 73.3% manufacturers spend no more than 2000 EUR for marketing purposes (*table 1*). Widespread opinion among owners and managers is that marketing represents a cost, which is correct if there is no vision, no mission statement and that company goals, i.e. marketing objectives and strategies are vaguely expressed or completely absent. Although it generates costs which are necessary in order to perform different marketing activities, marketing represents an investment which impacts product value and positively affects sales even after the costs of certain marketing activities have occurred.

Table 1. Degree of marketing investments in micro, small and medium-sized enterprises in relation to production volume

Production volume	Up to 99 tonnes	100–299 tonnes	300–299 tonnes	600 tonnes and above	Total
Degree of marketing investment, EUR	(%)				
0	5.9	0.0	0.0	0.0	3.3
1-500	35.3	22.2	0.0	0.0	26.7
501-1,000	29.4	22.2	0.0	0.0	23.3
1,001-2,000	17.6	22.2	33.3	0.0	20.0
2,001-5,000	5.9	22.2	0.0	0.0	10.0
5,001-10,000	0.0	0.0	66.7	0.0	6.7
10,001-15,000	0.0	11.1	0.0	100.0	6.7
Above 15,000	5.9	0.0	0.0	0.0	3.3
Total number of responses	100.0	100.0	100.0	100.0	100.0

Source: Author's calculation based on the questionnaire data

Data indicates that cheesemakers in the Republic of Serbia are primarily oriented towards production and sales. Under conditions of modern market operations characteristic of numerous competition and cheese brands, cheesemakers cannot meet consumer needs and requirements as well as competitive advantage and market share increase without consistent marketing orientation. Besides jeopardizing growth and development of cheesemakers, absence of strategic and tactical marketing activities threatens their survival in the market. Office of Entrepreneurial Development of the United States of America recommends the so-called start-up for entrepreneurs who are starting a business and small enterprises in the amount of 2-3% of revenue for marketing budget to as much as 20% if the business belongs to a highly competitive industry. Most marketing experts agree on funding 1 to 10% of revenue necessary for marketing activities planning which depends on business's life span, competitive activity and company's financial capability. According to the research

conducted in 2010, 58% of 6,000 marketing managers responded that their companies invest less than 4% of annual revenue for marketing (www.smallbusiness.chron.com). Based on examined business entities' financial reports from 2014 and statements made by marketing decision-makers regarding the amount of funds annually invested for marketing purposes, it can be concluded that without regards to business size and life span cheesemakers invest an average of 0,003% of revenue from sales and services into marketing.

Type of the survey used is personal interview survey conducted via e-mail or telephone with manufacturers who agreed to participate in research. The questionnaire included 29 questions and it represents a combination of open-ended and closed-ended questions adjusted to each respondent's target group. Data on product range was collected by personal interview followed by internet presentation research as well as author's own research of cheese distribution channels. In processing the obtained data we used descriptive statistics and analytical statistic methods. Data interpretation and analysis as well as conclusions represent an information synthesis obtain based on the cheesemakers' attitudes, general statistics and other secondary sources, on the basis of which a SWOT analysis was performed, as a proposal of strategic option.

Results and discussion

In order to identify the role of marketing and its position in business practice in micro, small and medium-sized enterprises (MSMEs) in the Republic of Serbia, it is necessary to determine whether companies have a specific sector related to marketing. Regarding the question whether marketing department exists, 64.1% of total number of participants responded negatively claiming that all decisions are made by the owner, i.e. company manager. Marketing activities are performed within other (mostly commercial) departments in 33.3% of enterprises and only 2.6%, i.e. one enterprise has a developed marketing department (*Table 2*).

Table 2. Marketing department presence in micro, small and medium-sized enterprises

Size	-	Micro	Small	Medium	Total
Does marketing department exist					
Yes.	(%)	0.0	6.7	0.0	2.6
No separate department, marketing is within another department.	(%)	11.1	46.7	66.7	33.3
Doesn't exist, marketing related decisions are made by the owner or manager.	(%)	88.9	46.7	33.3	64.1
Total	%	100.0	100.0	100.0	100.0

Source: Author's calculation based on the questionnaire data

When it comes to micro enterprises (88.9%), decisions are most frequently made by the owner. These decisions are informal, i.e. not a result of marketing planning. While business entities experience growth, information received from the commercial department contribute to marketing decision-making in 46.7% of small enterprises.

Although it does not officially exist as a separate department, marketing is defined as a business activity within the commercial department in 66.7% of medium-sized enterprises. There is only one company classified as a medium-sized enterprise that uses other legal entities' external marketing and consulting services.

Strategic marketing planning starts from the defined business purpose, that is, clearly defined company mission statement which describes company scope of operations, its business goals, consumers, competences required to achieve those goals, etc, (McDonald, 2016). Only third (31.0%) of respondents confirmed it has a clearly defined mission, however, merely two respondents were able to interpret it. Quality mission statement focuses on goals, points out core values and defines essential areas of competitiveness for the company in order to achieve competitive advantage (Vasiljev, et al., 2007). The lack thereof or vaguely formed mission statement impedes clear corporate goals and strategies from being defined, therefore hindering identification of marketing goals and strategy. It also contributes to non-objective overview of requirements, calculations and planning regarding the funding necessary for marketing which ultimately leads to complete absence of marketing activities.

In most of surveyed enterprises research is either not performed systematically or not performed at all. Marketing decisions are made subjectively by individuals, mainly on the basis of partial information or experience. Wang et.al (2016) asserts that executive's characteristics, predominantly age and formal education, significantly determine an organization's performance. Prior research (Hiebl, 2014) consistently indicated that younger executives and executives with business-related backgrounds are correlated with more innovative and/or sophisticated management systems. A decision made by a business entity should be made primarily on market research analysis related to the business entity and comparative advantage analysis (Palmatier and Sridhar 2017). According to cheesemakers' opinion, with the ability to grade quality of source of information with grade 1 to 5 and multiple choice answers, it was proven that the most significant source of information are distributors. Quality of information was ranked with an average grade of 3.6 (Table 3). Retail chains follow with an average grade of 3.5, information given by chambers of commerce (3.0), Statistical Office of the Republic of Serbia (2.9), internet (2.8) and the lowest grade belongs to the development agencies (2.6).

Table 3. Source and quality of information used by the marketing decision-makers

Production Volume (tonne) Source of information	Up to 99	from 100 to 299	from 300 to 599	600 and above	Total
	Average grade				
Chambers of commerce	3.3	2.6	3.0	0.0	3.0
Development agencies	2.9	2.0	0.0	0.0	2.6
Statistical Office of the Republic of Serbia	1.8	4.3	3.0	3.0	2.9
Retail chains	3.7	3.4	3.8	2.7	3.5
Distributors	3.5	3.9	3.7	3.3	3.6
Internet	2.0	5.0	4.0	0.0	2.8

Source: Author's calculation based on the questionnaire data

Competitive strategy of cheesemaking business affects the capacity to deliver value within entire dairy sector, additionally affecting economic efficiency of both processors and milk producers (Špicka, 2013). Consequently, an intensified vertical integration within dairy sector is needed, specifically between milk producers and processors. Apart from aforementioned advantages, vertical integration between cheesemakers and other participants of value chain creation and mutual horizontal link affect range and quality of total data necessary for marketing decision-making.

Marketing Mix - Product

Cow cheese predominates in the micro enterprises' assortments while only 1 of 18 manufacturers has sheep milk cheese in their assortment. Average number of different cheese in individual manufacturers' assortment is 3.6. Small enterprises have wider range of products in comparison to micro enterprises with an average number of 4.2 types of cheese in the individual manufacturers' assortment. There are cow, goat and sheep milk cheeses including semi-hard and processed cheeses. Medium-sized enterprises offer 5.8 varieties of cheese on average. In relation to small enterprises, expanded varieties of cow milk cheese can be noted such as soft cheese (equivalent to feta) and various semi-hard cheeses. There is also one manufacturer within this classification who produces goat milk cheese with certified organic product label (*Table 4*).

Table 4. Predominant product range of cheese from MSME

Company size	Predominant product range	Average number of cheese in assortment
Micro	Fresh cow cheese milk (equivalent to cottage), plain ripe cheese and ripe cheese with chilli pepper, soft low-fat cheese, semi-hard cow and sheep milk cheese (equivalent to kashkaval), stretched curd cheese, pizza cheese (equivalent to processed mozzarella), etc.	3.6
Small	Fresh cow cheese milk (equivalent to cottage), cream cheese, cheese spread (variety of cream cheese), albumin cheese (equivalent to urdā); plain fresh cheese, plain ripe cheese and fresh cheese with chilli pepper (equivalent to feta); processed cheese (equivalent to edam), varieties equivalent to trappist, kashkaval, mozzarella, pizza cheese; goat milk cheese (fresh and ripe), goat milk cheese with dill, semi-hard cheese, pizza cheese; mixed soft ripened sheep milk cheese, fresh cheese (equivalent to feta).	4.2
Medium-sized	Fresh cow cheese milk (equivalent to cottage), plain cream cheese and cream cheese with chilli pepper, cheese spread (variety of cream cheese), cream cheese, plain fresh cheese and plain ripe white cheese (equivalent to feta), varieties equivalent to feta, kashkaval, gouda, trappist, edam, organic fresh goat milk cheese, etc.	5.8

Source: Author's calculation based on the questionnaire data

By gaining insight into product range of studied legal entities, it is noted that foundation consists of plain fresh cheese (equivalent to feta and ricotta), fresh cow cheese milk (equivalent to cottage), cream cheese and semi-hard cheese equivalent to kashkaval. Unlike numerous imported cheeses with herbs and spices, domestic manufacturers

have modest product line regarding this type of cheese which is mostly limited to added paprika and dill. Starting point for creating product offer is market research of consumer needs and wants. Consumers usually see products as complex groups or benefits which meet their needs. For product development, marketing experts must first identify consumer's basic needs that the product should meet, then create the potential product and, ultimately, find a way to broaden it in order to create a set of benefits which will be of best use to the consumers (Kotler et al., 2007).

Considering the growing demand for organic products worldwide, one of the alternative directions for product development is the production of organic cheese. The steady increase in demand for organic products worldwide indicates that this production method can be very profitable if natural resources, knowledge and production experience are used properly (Hamzaoui-Essoussi & Zahaf, 2012). One of the significant factors in the development of organic cheese production is certainly the education of producers, the level of support of local and regional agencies, development funds, as well as the strategic commitment of the state towards encouraging the production and export of high quality organic cheese. One more way to add cheese value, as a final product of milk processing, is to introduce and certify a food safety and quality system. All the companies that are the subject of this research have the HACCP standard, and most of them are in the ISO group.

Cheese production requires innovative technological solutions. Relatively uniform assortment, dominated by feta cow cheese, semi-hard cheese (equivalent to kashkaval), pizza cheese and fresh cow cheese milk (equivalent to cottage), indicate the possibilities of enhancing this strategic activity of the company, introducing cheeses according to the needs and demands of specific market segments such as children, athletes, then smaller packages with two or more types of cheese, with different additives, for use on various opportunities etc. The starting point of achieving long-term market affirmation in the domestic and export markets is the uniformity of the cheese quality and its standardization in accordance with the requirements of the market to which it is delivered. Increasingly, the modern consumer is shifting demand towards "healthy" products, which has led to the development of cheeses with improved nutritional properties, including cheeses with lower fat content, enriched with fatty acids, etc. (Jerónimo, et al., 2013). The existing range of cheese from the offer of domestic producers leaves the possibility of its expansion cheeses with longer ripening, lines of low-fat cheeses, various packages for parties, for children, portions provided for one meal, etc. Starting from the use, the important attribute is the shape and size of the cheese. Among the attributes related to cheese making, such as length and width of pieces, surface fineness, etc., U.S. consumers, for example, prefer longer, thicker, and truer pieces (Rankin, et al., 2006). Some of the attributes of cheese that consumers consider to be crucial when choosing cheese are its use, degree of maturity, eco-packaging, transparency, packaging convenience and safety, handmade cheese, degree of innovation, higher price, etc. (Užar, et al., 2019). The packaging design are of utmost importance in marketing communications. Form, material of production, graphic solutions, etc., influence the differentiation of cheese among competing products and

enhances the image of the brand and the manufacturer. Creation of cheese packaging requires a methodical approach, respecting the requirements of environmental protection, international markets, distribution, etc. Packaging represents the last level of communication between the company and the consumer before making a purchasing decision, emphasizing its role in marketing communications (Rundh, 2013). Domestic producers, especially cow cheese, among micro, small and medium-sized enterprises pay insufficient attention to packaging. It is a common practice that packaging, instead of attractive and original graphic solutions, contains a set of obscure and unrelated objects, as well as inadequate photographs. This is not the case with the small number of goat cheeses, which come in the market in different packaging, with significantly better functional and aesthetic solutions, which can be partly justified by their higher selling price which leaves more space to cover the cost of packaging. The perceived values presented are important when selecting cheese, whereas effective positioning requires continuous communication with target segments, as well as conducting motivational and in-depth consumer research (Užar, et.al, 2019).

Marketing Mix - Price

According to studied business entities, price of the product has the greatest influence on buyers and consumers when it comes to making a purchase decision, i.e. 43.6% of respondents gave this factor the highest grade habits (28.2%) are second, followed by packaging (10.3%), brand (7.7%), brand awareness, promotion (5.1%) and availability in distribution channels (5.1%). When it comes to information on declaration manufacturers claim that they do not affect purchase decision whatsoever. Expectedly, the represented hierarchy consisting of most important factors indicated that manufacturers notice the buyers' price orientation which is characteristic of low-income market such as the market of the Republic of Serbia. What comes as unexpected is the highly ranked response regarding *habits* which precede packaging, brand, etc. Such type of perception which, in addition, entrenches the attitude towards marketing as a secondary business activity is a reflection of core unfamiliarity with marketing. Taking into consideration manufacturers' attitude, it can be concluded that market behaviour of manufacturers is a result of viewing the role of marketing as peripheral: if habits influence purchase decision and considering consumer behaviour predictability, making investments and putting effort in creating marketing strategy and performing marketing activities is not necessary since it would not affect sales volume. Marketing concept recognizes that in order to achieve objectives, an organization should incorporate better integrated marketing activity efficiency than its competitor which is directed toward determining and meeting wants and needs of target markets (Kotler and Keller, 2016). Great number of companies use cost orientation for pricing, however, a lot of them set prices based on product value perceived by buyers and consumers (Braidert, 2007). Companies that make profitable pricing decisions have a proactive approach to pricing with regards to impact of pricing decision on how the consumers will observe it and develop the perception of product value (Monroe, et al., 2001).

Notwithstanding the various pricing decisions among industries, different markets and different buyers and consumers, there is a mutual agreement in reference to pricing strategies which can be divided into three categories: cost-based pricing, competition-based pricing and value-based pricing, i.e. pricing based on the customer perceived value (Hinterhuber, 2008). Regarding price setting and multiple choice answers, manufacturers expressed their opinion on the basis of company's current business practice. Out of 56 responses in total, 42% sets price by adding price margin to total costs; 33% of respondents use competition price as a basis for setting their own prices, 16.1% set price in accordance with identified market segmentation and willingness to pay for the product(s) whereas 7.1% adapts to the distributors' suggested price.

Unlike other marketing mix elements which create costs, price generates revenue. Hence, companies put in effort to determine prices on a level that would allow for product differentiation (Kotler, 2012). Product price interacts with other marketing mix elements whose final goal is profit maximization or market share increase. Price can have strategic and tactical role within business entities (Middleton, et.al, 2009). In accordance with the abovementioned and within the context of response structure on how the respondents set prices (relatively low responses to "Pricing based on indicated willingness of specific market segmentation to pay for the product") indicates low degree of cheese differentiation, lack of segmentation, low use of price as a marketing mix tool with the aim to establish position, create image, highlight quality, etc. One of the deciding factors for product selection in low purchasing power markets is price. It makes marketing activities even more complex and requires putting greater emphasis on product benefits and relevant consumer satisfaction. In conditions mentioned above, marketing has a task to increase brand awareness for a product, to increase the probability of product to be chosen because of its identified advantages and to emphasize – not just the financial advantage ("cheaper", "more for less") but also the "emotional" advantages ("feels good", "appreciated", "classy, fancy", "always by your side" etc.) (Rice, 2010).

Marketing Mix - Distribution

Marketing channels are an important element in the value chain of cheese, since it is a food item, whose production requires the milk of proven quality, under controlled conditions and as soon as possible reach the processors, as well as deliver the cheese as a finished product, at minimal cost, to consumers at the right place and time, in the right quantities and at the right price. Consumer habits are essential determinants when deciding which marketing channel to choose (Radosavljević, 2014). Distribution is a set of activities which make product available to target segment of buyers and consumers. Distribution of agricultural products must be adapted to the changes in the market environment (Kuzman, et al., 2017). Marketing channels, often called distribution channels in textbooks, represent a link between production and consumption which moves goods from producer to the consumer by a set of coordinated actions (Renko, 2009). Working on the assumption that business entities use more than a few distribution channels simultaneously, the respondents had the option for multiple

choice answers. Most predominant distribution channel are retail stores (24.1%), followed by restaurants (20.7%), wholesalers (16.4%), personal store brands (15.5%) and supermarkets (14.7%). The least used distribution channel for cheese placement are convenience stores (8.6%).

Marketing Mix - Promotion

With the aim to stimulate demand, largest number of respondents offer discounts on certain amount of bought cheese (48.1%), discounts for increased sales of specific cheese (27.8%) and limited-time offers for entire assortment of goods (14.8%). However, some manufacturers (7.4%) do not offer discounts because, according to their opinion, it does not affect cheese sale and only one company allows discount to selected market segment of buyers and consumers (1.9%).

In modern business environment with fragmentation of mass consumption markets, information technology development, media fragmentation and differentiation – business entities are required to integrate greater number of communication channels. Integrated marketing communications include identifying target audiences and shaping coordinated promotion program with the aim to achieve desired reaction of target buyers and consumers (Batra and Keller, 2016). With the rational analysis of all relevant, continuously collected data and information, the marketing experts by coordinated functioning of all available processing departments, get to know with the needs of consumers, primarily, by perceiving the impact of qualitative and specific stimulus on buyers' decisions whether to buy or not (Puškarić et al., 2016). Question on cheese promotion allowed for multiple choice answers. Largest number of answers indicated that main type of promotion is by creating events and experience, i.e. cheese tasting at the sales location (23.5%) and sales boost by providing extra quantities (23.5%). Direct marketing in the form of printed promotional material or online shopping is implemented by 19.1% manufacturers while 8.8% of respondents use different types of advertising with the aim to inform, persuade, remind and encourage. According to Fuchs (2018) Internet increases social media's power in advertising and as news media. Castells (2009) that a larger number of producers online as compared to the broadcast model can reach a larger audience. Cheese producers should pay more attention to the internet as a promotional medium and instead of static, website should be a dynamic place for visitors to return. Content should be available in at least one other world language, especially within the presentation of those entities that export cheese or plan to export. The function of the website is to provide visitors with quality information and at the same time to be a source of information about visitors, an instrument of image enhancement, as well as a potential place of sale. Low degree of vertical integration reflects a relatively low involvement of promotional activities performed in cooperation with different food related organizations (8.8%) as well as travel organizations (5.9%). In addition, 10.3% of respondents do not utilize any type of marketing communications.

Swot analysis -micro, small and medium-sized enterprises

Strategic analysis of internal and external factors based on assessment of company's own advantages and weaknesses, competition analysis, stakeholders and business environment analysis enable database creation necessary for marketing decision-making. The starting point for the development of an appropriate marketing strategy is the SWOT analysis, which introduces the previously anticipated characteristics of the cheese market in the Republic of Serbia into the context of strengths and weaknesses as internal factors, or opportunities and threats as external factors affecting the market performance of the business entities. The current situation in the field of cheese production and delivery is characterized by the following facts:

Table 5. Swot analysis of cheesemaking business enterprises

Strengths	Weaknesses
<ul style="list-style-type: none"> -Favorable geostrategic position; -Preferential tariff rates (CEFTA), free trade (R. Federation); -Available production capacity; -Production in accordance with the minimum one (HACCP) standard; -Production of organic cheeses; -Protected geographical indication of origin. 	<ul style="list-style-type: none"> -Lack of marketing knowledge and skills; - Absence of segmentation and differentiation; - Weakness of cheese brand image; - Unclear strategic direction; - Non-innovative and narrow assortment; - Insufficient financial resources; -Lack of standards introduced to meet specific market needs. - Producers' lack of interest in acquiring the status of the authorized use of geographical origin
Opportunities	Threats
<ul style="list-style-type: none"> -Growing demand of cheeses with a protected geographical indication; -Growing demand for organic cheeses; -Exports to the market of the Russian Federation and other members of the Eurasian Economic Union -Export of sheep cheese to different markets, according to the specific requirements of the standard (Halal, Kosher, etc.). -Proximity to the CEFTA market and cost-benefit in exports 	<ul style="list-style-type: none"> -Lack of domestic raw materials; -Large assortment of imported cheeses; - Entry of new competitors into the CEFTA markets; -High quality requirements in export markets -Low purchasing power in the domestic market; - The increasing strength of cheese retailers and private label brands -Absence of marketing information system at dairy industry level

Source: Author's calculation

Placing and analyzing the interplay of elements of the SWOT matrix gives insight into the factors that are decisive in formulating a marketing strategy and goals, for the purpose of realizing the overall goal: improving cheese promotion and marketing. In conditions of growing presence of global cheese brands' which are imported into the Serbian market, the pressure on domestic brands is rising. Hence it is necessary to identify factors which shape consumer and buyers' preferences. Taking that into consideration, developing a methodology and integrated marketing data collection system on consumers (needs, wishes, complaints, etc.) is essential. That could enable adequate and timely marketing decision-making, more efficient marketing communication, better positioning and greater product differentiation.

Although enterprises possess significant factors necessary for taking advantage of the opportunities, the presented matrix indicates the priority need to eliminate or minimize several key weaknesses: lack of marketing knowledge and skills, lack of marketing as a business function in the organizational structure of the company, market segmentation, differentiation of supply and creating the image of cheeses by applying integrated marketing communications.

The following section identifies problems that implicitly arise from the perceived attitudes and opinions of marketing decision-makers, and indicate the weaknesses as well as the levels of support needs in the field of marketing. When it comes to the challenges faced by micro, small and medium-sized enterprises, 17.9% of respondents consider the presence of vegetable fat-based products with the addition of milk protein, from which it can be concluded that consumers perceive such products as cheeses (although these are not), which have a significantly lower price (table 6). In order to differentiate cheese from the aforementioned substitute, it is necessary for producers to cooperate for common goals: consumer information and education, with an emphasis on the incomparability of cheese and the aforementioned products, while strengthening the position of local cheeses in the awareness of consumers.

Table 6. Attitudes of micro, small and medium enterprises on the biggest challenges and possible solutions within marketing activities

Problems of entities	Number of responses	Framework of required marketing activities
The presence of vegetable fat-based products with the addition of milk protein.	17.9%	Cooperative affiliate propaganda, positioning
The gray economy in the cheese market.	10.3%	Positioning
Insufficient payment system.	7.7%	Creating unique value, differentiation, strengthening identity and image, positioning.
Imports of cheeses from European Union countries.	5.1%	Defensive marketing strategies, differentiation - emphasis on attribute "home-made", "fresh milk", product range innovation
Insufficient business relationship between subcontractors and manufacturers.	5.1%	Creating stronger and long-lasting relationships between participants, production of cheeses with geographical origin, branding
Great competition and market supply of cheese.	5.1%	Introduction of marketing concept in business of entities, production of cheese with protected geographical indication.
Other	30.8%	-
Without answer	17.9%	-

Source: Author's calculation

The main identified deficiencies, which significantly influence the market position of manufacturers, are in fact the result of their attitudes, which are:

- Independent decision-making by the owner or director of the company;

- Insufficient strategic orientation, reflecting lack of vision and mission in the company and consequently inconsistency of goals;
- Annual level of marketing investment, in approximately one fifth of respondents does not exceed EUR 500 (in RSD equivalent), and over half of producers (56.4%) spend up to EUR 2,000 annually for marketing purposes;
- Narrow range of cheeses; Very limited selection, delivery and transfer of value through customer segmentation, product and service development, positioning, distribution, etc .;
- Overrated strengths related to the image and recognizability of cheeses;
- Insufficient, functionally usable marketing research and insufficient amount of marketing information on the basis of which customer and consumer segmentation can be performed;
- Low level of promotional activities and marketing communications.

The problems presented require the implementation of the marketing concept in the business practice of cheesemaking entities. Remaining producer responses (28.2%), such as uncontrolled imports of milk and milk powder, unregulated raw milk market in the Republic of Serbia, lack of export support, inability to realize loans for “Start up” companies, etc., although not directly subject of marketing activities, are elements of the environment that significantly affect the ability to realize the marketing concept.

Conclusion

Marketing strategy planning, creating and improving product to possess adequate quality for a defined, solvent market demand and incorporating marketing mix tools are imperative to cheesemakers but also to other agribusinesses which perform product placement in both domestic and international market.

Business entities present in the recently liberalized market of the Republic of Serbia are deprived of marketing management knowledge. According to the results presented it can be concluded that studied business entities do not, or in a very limited approach, use marketing mix instruments which are not interlaced and do not complement each other.

Independent decision-making of the owner or general manager, including the identification of marketing with sales can lead to a distorted interpretation of buyers’ wants and needs, competition, business entity’s technological process, etc. At the age of fast market changes and high competition, marketing represents a key success factor of a company, therefore it is essential that decision-makers develop external and internal marketing capacities including adequate marketing information system adjusted in accordance with business entity size and activities.

Marketing strategy planning and utilization of marketing mix instruments become

paramount on the road to solidify in the market and increase market share with the aim to create and maintain competitive advantage including the conditions of numerous market challenges such as: presence of various foreign brands and domestic cheeses, low purchasing power, high food safety standards, demands and requirements of distributors and retailers, limited financial resources, etc. The conclusions derived and methodology applied in this study are thought to serve as efficient guidelines for future research related to market-oriented companies. Given that this study did not identify articles examining purchase behavior in real market scenarios with real market transactions in this region, future research should focus on understanding of consumers' attitudes and their buying motives.

Conflict of interests

The authors declare no conflict of interest.

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DEVELOPMENT OF SMALL BREWERIES AND INNOVATION IN THE BREWING INDUSTRY IN THE REPUBLIC OF SLOVAKIA

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ABSTRACT

The aim and purpose of this paper was to evaluate the current market situation based on respondents' answers and to present the current situation on the market, to find out about the opinion of users about beer, but also about the development of beer tourism, which is gaining in importance. The brewing industry was deemed to be a relatively stable and attractive industry. Brewery strategies have been influenced by several factors. The brewing industry had the opportunity for a new beginning in 1990. The production and distribution were locally oriented, with customers usually drinking local beer. It was important to find out and evaluate their general attitudes about beer, brewery and beer tourism. The problem of analyzing customers opinion is very important and significant but also complex. Innovation is an important factor in all economies. The Republic of Slovakia has a long tradition in brewing. The results are presented in the form of descriptive statistics and strong conclusion and recommendations made regarding the brewing industry of the Slovak Republic.

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Introduction

Customer demands are different from country to country; this is not conditioned by economic development, but also by social, sociological, cultural... However, one fact is common to all customers, and their demands become more sophisticated, and the characteristic of innovation changes. Changes are not only characteristic of young and newly opened companies, they are also happening in companies with long-standing business history. More and more important are new creative ideas, new technologies, knowledge. In these conditions, when Knowledge-Based Economy is in focus, when businesses want to achieve as much financial gain as possible and penetrate the market, they have to offer their customers the best, have to innovate more quickly than others, they have to be different from the others. Successful companies, who at the present time are not capable of innovating innovations, are forced to disappear from the market because the demands that come from these markets are day by day menus. Maintaining continuity of business, survival on the market requires constant innovation of the novels as well as implementation of innovative activities in all phases of its business.

The Slovak Republic is recognizable not only for good wines characteristic for this region, but also for the small brewery and beer industry. After the breakup with the Czech Republic, this brewing industry is experiencing transformation, incentives and investments in the brewing industry are evident in both countries. Privatization, which is characteristic for the period after, changes the way business, but also the challenges that come from the market stimulate the change of business and market performance. New ways of price formation, demand for new types of beer, higher quality, more sophisticated demands from customers, market competition, sharp marketing are just some of the effects that have brought huge changes within this industry. Marketing involves the creation of valuable, relevant and consistent content to acquire and retain customers (Poráziková, Vojtechovský 2016). Inadequate management, the decision-making process without prior market research and customers resulted in the deterioration and closure of certain breweries. Before the 1990s Bulgaria, ex-Czechoslovakia and Hungary were the only countries from the Central and Eastern Europe - CEE region that were members of the European Brewing Union. In the 1990s and early 2000s, the beer markets of CEE have followed different development paths. While some markets have been mostly stable (e.g. the Czech and Slovakian markets), others have followed a downward trend in production and consumption patterns (e.g. the Hungarian market) (Larimo, Marinov, Marinova, 2006).

Materials, methodology and research questions

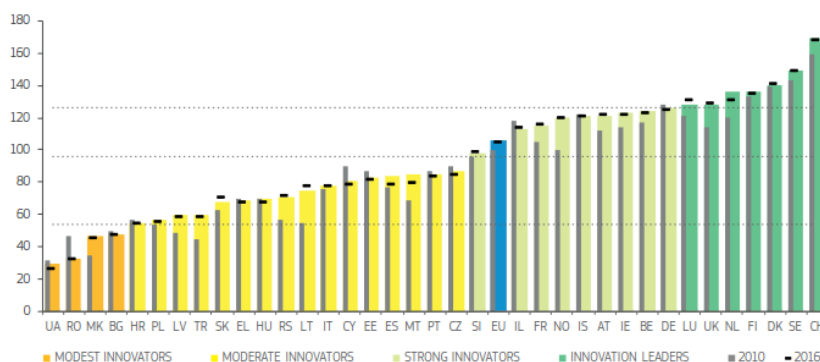
That the innovation is very important confirms the strategic goal set by the European Commission (EC) in Lisbon in 2000. The main goal of the Lisbon Strategy was to make the European Union the most competitive economy in the world by 2010, to create new jobs, provide good social support, and increase investment for research and development. EC emphasized the development and improvement of knowledge, which resulted in higher investments in education and professional development, scientific and technological research and innovation. In March 2005, the European Commission adapted the set goals of the initial strategy and focused on the employment, stimulation and development of the

economy. The most cited definition in innovation literature and innovative activities is from the OECD Handbook. This manual defines innovation as a new or significantly enhanced product, service or process, marketing method or new organizational methods in business, organization of work, or relationships of an entity with the environment (OECD, 2005). While innovative activities are all activities that include all the scientific, technological, organizational and commercial steps that lead, or intend to lead to the realization of innovation. Innovative activities also include research and development that are not directly related to the development of concrete innovation (OECD, 2005).

The European Union's innovation index represents a new mechanism for assessing and comparative analysis of the innovation performance of EU member states and associated countries, as well as defining the strengths and weaknesses of their research and innovation systems. This instrument should enable monitoring of the implementation of innovations, which are one of the seven most important factors of the Europe 2020 strategy for successful business and efficient economy. The European Union Innovation Index (IUS) is largely based on the methodology of its previous instrument of the European Innovation Scoreboard (EIS). In the period from 2010 to 2015, this EC report on state innovation was published under the name IUS, while under the name EIS, this report was published between 2001 and 2009, and from 2016 to 2018. Although it is not the only instrument for monitoring the innovation of the economy, it is most represented in the studies, because other than the EU Member States, states other countries of the world. It distinguishes three main types of indicators and eight innovative dimensions, covering a total of 25 different indicators. Based on the value of innovation indicators and trend analysis, within the EIS instrument, there is a division into four groups in which the analyzed countries can be classified (EIS 2018 Figure 1):

- 1) Innovative leaders (seven countries, Switzerland is the highest ranking)
- 2) Innovative followers (eight countries)
- 3) Moderate innovators (16 countries, in this group of countries there are the Republic of Slovakia, but also the Republic of Serbia)
- 4) Modest innovators (four countries: Ukraine, Macedonia, Romania, Bulgaria).

Figure 1. EIS 2018 - Performance of European and non EU countries' systems of innovation



Source: European Commission, 2018

On this figure 1, coloured columns show countries' performance in 2017, using the most recent data for 27 indicators, relative to that of the EU in 2010. The horizontal hyphens show performance in 2016, using the next most recent data for 27 indicators, relative to that of the EU in 2010. Grey columns show countries' performance in 2010 relative to that of the EU in 2010. For all years, the same measurement methodology has been used. The dashed lines show the threshold values between the performance groups in 2017, comparing countries' performance in 2017 relative to that of the EU in 2017. Switzerland is the overall Innovation Leader in Europe, outperforming all EU Member States and Iceland, Israel, and Norway are Strong Innovators. For Slovakia, performance increased by 4.8 percentage points, with performance increasing strongly until 2013, and at more moderate rates in 2015 and 2016. Serbia is Moderate Innovator for country performance relative to the EU has increased strongly by 13.3%. (European Commission, 2018).

The qualitative approach was incorporated in the form of historical research, which is considered to be the most useful form for acquiring knowledge of the industry's development (Andrew et al., 2011). Statistical data was collected from the websites of the Slovak Statistical Office, the Slovak Union of Breweries, the Brewers of Europe and by our own research. The problem with the statistical data was that it was incomplete for the whole period. The respondents were interviewed as the primary source for validating our findings and they were selected based on the authors' and their acquaintances' contacts. The form of each interview was a combination of a narrative and a semi-structured interview.

Two research questions were formulated:

- 1: The emergence of the brewing industry throughout history and is beer the most popular drink on the market of the Slovak Republic?
- 2: What types of beer do customers consume the most?

History of beer in the Slovak Republic

Beer as a beverage dates long before the new era, probably by accidental discovery while cooking bread (the oldest proof of mentioning beer is preserved today in the Louvre Museum in Paris). The Old Babylonians produced beer in the household for 7000 years before the new era. They had several breeds of beer, and they used barley sugar and wheat for fermentation. By expanding and growing consumption, beer production in other parts of the world was transferred, first in ancient Egypt, Persia, Greece, and after other countries. The Egyptians knew how to make beer 2000 years before the new era, while the Greeks wanted to be like them, learned the beer production skills. Later, the Romans, after them, the Germans, and then other European countries began to be interested in beer production (Večerníček, 2015). At this time, beer was made of sugar, but without hops, so the resulting product was very acidic, and various grasses, such as pellets, saffron and others, were added to the beer. Innovation and application of hop in brewery is an important discovery and it forms the basis of modern beer technology. The emergence of new technologies has a favorable effect

on the development of brewing (Ciutacu & Chivu, 2015). The discovery of brewer's yeast and the spreading of the church, mainly by the monks, also extended the use of beer, since the monks were those who focused on cooking beer. In Slovakia, the golden age of brewing is considered to be the first half of the 17th century, although in recent years the expansion of small breweries on the ground of the Slovak Republic again appears. The economic environment is made up of factors that affect purchasing power and consumer buying habits (Kotler, 2007). The development of customer and market behaviour reflected in the breweries' strategies. Knowledge of customers, competitors, and other stakeholders is vital to strategy formulation (Freeman, 2010). The position of regional breweries came under threat from pressure from the large breweries, which with their ability to realise economies of scale, were able to invest in technology due to their strong distribution position (Tripes, 2017).

During the period, the production process changed depending on the emergence of new technologies, innovations and the implementation of innovative activities in the process of production itself, the production spread to all continents of the world. After World War II, 12 breweries were renovated in the Republic of Slovakia. Beer is becoming more and more attractive, because so far the Slovak Republic is famous for winemakers not so much for beer. Wine tours as a tourist event replace beer. An alliance was established to conserve brewery, and until 2000 there were 15 major breweries in the Republic of Slovakia. Different approaches to selling beer, which incorporated low-cost or generic differentiation strategies were used (Porter, 2008).

Large and small breweries in the Republic of Slovakia

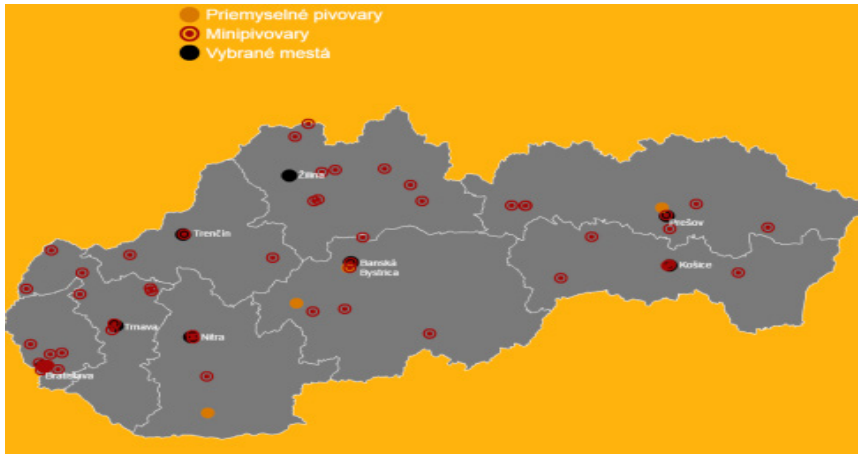
Beer is an alcoholic drink (now there are non-alcoholic types), which contains 4 basic ingredients: water, brewer's yeast, malt and hops. Depending on the type of beer, the alcoholic strength of the alcohol can be different, there are non-alcoholic beers and beers with a higher alcohol percentage, for example, from 2% upwards. Lager beers contain up to 0.5% carbon dioxide, which gives it a freshness, which affects the beer's blubberiness. Small breweries produce various types of beer are mostly non-commercial beers, based on natural ingredients without additional preservatives, artificial additives, non-fertilized, and unfiltered the shelf life is short. Small breweries with help and ideas coming from buyers create new types of beers, of different tastes. The breweries can be divided into (according to the realized profit): the big breweries fall - Heineken breweries as well as Topvar because they produce more than 200000hl of beer a year, while in small and independent breweries and medium-sized they belong to a group that produces up to 200000hl of brewery Steiger and Urpiner. Large breweries operating on the territory of the Slovak Republic include Heineken, headquartered in the Netherlands. It is the largest group that operates in the brewing industry in Europe, while it is the third largest in the world. Heineken Slovakia is therefore the largest brewery operating in the territory of R. Slovakia with its headquarters in Hurbanovo. The brewery in Hurban was founded in 1969 and part of the Heineken group became 1995. The largest is the consumption of cans in Eastern Europe. Heineken, apart from

the well-known brands Heineken and Amstel produces beer under other names, more than 200 brands. Among the famous Slovak brands are: Zlatý Bažant, Corgoň, Maurus, Kelt, Martiner. The second big brewery operating in this territory is Topvar brewery, which was created by the merger of two breweries Saris and Topvar, when it was bought by South African company SABMiller, now it is headquartered in Slovakia in the Saris brewer in the town of Veliki Šariš. From 2016, the owner of the Topvar brewery is the Japanese group Asahi Group, Slovak brands that are known on the market: Šariš, Smädný Mních. Foreign investment and international owners proved to be good for beer exports [Hergetová, 2015b; Janda & Mikolasek, 2011; Pulec, 2016].

Some small breweries were created by the owners going home with beer brewing, and this has now become a lifestyle and satisfied customers are increasingly visiting such places. The advantage of these breweries is that users receive information about the product, that it is natural, it does not contain chemical additives, is cooked only in small quantities and in small batches. There are three methods of beer production, the most complex process is made of basic ingredients, but which requires knowledge of the whole production process and requires adequate space. In the last five years, around 30 small breweries have been established on the Slovak market, so now there are a total of over 70 that operate in the territory of the Republic of Slovakia. Most microbrewery owners started to brew beer as a hobby and later upgraded their production. Some owners use the differentiation strategy while others state differentiation whereas, in reality, the production is based on a low-cost strategy (Klepetko, 2015). The term “craft beer” has been increasingly used to cover the beers produced by small-scale breweries but it is unclear if this term is definable in terms of beer styles (Elzinga et al., 2015) or whether it has more focus on consumer orientated impressions of novelty (Cardello et al., 2016; Donadini, Porretta, 2017) and association with experience (Gómez-Corona et al., 2016). The advantage of small breweries is that they can achieve faster contact with customers, get product information, have more experimenting, develop new types of beer, and have the capability for greater flexibility and adaptability to customers. Brewery Lanus is one of the small breweries on the territory of the Republic of Slovakia, which opened on April 25th. 2014 in Trenčín, there are about 250 employees and the preparation of beer goes in large quantities of 20 vessels, each about 250 liters. In this brewery there are 8 types of straight beer: 6 is daily and 2 are changed. Depending on the season, beer has a long intensity (flying with less alcohol, refreshing). Beer is cooked every day, users can visit the production process whenever they want, there is also a possibility of bottled packaging. Another well-known small brewery is the brewery in Banská Štiavnica which dates back to 1473 when Steiger brewery was founded. Brewery Erb (Eduard Rada Breweries) is a small craft brewery founded in this city in 2010. This brewery offers besides refreshment and cultural experience, because within the brewery there is a space where the theater for 111 guests. Also, as part of its business, the hotel, wellness center, restaurant, offers space for various gatherings. The Sessler brewery in Trnava (14th century) was rebuilt in 2008, which also has a restaurant and produces 10 beers in its business. Kaltenecker brewery in Rožňava was

founded in 1997 as a small brewery with a restaurant, now it produces 40 types of beer with a capacity of 15000hl/year.

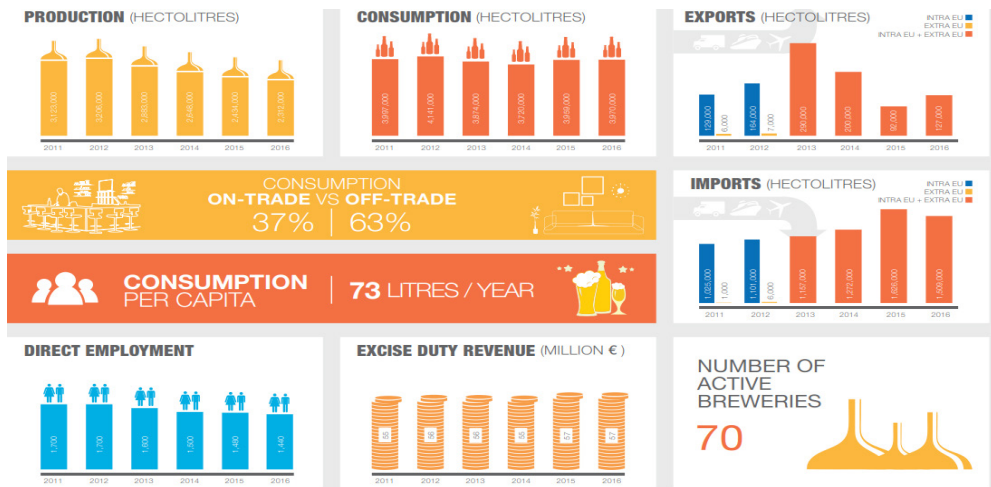
Figure 2. Breweries in Republic Slovakia in 2018



Source: Pivdiky, 2018

As shown in Figure 2 in the Republic of Slovakia currently there are 71 small breweries and 4 large ones. By regions it is: Banskobystrický - 10 breweries, Bratislavský - 18 breweries, Košický - 8 breweries, Nitriansky - 5 breweries, Prešovský - 8 breweries, Trenčiansky - 6 breweries, Trnavský - 9 breweries, Žilinský - 11 breweries.

Figure 3. Key facts and figures about production, consumption and exports beer in Republic Slovakia for 2016



Source: The Brewers of Europe, 2018

As Figure 3 shows the production in 2016, it decreased compared to 2012 from 3206000 l to 2312000 l, as well as the number of jobs in this brewing industry, while consumption increased in comparison to 2015. Compared to 2016, another 5 small breweries were opened in 2018.

Tassiopoulos (2010) explains that festivals are celebrations with a public theme where the social and symbolic meaning of the event is closely related to a series of overt values that the local community recognises as part of their heritage. Beer tourism, as a segment of gastronomic or food tourism, is considered by some scholars as a young form of special interest tourism, or as a form of tourism where participants are motivated by a gastronomic experience of drinking different types of beer in a typical atmosphere of brewing restaurants, or learning about current technology and the history of beer manufacturing (Rogerson & Collins, 2015a). Consequently, beer tourism is an integral part of tourists experiencing and consuming local heritage, local history and cultures as mirrored in the local food and drink. Tourists partake in the craft beer culture as it is regarded as authentic and unique as opposed to commercialised massproduced beer (Munar, 2012). By spreading beer production, every year there are various manifestations, beer brewing competitions and festivals dedicated to beer and brewery. The most famous international competition is “Biela Vrana”, organized by Košická domovaričská divízia, KaltBier Klub and Asociácia malých nezávislých pivovarov (Association of small independent breweries) in the town of Kosice since 2012, also known as Domovaričská pivománia, which is being organized since 2011. Every May it has festival “Švejkové pivné dni” in the town of Humenno, while in August in the town of Partizánsko, Častej, Novo Meste nad Váhom, Donovalí, and every September Banskobystrická brewery Urpiner opens its doors to visitors. Beer Fest was founded in 2013 with the aim of supporting small and craft breweries. Millennials and Generation Z consumers may therefore be considered the demand element of such a festival. Millennials are considered consumers who enjoy collaborative experiences. These consumers are known to want to share their experiences with others and they are keen to utilise new technologies to achieve this, perhaps through social media and online review platforms (Hobson, 2017). Also, every year in the premises of the market in Bratislava and Košice there is a manifestation where small breweries are presented, and the workers can see the novels that have been designed during the year. Here comes the exchange of ideas, which contributes to the exchange of experience and thus stimulates and contributes to improving the quality of beer. There are also breweries from Slovakia, the Czech Republic, Austria, Hungary, Belgium and England. Details of each next event can be found at <https://www.salonpiva.beer/Sk/20>. Modern technology increasingly provides users with various information - there is a specially created application that gives users information about breweries in R. Slovakia (<https://pivni.info/pivovary/slovensko/>) as well as an application that shows users where they can drink good beer on the territory of the Republic of Slovakia (<http://opive.sk/mapa-slovenskych-pivovarov-kde-vsade-varia-pivo/>).

Results

The aim of this study was to evaluate the current market situation based on respondents' answers. It was important to find out and evaluate their general attitudes about beer, brewery and beer tourism. The Slovak brewing industry has begun to develop in recent years, and besides this is an interesting offer of beer events, which have created a market for beer tourism in the market. This kind of tourism not only makes Slovakia more visible, it can also help economically strengthen this branch of economy. In this survey conducted in March 2018, 120 respondents, 65 women and 55 men, with average age from 25 to 60 years, participated in the territory of the Republic of Slovakia. The highest number of respondents was up to 30 years of age, up to 75%. The research showed that more than half of the respondents drink beer in the Slovak Republic, while one third declared that the wine is a priority. When asked if they were drinking beer, the majority of respondents said they like to drink beer, which is 53% (see the response given in Table 1).

Table 1. User responses about beer consumption

Drink beer?	Percentage of respondents' answers
Yes	53%
Sometimes	37%
No	6%
I do not drink alcohol at all	4%

Source: Authors research

The next question shows which beer (depending on the color and taste) the participants consume and whether they prefer the large or small breweries. Most respondents, 63% of them decided to give preference to light beer, probably because it is the most widespread in the market with an affordable price. Beers with a variety of fruit tastes prefer only 15% of the respondents, and these are mainly those who drink beer rarely and mostly non-alcoholic. Only 4% of the examinees drink a dark beer, while 7% of the respondents say it is dark sweet. Half the preference is given to 6% of the respondents, while wheat only 5%. The next question was aimed at determining the reason most people consumed beer, 69% of respondents said they like beer because of its taste and smell, and 7% of respondents because it threses. Classical beer (beer of large breweries) is decided by 29% of respondents, 33% of respondents declared that they do not care, and 38% of respondents decide to consume beer of small breweries. Also, two-thirds of the respondents were at least once in one of the breweries operating in the territory of the R. Slovakia, while three quarters responded to regular visits to events such as days of beer. More than 85% of respondents said they like innovations and new types of beer. Two thirds of respondents during the working week decide on non-alcoholic beer as refreshments or breaks.

After the 1950s, however, American and Asian countries gradually begun to catch up with the European levels of production, what together with other factors contributed to the rise of world beer trade. Despite growing international beer trade, only around 15 % (in 2017) of the global beer production is traded (Bieleková, Pokrivčák, 2020). In Europe, the most prevalent alcoholic beverages are beer, wine and spirits in different proportions and beer represents, in several European countries, the most prevalent source of alcohol consumption (>50%) (Spaggiari, Cignarelli, Sansone, Baldi, Santi, 2020). But, many countries use protectionist policies (e.g. tariffs, government standards and laws, certifications, testing of consignments, excise duties), which create additional restrictions to trade with alcoholic beverages (Bjelić, 2016).

Conclusion and recommendations

The development of technology and increasingly sophisticated customer demands require companies and entrepreneurs to introduce innovations and innovative activities into their business, in each branch of business as well as in the brewing industry. Every year, new small breweries, new types of beers and various events appear on the market, which aim to promote beer and thus attract more and more visitors. Large breweries operating on the market for many years did not have strong competitors, but in recent years with the emergence of small craft shops, which offer various types of beer and accompanying content in their offer, they are increasingly winning consumers / customers. The strong sides that the Republic of Slovakia has are: the popularity of beer in the population, good price and quality ratio, quality ingredients, modern technology and application of innovations, good geographical position, an increasing number of small breweries, traditional and high quality domestic products, encouraging tourism and promoting the country through festivals.

Conflict of interests

The authors declare no conflict of interest.

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SMART FARMING IN AGRICULTURAL INDUSTRY: MOBILE TECHNOLOGY PERSPECTIVE

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ABSTRACT

The aim of this research is to examine key indicators that are necessary for the implementation and development of smart farming concepts in the agricultural industry, especially from the applied mobile technology point of view. Accordingly, the authors used a neural network based software solution to determine the correlation, relationship structure and partial contribution of indicators for the mobile technology development in agricultural industries in selected countries. The validity of the input-output model in a neural network based software solution was evaluated using the Minkowski error and Quasi-Newton method through several iterations/epochs. The neural network structure has shown the importance of particular indicators for adopting a mobile technology perspective in the agricultural industry, where the application of Information and Communications Technologies (ICT) in agriculture is most emphasized. Only those countries that invest the most in the ICT in the agricultural sector can achieve greater efficiency and productivity by applying smart farming.

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Introduction

Agriculture is one of the most important sectors in the world in the context of rapidly increasing population. “Technological progress in this field that needs control and optimization can really contribute to save environmental resources, respect business and international laws, satisfy the consumer needs, and pursue economic profits” (Balducci et al., 2018). One of the biggest challenges in agriculture is to improve food quality

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and increase productivity without unnecessary and redundant manual work. Mobile technology certainly enables efficient use of inputs and reduces the demand for labour, leading to increased production productivity (Mykulsykyi, 2019). The major challenge for hi-tech agriculture is to ensure that new technologies help farmers become more economically competitive (Jurjević et al., 2019).

In order to achieve this, it is necessary to have information-intensive and precise farming techniques based on knowledge (Milovanović, 2014). This involves constant and effective monitoring as well as making agriculture smart using automation and Internet of Things (IoT) technologies that are “personalized” in mobile technologies (Gondchawar, Kawitkar, 2016). “Monitoring contains modules like remainder, plant growth monitoring in various stages, irrigation planner, crop profit calculator, calamity check and problem identifier” (Mohanraj et al., 2016). According to the agricultural areas the prediction data varies and it is provided to the farmers so that they can plan for their farming (Savitha, UmaMaheshwari, 2018).

Certainly, the usage of Information and Communication Technologies (ICT) brings relevant information to farmers in real time (Mahant et al., 2012). In order to improve efficiency, productivity, global market and reduce human intervention, time and cost there is a need to divert towards new technology in agriculture based on artificial neural networks algorithms and mobile technology, for example crop prediction using smartphones (Jha et al., 2019). The data is stored on the web server which can then be visible to the farmer on the web browser and on the mobile phone too (Pawar et al., 2018). Therefore, it is necessary to implement the digitalization of agriculture and the automation of agricultural techniques, and to collect and analyse farm data (Ashifuddin, Rehena, 2018) using the concept of internet based smart farming (Charania, Li, 2019).

This agricultural data is processed and analysed into mobile applications that are suitable for automated real-time detection of farm conditions (Ferentinos, 2018). More and more data are being generated in agriculture and the rest of the food chain, which helps steer production processes with greater precision (Pope et al., 2013). General crop, pest, disease, soil and irrigation and weed management and also yield prediction are key areas where mobile technology and artificial intelligence through neural networks should be deployed (Bannerjee et al. 2018). This neural network system in agriculture as an integral part of applied machine learning in disease detection, for example “is based on a self-organizing map neural network and data fusion of hyper-spectral reflection and multi-spectral fluorescence imaging” (Liakos et al., 2018).

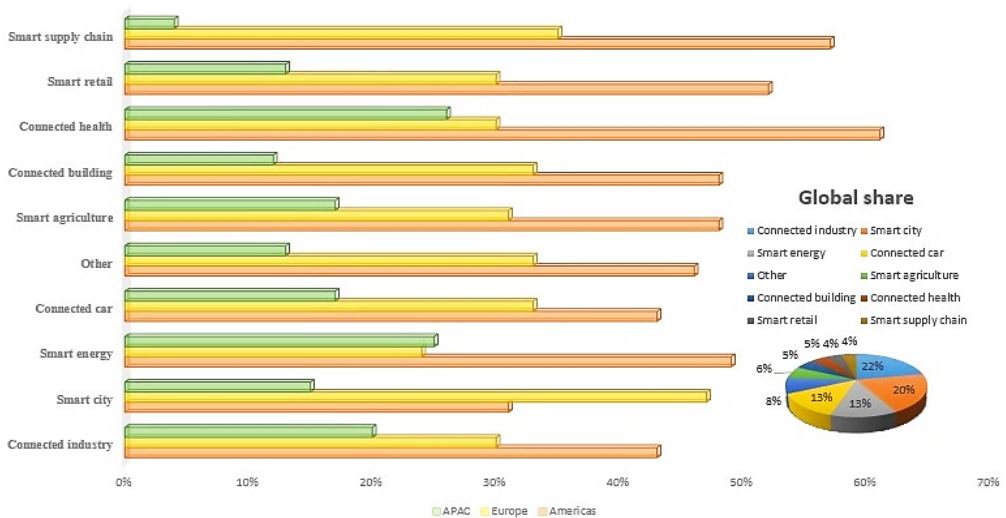
Consequently, it is clear that smartphones and external sensors show fascinating new opportunities for farmers in the digital age (Daum et al., 2018). One of the main priorities of the European Union are innovation and smart development (Wasilewski, & Wasilewska, 2019). Internet-based remote control farming activities followed by mobile technology and mentioned sensors could create a wireless farm network and this will be a significant contribution to the smart farming concept (Dursun, Ozden, 2011). Mobile technology with smartphones and other smart agri-devices extend conventional

tools (rain gauge, tractor, notebook) by adding autonomous context-awareness to all kinds of sensors, built-in intelligence, capable of executing autonomous actions or doing this remotely (Wolfert et al., 2017).

Mobile technology with application support for smart devices enables the wireless connection and communication of multiple agricultural machines and devices simultaneously, which ultimately leads to the development of a machine-to-machine concept. This concept involves the independent communication of agricultural machines regarding the data exchange of the agricultural parameters values such as elevation, mean daily temperature, max. daily temperature, min. daily temperature, wind speed, relative humidity, sunshine hours, daylight hours, latitude, condition coefficient. In this way, mobile technology performs the function of monitoring, collecting and analysing data of the state of the plant and animal life on the farm, current production, weather and soil conditions. Thus, mobile technology through its applications also influences the implementation of the big data concept and cloud computing in agriculture.

Also, mobile technology based on IoT concept “assisted agriculture research patterns to incorporate network platforms, the architecture of the respective network, applications, security issues, and challenges among others” (Mahbub, 2020). All of this means that “the evolution of agriculture steps into Agriculture 4.0, thanks to the employment of current technologies such as IoT, Big Data, Artificial Intelligence, Cloud Computing and Remote Sensing” (Zhai et al., 2020), which especially thanks to mobile technology implementation. This technology makes farm more intelligent and makes it possible to create a smart farm concept (Suakanto et al., 2016). Figure 1 shows the share of smart concepts in the world.

Figure 1. Percentage share and global contribution of smart agriculture in world regions



Source: Authors' calculation based on IoT Analytics 2016 Global Overview

Materials and methods

The methodology used in this paper is based on a software solution for neural networks, which aims to discover the connection between inputs and output as a target variable in the example of a smart farming concept and its mobile technology perspective. In agricultural industry “neural network applications have gained popularity due to their functional characteristics, lesser data requirement and capability of long term forecasting which provide many advantages over traditional analytical approaches“ (Nema et al., 2017).

For this purpose, the Neural Designer - Machine Learning Software solution was used to form the optimal neural network architecture for selected mobile technology indicators of smart farming because it takes some intelligence to interpret the agricultural data collected and analyse the data accordingly in order to predict the outputs, not the next traditional rule-based algorithm (Shekhar et al., 2017). The neural network method was applied to determine the highest correlation between the input variables and the output variable and to notice which indicator most influences the output variable structure, for those selected countries.

Namely, the research is based on selected countries, who have made some progress in smart farming technology application, especially in its mobile technology perspective. Accordingly, based on the available database for selected countries (Table 1), the authors selected seven indicators necessary for the implementation of the mobile technology concept, which were taken as inputs/output variables:

- *Agriculture value added percentage of GDP* (input) - the value of this indicator shows the agricultural value added percentage contribution to GDP.
- *Mobile phone subscriptions/100 habitants* (input) - the value of this indicator shows the mobile phone availability at the farmers, especially the number of mobile phones on 100 habitants.
- *Farmers using Internet/100 habitants* (input) - the value of this indicator is based on the number of farmers who have used Internet on 100 habitants.
- *Mobile broadband subscriptions/100 habitants* (input) - the value of this indicator shows the density, actually the mobile technology broadband access on 100 habitants.
- *Governance Agriculture Online Service Index* (input) - this indicator shows the value of digital services providing by state authority which in charge of agriculture. Digital services refer to providing consulting advices such as statistical analysis and applicative support for some agricultural sectors. The value of this index is better if it is close to 1.
- *Importance of ICT in Agriculture* (input) - the value of this index relates to determining the importance of the application of ICT in agriculture and ranges from 0 to 5.

- *WEF Network Readiness Index* (output) - this indicator represents the index of the World Economic Forum (WEF) which defines the country's readiness to accept the digitalization and smart farming concept in agriculture. The value of this index is better if it is close to 5.

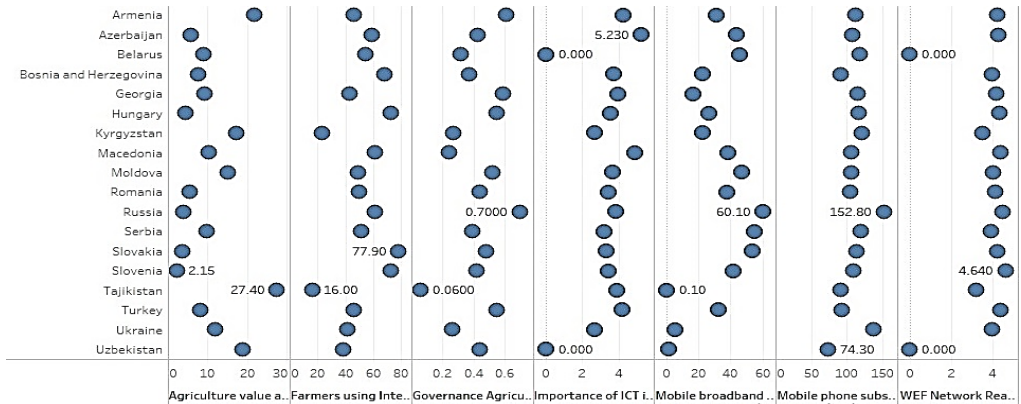
Table 1. Smart farming indicator values for the selected countries

Countries	Agriculture value added (% of GDP)	Mobile phone subscriptions /100 habitants	Farmers using Internet/100 habitants	Mobile broadband subscriptions /100 habitants	Governance Agriculture Online Service Index	Importance of ICT in Agriculture	WEF Network Readiness Index
Armenia	21.93	112.40	46.30	31.00	0.61	4.22	4.24
Azerbaijan	5.69	107.60	58.70	43.90	0.43	5.23	4.28
Belarus	8.86	118.80	54.20	45.90	0.32	0.00	0.00
Bosnia and Herzegovina	7.51	91.20	67.90	22.20	0.37	3.74	3.98
Georgia	9.20	115.00	43.10	16.40	0.59	3.95	4.22
Hungary	4.37	116.40	72.60	26.30	0.55	3.55	4.33
Kyrgyzstan	17.25	121.40	23.40	22.70	0.27	2.70	3.53
North Macedonia	10.23	106.20	61.20	38.30	0.24	4.88	4.41
Moldova	15.23	106.00	48.80	47.20	0.52	3.67	4.03
Romania	5.36	105.60	49.80	37.60	0.44	3.43	4.15
Russia	3.95	152.80	61.40	60.10	0.70	3.82	4.52
Serbia	9.68	119.40	51.50	54.80	0.39	3.22	3.95
Slovakia	3.74	113.90	77.90	53.60	0.48	3.29	4.23
Slovenia	2.15	110.20	72.70	41.80	0.42	3.42	4.64
Tajikistan	27.40	91.80	16.00	0.10	0.06	3.92	3.20
Turkey	8.03	93.00	46.20	32.30	0.55	4.21	4.41
Ukraine	11.78	138.10	41.70	5.40	0.26	2.69	4.00
Uzbekistan	18.98	74.30	38.20	1.10	0.44	0.00	0.00

Source: Authors' calculation based on FAO, 2018

Below the text is a circle chart (Figure 2) that aims to indicate fluctuations in the values of the analysed indicators for smart farming mobile technology concept by country. The x axis of this graph shows the values and the names of the indicator by column, while the y axis shows the name of the country to which the particular indicator refers. The circle chart for each indicator also shows the minimum and maximum values of each indicator by country.

Figure 2. Circle chart of the selected indicator values



Source: Authors' calculation

Results and Discussions

In the Neural Designer software solution, an analysis of the inter-correlation of input variables was first conducted to determine which variables have the highest degree of correlation. Thus, from Table 2 it can be concluded that the highest degree of correlation exists between *Farmers using Internet/100 habitants* and *Mobile broadband subscriptions/100 habitants*. The value of this correlation coefficient is 0.67 which at the same time indicates the joint contribution of the mentioned input variables in the formation of the output variable. Their positive relationship also indicates an identical course of action when it comes to the formation of the output variable of the *WEF Network Readiness Index*. On the other hand, the highest negative correlation, which is -0.88, has variables the *Agriculture value added percentage of GDP* and *Farmers using Internet/100 habitants*, which means that these variables have a diametrically opposite effect on the output variable and are not dependent on each other.

Table 2. Correlations between agricultural mobile technology indicators

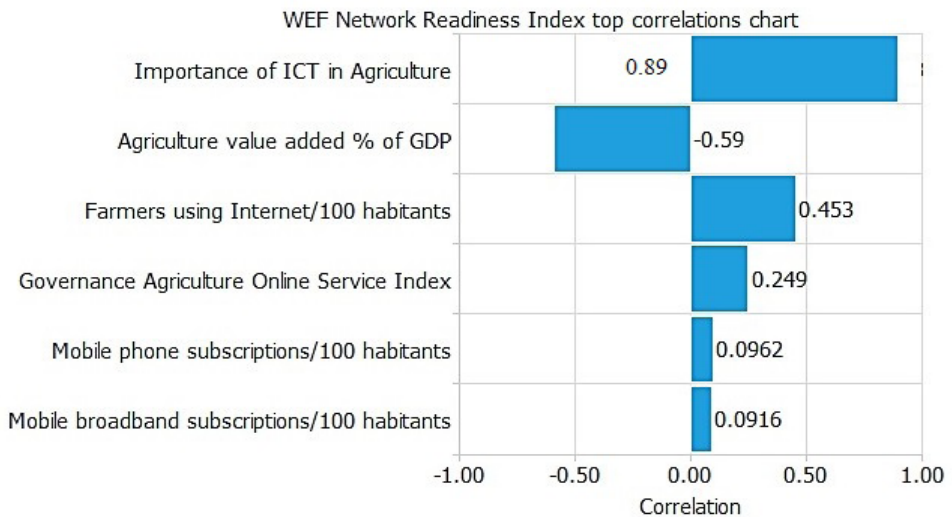
	Agriculture value added (% of GDP)	Mobile phone subscriptions/100 habitants	Farmers using Internet/100 habitants	Mobile broadband subscriptions/100 habitants	Governance Agriculture Online Service Index	Importance of ICT in Agriculture
Agriculture value added (% of GDP)	1	-0.45	-0.88	-0.74	-0.65	-0.28
Mobile phone subscriptions/100 habitants		1	-0.12	-0.21	0.29	0.16
Farmers using Internet/100 habitants			1	0.67	0.54	0.24
Mobile broadband subscriptions/100 habitants				1	0.51	0.41
Governance Agriculture Online Service Index					1	0.11
Importance of ICT in Agriculture						1

Source: Authors' calculation

Authors have considered that might be interesting to look for dependencies between single input and single target (output) indicator. This task calculates the values of the correlation coefficient between all inputs and target indicator (Figure 3). Correlation close to 1 means that a single target is correlated with a single input. On the other hand, correlation close to 0 means that there is not a relationship between an input and a target variable. Note that, in general, the target depends on many inputs simultaneously. Figure 3 shows that indicator *Importance of ICT in Agriculture* has the highest coefficient of correlation with *WEF Network Readiness Index* (0.890). It can be concluded that farmers which understand the importance of using ICT in agriculture are more likely to adopt a mobile technology perspective as a part of smart farming concept. In addition, this conclusion is also reflected in the neural network architecture (Figure 6).

Also, the lowest value of the indicator which represents *Agricultural value added percentage of GDP* (-0.59) means that there is no relationship between smart farming and its mobile technology perspective in increase GDP. This means that some countries don't implement smart farming concept in the appropriate agricultural areas and because of that wrong digitalization policy in agriculture sometimes there is no agricultural additional value.

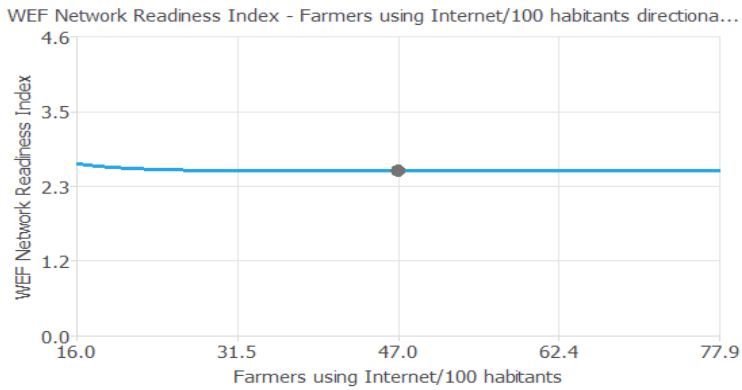
Figure 3. Correlation coefficient values between all inputs and output



Source: Authors' calculation

It is very useful to see how the outputs vary as a function of a single input, when all the others are fixed. This can be seen as the cut of the neural network model along some input direction and through some reference point (Figure 4). The next plot shows the output *WEF Network Readiness Index* as a function of the input *Farmers using Internet/100 habitants*. The x and y axes are defined by the range of the variables *Farmers using Internet/100 habitants* and *WEF Network Readiness Index*, respectively. The grey point represents the reference point.

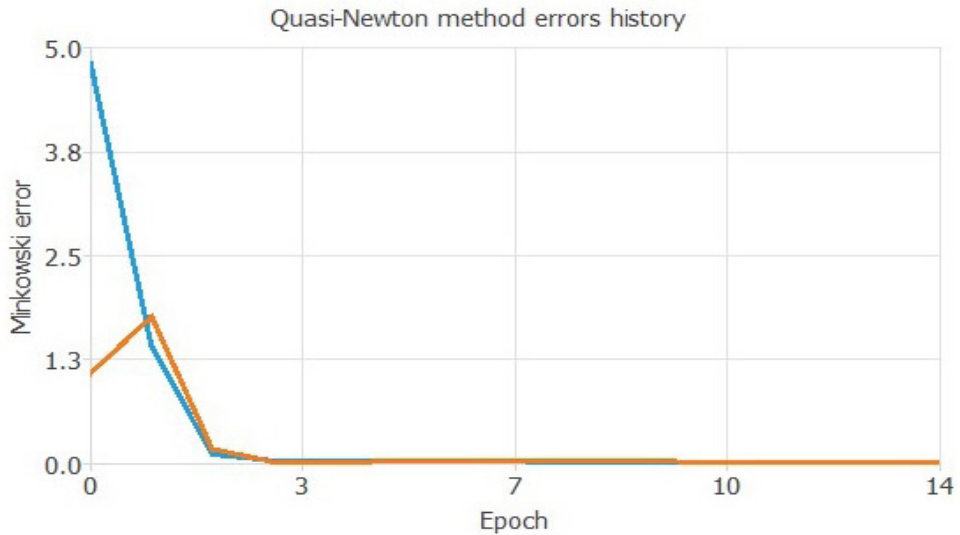
Figure 4. Reference point for selected input and output



Source: Authors' calculation

For data collection an incremental order of selected indicators was used in the Neural Designer - Machine Learning Software. This software solution is based on a wide range of advanced neural network algorithms which can detect, identify relationships and predict trends between inputs and outputs in the form of applied mobile technology perspective. This incremental order method starts with a small number of neurons and increases the complexity until some stopping criteria is met. Also, input selection in this predictive model for smart farming is based on growing inputs method. This method calculates the correlation of every input with every output in the data set and creates neural network that only contains the most correlated input with the properly output.

The procedure used to carry out the learning process is called training or learning strategy. “The training strategy is applied to the neural network in order to obtain the best possible loss” (Neural Designer, 2020). The type of training is determined by how the parameters in the neural network are adjusted. The quasi-Newton method is used here for training. It is based on Newton’s method, but does not require the calculation of second derivatives. Instead, the quasi-Newton method computes an approximation of the inverse Hessian at each iteration of the algorithm, by only using gradient information (Song, 2018). Figure 5 shows the training and selection errors in each iteration. The blue line represents the training error and the orange line represents the selection error. The initial value of the training error is 4.80926, and the final value after 14 epochs is 0.00380483. The initial value of the selection error is 1.08657, and the final value after 14 epochs is 0.0180442.

Figure 5. Smart farming neural network model validation and correction through iterations/epochs

Source: Authors' calculation

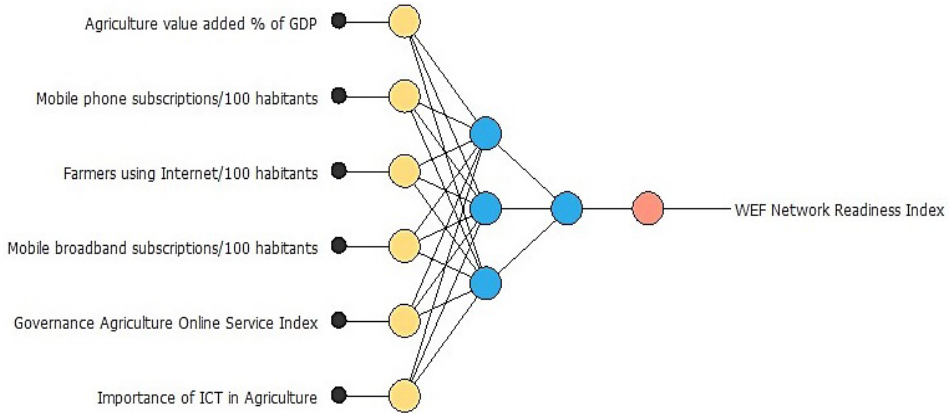
The model validity is based on the so-called Minkowski error (R), which referent value is 2. In this model, Minkowski error is $1.2 \leq 1.3 \leq 2$ which confirmed model justification especially after fourteen epochs. Minkowski error can be expressed by this formula:

$$E = \frac{1}{R} \sum_n \sum_{k=1}^c |y_k(x_n; W) - t_{kn}|^R \quad (1)$$

where E is error function, R is number 2, y_k is output layer, x_n is input layer, W is weights array, t is time (Christiansen et al., 2014).

Finally, the graphical representation of the resulted deep architecture of the mobile technology smart farming indicators is shown in Figure 6. It contains a scaling layer, a neural network and an unscaling layer. The yellow circles represent scaling neurons, the blue circles perceptron neurons and the red circles unscaling neuron. The number of inputs is 6, and the number of output is 1. The complexity of the neural network architecture is 3, represented by the numbers of hidden neurons.

Figure 6. Neural network architecture for agricultural mobile technology indicators



Source: Authors' calculation

The predictive model takes the form of a function of the output with respect to the five inputs. The mathematical expression represented by the neural network is written below:

$$\begin{aligned}
 &\text{scaled_ImportanceofICTinAgriculture} = 2 * (\text{ImportanceofICTinAgriculture} - 0) / (5.23 - 0) - 1; \\
 &\text{scaled_input_2} = 2 * (\text{input_2} - 0) / (5.23 - 0) - 1; \\
 &\text{scaled_input_3} = 2 * (\text{input_3} - 0.06) / (0.7 - 0.06) - 1; \\
 &\text{scaled_input_4} = 2 * (\text{input_4} - 0) / (5.23 - 0) - 1; \\
 &\text{scaled_input_5} = 2 * (\text{input_5} - 0) / (5.23 - 0) - 1; \\
 &y_{1_1} = \tanh(-1.53438 + (\text{scaled_ImportanceofICTinAgriculture} * -0.580294) + \\
 &\quad (\text{scaled_input_2} * 1.78343) + (\text{scaled_input_3} * 0.653686) + (\text{scaled_input_4} * \\
 &\quad 0.234748) + (\text{scaled_input_5} * 0.413798)); \\
 &y_{1_2} = \tanh(1.79453 + (\text{scaled_ImportanceofICTinAgriculture} * 0.665284) + \\
 &\quad (\text{scaled_input_2} * -0.0348502) + (\text{scaled_input_3} * -0.251141) + \\
 &\quad (\text{scaled_input_4} * 0.0844995) + (\text{scaled_input_5} * 2.1203)); \\
 &y_{1_3} = \tanh(2.0106 + (\text{scaled_ImportanceofICTinAgriculture} * 2.24073) + \\
 &\quad (\text{scaled_input_2} * -0.116955) + (\text{scaled_input_3} * -0.416228) + \\
 &\quad (\text{scaled_input_4} * 0.046192) + (\text{scaled_input_5} * -1.38855)); \\
 &\text{scaled_WEFNetworkReadinessIndex} = (-0.595374 + (y_{1_1} * 0.0231964) + \\
 &\quad (y_{1_2} * 1.5265) + (y_{1_3} * -0.186018)); \\
 &\text{WEFNetworkReadinessIndex} = \\
 &\quad (0.5 * (\text{scaled_WEFNetworkReadinessIndex} + 1.0) * (4.64 - 0) + 0).
 \end{aligned}$$

This expression takes the inputs: *Agriculture value added percentage of GDP*, *Mobile phone subscriptions/100 habitants*, *Farmers using Internet/100 habitants*, *Mobile broadband subscriptions/100 habitants*, *Governance Agriculture Online Service Index*, *Importance of ICT in Agriculture* and *WEF Network Readiness Index* as output. The future analysis may go toward solving regression issues through the scaling layer, the perceptron layers and the unscaling layer in feed forward fashion.

Conclusions

The digitalization of agriculture is one of the most significant innovations in the agricultural sector. This process has led to a significant increase in value added in the production process and ultimately to an increase in the percentage share of the agricultural sector in GDP. The usage of mobile technology as an integral part of the digitalization process and the smart farming concept is certainly a basic factor in using ICT in agriculture. In order for mobile technology and its application support to experience full expansion, it is imperative that each country, or farm, shows a willingness to embrace digital innovations. By analysing the relationships of the variables, the importance of implementing ICT in agriculture has proven to be a key indicator of the country's willingness to embrace digitalization in agriculture. Namely, the country that has the highest index of applied ICT in agriculture can significantly increase the level of added value. This indicator had the greatest influence on output neural network structure, as can be seen in the analysis in the paper. The highest positive correlation was observed between *Farmers indicators using Internet/100 habitants* and *Mobile broadband subscriptions/100 habitants*, while the highest negative ratios are indicated by the *Agriculture value added - % of GDP* and *Farmers using the Internet/100 habitants* indicators.

“Cost optimization techniques may be developed based on big data analytics that could be implied upon large scale agricultural sector” (Ray, 2017, p. 417) through mobile technology and its smartphones and other smart agri-devices as an integral part. This leads to the agricultural predictive analytics because the large amount of farm data could be processed. Specifically, mobile technology thus enables farmers to anticipate further farm production through applications and smartphones. Satellite imagery of farmland registering on smartphones with mobile technology reduces monitoring costs and gives a real-time view of the farm. This allows farmers to respond quickly to certain anomalies such as pest attacks on plant crops. In addition to practical application on the farm itself, mobile technology also reduces the administrative and operational costs.

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Conflict of interests

The authors declare no conflict of interest.

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THEORETICAL BASES OF FORMATION AND DEVELOPMENT OF AGRICULTURAL ORGANIC PRODUCTION IN UKRAINE IN MODERN ECONOMIC CONDITIONS

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ABSTRACT

The article discusses the current state of the global market for organic products and the main trends of organic production in Ukraine. The analysis of the main indicators of the leading countries in the production and sale of organic products is carried out. Based on a comparison of the indicators of the Ukrainian market for organic products with world leaders, it was concluded that the Ukrainian market for organic products needs: the formation and implementation of a national management model, improving legislation and the structure of certification organizations, drawing up a program of financial, information and marketing support for domestic producers.

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Introduction

In modern economic conditions, the effective management of agricultural production depends on the degree of its balance and applied organizational and economic methods. The main goal of organic farming is to produce high quality food in precisely defined conditions (Stojic, Dimitrijevic, 2020). Public awareness has reached such a level of development when an increase in the volume of production is not the only criterion for the activity of agricultural production. The preservation of natural resources becomes more and more important. This is due to the constantly increasing anthropogenic pressures on the environment – soil cover, biological organisms, atmosphere and water resources, due to what there is the violation of natural balance.

The formed dilemma of the further development of agricultural production and the preservation of the natural environment as the basis for the life of future generations predetermined the search for alternative options for the development of the industry. Over the past three decades, leading foreign scientists and agricultural practitioners, in order to solve territorial environmental problems and improve food quality, have gradually switched to organic farming methods, turning this area of production into

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a strategically important and significant sector of the economy. The most obvious advantage of the organic farming, among many benefits, over the other agricultural production methods is usage of environmentally sustainable systems in crop and livestock production (Čagalj, Grgić, Gugić, 2020). Organic farming represents a comprehensive system of farm management and food production that protects environment, preserves biodiversity and natural resources. The sustainability of organic production is reflected in the rational use of natural resources, without exhausting, but rather through maintaining and increasing their diversity, leaving no negative impacts on the environment (Roljević Nikolić, Vuković, Grujić, 2017).

In particular, the agrarian sector of the Ukrainian economy greatly influences the formation of gross domestic product, thereby ensuring the country's food security. One of the strategic tasks of the state during the formation of food security is the greening of agricultural production, an important place in which is given to increasing the volume of organic production.

Ukraine has everything necessary for the formation of agriculture, focused on the production of organic products: long-term agricultural traditions, vast areas of agricultural land, as well as an insignificant level of intensification and chemicalization of the agricultural sector in comparison with industrialized countries. Taking into account the considerable resource potential of the country in the agricultural sector, it is of great importance to provide a mechanism that would contribute to the development of organic agricultural production in Ukraine and increase on the basis of this competitiveness of the national economy.

Materials and methods

The theoretical and methodological basis of the study is the dialectical method of cognition, a systematic approach to the study of economic phenomena and processes, scientific works of domestic and foreign scientists on the problems of theory and practice of ensuring the development of organic production. Special research methods are also used, in particular: abstract-logical – to generalize the components of the mechanism for ensuring the development of organic production, formulating conclusions; economic and statistical – while analyzing the current state and predicting the prospects for the development of organic production in Ukraine and the world; graphic – when constructing graphic images of the processes under study.

Results and discussions

Ecological and economic essence of agriculture focused on the production of organic products

The feasibility of forming the theoretical foundations of economic relations that are determined in the process of interaction between human society and the natural environment, as well as the need to develop methods for regulating the rational use of natural resources, predetermined the emergence of a new scientific direction –

environmental economics, which arose on the basic principles of the scientific theory of welfare and neoclassical economic theory.

The regulatory framework of environmental economics is the theory of external effects of economic production, which have a positive or negative effect on the opposite side. The theory of external effects is based on the fact that environmental pollution causes economic damage, and this damage can be materially estimated and, if necessary, monetary compensated. The English economist A. Pigou was one of the first to study the costs associated with external effects. The scientist proved that environmental pollution leads to an increase in external costs. At the same time, the main goal of any organization is to minimize production costs in order to increase profits, as a result - the desire to reduce environmental costs. In this case, environmental pollution is not considered as production costs and, accordingly, the cost of eliminating pollution is not included in the cost of production. With this approach, society, individual organizations, citizens will be forced to spend their additional material and financial resources on the elimination of environmental damage. Consequently, the total social costs and production costs will be formed from individual and external costs, expressed in monetary value (Pigou, 1924).

The representative of the neoinstitutional orientation in economic theory, R. Coase, believes that the root cause of external effects is the lack of clearly established ownership rights to natural resources and environmental objects. The author believed that if this shortcoming is eliminated, then optimality in the quality of the environment can be ensured in market conditions. In this case, the role of the state will be to establish such ownership rights (Coase, 1990).

Nevertheless, in spite of the achievements of scientists in the field of the theory of external effects, the main problems of taking into account external effects in the formation of the economic mechanism of environmental management have not yet been widely reflected in scientific research.

The further formation and development of social production dictates the need to take into account environmental factors and principles. It requires the search for new directions in the field of environmental management, based on maintaining the basic conditions that are important for human life and social production – clean air, water and soil resources, and neutralizing the possibility of depleting these resources. Objectively, there is a need of development of the concept of ecological-economic balance. Thus, the problems closest to those identified were those contained in the Concept of Sustainable Development of the World Community, presented at the United Nations conference in the early 90s, which was formed as an alternative to the prevailing stereotype of “consumer society” and the main economic development paradigms.

It is believed that the concept of “sustainable development” was first mentioned in 1987 at an annual report presented by the World Commission on Environmental Protection, as “a development process in which existing social needs are met without the risk of likely harm to the process of satisfying the needs of future generations” (United Nations, 1992).

As theoretical studies show, the problems of sustainable development are often associated only with the state of the natural environment, not taking into account or underestimating the equally significant factors associated with sustainable development - political, social, economic, cultural, national-ethnic, etc. In the modern scientific environment, there is a position that is based on the principles of sustainable development. It is associated with the need to move from the consideration of the economic system in its pure form to the analysis of ecological and economic systems. Theoretical and methodological foundations of the sustainability of agricultural production in the ecological and economic aspect are investigated in the works of many economists. For example, A. Zhuchenko believes that a unilateral, mainly technogenic and chemical strategy for intensifying agricultural production, based on the application of ever-increasing costs of irreplaceable energy resources, has shown its failure to ensure sustainable, resource-energy-efficient and environmental development of agricultural production. As a result, the author proposed the use of a strategy of adaptive intensification, focused on the integrated use of chemical, technological and biological factors in order to increase the efficiency of agricultural production. This strategy includes: 1) elimination of environmental pollution and destruction when chemical fertilizers, plant protection products are applied, and gentle soil treatment is used; 2) bio-greening of technological processes of intensification; 3) reduction of energy costs; 4) production of quality and safe food and industrial raw materials (Zhuchenko, 1994).

In partnership with other United Nations Member States, Ukraine has undertaken the obligation to adapt and implement the global goals and objectives of the “Sustainable Development Goals”, which were approved at the United Nations Summit on Sustainable Development (United Nations, 2015), taking into account national economic, environmental, social, legal and other specifics of the strategy of balanced (sustainable) development of Ukraine until 2030. In this regard, the President of Ukraine issued a Decree “On Sustainable Development Goals of Ukraine until 2030” of September 30, 2019 (President of Ukraine, 2019), which names the goals and outlines tasks for organic production through the prism of solving problems to overcome poverty, prevent hunger, ecology, nature management, environmental protection, use of land and other natural resources in agriculture, investment attraction, etc.

It is rightly emphasized in the legal literature on the strategic importance of cooperation between Ukraine and the European Union in such areas of cooperation as promoting modern and sustainable agricultural production, taking into account the need to protect the environment, in particular, disseminating the use of organic production methods and the use of biotechnology through the introduction of best practices in these areas (Urkevych, 2015).

Based on foreign experience in organic agricultural production, some Ukrainian organizations in the agricultural sector are starting to turn agricultural production to alternative and innovative methods. The land use of these organizations is based on the use of an ecological fertilizer system that allows the use of organic and green fertilizers instead of chemical natural ones. Agrotechnical soil cultivation in this management system is considered as energy-saving. It is based on the combination of plowing and surface soil cultivation in accordance with the requirements of the climatic and territorial landscape conditions of the area, as well as the use of combined units. Over the past two decades, Ukrainian agriculture has been trying to introduce organic farming methods into agricultural production and creating specialized companies for the cultivation and processing of organic agricultural products in various regions of Ukraine.

It should be noted that a significant share of these companies was formed with the financing and support of a number of European countries - Germany, Switzerland, Denmark. For example, a foreign investor is IFC, which provided \$ 95 million to agro holding "Kernel" for working capital replenishment (Fedchyshyn, Ignatenko, Shvydka, 2019).

Most of the products manufactured by these enterprises are supplied to the ecological markets of European countries, which make producers of ecologically clean products dependent on market conditions, hampering their orientation on the domestic market of ecological products.

Ukrainian land has always aroused interest from foreign investors as a means of production and an object of investment. The tendency to increase such interest has not changed for a long time, and in the near future there are no preconditions for reducing the interest of the land. Taking into account the fundamental importance of the land as a strategic asset for any country, the regulation of property relations and land use occupies a special place in all developed legal systems (Fedchyshyn, Ignatenko, Bondar, 2019).

It should be noted that according to the study "The world of agriculture. Statistics and emerging trends", conducted in 2017 by IFOAM and the Research Institute of Organic Agriculture (German: Forschungsinstitut für biologischen Landbau - FiBL), there were 181 countries engaged in organic farming (table 1) (Wilier, Lernoud, 2019).

Table 1. Organic agriculture: key indicators and leading countries

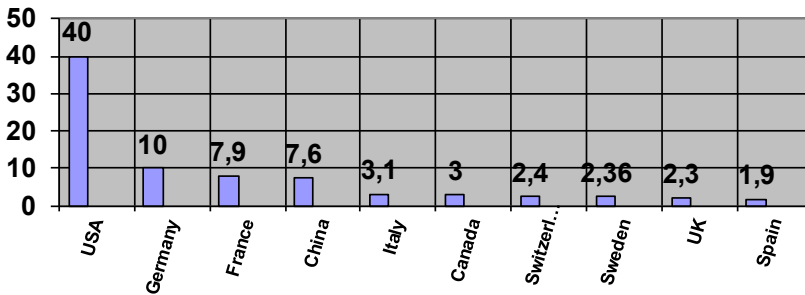
Indicator	Quantity	Leading countries
Organic producers (countries)	181 countries	New countries (2019): Brunei, Cape Verde, Hong Kong, Monaco, Sierra Leone
Organic agricultural land	69.8 million ha	Australia (35.6 million ha), Argentina (3.4 million ha), China (3 million ha)
Organic producers	2.9 million	India (835000), Uganda (210352), Mexico (210000)
Organic market	90 billion euro	USA (40 billion euro), Germany (10 billion euro), France (7.9 billion euro)
Consumption of organic products per capita	10.8 euro	Switzerland (288 euro), Denmark (278 euro), Sweden (237 euro)

Source: FiBL survey 2019, based on national data sources and data from certifiers (Wilier, Lernoud, 2019)

In 2017, there were 2.9 million organic producers in the world, compared to 200 thousand in 1999. Moreover, 69.8 million hectares of certified agricultural land were allocated for organic farming (11 million hectares in 1999). There are only 93 countries in the world where the production and marketing of organic products is legislatively fixed and regulated by legal acts. In other countries, due to the lack of a legislative framework for regulating issues in the organic agriculture industry, the production of organic products is limited to the choice of the manufacturer who refused to use mineral fertilizers and plant protection products.

The global market of organic products in 2017 amounted 90 billion euro. Moreover, an increase in the market can be traced every year, starting in 1999. The country with the largest market for organic products is the United States (40 billion euro), followed by Germany with a market size of 10 billion euro. The third and fourth places are occupied by France and China (7.9 billion euro and 7.6 billion euro, respectively) (figure 1) (Wilier, Lernoud, 2019).

Figure 1. Countries with significant organic market volumes



Source: FiBL survey 2019, based on national data sources and data from certifiers (Wilier, Lernoud, 2019)

Organic distribution channels in the world vary from country to country. In the past, the countries involved in the retail trade, showed a steady growth in their volumes of organic markets. As an example of such countries we can name Austria, Denmark, Switzerland, United Kingdom (table 2) (Wilier, Lernoud, 2019).

Table 2. Sales of organic products through various sales channels in Western European countries, million euros

Country	General retailers	Specialized retailers	Direct sales	Other channels
Austria	1398	325	–	–
Belgium	354	177	38	63
Denmark	1520	81	–	–
France	3652	2874	1006	390
Germany	5930	2910	–	1200
Italy	1595	865	–	677
Switzerland	1979	247	130	80
United Kingdom	1677	405	–	322

Source: FiBL-AMI survey 2019, based on national data sources (Wilier, Lernoud, 2019)

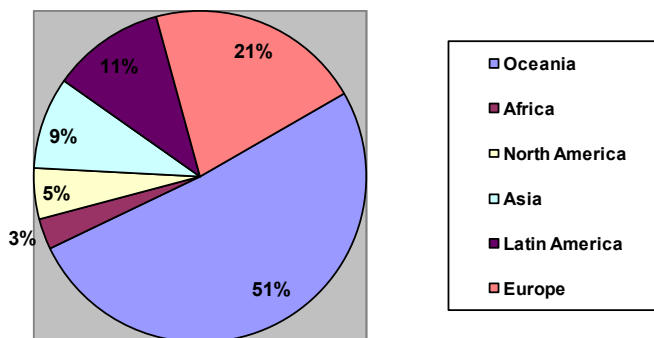
However, the financial crisis has shown that dependence on supermarkets is dangerous. Supermarkets, in turn, consolidated their position as a driving force in the market, so specialized sales channels are faced with huge competition.

It should be noted that there is a gradual increase in demand for organic agricultural products and in the domestic market of Ukraine. One of the most important channels of distribution and promotion of organic products in Ukraine are small specialized health food stores in major cities (for example, organic shops “Натур Бутик”, organic grocery store network “Eco-Chic”, etc.). Supermarkets are the most powerful organic distribution channel in Ukraine (Bezus, 2011). Supermarket “Good Wine” sells domestic and imported organic production, combining it in the “Good Food” section. Supermarket “Megamarket” represented to consumers separate sections with organic products. Certified organic products are also presented in supermarkets “Auchan”, “Delight”, “Billa”, “Furshet”, “Novus”, etc., with special attention on organic dairy and meat products, cereals, flour, bakery products, jams, juices, eggs, honey, teas, vegetables, fruits, etc. (Boyko, 2011). Consumer demand and the emergence of organic agricultural products in supermarkets have led to a significant increase in sales, even though its share is less than 1% on store shelves (Kostin, 2011).

There are different views on the demand for these agricultural products: some experts claim that a segment of consumers, which are ready to pay a higher price for ecologically clean agricultural food (especially in large cities), has already emerged in the country, while others believe that such products have not yet been consumed. However, as we can see, there is a trend of increasing demand in the organic agricultural market in the world and increased interest on the part of business entities. Therefore, it can be argued that production of such products has increased (Chernishov, Levchenko, Mazurkevich, 2016).

At present, there are 69.8 million hectares of organic land worldwide. Only lands that have undergone a transitional period are considered. The region with the largest area of organic land is Oceania, with 35.9 million hectares certified for organic farming. This is followed by Europe with an area of 14.6 million hectares, Latin America - 8 million hectares, Asia - about 6.1 million hectares, North America - about 3.2 million hectares and Africa – 2.1 million hectares (figure 2) (Wilier, Lernoud, 2019).

Figure 2. Distribution of organic lands by regions of the world



Source: FiBL survey 2019 (Wilier, Lernoud, 2019)

In Oceania, more than a half (51 %) of the world's organic land is concentrated. Europe is a region that has shown fairly solid organic land growth over the past few years. The largest share belongs to countries such as: Spain (2.1 million hectares), Italy (1.9 million hectares), France (1.7 million hectares). In this rating, Ukraine occupies the 20th place with an area of organic land of 411.2 thousand hectares (Lialina, Matviienko-Biliaieva, 2019). Europe accounts for 21% of the world's organic land, followed by Latin America (11%).

The increase in the total area of agricultural organic land is due to the transformation of existing arable land and gardens in accordance with the standards of organic agriculture, as well as through the development of new territories. For example, in Europe, out of 12.7 million hectares of organic land, 8 million have already passed transitional period, and the others are in the transition to organic production. This trend indicates that in the near future we can expect an increase in the supply of organic products on the market.

On average, the area of agricultural land per capita in Europe is 0.43 hectares, in Ukraine - 0.90 hectares, arable land - 0.24 and 0.67 hectares respectively. The share of certified organic land in the total agricultural area of Ukraine is almost 0.7% (Cabinet of Ministers of Ukraine, 2017). Ukraine ranks first in the Eastern European region in terms of certified organic arable land, specializing mainly in the production of cereals, legumes and oilseeds (Chernishov, Levchenko, Mazurkevich, 2016).

It should be emphasized that Ukraine has all the necessary conditions for the production of organic products and their further development, which is able to meet not only domestic demand, but also to occupy a niche in the world market. Some steps have already been taken in this direction. The total area of agricultural land in Ukraine occupied by organic production in 2017 was 420 thousand hectares, which is 2.5 times higher than the corresponding figure of 2002 (International Federation of Organic Agriculture Movements, 2019).

According to official IFOAM data, the number of farms engaged in organic farming in Ukraine is increasing year by year. If in 2002 there were 31 such enterprises, then in 2017 there were 375 organic farms. As a result, there is an increase in organic production in the domestic market, increasing interest from the processing industry (International Federation of Organic Agriculture Movements, 2019). If the general tendency of development of organic agro-production in Ukraine is maintained, in 2020 the area of organic crops can increase to 507 thousand hectares, and the number of certified organic farms will increase to 575.

However, a considerable part of organic agricultural production (about 80%) is exported abroad due to the lack of development of domestic markets. The main export market for Ukrainian organic products is the European Union. The Netherlands, Germany, Switzerland, the Czech Republic, Poland, Italy, Greece, Moldova and Norway are the main countries to which organic products are exported from Ukraine. Middle Eastern countries, such as the United Arab Emirates, are beginning to become interested in Ukrainian certified organic products.

The development of organic agriculture strongly depends on economic factors, mainly including demand, prices of organic products and the level of producers' support (Baer-Nawrocka, Błocisz, 2018).

The practice of farming, focused on the production of organic products, proves that organic farmers do not earn more income due to their higher production costs including labor, insurance and marketing charges (Uematsu, Mishra, 2012). Profitability of organic farms is very dependent on higher prices of production (Krause, Machek, 2018). According to Nieberg's and Offermann's research, it was easier for the organic farms to achieve higher prices for the crop production, but more difficult for the livestock production (Nieberg, Offermann, 2003). So, consumers' preferences are the fundamental factor in the success of the market for organic products. Numerous studies have found that health benefits are the main motives for buying organic food products (Wier, Calverly, 2002; Roitner-Schobesberger et al., 2008). The importance of health and environmental concerns reflects the growing affluence of consumers (Ham, 2019).

For example, according to the research conducted in Croatia (Čagalj, Haas, Morawetz, 2016), consumers are ready to spend more for fruit and vegetables from organic production (apples, tomatoes), if there is proof of organic production and because of the belief in health benefits of organic food. The same support we get from the research results conducted in Sweden (Bosona, Gebresenbet, 2018).

Consumers mostly describe organic food as food that is ecologically acceptable, has a positive effect on health and has good sensory quality, while the main disadvantages are high price and insufficient representation on the market (Gajdić, Petljak, Mesić, 2018).

So, foreign markets of ecological food are mainly targeted at consumers who are able and willing to buy a quality product at a higher cost. In Ukraine a class of wealthy people has also formed, but it will be wrong to orient the organic food market only to wealthy people.

We believe that Ukrainian agricultural producers of organic products need an appropriate segment of the food market, aimed at consumers who care about maintaining their health and the health of their loved ones. Consumers of organic products can be children (baby and diet food); people with poor health; patients undergoing rehabilitation, spa treatment; people with food allergies; agritourists and other organic products.

The importance should be given to scientific research in the direction of forming a strategy for the transition of a particular segment of agricultural producers to the organic way of farming.

Methodological aspects of the formation of the concept of agricultural development, focused on the production of organic products

When forming a methodological approach to the development of the system of land relations in the direction of agricultural production of organic products, there is a real opportunity to introduce important adjustments to land relations at the local level. This is due to the unevenness of the factors of natural and economic environment. In addition

to the political orientation of the authorities, there are still quite objective reasons that have a serious impact on the level of development of land relations at the local level. A modern feature of agricultural lands is not only a general decrease in their area, but also deterioration in the quality of their land, and a decrease in the soil-biological and economic fertility of the land.

In addition, today, a number of reasons can be identified that slow down the development of organic agricultural production in Ukraine: 1) difficulties with investing in projects for the development of production and processing of organic products; 2) lack of a market for organic products; 3) lack of qualified specialists in the field of greening land use and certification of organic products.

The current situation in the agricultural sector of Ukraine does not imply a quick and widespread rehabilitation of it. As a result, it is required at the state level to define clear strategic and tactical goals for the systematic development of agriculture oriented towards the organic production. It is necessary to justify specific ways to achieve these targets, clearly define measures of state support, and outline the sequence of stages of reforming the system of land relations with organic development guidelines.

It seems that the awareness of the importance and need for a gradual transfer of the agricultural land use system from traditionally developed to organic will give a new impetus to the development of the entire agricultural sector. A systematic analysis and assessment of the possibility of using the world experience in organic farming in conjunction with the established traditions of land use are a prerequisite for the strategic development and strengthening of the position of agriculture in the system of the national economy.

It should also be noted that due to the increasing growth in the consumption of organic products in the economically developed countries of the European Union, North America and Asian countries, and also taking into account the limited land resources suitable for the purpose of maintaining an organic land use system in these countries, it can be assumed that in subsequent years, developing countries will be able to take a leading place in the global production and export of organic food. Ukraine, with its significant potential in increasing the land area suitable for the production of organic products, the availability of labor resources in rural areas, can occupy its niche in the global organic food markets.

In this regard, it is necessary to make timely and comprehensive decisions in determining the nomenclature of organic products, the formation of mechanisms of state support for agriculture, focused on the production of organic products and the promotion of organic products on domestic and foreign markets.

The development of agriculture in Ukraine, focused on the production of organic products should be based on solving a list of interrelated priorities:

- conducting land monitoring in order to determine the land potential suitable for the production of organic products;

- justification of methodological foundations for the development of a mechanism for the formation and development of agriculture, focused on the production of organic products;
- development and co-financing of programs aimed at the conservation and restoration of soil fertility of agricultural lands;
- implementation of programs aimed at improving knowledge and developing skills in maintaining organic land use systems for agricultural producers of various organizational and legal forms of ownership in order to overcome the deficit of economic thinking and to establish an adequate level of education;
- development of national standards for certification of agricultural organic products, as well as the creation of conditions for organic products to pass international environmental certification.

The fundamental objective of the organic land use system is the development of incentives for the production and sale of organic food. The emerging system of organic farming should include the following activities:

- development and adoption of the regulatory framework necessary for the effective functioning of the system of organic agricultural production and markets for organic products;
- introduction of the necessary amendments to the current tax legislation aimed at supporting and economic stimulation of the developing organic sector of agricultural production;
- development of a set of measures and the adoption of a state program to support agricultural producers of organic products;
- providing consulting and information support to organic producers and the formation of an environmental culture of consumers;
- organization of an environmental management system in national agricultural production;
- organization of a centralized marketing service promoting the organic production of Ukrainian agricultural producers in domestic and international markets.

The main condition for the effective functioning of the proposed system is the development of an economic mechanism for organizing agricultural production of organic products both in large agricultural organizations and in small organizational and legal forms of management.

Today, there are many parties willing to engage in organic production in Ukraine and invest in its development, but they need state support, especially during the conversion period. In Ukraine, there is no government strategy and program to support the

development of organic farming, which hinders the formation of the organic agricultural market due to the uncertainty of investors, credit institutions, farmers themselves about the feasibility, effectiveness and absence of risks of such production. Therefore, first of all, it is necessary to introduce a state program for the development of production of organic agricultural products, which will anticipate the development of this sector of economy and create the necessary frameworks for the coordination and control of organic production, as well as contribute to the expansion of markets for organic products. The main financial and economic measures for implementing state support for the development of organic agricultural production in Ukraine should include: subsidizing interest rates on loans, subsidizing part of the costs of production and crop insurance for organic producers, preferential lending and taxation, as well as improving mechanisms for regulating regional markets.

Thus the production of organic agricultural products, as a promising form of economy in Ukraine, depends on the method and extent of government support. Such support for organic producers abroad has become an effective tool for stimulating the development of organic farming.

Conclusions

Having considered the major global trends in the development and management of organic production and considering Ukraine's accession to the World Trade Organization and the association with the European Union, we can conclude that the Ukrainian market for organic products runs the risk of facing the expansion of foreign producers, which operate in much more favorable financial and legal conditions. Thus, in order to ensure that the Ukrainian market for organic products does not die as soon as it starts functioning, it needs to form and implement a national management model that will take into account both the interests of developing the domestic market and the interests of exporting organic products. Improving the legislation and structure of certification and supervisory organizations, drawing up a program of financial, informational and marketing support for domestic producers of organic products are those measures without which the development of Ukrainian market for organic products in the face of fierce international competition is almost impossible.

Conflict of interests

The authors declare no conflict of interest.

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RASPBERRY AS A POTENTIAL COMMODITY EXCHANGE MATERIAL IN THE REPUBLIC OF SERBIA

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ABSTRACT

Commodity exchange has a very long tradition and in a modern business conditions. Serbia ranks among the world's largest producers of raspberries, exporting more than 90% of total production of this fruit. Considering that Serbia is among global leaders in the export of frozen raspberries and that the process of standardization of the quality and quantity of this type of fruit is relatively simple, the starting hypothesis is that Serbian raspberry can be traded at commodity exchange. The main objective of our research is to analyze the necessary conditions for formation and sustainable functioning of the raspberry commodity exchange, with the emphasis on testing the proposed model of the commodity exchange method of communication between primary raspberry producers (vendors), intermediaries (purchasers, raspberry dealers or exporters of raspberries) and end customers who buy raspberries. We surveyed 100 persons representing the key actors of the Serbian raspberry producers and proposed the model of raspberry trading through commodity exchange.

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Introduction

Raspberries represent a highly sought after commodity in the world market. Apart from being a delicious fruit that can be consumed without any further processing, raspberries are an essential input when it comes to the production of juices, jams, extracts and similar food and beverages. They are also very popular for their properties connected to health benefits. Numerous empirical studies confirm that raspberries can help control blood glucose for people who have high risk of diabetes (Schell et al., 2019; Di Xiao et al., 2019; Moreno, 2019). This medicinal property of raspberries is of great importance given that more and more adults in the world are facing this problem. For example, in the US, about 84.1 million of Americans over the age of 18 have diabetes, which is approximately 33.9% of its total adult population (National Diabetes Statistics Report, 2017). Additionally, it has been proven that some raspberry extracts can protect the skin against damage caused by UVB rays, by its anti-oxidant and anti-inflammatory properties (Pei-Wen Wang et al., 2019). Extracts of raspberry leaves and fruit has been proven to have an anti-oxidative and also anticancer effect, which has been proven on the example of Serbian wild raspberry (Veljković et al., 2018). The aforementioned benefits of consuming raspberries certainly add to the demand for these fruits in the global market. On the other hand, Serbia is one of the world's largest raspberry producers, so it is of great importance to consider the possibility of including Serbian raspberries in the stock exchange trading process.

Instability of prices of the goods and high transaction costs provide a strong theoretical background for establishment of commodity exchanges in all parts of the world (Nicholas, Jayne, 2012). In accordance with the level of development of the country, commodity exchanges can have a number of significant functions, the most important of which are the following functions: market risk management, reducing the risk of not fulfilling the obligations of the other party, increasing price transparency, reducing the risks related to collateral value, standardization of the quality of goods and providing direct access to the capital market through repo-transactions (Belozertsev et al., 2011).

Goods and commodities which are used for trading on commodity exchanges can be of various kinds with four categories of commodities generally distinguished in practice: energy (crude oil, gas, natural gas), metals (gold, silver, platinum and copper), livestock and meat (pork, beef, offal, etc.) and agricultural products (corn, soybeans, wheat, rice, cocoa, coffee, cotton and sugar) (Faruk, 2015). However, when it comes to trading of these commodities, authorized warehouses play a very important role, especially in the field of agricultural production (which is of particular importance in our case). In the warehouses, the evaluation of the quality and quantity of the commodities is being performed, after which farmers can obtain certificates. Storage certificates (merchandise records or warehouses receipts) are papers or electronic documents indicating the type of goods, quality, location and ownership of the goods deposited in the warehouse. Unlike private warehouses that only issue a certificate of receipt, record of goods (warehouse receipt) can be issued only by public (authorized) warehouses. Warehouse receipts allow depositors of agricultural products to have full

disposal of stored goods without physical contact with the goods. The easiest way to utilize a warehouse receipt for farmers is to give some kind of security or pledge over stored goods to get a favorable short-term loan. A warehouse receipt for banks is a much safer means of collateral security than other types of physical securities.

Commodity exchanges were created a long time ago, but in modern business conditions, their development is generally tied only to developed industrial countries. However, with the liberalization of the market and the development of information technology, they are also being introduced in developing countries (Rashid et al., 2010). The most important conditions for the development of the commodity exchanges are usually the following ones (Belozertsev et al., 2011):

- Supply and demand for goods must be large enough, i.e. there must be a large number of potential participants;
- Traded goods must be subject to standardization;
- Determining the price of goods should be left to the market, without monopolistic influence and state interference;
- The stock market should support major commercial interests;
- Leading commodity exchange participants should join their efforts towards establishing a functioning and reliable clearing system that would guarantee commodity exchange in a regulated market (stock exchange);
- Stock exchange services must be functional and accessible, with the necessary infrastructure facilities (accessible roads, adequate freight bridges, availability of transport companies, quality control services, efficient administration, storage and communication, etc.);
- Adequate support of the state is required, along with defining appropriate regulation and supervision of stock market trading.

It can be noticed that for the formation and efficient functioning of commodity exchanges, it is necessary to fulfill the conditions that come from the broader economic and political environment, which primarily include: physical, legal and regulatory infrastructure, macroeconomic stability, development of the commercial and financial sector and political support as well (Rashid et al., 2010). Also, the development of commodity exchanges requires fulfillment of specific conditions, such as: continuous production and adequate storage of products, homogeneity of products, large and active spot market and large price variability in the spot market.

All of the aforementioned conditions indicate that the development of commodity exchanges is a very complex and demanding process. In this regard, some countries have experienced certain restrictions during their process of development. The most common restrictions of their more intensive development are: lack of knowledge when it comes to stock market operations and risk management systems, low level of

development of agricultural production, low level of development of the agricultural and financial sector and inadequate agricultural policy (Belozertsev et al., 2011). If the volume of agricultural production is low, the potential exchange through the commodity market is also low, which indicates its financial unsustainability. In addition to that, when agricultural production is poorly organized, i.e. when farmers, intermediaries and traders are poorly educated, the chances of the successful establishment of a commodity exchange are very low. On the other hand, when the agricultural sector is very well organized but it consists of several large and vertically integrated companies, then those companies generally do not show interest in increasing market transparency (Maxwell, 2015). The highest level of market transparency is achieved when there is a lot of competition in the sector, that is, when goods are sold through auctions or commodity exchanges.

Regulatory Framework of Commodity Exchanges' Operations in Serbia

The unique mission of commodity exchange is to provide conditions for commodity market, as well as to monitor supply and demand and to form a balanced level of the price of goods. Regarding this, in most cases, commodity exchanges have significant government support and precisely-defined regulations, since they provide security in trading strategically important products. However, in Europe, the area of functioning of commodity exchanges is not regulated by some specific EU directives, so the regulatory framework of their functioning is different from country to country. In Serbia, commodities and commodity securities were treated differently over time in the past years. The Law on Commodity Exchanges, Commodity Exchange Operations and Stock Brokers (applicable from 1994 to 2002) defined goods as stock market material and commodity exchange as an institution that organizes trading of these materials. On the other hand, the Law on the Market for Securities and Other Financial Instruments (applicable from 2002 to 2011) completely neglected the goods and all market materials that derive from the goods. However, the Capital Market Act, which came into force at the end of 2011, provides the opportunity to develop a modern commodity exchange. This law defines transferable securities as all types of securities that can be traded on the capital market, except for payment instruments (Vlatković, Jovanović, 2016). In addition to this, the Law on Trade (Article 22) defines a commodity exchange market as a separate market institution that organizes interaction of buyers and sellers of standardized goods and goods which can be exchanged. In accordance with the same law, it is stipulated that the commodity exchange and stock exchange operations are regulated by a separate law. Regarding this, the Law on Commodity Exchanges was adopted in Serbia in 2019, which should contribute to a significant development of the commodity market in the observed area. The main objective of this law is to regulate and organize a fair, transparent and efficient market for standardized market material and protect the integrity of the market (Law on Commodity Exchanges, Art. 3).

The analysis of quantity and quality of the raspberries produced in Serbia

The most important conditions for including some commodities (in this case raspberries) in the commodity exchange trading process are: sufficient amount of commodities and the possibility of standardizing their quality (Belozertsev et al., 2011). In this regard, the following two parts of the paper will analyze the volume of raspberry production in Serbia and the current standardization of the quality of those raspberries.

The analysis of the quantity of raspberry production in Serbia

The total area where raspberries are planted and total raspberry production worldwide is analyzed based on the data published by The Food and Agriculture Organization - FAO (Table 1).

Table 1. The total area where raspberries are planted and total raspberry production worldwide

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
h (000)	96.9	106.3	106.8	102.2	92.5	93.3	101.1	114.3	118.2	124.9
t (000)	553.5	522.0	599.4	569.2	588.0	629.9	676.4	824.1	797.3	870.2

Source: FAOSTAT

It can be concluded that, on the global level, raspberry plantations have increased by about 25% in the last ten years. Regarding this, in the observed period, there was an increase in the production of this fruit. In the ten-year period which was observed, raspberry production increased by about 60%. Observed by regions, Europe is by far the largest producer of raspberries (Table 2).

Table 2. Production of raspberries by regions, total 2009-2018

Europe	70,50%
America	27,10%
Asia	2,10%
Africa	0,10%
Oceania	0,10%

Source: FAOSTAT

Out of the total raspberry production globally in 2009-2018, 70.5% were produced in Europe. The largest world producer of raspberries is the Russian Federation, which produced an average of 141,350 tons of raspberries annually, while Serbia ranks fourth with an average annual production of 90,802 tons in the last ten years (Table 3). However, although it is the largest producer, the Russian Federation does not cultivate many crops of raspberries per hectare. This is probably because they do not use state-of-the-art raspberry cultivation technology. The Netherlands, Italy, Switzerland and the USA have the highest raspberry crop yields per hectare (Sarić et al., 2009).

Table 3. The world's largest raspberry producers (average annual production in the period of 2009-2018)

Russian Federation	141 350 tons
Poland	109 564 tons
USA	94 459 tons
Serbia	90 802 tons

Source: FAOSTAT

According to the data referring to 2018 only, Serbia ranks third with a total production of 127,010 tons of raspberries (Table 4).

Table 4. The world's largest raspberry producers in 2018

Russian Federation	165 800 tons
Mexico	130 187 tons
Serbia	127 010 tons
Poland	115 613 tons
USA	99 215 tons

Source: FAOSTAT

Raspberry production in Serbia is getting more and more popular, which is also confirmed by the significant increase in its production over the last three years. The majority of raspberry production is intended for export, while only a small portion of production stays on the domestic market. Raspberries are mainly exported in frozen form, making Serbia the world leader in this type of export (Djurkovic, 2012). In 2017, the export of frozen raspberries from Serbia amounted to approximately 94,000 tons, which makes for about 29.9% of the world's total export of frozen raspberries (Serbia Food Industry). About half of raspberries produced in Serbia are exported to Germany, while about a quarter of produced raspberries is exported to France (Djurkovic, 2012; Nikolic, 2018). On the other hand, there is also an increase in raspberry imports from other countries into Serbia. It is estimated that in the period from 2010-2015 between 5,000 and 3,000 tons of raspberries were imported into Serbia in 2016, and around 5,000 tons were imported in 2016 alone. In 2017, raspberry imports to Serbia amounted to about 11,000 tons, an increase of more than 100% compared to 2016 (Nikolic, 2018).

At the end of 2017, raspberry crops in Serbia occupied an area of 21,861 hectares, which is approximately 12.5% of the total area under fruit in the observed area (SORS). Ten years ago, raspberries in Serbia were cultivated on an area of between 14 and 15 thousand hectares (Saric, Subic & Roljevic, 2009). In the region of Sumadija and Western Serbia, raspberries are grown on an area of 18,175 ha, which represents more than 80% of the total area under raspberries in Serbia. They are mostly produced on the territory of the municipalities of Ivanjica and Arilje, where approximately a quarter of the total raspberries planted in Serbia are located (Nikolic, 2016).

Raspberry production in Serbia is very profitable, which is confirmed by one empirical research conducted in Serbia (Kljajić et al., 2017; Wróblewska et al., 2019). For the formation and cultivation of raspberries, alongside irrigation, on the area of one

hectare, it is necessary to invest about 12,140 EUR. The earnings from the first year can be approximately EUR 9,300. It can be observed that the accumulation rate is about 77%, which means that the return on invested capital is already achieved in the second year (Kljajić et al., 2017). However, the buying up price of raspberries changes every year, which causes uncertainty and often dissatisfaction with the producers of this fruit. Independent appearance of individual producers on the foreign market mainly damages the reputation of Serbian raspberries, with financial effects well below the real level. Regarding this, the mutual competition among individual raspberry producers (purchasers) in the foreign market may be one of the important reasons for the lower price of this product (Sarić et al., 2009). One empirical research conducted in the region of Šumadija and Western Serbia points out that the mining sector has great potential for a successful and sustainable development of clusters, which can only be established by removing the existing limitations and constraints. For the development of clusters in the raspberry sector, it is important to meet the following important prerequisites: better organization of marketing channels through horizontal and vertical integration of all actors in the sector, strengthening cooperatives specialized in raspberry production, application of innovation and scientific knowledge in the production, processing and distribution of raspberries (Paraušić, Simeunovic, 2016). In addition to that, the development of cluster initiatives requires the joint work of agricultural producers, people who work in the area of processing, refrigerator business, traders, government, regional development agencies, research institutions and other institutions and organizations (Paraušić, Simeunović, 2016). In this regard, farmers are generally willing to pay for additional services in order to integrate the input and output markets more efficiently. They are interested in services of sorting out the goods, of storage, transport, short-term loans (such as, loans for transport to the market), preparation of documents, mobile service providers and other electronic services such as email. However, providing such services requires the existence of local entrepreneurs with the necessary knowledge and capacity to develop and provide these services in the remote rural areas where most farmers live (Mukhebi, Kundu, 2014).

Standardization of the quality of raspberries in Serbia

The industrialization of agricultural production, the use of agents such as additives, hormones, pesticides, antibiotics, etc., has imposed the need for an effective and internationally acknowledged system for controlling their use. In Serbia, raspberry quality is standardized according to GLOBALGAP standards (GAP – Good Agricultural Practice). GLOBALGAP is based on principles for safe and sustainable agriculture and on partnerships between farmers and traders. This standard applies to the production of primary agricultural products, but also to the activities that follow. Regarding this, in the process of raspberry production, a very important role is played by harvesting fruits, so it is of great importance that it is properly implemented. Also the activities following the harvest are of great importance. Integral food safety system includes food production, processing, packing, distribution/transportation, storage and preparation (Abdulah et al., 2011).

The raspberry fruits are classified into three categories, according to their quality: extra quality fruits, class I fruits and class II fruits. Since the raspberry fruit is sensitive, keeping it fresh is difficult and short-term. Fresh raspberry fruit can be stored for 10-14 days in the refrigerator at -0.6 to 0 degrees and at a relative humidity of 85-90%. Today, raspberries are mostly frozen and stored until used. This procedure consists of (<http://www.agroTV.net/berba-cuvanije-klasiranje-plodova-maline/>):

1 – previous cooling of the fruit to 0 °C

2 – deep freezing at -35 to -45 °C

3 – storing fruits at -18 to -20 °C.

Deep-frozen raspberry fruits can be stored for a very long time. They are divided into four categories: roland, bruh, grits and block. Roland raspberry is of equal color and ripeness without buds and foreign matter, of vegetative and mineral origin. These are single frozen fruits of good quality. Bruh raspberry is a mixture of whole, broken fruits and bites. Grits is a ground raspberry, and block is a third class of raspberries used for hot processing (jams, juices, etc.).

In order to apply quality standards in the raspberry sector in a more efficient way, it is necessary to introduce to Serbia appropriate technological innovations which are increasingly applied in the food sector. Applying new technologies, like IoT (Internet of Things), nowadays it is possible to connect food producers, transportation and hospitality/retail companies (Maksimovic et al., 2015). Technology innovation and the IoT move the packaging market from conventional packaging to interactive, aware, and intelligent. Smart packaging utilises chemical sensor or biosensor to monitor the food quality and safety from the farm to the costumers. This technology can result in a variety of sensor designs that are suitable for monitoring of raspberry quality and safety (freshness, pathogens, leakage, carbon dioxide, oxygen, pH, time or temperature) (Abdulah et al., 2011). With the development of nanotechnology, the use of nanosensors could enable production, processing, and transportation of raspberry products more secure (Wesley et al., 2014). For example, frozen raspberry casings and bags can be labeled with a gsm chip and a temperature sensor, so that it can be seen at any time via the wifi connection if the raspberries have been properly stored and in what way they were transported.

Methodology

In order to collect primary data, we used the survey method. The survey was conducted based on personal contacts with raspberry producers. Raspberry producers were contacted at the place of purchase and asked to participate in survey which would be used solely for research purposes. We also emphasized that the survey was anonymous. Interviews were scheduled with manufacturers who agreed to participate in the survey so that they could have time to think and give objective and representative answers.

The questionnaire had a total of 17 questions divided into three groups. The first group of questions was intended to determine the basic characteristics of individual raspberry

producers, while the second group of questions was defined with the aim of determining the real need for establishing a raspberry market exchange, that is, examining the satisfaction of raspberry producers with the current way of buying up raspberries. The third group of questions was aimed at testing the proposed model of the commodity exchange for raspberry trading. At the end of the questionnaire, we left some space for the respondents to make their suggestions regarding the improvement of the current way of buying up (trading) raspberries.

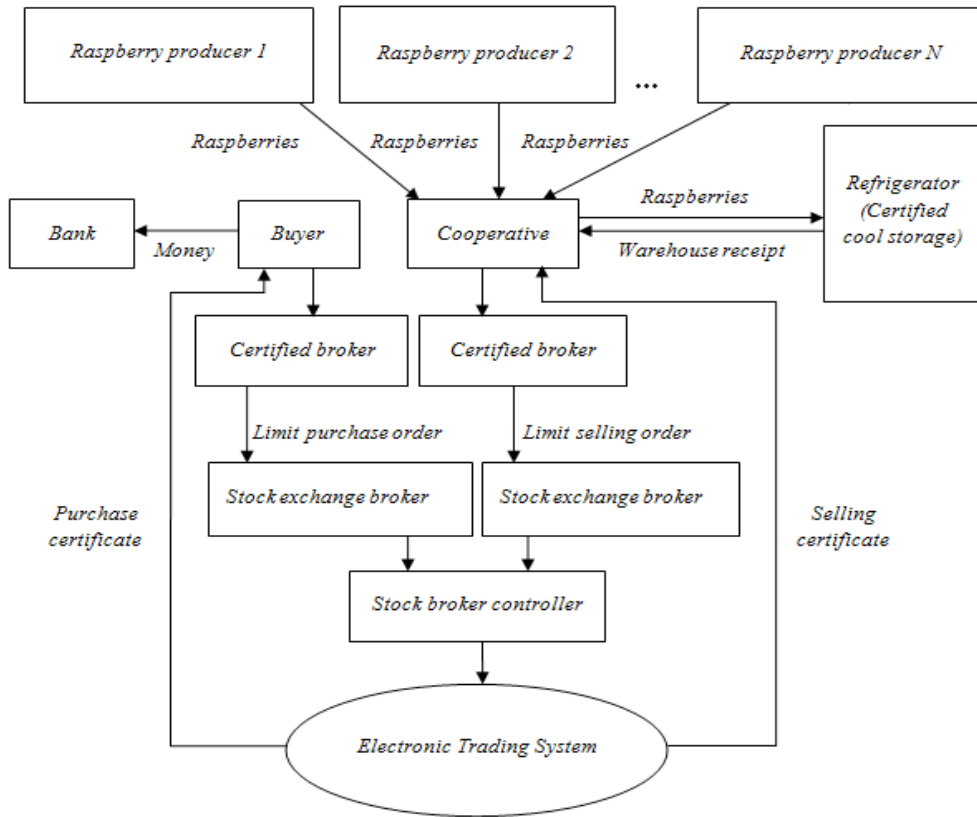
Results and discussion

According to the proposed model for trading raspberries through commodity exchange, trading would be conducted in the trading hall by placing limit orders for buying and selling into an electronic trading system. In order to prevent possible abuses, only limit orders would be traded, i.e. there would be no market orders on the market. Market orders do not contain the stated price, but the purchases and sales are carried out according to market prices, that is, at the prices established during the trading day. A limit sale / purchase order can be defined as a stock exchange order to buy or sell raspberries within the defined limit. The stated price limit in the sales order represents the minimum price at which the potential seller is ready to sell the raspberries, while the price limit in the purchase order represents the maximum price that the potential raspberry buyer is willing to pay.

The basic elements of limit orders for trading are: the date of issue and receipt of the order; order number; name and surname of the stockbroker who the order was addressed to; complete information about the client; a type of raspberry with a defined quality; raspberry price; quantity of raspberries; place of loading (pickup) of raspberries; delivery time for raspberries; terms of payment; "total amount or nothing" element; validity period of the order and the defined commodity exchange fee, as well as penalties and fees for negligent execution of the work, which the principal accepts with his verification of the order.

Trading process: Purchase and sale orders are issued to stockbrokers who further check them. After checking the orders, the brokers forward the orders to the stockbroker controller who inputs them into the electronic trading system, after which they become visible on the monitor in the trading hall. Also, members of the commodity exchange can be informed about quotations online, on the commodity exchange's website. After pairing orders that match, the stock exchange prepares invoices, that is, receipts that will be submitted to the buyer and vendor. After the purchase and sale confirmations are received, the realization of the work starts. Commodity exchange trading means that buyers and vendors do not know each other until they receive confirmation. In accordance with the above described process of trading on commodity exchanges, a possible model of raspberry trading in Serbia is shown schematically (Figure 1). The raspberry trading model presented here can be further developed and adapted to the standardized graphical notation of business process modeling, BPMN (Aagesen and Krogstie, 2010).

Figure 1. A proposed model of raspberry trading through commodity exchange



Source: Authors research

Fig. 1 shows that the process of raspberry trading through the commodity exchange implies that individual raspberry producers must be registered members of the cooperative. In this regard, they would have to sign a representation agreement with the cooperative. In addition to providing small farmers with the opportunity to trade their products through the commodity exchange, cooperatives are also useful from the perspective of educating farmers and improving efficiency of the production (Faruk, 2015). Therefore, the proposed model of the commodity exchange for raspberry trading implies that the cooperative (association of raspberry producers) represents and acts on behalf of individual producers and through the authorized brokers, hence issuing the limit of the sales order. On the other hand, after depositing the required amount of money in a dedicated trading account, potential raspberry buyers place a limit on the purchase order through authorized brokers.

The survey was conducted in 2019 on the territory of Ivanjica municipality, which is the largest raspberry producer in Serbia alongside the municipality of Arilje. In total, 100 completely filled questionnaires were collected and processed. Partially filled questionnaires (20 of them) were not included in the data analysis. The results of the survey are presented in Tables 5, 6 and 7.

Table 5. Determination of basic characteristics of raspberry production

I have been producing raspberries	less than 5 years	from 5 to 15 years	more than 15 years
	18%	32%	50%
I produce (process) raspberries every year.	YES		NO
	86%		14%
Raspberry production is my main source of income.	YES		NO
	23%		77%
The raspberry plantation area is:	up to 50 ares	from 50 ares to 1 acres	over 1 acre
	73%	25%	2%
Average annual crops of raspberries:	up to 5 tons	from 5 tons to 1 wagon	over 1 wagon
	65%	33%	2%
The female population's participation in raspberry production is:	up to 25%	from 25 to 50%	over 50%
	9%	48%	43%

Source: Authors research

Table 6. An analysis of the current way of buying up raspberries

Raspberry buyers do not agree among themselves on the purchase price.	YES	NO	Not sure
	15%	46%	39%
The price of raspberries is realistic / determined by the supply-demand ratio).	YES	NO	Not sure
	2%	71%	27%
Raspberry dealers (refrigeration facilities) are fully fulfilling their obligations.	YES	NO	Not sure
	39%	33%	28%
Communication with raspberry dealers (refrigeration facilities) is good.	YES	NO	Not sure
	46%	22%	32%
There is a possibility of credit financing by the buyer (refrigeration facilities) ("borrowing at the expense of raspberries")	YES	NO	Not sure
	70%	8%	22%
Classification of the raspberries is done in the right way.	YES	NO	Not sure
	22%	43%	35%

Source: Authors research

Table 7. Testing of the proposed model of the commodity exchange for raspberry trading

Do you have a registered agricultural holding?	YES		NO
	71%		29%
Are you a member of an agricultural cooperative?	YES		NO
	1%		99%
Would you sell raspberries through commodity exchange (a public market visible to the world)?	YES	NO	Maybe
	53%	7%	40%
Would you agree for a cooperative, as an authorized stock exchange seller, to sell raspberries on your behalf?	YES	NO	Maybe
	52%	9%	39%
In order to maximize the purchase price of raspberries, would you apply standards related to raspberry quality in a more effective manner (weight of full casks, the humidity of raspberries, fruit size, and method of storage and transport of raspberries to the refrigerator facility, etc.)?	YES	NO	Maybe
	77%	3%	20%

Source: Authors research

Based on the conducted empirical research, we can conclude the following important information, regarding the determination of the basic characteristics of raspberry production, the analysis of the current method of buying up raspberries and the testing of the proposed model of the commodity exchange for raspberry trading:

Raspberry production in Serbia is longstanding and continuous. Half of the respondents have been part of this production for more than 15 years, and about one third of respondents have been engaged in raspberry cultivation for the period between 5 and 15 years. Also, 86% of respondents stated that they process (produce) raspberries every year. This statement is of great importance for the establishment of the raspberry commodity exchange, as continuous production is necessary and it is a precondition for the inclusion of some commodities in the commodity exchange trading process).

However, raspberry production in Serbia is very fragmented and is not a major source of income for most of the respondents. The survey found that 73% of respondents cultivate raspberries on an area of less than 50 acres, with 65% of respondents achieving an overall amount of crops of less than 5 tons. The fragmentation of the raspberry production process is a potential barrier to the development of the raspberry commodity exchange, having in mind that the commodity exchange trading method involves the trading of large quantities of a standardized product. Also, for 77% of respondents, raspberry production is not a main source of income, which can also be one of the obstacles for the development of the raspberry commodity exchange. When raspberry production does not constitute a primary source of income, these producers are less likely to be willing to make some extra effort and invest the extra time which is required to move to an alternative way of selling (selling through the commodity exchange market).

Female population is dominant in the raspberry production process. In 43% of respondents, the female population makes up the majority of employees in the raspberry production process, while in 48% of respondents their participation ranges between 25 and 50%. The majority participation of the female population in the process of raspberry production in Serbia may indicate that raspberry production contributes to the improvement of financial position and greater independence of women in rural areas.

15% of respondents believe that raspberry buyers do not agree among themselves on the purchase price of raspberries. Also, 71% of the surveyed producers believe that the purchase price of raspberries is not realistic. In this regard, only 2% of respondents believe that the price of raspberries is determined by the relationship between supply and demand. The attitude of the respondents regarding the fact that the purchase price of raspberries is not realistic and that it is mainly the result of mutual agreement among buyers (raspberry dealers) represents a real chance for the development of the raspberry commodity exchange (a transparent market in which the real price of goods is determined on the basis of supply and demand).

70% of the respondents found that the current way of buying raspberries offers the possibility of credit financing, or borrowing based on the future crops of raspberries. The fact that raspberry producers can carry out the entire production process without

significantly investing their resources can be an obstacle to switching to alternative ways of production and sale (e.g. raspberry commodity exchange). However, 22% of surveyed raspberry producers believe that communication with purchasers is not good, and 33% of producers believe that purchasers do not completely fulfill their obligations, which may be beneficial for the development of the raspberry commodity exchange. Also, only 22% of respondents believe that the current way of classifying raspberries by the purchasers is being implemented in the right way. In contrast, the auction trading method, i.e. commodity exchange, implies clearly defined product quality standards, which would probably contribute to the elimination of this problem by the manufacturers (Handschuch et al., 2013).

Our evaluation of the proposed commodity exchange model for raspberry trading revealed that 29% of raspberry producers do not have a registered agricultural household, and that almost all raspberry producers (99%) are not members of the producers cooperative. This fact is an obstacle for the eventual development of the raspberry market, which implies that all raspberry producers must have registered agricultural households and be associated amongst themselves.

However, the raspberry producers who were surveyed expressed great confidence in the cooperatives, as only 9% of producers expressed the attitude that they would not agree to be represented by the cooperatives on the commodity exchange and also would not agree for the cooperatives to sell raspberries on their behalf. In addition, as many as 77% of respondents expressed their willingness to apply the quality standards more efficiently in order to attain a higher purchase price for raspberries (weight of full casks, humidity of raspberries, fruit size, storage method and transport of raspberries to the refrigerator, etc.). Implementing raspberry quality and safety standards is decisive in increasing farm income (Jara-Rojas et al., 2018).

The major suggestion of the respondents related to the possible improvement of the raspberry market, was the establishment of the free market, along with the better regulation of the production, sale and distribution process. It was pointed out that currently established system is a cooperative oligopsony, with only a small number of existing large buyers.

Conclusions

Based on the conducted empirical research, it can be concluded that including raspberries in the commodity exchange trading process in Serbia would be possible for several reasons. First of all, Serbia is one of the largest raspberry producers in the world and it is a global leader in the export of frozen fruits. Annual production of raspberries of more than 100 thousand tons would be more than sufficient to cover all commissions and compensation of participants in the stock exchange trading process. The analysis also found that the processes of standardization of the quality of this fruit and its storage are not too demanding and complicated. In addition, it has been established that the production of this fruit in Serbia is long-standing and

continuous, which is also one of the important preconditions for the development of the commodity exchange. On the other hand, the analysis revealed dissatisfaction of raspberry producers with the current way of buying up raspberries, which may indicate a real need to switch to alternative trading methods. This dissatisfaction is reflected in the fact that the majority of the respondents expressed the opinion that the purchasers and raspberry dealers agree among themselves on the amount of the purchase price, which results in a low purchase price. Also, only a small number of respondents believe that the current way of classifying raspberries is implemented in an adequate way. Raspberry producers, on the other hand, have expressed their willingness to sell their products through the commodity exchange. In this regard, most respondents would make additional efforts to raise and maintain the quality of these fruits in order to achieve a higher raspberry selling price.

However, the research also identified some limitations that are an obstacle to the possible development of the raspberry commodity exchange. Raspberry production is generally a family-run business and is characterized by a large fragmentation of production, while further efforts are needed to bring them together in associations. It was found that for most of the respondents, raspberry production is not the main source of income, which can be an obstacle for their additional engagement and education, which are necessary factors for the initial stages of the development of commodity exchanges. Also, the current way of buying up raspberries offers different forms of crediting, that is, the borrowing of producers at the expense of the future crops of raspberries, which can be an obstacle to switch to alternative ways of production and sale. The next limitation was established when we tested the proposed commodity exchange trading model. Approximately one third of raspberry producers do not have a registered agricultural holding, while almost all producers who were surveyed were not members of the cooperative. Without well-organized cooperatives and associations of raspberry producers, selling raspberries through the commodity exchange market is impossible. In Serbia, the process of registration of agricultural holdings is quite simple, which indicates how easy it is to solve this problem. However, the problem of underdevelopment of cooperatives in the observed area is much more complex and more difficult to solve. In relation to this, unless more intensive development of cooperatives in the sector of raspberry production occurs in the future, it is impossible to think about the inclusion of raspberries in the commodity exchange trading process. Also, this process involves the development of a network of authorized warehouses that would perform the tasks of standardizing the quality and quantity of raspberries. We also concluded that application of internet of things in packaging and transport would be good support in establishment of efficient commodity market.

Conflict of interests

The authors declare no conflict of interest.

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LEGAL ASPECTS OF DEVELOPMENT OF ORGANIC AGRICULTURE IN UKRAINE IN THE CONTEXT OF EUROPEAN INTEGRATION

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ABSTRACT

In modern economic conditions, organic production is gaining global significance, partly addressing food security and contributing to the well-being of the population. Ukraine is in the top-20 of world leaders in the organic movement. In this regard, the prospects for the development of organic farming are considered. The current state of regulatory support for organic production in Ukraine has been analyzed. It is proposed to approve the procedure for certification of organic production, the procedure and requirements for labeling of organic products, as well as requirements for material and technical base and other infrastructure necessary to perform functions of certification of organic production and circulation of organic products. The necessity of approving the criteria for determining the suitability of agricultural lands for use in the process of organic production is substantiated.

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Introduction

In the current conditions of development of the agrarian sector of the economy of Ukraine, there is a close correlation between the global processes of globalization and the formation of a wide range of methods of land management that do not create risks and threats to human health, do not harm the environment. First of all, this can be seen in the transition to organic farming. In this case, regardless of the level of development, ownership or methods of organization - organic agro-production has its specific features, which significantly differs this ecologically oriented direction of agriculture from the opposed so-called intensive system of agro-production.

Researchers around the world declare numerous benefits that organic farming brings, for example: 1) for agriculture: increased soil fertility, stable production and high quality food; 2) for the environment: reduced pollution and conservation of agro-ecosystems;

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3) for the economy: income security and strengthening local communities; 4) for the population: promotion of public health (Roljević Nikolić, Vuković, Grujić, 2017).

Organic agriculture is conceptualized in the way that it protects the soil, water, air, plants, animals and genetic resources, it is not degrading for the environment, it is technically appropriate, economically stable and socially acceptable (Kisić, 2014).

The worldwide public's attention to organic products is steadily increasing. This attitude is caused not only by the concern for the environment, but also by the concern for one's own health. Ukraine does not stand apart from this trend, so organic production is relevant. The domestic consumer becomes more cautious and demanding when choosing food. Consequently, the number of producers of organic products is increasing.

According to the programming documents, organic agriculture is a priority for Ukraine. In particular, this provision is proclaimed in "Medium-term plan of priority actions of the Government to 2020", approved by the Cabinet of Ministers of Ukraine Decree dated April 3, 2017 and the "Farm development and agricultural cooperation Concept for 2018-2020" approved by the Cabinet Order Ministers of Ukraine dated September 13, 2017. These legislative acts provide for the stimulation of an increase in the area of agricultural land on which organic agricultural products are grown or produced, as well as encourage the transition of farms to organic production.

Meanwhile, organic market experts are confident that Ukraine has all the prerequisites to become an organic hub for the European market. According to the Ministry of Agrarian Policy and Food of Ukraine over the last 5 years, organic production has increased by 90%, the area of organic farms has increased from 260 thousand hectares to 421.5 thousand hectares and constitutes 1% of the total area of agricultural land of Ukraine. Also 550 thousand hectares of land reserved for certified wild plants (herbs, berries and mushrooms). Accordingly, the number of producers of organic products is increasing, so as of June 2017, more than 420 producers were registered, which compared to 2011 (260 producers) increased by almost 65% (Yaroshchuk, 2017). These statistics show that Ukrainians have increased interest in this system of agricultural production.

Materials and methods

The methodological basis of the work is a system of general scientific and special methods, which allowed us to investigate the processes and phenomena in their relationship and to solve scientific and applied problems. The general scientific dialectical method became the basis of the scientific work, which made it possible to consider the legal regulation of land use of lands for organic farming in conjunction with other legal phenomena, and the corresponding legal array in the dynamics of its development. The analysis and synthesis helped to investigate the theoretical and practical provisions about the organic agriculture. The comparative legal method was used to compare certain provisions of the land legislation of Ukraine with the EU legislation. The formal-legal method was chosen to establish the content of certain provisions of land legislation, which regulates the procedure for certification and labeling of organic products. The use of the

system-structural method helped to clarify the criteria for determining the suitability of agricultural land for use in the process of organic farming. The modeling method was used in the construction and modification of legal norms proposed as amendments to the current legislation of Ukraine. The method of interpreting legal norms was used to determine the conformity of law with public relations.

Results and discussions

Legal and regulatory support of organic agriculture of Ukraine

At the international level, general principles of organic agriculture are defined by two organizations: Codex alimentarius Commission FAO/WHO-a (Food and Agriculture Organization of the United Nation/World Health Organization) and International Foundation for Organic Agriculture - IFOAM, the roof organization with around 750 members in 108 countries (Znaor, Landau, 2014).

According to IFOAM, organic farming combines all systems that support environmentally, socially and economically viable agricultural production. The main goal of organic farming is to produce high quality food in precisely defined conditions (Stojic, Dimitrijevic, 2020). It also significantly reduces the use of external factors of production (resources) by limiting the use of chemically synthesized fertilizers, pesticides and pharmaceuticals. Instead, agrotechnological measures of a natural nature are used to increase yields and protect plants. Therefore, as an organic can be considered that production of agro-industrial complex which is grown, processed, transported, stored and sold in accordance with the laws of nature. These provisions should also be supplemented by national regulatory documents.

The development of organic agricultural production in Ukraine is a task that can be solved through proper legal regulation. For a long time, the production and circulation of organic agricultural products in Ukraine was not regulated at all. The beginning of legislative regulation of organic crop production is connected with the adoption of the Law of Ukraine "On baby food" on September 14, 2006 (Verkhovna Rada, 2006). This Law for the first time established legal requirements to reduce or even stop the use of agrochemicals on agricultural lands of those farms that produced agricultural products for baby food. In order to implement this Law, the Cabinet of Ministers of Ukraine adopted on October 3, 2007 Resolution № 1195 "On approval of the Procedure for granting the status of a special zone for the production of raw materials used for the manufacture of baby food and dietary food" (Cabinet of Ministers, 2007). However, these legal acts did not provide a proper legal basis for the development of organic farming.

The basis for the development of organic production in Ukraine is the Sustainable Development Strategy "Ukraine – 2020", which aims at the introduction of European standards of living in Ukraine and Ukraine's moving to the leading position in the world. In particular, the vector of development of this strategy is to ensure sustainable economic growth in an environmentally sustainable way. The safety vector implies

observance of the safe state of the environment and access to quality drinking water, safe foodstuffs, which are primarily organic (President of Ukraine, 2015). Moreover, the President of Ukraine issued a Decree “On sustainable development goals of Ukraine until 2030” of September 30, 2019 (President of Ukraine, 2019). Organic production is one of the ways to implement a sustainable development strategy as a basis for ensuring the environmental security of the industry through the integration of economic growth, social protection and environmental protection as complementary elements of effective strategic development of Ukraine.

In order to approximate Ukrainian agricultural legislation with EU legislation in the field of production and circulation of organic agricultural products and food products, the Law of Ukraine “On production and circulation of organic agricultural products and raw materials” was adopted on September 3, 2013. Subsequently, the Law of Ukraine “On basic principles and requirements for organic production, circulation and labeling of organic products” of July 10, 2018 was adopted instead.

In general, the Law “On production and circulation of organic agricultural products and raw materials” of September 3, 2013 contained a large number of instructions, that had to be adopted by the authorities of executive power. However, only 7 of the 23 regulations provided by law were actually approved, which was one of the reasons for the low effectiveness of this Law. In addition, the Law did not fully take into account the content of legal regulation of organic production in the main market of Ukrainian agricultural products - the European Union. All this necessitated the development of a new law on organic farming.

The entry into force of the new Law “On basic principles and requirements for organic production, circulation and labeling of organic products” provides for the intensification of the market of organic agricultural production in Ukraine and the expansion of exports. The following issues were on the agenda: 1) creation of institutional infrastructure, first of all, certification institutions, associations of organic producers and the relevant trade network; 2) integration into existing international structures to facilitate access to foreign markets; 3) improvement of the system of information and consulting support and competent advisory services.

New principles and requirements for the legal provision of organic production were established with the adoption of this law in Ukraine. In particular, it defines the basic principles and requirements for organic production, circulation and labeling of organic products, the principles of legal regulation of organic production, the functioning of the market of organic products, the legal bases of activity of central executive bodies, subjects of the market of organic products as well as directions of state policy in these areas (Verkhovna Rada, 2018).

A number of provisions of the Law “On basic principles and requirements for organic production, circulation and labeling of organic products” need to be detailed and actually implemented through the adoption of government law-making acts. The Cabinet of Ministers of Ukraine must approve the Procedure (detailed rules) for organic production

and circulation of organic products (part 2 of Article 13 of the Law), the Procedure for certification of organic production and circulation of organic products (part 9 of Article 24), the Procedure for maintaining the Register of Organic Seeds and planting material, the Register of Operators, the Register of Certification Bodies (Part 6 of Article 24, Article 31 of the Law). They should change those bylaws that were adopted on the basis of the previous law on organic production in 2013 and are currently in force, namely: Resolution of the Cabinet of Ministers of Ukraine dated August 8, 2016 № 505 “On approval of the Procedure for maintaining the Register of producers of organic products (raw materials)”, Resolution of the Cabinet of Ministers of Ukraine dated August 31, 2016 № 587 “On approval of detailed rules of production of organic products (raw materials) of crop origin”, Resolution of the Cabinet of Ministers of Ukraine dated March 30, 2016 № 241 “On approval of the Detailed rules of production of organic products (raw materials) of animal origin”, etc.

According to the Law of Ukraine “On the fundamental principles (Strategy) of the state environmental policy of Ukraine until 2020” dated December 21, 2010, one of the tasks in the field of integration of environmental policy and improvement of the system of integrated environmental management in agriculture is to create conditions for widespread implementation of farming technologies, which should be organic and environmentally friendly oriented. Also the areas of the use of such technologies should be, at least, doubled (Verkhovna Rada, 2010).

Thus, the success of agribusiness development in the field of organic agricultural production largely depends on the quality of legal support, economic feasibility for both producers and consumers and proper government support for such production. All this should be considered as a single system, the main elements of which are the producer, consumer and the state as a whole.

Conditions and prospects of organic production development

In modern economic conditions, organic production is gaining global significance, partly addressing food security and contributing to the well-being of the population. According to the statistics, organic agriculture is practiced in 172 countries around the world, on around 40.3 million hectares (1% of global agricultural land), on which there are registered 1.8 million farms (FiBL-IFOAM, 2016). In recent years, such production has become especially widespread in EU Member States. In particular, organic production dominates in Spain, with an area of almost 2 million hectares, Italy - 1.5 million hectares, France -1.4 million hectares and Germany -1 million hectares. The number of organic producers in Europe is increasing every year. The leader in the European rating on the number of producers of organic products is Turkey, which has about 70 thousand such enterprises. It is followed by Italy, with almost 53 thousand producers, and Spain is in the third place – 35 thousand producers (Yatsenko, Zavadzka, 2018).

The leading organic products organizations (IFOAM, FiBL, the Datamonitor Group) have estimated global market of organic products at \$ 60 billion. About 1.8 million farms

using 37.2 million hectares are involved in the ecological production of agricultural products and food. At the same time, over a third part of world manufacturers are in Asia, Africa and Latin America. Consumer demand for organic products is concentrated in North America and Europe - the two regions generate 97% of global revenue. Asia, Latin America and Australia are important producers and exporters of organic food (Willer, Lernoud, 2018). The biggest share of the organic market in the entire market is in Denmark, then Luxembourg, Switzerland, Sweden and Austria (Gajdić, Petljak, Mesić, 2018).

The main trend of the world market is the increasing demand for organic products in most countries. The situation in the global organic market is characterized by: 1) concentration of demand in developed countries; 2) increasing demand in developing countries; 3) consolidation of market participants; 4) the development of distribution of organic products.

Organic products have become the most popular in the US and Western Europe. Germany is the leader in organic consumption. This country began to adopt a healthy nutrition policy in the 1980s. Despite the fact that the cost of organic products compared to traditional ones is 40-50% higher, Italians spend an average of € 25 a year on organic products, Swiss - € 105, Danes - € 51, Swedes - € 47. It is also should be noted that in most EU countries, main distribution channels for the producers (processors) of organic food are: direct sale, specialized organic food product stores and supermarkets (Dovleac, 2016; Enjolras, Aubert, 2018).

Most organic farming enterprises in Ukraine are located in the south of the country (Odesa, Kherson regions), in western Ukraine (Chernivtsi, Lviv, Ternopil regions), as well as Poltava region. Quite often these enterprises are participants in international projects (in particular with Switzerland and Germany) on the introduction of organic farming in Ukraine and cooperate with foreign companies. About 60% of areas of crops are occupied by wheat, barley, sunflower and corn. These cultures form the basis of the export offer of Ukrainian organic products. In addition, part of the acreage is allocated to peas, rapeseed, buckwheat, soybeans, rye, oats, sorghum, millet, mustard, sugar beets and others.

According to the Federation of Organic Movement, there are 130 farms in Ukraine that produce organic agricultural products, and their area is only 0.7% of agricultural land. More than 90% of the produced domestic organic products are exported: the sale of products within the country provides producers with a profitability of 70% per hectare, while sales to EU member states - 200% (Willer, Lernoud, 2018).

As it is known, the basis of organic agriculture is the suitability of land for growing environmentally friendly products. In this regard, organic agricultural production is strictly tied to ecologically clean natural lands, which, accordingly, is regarded as a spatial factor, as well as the subject of labor and the main means of labor.

In the current conditions of globalization of economic and social processes, agricultural lands due to the irrational use and impact on them of various environmental pollutants lose the quality properties of the soil. The quality of land improves if it is rationally used as a means of production. However, in order to maintain the required level of fertility, it is necessary not only to reimburse the consumed substances of the soil, but also to restore its quality indicators, which is associated with significant logistical and financial costs. At the same time, the return on major investments is stretched over time and measured in years, which hinders investment in environmentally friendly agriculture. In order to mitigate the impact of these objective factors, land in all countries - regardless of ownership - is considered a national asset, and funds for their preservation are allocated from national budgets. Consequently, the land factor is important for providing organic agriculture in the country and determining its specialization.

The world tends to increase the land area under organic agriculture, especially in EU countries, which is confirmed by the analysis of statistical information FAO. The total area of agricultural land is 11% of the world's land fund, which occupies 1.5 billion hectares, and more than 30 million hectares of which are allocated for organic farming. The largest areas of certified land are in the United States (400 thousand hectares), Argentina (300 thousand hectares) and Italy (120 thousand hectares). Establishing certified production allows not only to meet domestic needs, but also to form export of such products. Liechtenstein (26%), Austria (13%) and Switzerland (11%) are the leaders in the share of organic land in the total area of agricultural land. More than 558,000 farms in 108 countries operate on the basis of organic farming. The annual growth of environmentally friendly products on the world market is 25% (Willer, Lernoud, 2018). Accordingly, the area of organic land is increasing every year, due to the significant demand for these products.

In Ukraine, the area, used for organic production, is only 411 thousand hectares. In the structure of certified organic agricultural lands, arable land occupies 206.5 thousand hectares or 76.4%. Pastures and hayfields account for 57.5 thousand hectares, which is 21.3%, fallow lands - 5.0 thousand hectares (1.5%) and only 1.3 thousand hectares or 0.5% for perennials (Milovanov, Konyashyn, 2019). At the same time, the available soil and climatic conditions allow to expand the areas under this production. However, the lack of infrastructure and state support for this type of business activity and the imperfect legal framework that regulates it, do not allow to quickly increasing organic production.

The scientific literature focuses on the need to develop and approve criteria for determining the suitability of agricultural land for use in organic farming, addressing issues related to soil conservation and protection of their fertility, development and approval of standards for their quality, which would meet requirements for growing organic products of plant origin, etc. (Ignatenko, Fedchyshyn, Bondar, 2019).

The suitability of lands (soils) for the production of organic products and raw materials had to be established in accordance with the provisions of Article 23 of the Law of Ukraine "On production and circulation of organic agricultural products and raw

materials”, which expired in August 2019. Therefore, the question of mandatory regulatory criteria for determining the suitability of agricultural lands (soils) for the production of organic products, including plant products, remains open.

Unfortunately, the current Law of Ukraine “On basic principles and requirements for organic production, circulation and labeling of organic products” also does not provide legal requirements that would determine the criteria to be used in deciding on the suitability of agricultural land for organic production. However, this Law (Part 3 of Article 25) provides that for organic crop production the duration of the transition period for land for growing annual crops may not be less than 24 months before sowing, and for perennial crops (except fodder) - not less than 36 months before the first harvest of organic products (Verkhovna Rada, 2018). Undoubtedly, the assessment of the suitability of agricultural land for the production of organic products of plant origin is a proper guarantee for the production of such products. The lack of legal regulation of such an assessment in Ukraine nullifies the guarantee itself.

It seems that when developing the Procedure for assessing the suitability of lands (soils) for the production of organic products of plant origin, it is necessary to take into account that the cultivation of such products can be carried out within agricultural lands used for commercial agricultural production and personal farming. The assessment of the suitability of land for the production of organic products of plant origin should be based not only on the quality of soils and plants to be grown, but also the remoteness of these lands from sources of pollution. The accumulated content of pollutants in the soil on the relevant land plots should also be taken into account. In addition, when developing criteria for assessing the suitability of land for the production of organic agricultural products, the data of agrochemical certification of agricultural land must be taken into account. Its task is to determine the quality of soils, their changes in the process of economic activity, as well as conditions for the rational use of organic fertilizers, protection from pollution and restoration of soil fertility. Lands that will be assessed as suitable for organic farming, which will confirm the relevant certificate, should be recognized as object of special legal protection.

This means that the legal regime of agricultural land, which is intended or already used for growing organic products of plant origin, should be clarified in the Land Code of Ukraine. In addition, the “Procedure for assessing the suitability of lands (soils) for the production of organic products of plant origin” should be adopted at the level of the Cabinet of Ministers of Ukraine.

In order to make more efficient use of agricultural land for organic production, it is advisable to conduct their inventory, contour and reclamation organization of the territory. For modern organic production, it is necessary to streamline the structure of sown areas, fill crop rotations with legumes and legume mixtures, which, with the help of nodule bacteria, are able to fix atmospheric nitrogen. In the conditions of introduction of organic agriculture, it is important to include in crop rotation the cultivation of green manure crops, expansion of areas under fruits and vegetables.

The current state of the structure of sown areas in organic production shows that almost 200 thousand hectares, or 49%, are cereals. Oilseeds are located on an area of 67 thousand hectares (16%). Only 19 thousand hectares, or 4.7%, are occupied by legumes. At the same time, vegetables are grown only on 8.1 thousand hectares (2%), fruits - 2.4 thousand hectares (0.6%) (Milovanov, Konyashyn, 2019). Such structure of sown areas cannot ensure effective organic farming, crop rotation, preservation of soil fertility. This structure of growing products is typical for the market, which is at the stage of formation with an underdeveloped product range.

According to the existing structure of sown areas, the production of marketable organic products needs to be transformed. In the structure of marketable organic products, the production of winter wheat is 31%, sunflower - 27%, corn for grain - 19%, while soybeans - 5%, and sugar beets only 2%. At the same time, the range of potatoes, vegetables, fruits and berries is completely absent in marketable organic products (Milovanov, Konyashyn, 2019). In addition, the analysis shows that most of the manufactured products were sold as raw materials, without appropriate processing and formation of additional value added.

Significant potential opportunities for the development of the organic sector are concentrated in Ukraine, due to the availability of land potential that is suitable for the production of environmentally friendly products of organic origin.

On the basis of the analysis of ecological and toxicological condition of arable lands of Ukraine carried out by experts of the Institute of Agrochemistry and Soil Science of NAAS of Ukraine, zones of suitability for cultivation of ecologically pure production were allocated (Kysil, 2000). Researchers have shown that anthropogenic pollution of the territory of Ukraine has a local character. Ukraine still has a part of clean lands, where the level of pollution is much lower compared to Western Europe.

According to the Ukrainian scientists, there are four small regions left in Ukraine where soils are not yet polluted to dangerous limits and where it is possible to grow environmentally friendly products at the level of the strictest world standards. These regions are: 1) the North Poltava - covers most of Poltava region (except for the regions adjacent to the cities of Kremenchuk and Komsomolsk), north-western districts of Kharkiv region, south-western districts of Sumy region, south-eastern districts of Chernihiv region and eastern districts of Kyiv and Cherkassy regions (left bank); 2) Vinnytsia-Prykarpattia - stretches a wide strip about 100 km from the town of Popelnya (Zhytomyr region) and extends to the north of Vinnytsia, Khmelnytsky and Ternopil regions in the direction of Lviv; 3) the Southern Podil - includes a small south-eastern part of Vinnytsia region, south-western part of Kirovohrad region, northern Mykolayiv region and northern half of Odessa region; 4) the Northeast-Luhansk - covers Milovsky and Novoposkovsky districts of Luhansk region (Shykula, 1998). But only the presence of areas potentially suitable for organic production is not enough. It should be clear that the transition from conventional (intensive) agricultural production technologies to organic farming is a rather long process and is accompanied by certain risks and the need to solve a number of problems.

Today, one of the most famous “organic” farms in the North-Western region of Ukraine is a private enterprise “Galex-Agro” based in Novograd-Volyn district of Zhytomyr region. This farm is specialized in the cultivation of cereals and industrial crops, milk and meat production. Due to the intensification of production at the farm it was possible to achieve more than 2000 kg/ha of yield of organic rye, and legumes - about 1500 kg/ha. The basis of the farm’s agriculture is the “Drevlyanska” system, which provides a four-field crop rotation: diaper-oat mixture, rye, oat mixture and winter (rye, wheat).

Studies of current trends in the market of organic products on the example of the North-Western region of Ukraine allow us to identify the following trends: 1) interest of agricultural holdings in the development of organic production; 2) preferential conditions for land auctions for organic production; 3) cooperation of producers; 4) expansion of exports of organic products. These trends suggest the expansion of areas under organic products in the short term.

In addition, a significant role in the development of the Ukrainian market of organic products is played by public organizations and projects that focus their activities on various areas of this system of agricultural production. The Federation of Organic Movement of Ukraine, the Union of Participants of Organic Agriculture “Naturproduct”, the Association of Organic Agriculture and Horticulture are functioning successfully today. In 2002, the Association “BioLan Ukraine” was established, which unites the efforts of producers, processors, scientists, and all stakeholders, and serves as a national platform for information exchange. In order to conduct research, promote the production and consumption of organic products in all regions of the country, it is planned to establish Centers for Organic Agriculture. Today such centers are actively working in Dnipro, Poltava, Zaporizhzhia regions.

For a long time in Ukraine there are many international projects aimed at the development of the organic movement. Thus, from 2011 to 2016, the technical assistance project “AgroInvest”, funded by the United States Agency for International Development (USAID), operated in Ukraine. In 2016, two German-Ukrainian cooperation projects “Advising Ukraine on Agricultural Trade - in the framework of the Full and Comprehensive Free Trade Agreement between the EU and Ukraine” and “German-Ukrainian Cooperation in Organic Agriculture” were launched. These projects are supported by the German Federal Ministry of Food and Agriculture.

A foreign investor, who is really interested in working with such an asset as Ukrainian land, can implement such projects, effectively using the current legal field of Ukraine. However, this requires well-thought-out and balanced planning and corporate structuring of business, which takes into account the Ukrainian realities (Ignatenko, Fedchyshyn, Bondar, 2019).

Features of certification of organic products in Ukraine

Ukraine is ranked 11th in Europe in the area of certified land for organic agriculture (Trofimtseva, 2017). Taking into account the fact that in Ukraine today the share of certified organic land in the total agricultural land of Ukraine is less than 1%, and it

ranks 11th in Europe by area, it is possible to conclude there is the great potential for the implementation of this type of production.

Establishment of standards, control and certification of organic production are the most important elements of a system that guarantees the appropriate quality of organic products. The certificate must be obtained by all those involved in the cultivation, processing and preparation for sale of organic products. That is, not only producers but also intermediaries involved in the delivery, packaging and storage of organic products.

According to the Law of Ukraine “On basic principles and requirements for organic production, circulation and labeling of organic products”, organic production and circulation of organic products in Ukraine is subject to certification (Verkhovna Rada, 2018).

This new law has radically changed the approach to the certification of organic production and circulation of organic products, taking into account the EU’s approaches to relevant activities. The key position of this law is the certification of the whole process of organic production, and not only the finished product, as it was provided in the previous legislation. The law defines in detail the grounds and procedure for certification of organic production and circulation of organic products; requirements for the content and terms of the certificate; requirements for the certification body and its functions; conditions for recognition of certificates certifying the production and circulation of organic products in accordance with legislation other than the legislation of Ukraine; requirements for the inspector for organic production and/or circulation of organic products; general principles of maintaining the Register of certification bodies.

The special nature of the above Law has limited the scope of the Law of Ukraine “On technical regulations and conformity assessment”. However, Article 45 of this Law establishes the basic principle of recognition of the results of conformity assessment carried out outside Ukraine: “The results of conformity assessment of technical regulations conducted in another state are recognized and accepted in Ukraine if conformity assessment procedures are applied in that state (even if they differ from Ukrainian procedures) ensure the same or higher level of compliance with the requirements of the relevant technical regulations as the Ukrainian conformity assessment procedures” (Verkhovna Rada, 2015).

In particular, certification of organic production and/or circulation of organic products is interpreted as checking and establishing compliance of production and/or circulation of products with the requirements of legislation in the field of organic production, circulation and labeling of organic products. Such certification is carried out with an annual mandatory on-site inspection by the certification body in order to establish compliance of the production process and its circulation with the requirements of the legislation in the field of organic production, circulation and labeling of organic products. Certification bodies are those subjects of issuing certificates, which confirm compliance of the production process and its circulation with the requirements of the legislation in the field of organic production, circulation and labeling of organic products.

However, the lack of domestic standards and certification systems for organic products forces agricultural producers to use the standards developed in countries where the market for organic products is already formed and relations in this area are clearly regulated. International certification companies help agricultural companies to complete the entire process of certification of production as organic, including the development of a conversion plan, partial production, full conversion of the farm, recommendations for the production of organic crop and livestock products, processing and transportation, inspection, product certification, labeling, packaging and waste disposal.

The most authoritative certification and accreditation organization is the IFOAM, which in 1980 developed the "IFOAM Basic Standards for Organic Production and Processing". Today, IFOAM standards and accreditation criteria are registered as "international ISO standards", on the basis of which national standards of many countries have been developed.

There are more than 15 representatives of foreign certification companies in Ukraine, which carry out certification of agricultural production according to the rules of organic production adopted in accordance with EU Regulation № 834/2007. These companies include: ETKO, a Turkish certification company operating in accordance with the requirements of Council Regulations (EU) № 834/2007 and 889/2008 concerning organic production and labeling of organic products; Control Union Ukraine - representative office of a Dutch company, which provides certification according to the requirements of Regulation (EEC) N ° 2092/91 and some others.

Confirmation of compliance with the standards of a particular country is a necessary component of the product certification procedure, through which it is possible to ensure that products and their production process meet certain norms and standards of the country with which the certification body cooperates.

An example of Ukraine's successful international cooperation in the development of organic agriculture is the implementation of the project "Certification in Organic Agriculture and Development of the Organic Market in Ukraine" (2005-2011), as well as the implementation of its second stage "Development of the organic market in Ukraine" (2012-2018) with the financial support of the Swiss Confederation through the Swiss State Secretariat for Economic Affairs (SECO). The project was implemented by the Research Institute of Organic Agriculture (FIBL Switzerland) in cooperation with key players in the economic sector in Ukraine and the Ministry of Agrarian Policy and Food of Ukraine. As a result of the project, a certification company "Organic Standard" was created, which occupies a leading position in Ukraine. Thanks to the project, the organic market in Ukraine has significantly revived and the number of producers, processors and exporters of organic products has significantly increased.

It should also be noted that certain provisions of the Law of Ukraine "On basic principles and requirements for organic production, circulation and labeling of organic products" should have been to be specified by Resolutions of Cabinet of Ministers of Ukraine. The latter had to be adopted by August 2, 2019 - the date of entry into force of the Law

(paragraph 4 of Section XII “Final Provisions” of the Law), so that the new mechanism of legal regulation of organic agricultural production will work in full. Unfortunately, as of June 1, 2020, the relevant acts have not been approved. As well as, the registers provided by law have not started to operate. Today, only drafts of some resolutions are available on the websites of state bodies, for example, the draft resolution “On approval of the Procedure for maintaining registers”. In addition, there are no requirements for the material and technical base and other infrastructure facilities required to perform the functions of certification of organic production and/or circulation of organic products, as required by law. Only the approval of the whole set of regulations detailing the requirements, procedure and features of certification of organic agricultural products will launch a new mechanism of legislative regulation in this area.

Today the system of certification of organic production is insufficiently regulated by the state. This is manifested both in the inadequate level of regulatory support and the absence of a special certification body. There are no adequate conditions for the development of private certification bodies. Lack of national standards for organic products stipulates Ukrainian agricultural producers are forced to use the services of foreign certification companies. That is why it is advisable to create an independent certification system for organic production. The efficiency of enterprises producing organic products and the development of all organic production depends on the level of development of its certification system.

Despite the fact that the introduction of the system of organic farming creates a number of problems, Ukrainian agricultural producers are ready and plan to partially or completely switch to the production of organic products.

Labeling of organic products

Labeling is a key element of consumer confidence in organic products, as it is the main source of information for consumers. Labeling includes expressions, special marks, trademarks, manufacturer’s names, graphics and symbols placed on any packaging, documents, leaflet, label, board or tag indicating that it is an organic product.

This procedure is regulated by Article 34 of the Law of Ukraine “On basic principles and requirements for organic production, circulation and labeling of organic products”, as well as the order of the Ministry of Agrarian Policy and Food of Ukraine “On approval of the state logo for organic products” № 67 dated February 22, 2019. In 2014, the Ministry of Agrarian Policy and Food of Ukraine developed and published a draft Procedure and requirements for labeling of organic products, which had to define the requirements for labeling of organic products produced, imported and put into circulation in Ukraine. However, this project was never approved by the Government of Ukraine.

It should be noted that the Law of Ukraine “On basic principles (Strategy) of the State environmental policy of Ukraine for the period up to 2030” came into force on January 1, 2020, which regulates, in particular, the goals of sustainable land use and protection, improving environmental performance, including international certification

and labeling systems, etc. (Verkhovna, 2020). However, there is no clear correlation with the field of organic production, which is, in our opinion, a significant shortcoming of this document.

As Ukraine does not have norms or standards that would regulate its own organic market, all domestic organic products are produced according to European standards and meet the requirements of EU regulations approved by the Council Regulation (EC) on organic production and labeling of organic products, or in accordance with NOP standards or the organic standards of any other country. General principles of labeling of organic products are described in the Law of Ukraine “On basic principles and requirements for organic production, circulation and labeling of organic products”, although most manufacturers choose the label described in the standard according to which certification was conducted.

In accordance with European standards, the logo is used when labeling organic products. This logo marks the products of those producers who comply with the requirements of EU standards on organic agriculture. The logo should be applied only to those goods that consist of at least 95% of organic raw materials. Also, when labeling organic products, the certification body and the corresponding number of the manufacturer’s certificate must be indicated 2002 (International Federation of Organic Agriculture Movements, 2019).

On the territory of Ukraine, organic products may have certain types of labeling. In particular, 1) organic logo of the EU, valid in all EU countries; 2) labeling, which indicates the compliance of products with Ukrainian private standards of the Association of Organic Producers “BIOLan Ukraine”; 3) label indicating the compliance of products with the standards of the US National Organic Program (NOP); 4) “Eurolist” or “biolist”, which is the organic logo of the EU (came into force on July 1, 2010); 5) labeling indicating the conformity of products to the National Standards of Japan (JAS); 6) the sign of the first certification organization in Ukraine “Organic Standard”.

Labeling of organic products can be carried out depending on the percentage of organic components used in the production. If organic products contain 95% of ingredients of organic origin, the remaining 5% must be included in the “List of permitted substances” (this list is determined by the requirements of an organic standard). Under other conditions, the product contains ingredients of organic origin. All components must be indicated with their weight.

Conclusions

A study of the current state of development of organic production in Ukraine has shown that the organic line of business is at an early stage of development, although it has great potential.

High demand for organic products in the EU and the limited capacity of its production make Ukrainian organic producers a chance to be a full player in the organic market of the

EU. Moreover, global demand for organic products affects the development of this sector in Ukraine, as Ukraine cannot be separated from globalization processes, especially taking into account WTO membership and intentions for European integration.

However, despite the significant potential and prospects for the development of organic agriculture, there are gaps in the legislation of Ukraine. Today it is necessary to improve the legal framework, which would clearly define the state policy in the field of organic production, create conditions for legislative recognition and protection of organic products, the formation of a national certification system, approval of rules and standards.

In particular, certain provisions of the Law of Ukraine “On basic principles and requirements for organic production, circulation and labeling of organic products” must be specified in the Ukrainian legislation. For example, there is a need to approve the procedure for maintaining the Registers, the procedure for certification of organic production and circulation of organic products, the procedure and requirements for labeling organic products, as well as requirements for material and technical base and other infrastructure necessary to perform functions of certification of organic production and circulation of organic products, so that the new mechanism of legal regulation of organic agricultural production will work in full.

In addition, the legal regime of agricultural land, which is intended or already used for growing organic products, should be clarified in the Land Code of Ukraine. It is also necessary to develop and approve criteria for determining the suitability of agricultural land for use in organic farming, addressing at the legislative level issues related to soil conservation and protection of their fertility, development and approval of standards for their quality, which would meet the requirements of organic production of plant origin.

Conflict of interests

The authors declare no conflict of interest.

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A LITERATURE SURVEY ON RELATIONSHIP BETWEEN RENEWABLE ENERGY CONSUMPTION AND ECONOMIC GROWTH

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ABSTRACT

The purpose of this paper is to provide an extensive empirical literature review on the relation between renewable energy consumption and economic growth. The survey included 50 papers, most of which are published in major energy journals, to ensure the high-quality review. This literature review includes period, countries, methodology and research results. Also, the survey included policy recommendation for renewable energy policymakers depending on results obtained by authors. The general observation from reviewed literature is the absence of any clear consensus regarding the relationship between renewable energy and economic growth, which can be contributed to various factors.

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Introduction

The climate change agreement, known as the Paris Agreement, signed in 2016, aims to limit the increase in global average temperature to well below 2°C above pre-industrial levels, increase its ability to adapt to adverse impacts and foster climate resilience and develop low greenhouse gas emissions, in a way that does not compromise food production. In addition, The Paris Agreement requires all Parties to align financial flows with the needs of development accompanied by low greenhouse gas emissions and enhanced climate resilience. At the heart of the Paris Agreement are nationally determined contributions for each signatory country as part of the reduction of greenhouse gas emissions. Each climate plan reflects the Party's ambition to reduce

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harmful emissions, taking into account its domestic circumstances and capabilities (UN, 2020). These targets implicitly state that there is a need to move to a low-carbon energy sector, supported by estimates that renewable energy, together with an increase in energy efficiency, can provide a 90% reduction in carbon dioxide emissions by 2050 (IRENA, 2020).

Over the last 10 years, a substantial amount of research has been done on the relationship between renewable energy consumption and economic growth. Many of the papers written on this topic focus on different countries, time periods, and econometric models used in the analysis, and thus the empirical results obtained by the studies reviewed are varied (Drăgoi et al., 2018). It is safe to say, given the literature available in the above field, that no definitive conclusion has been reached regarding the causal link between renewable energy and economic growth.

By reviewing the extensive literature on energy and economic growth, four causal hypotheses can be identified: growth hypothesis, conservation hypothesis, feedback hypothesis and neutrality hypothesis (Adewuyi & Awodumi, 2017; Ozturk, 2010; Payne, 2010; Sebri, 2015; Squalli, 2007)

- [1] **Growth hypothesis** suggests that there is one-way causality between energy consumption and economic growth. “In the context of the Granger - causality, the growth hypothesis is supported if an increase in energy consumption causes an increase in real GDP. The policy implications of the growth hypothesis suggest that energy conservation-oriented policies may have detrimental impact on economic growth” (Payne,2010).
- [2] **Conservation hypothesis** is supported if the Granger test confirms one-way causality, that is, if an increase in real GDP causes an increase in energy consumption. This hypothesis suggests that energy savings policies, such as greenhouse gas reduction and energy efficiency enhancement policies, will not have an impact on GDP. “However, it is possible that if a growing economy constrained by political, infrastructural or mismanagement of resources could generate inefficiencies and the reduction in the demand for goods and services, including energy consumption. If such case, an increase in real GDP may have a negative effect on energy consumption” (Payne, 2010)
- [3] **The feedback hypothesis** suggests that energy consumption and economic growth are interdependent and supplementary. In this case, any increase (decrease) in energy consumption results in an increase (decrease) in GDP and vice versa. Therefore, restrictive energy policies will prevent economic growth and in the same way, any increase in GDP will boost energy demand (Ozturk, 2010; Sebri, 2015).
- [4] **The neutrality hypothesis** is supported in case where is no causality between energy consumption and GDP, and therefore neither a conservative energy policy nor an energy expansion policy has any effect on economic growth.

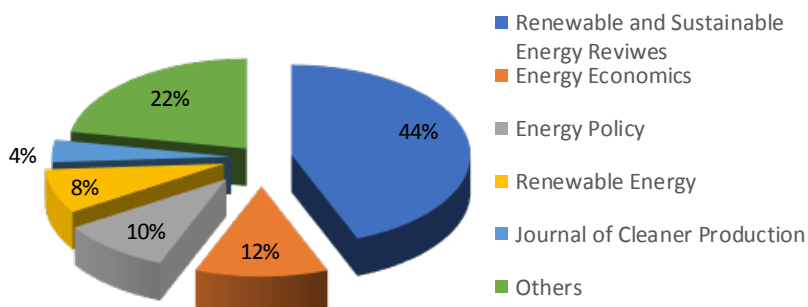
“Neutrality hypothesis views energy consumption as a small component of real GDP and therefore energy consumption should not have a significant impact on economic growth” (Payne, 2010).

The aim of this paper is to provide an overview of the available empirical literature on the causal link between renewable energy consumption and economic growth for the period 2009-2020. Although numerous papers that investigate the relationship between energy and economic growth are available, the authors believe that a literature survey that focuses solely on renewable energy-economic growth nexus is needed. This way the contribute to future research, by collecting and reviewing existing literature in this field, will be given. Also, the contribution of this paper is to provide significant information for renewable energy policymakers based on overview of past research and empirical results.

Materials and methods

For the purpose of this research, 50 papers are selected as a sample, 47 of which are published in journals with Impact Factor (IF) using online databases. The search criteria for the selection included only empirical studies focusing on renewable energy - economic growth, in order to ensure the best review on this subject. The representation of the journals based on the number of selected papers used in this research can be shown in the following chart.

Figure 1. Journal share based on selected papers



Source: Authors' calculations

From the total of 16 journals included in this research, 81% is with Impact Factor. Articles published in Renewable and Sustainable Energy Reviews comprises 44% of our sample, and also significant share of articles are published in Energy Economics, Energy Policy, Renewable Energy and Journal of Cleaner Production. Articles published in Others section are Ecological Economics, Applied Energy, International Journal of Hydrogen Energy, Energy Reports, Energy Strategy Reviews, Journal of Renewable and Sustainable Energy, Applied Energy, Energy Sources, Part B: Economics, Planning and Policy, Economics Bulletin, Procedia Economics and Finance and International Economics.

Results and discussions

The literature collected for this paper includes 50 papers, most of which have been published in the most renowned energy journals, to provide the highest quality analysis possible. The authors have focused on papers based on empirical research that cover the topic of renewable energy and economic growth. Table 1 presents literature in chronological order on the relationship between renewables and economic growth, including the period in which the survey was conducted, the countries are taken as a sample, the methodology used, and the results of empirical research. By examining Table 1, it can be concluded that the results obtained by the studies presented are mixed. “This lack of consensus can be attributed to the heterogeneity of climate conditions, varying energy consumption patterns, the structure and stages of economic development within a country, alternative econometric methodologies approaches, the presence of omitted variable bias along with the varying time horizons of the studies conducted” (Payne, 2010).

Table 1. Summary of empirical studies on renewable energy consumption-economic growth nexus

	Author(s)	Period	Country	Methodology	Causality relationship
1	(Sadorsky, 2009b)	1980-2005	G7 countries	Panel cointegration, Fully modified OLS, Dynamic OLS, Seemingly Unrelated regression (SUR)	GDP » REC
2	(Sadorsky, 2009a)	1994-2003	18 emerging countries	Ordinary least squares (OLS), Fully modified OLS, Dynamic OLS	GDP » REC
3	(Bowden & Payne, 2010)	1949-2006	USA	Toda-Yamamoto causality test	REC ≠ GDP (long run)
4	(Apergis, Payne, Menyah, & Wolde-Rufael, 2010)	1984-2007	19 developed and developing countries	Cointegration, Granger causality	REC « » GDP (short run)
5	(Apergis & Payne, 2010)	1985-2005	20 OECD countries	Panel cointegration test, Granger causality	REC « » GDP
6	(Apergis & Payne, 2010)	1992-2007	13 Eurasia countries	Panel cointegration test, Granger causality	REC « » GDP (long run)
7	(Fang, 2011)	1978-2008	China	OLS model	REC » GDP
8	(Menegaki, 2011)	1997-2007	27 European countries	One-way random effect model, Panel causality test	REC ≠ GDP
9	(Apergis & Payne, 2011a)	1990-2007	16 emerging countries	Panel cointegration test	GDP » REC (short run) REC « » GDP (long run)

	Author(s)	Period	Country	Methodology	Causality relationship
10	(Apergis & Payne, 2011b)	1980-2006	6 Central American countries	Panel cointegration and panel ECM	REC « » GDP (long and short run)
11	(Tiwari, 2011)	1960-2009	India	Structural VAR approach	REC « » GDP
12	(Yildirim, Saraç, & Aslan, 2012)	1949-2010	USA	Toda-Yamamoto causality test, Bootstrap-corrected causality test	REC » GDP (biomass) REC ≠ GDP
13	(Apergis & Payne, 2012)	1990-2007	80 countries	Panel cointegration and panel ECM	REC « » GDP (long and short run)
14	(Bildirici & Özaksoy, 2013)	1960-2010	10 countries	ARDL, vector error-correction models	GDP » REC (Austria, Turkey) REC » GDP (Hungary, Poland) REC « » GDP (Spain, Sweden, France) REC « » GDP (all countries)
15	(Al-mulali, Fereidouni, Lee, & Sab, 2013)	1980-2009	108 countries	FMOLS model	REC « » GDP (79% countries) REC ≠ GDP (19% countries) GDP » REC (2% countries)
16	(Ocal & Aslan, 2013)	1990–2010	Turkey	ARDL, Toda-Yamamoto causality test	GDP » REC (negative)
17	(Magnani & Vaona, 2013)	1997-2007	20 Italian regions	Panel error correction	REC » GDP
18	(Pao & Fu, 2013)	1980-2010	Brazil	ECM-based causality test	REC « » GDP (short run) REC ≠ GDP (long run)
19	(Al-mulali, Fereidouni, & Lee, 2014)	1980-2010	18 Latin American countries	Pedroni cointegration Test, DOLS, VECM Granger causality	REC » GDP (long run) REC « » GDP

	Author(s)	Period	Country	Methodology	Causality relationship
20	(Sebri & Ben-Salha, 2014)	1971-2010	BRICS countries	ARDL, VECM Granger causality	REC « » GDP
21	(Lin & Moubarak, 2014)	1977–2011	China	ARDL, Johansen cointegration, Granger causality	REC « » GDP (long run)
22	(Halkos & Tzeremes, 2014)	1990-2011	36 countries	Local linear estimator, Nonparametric analysis	REC » GDP (advanced economies)
23	(Azlina, Law, & Nik Mustapha, 2014)	1975-2011	Malaysia	Error correction model	GDP » REC
24	(Bilgili, 2015)	1981-2013	USA	Wavelet analysis	REC » GDP
25	(Shahbaz, Loganathan, Zeshan, & Zaman, 2015)	1972Q1–2011Q4	Pakistan	ARDL, Rolling widow approach (RWA), VECM Granger causality	REC « » GDP
26	(Ibrahiem, 2015)	1980-2011	Egypt	ARDL	REC « » GDP
27	(Chang et al., 2015)	1990-2011	G7 countries	The Emirmahmutoglu and Kose causality methodology.	REC « » GDP (all countries) REC ≠ GDP (Canada, Italy, US) GDP » REC (France, UK) REC » GDP (Germany, Japan)
28	(Dogan, 2015)	1990-2012	Turkey	ARDL, Johansen cointegration test, Gregory–Hansencointegration test with Structural break	REC ≠ GDP (short run) REC » GDP (long run)
29	(Inglesi-Lotz, 2016)	1990-2010	OECD countries	Pedroni cointegration test	REC » GDP
30	(Destek, 2016)	1971-2011	Newly industrialized countries	Asymmetric causality test	GDP » REC (South Africa, Turkey, India) REC ≠ GDP (Brazil, Malaysia)

	Author(s)	Period	Country	Methodology	C a u s a l i t y relationship
31	(Hamit-Haggar, 2016)	1991-2007	11 Sub-Saharan African countries	Panel cointegration, OLS, DOLS, FMOLS, DSUR	REC » GDP
32	(Alper & Oguz, 2016)	1990-2009	8 new EU countries	Asymmetric causality test, ARDL	REC ≠ GDP (Cyprus, Estonia, Hungary, Poland, Slovenia) GDP » REC (Czech Republic) REC » GDP (Bulgaria)
33	(Cherni & Essaber Jouini, 2017)	1990-2015	Tunisia	ARDL, Granger causality test	REC « » GDP
34	(Destek & Aslan, 2017)	1980-2012	17 emerging countries	Bootstrap panel causality	REC » GDP (Peru) REC ≠ GDP (12 countries) REC « » GDP (Greece, South Korea)
35	(Ito, 2017)	2002-2011	42 developed countries	Generalized method of moments (GMM), pooled mean group (PMG) technique	REC » GDP (long run)
36	(Rafindadi & Ozturk, 2017)	1971Q1-2013QIV	Germany	Clemente-Montanes-Reyesdetrended structural break test, Bayer-Hanck combined cointegration test, ARDL	REC « » GDP
37	(Amri, 2017a)	1990-2012	72 countries	Dynamic-simultaneous equation panel data approach	REC « » GDP (all countries, developing, developed countries)
38	(Kahia, Aïssa, & Lanouar, 2017)	1980-2012	11 MENA Net Oil Importing Countries (NOICs)	Panel error correction model	REC « » GDP REC » GDP
39	(Furuoka, 2017)	1992-2011	Baltic countries	Panel cointegration test, panel causality test.	GDP » REC

	Author(s)	Period	Country	Methodology	C a u s a l i t y relationship
40	(Brini, Amara, & Jemmali, 2017)	1980-2011	Tunisia	ARDL, Granger causality test	GDP » REC (negative)
41	(Amri, 2017b)	1980-2012	Algeria	ARDL	REC » GDP
42	(Koçak & Şarkgüneşi, 2017)	1990-2012	9 Black Sea and Balkan countries	Heterogeneous panel causality	REC » GDP (Bulgaria, Greece, Macedonia, Russia, Ukraine) REC « » GDP (Albania, Georgia, Romania) REC ≠ GDP (Turkey)
43	(Saad & Taleb, 2017)	1990-2014	12 European Union countries	Granger causality, Panel vector error correction model	GDP » REC (long run) REC « » GDP (short run)
44	(Bao & Xu, 2019)	1997-2015	30 provinces and 7 geographical regions	Bootstrap panel causality test	REC » GDP (4 provinces) GDP » REC (9 provinces, 4 geographical regions) REC « » GDP (1 province)
45	(Zafar, Shahbaz, Hou, & Sinha, 2019)	1990-2015	APEC countries	Westerlund cointegration test, Continuously Updated Fully Modified Ordinary Least Square (CUPFM)	REC « » GDP
46	(Aydin, 2019)	1980-2015	26 OECD countries	Dumitrescu-Hurlin panel causality test, Croux and Reusens frequency domain causality test	REC « » GDP
47	(Maji, Sulaiman, & Abdul-Rahim, 2019)	1995-2014	15 West African countries	Panel dynamic ordinary least squares (DOLS)	REC » GDP negative

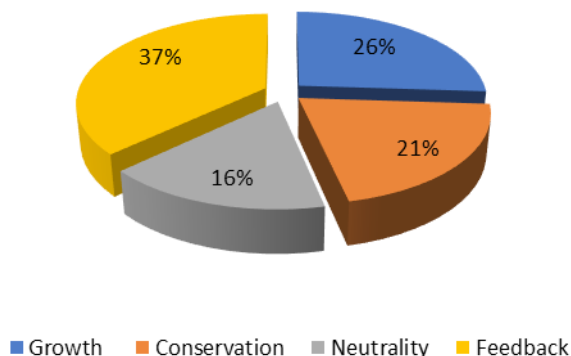
	Author(s)	Period	Country	Methodology	Causality relationship
48	(Ozcan & Ozturk, 2019)	1990-2016	17 emerging countries	Bootstrap panel causality test	REC \neq GDP (16 countries) REC \gg GDP (Poland)
49	(Alvarado et al., 2019)	1972-2014	19 countries of Latin America	Pedroni and Westerlund cointegration techniques, Dumitrescu and Hurlin causality test	REC \ll GDP
50.	(Rahman & Velayutham, 2020)	1990-2014	5 South Asian countries	Pedroni and Kao tests, FMOLS and DOLS estimation techniques, Dumitrescu-Hurlin	GDP \gg REC

Source: Authors

Notes: REC \gg GDP, GDP \gg REC, REC \ll GDP, REC \neq GDP indicates growth, conservation, feedback and neutrality hypothesis respectively.

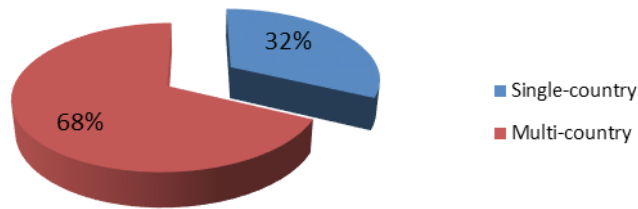
The selected literature can be divided on the basis of the empirical results obtained, i.e. the causal link between renewable energy sources and economic growth. The majority of papers reviewed confirm the relationship between renewable energy consumption and economic growth, only the direction of the relationship is different, while fewer studies confirm the neutrality hypothesis, indicating that there is no relationship between the two variables.

Figure 2. Hypothesis for renewable energy-economic growth nexus (in %)



Source: Authors' calculations

Taking into account the collected literature presented in Table 1, it can be said that in the past 10 years, research related to renewable energy and economic growth has been dominated by multi-country (68%) over single-country (32%) studies, which is consistent with previous literature reviews (Adewuyi & Awodumi, 2017).

Figure 3. Multi-country vs single-country studies (in %)

Source: Authors' calculations

Based on our review of selected literature, 86% of reviewed studies have confirmed the need to enhance investments in renewable energy sources. The authors also suggested the introduction of adequate policies that would encourage the development of renewable sources.

Review of literature supporting growth hypothesis

Fang was among the first to test the impact of electricity consumption from renewable sources on China's economic well-being for the period 1978-2008. Using multivariate Ordinary Least Squared (OLS) results were obtained that confirm the growth hypothesis, that is, "1% increase in consumption from renewable sources increases GDP by 0.12%" (Fang, 2011). Amri also researched the causal link between renewable energy and economic growth for an individual country. The Autoregressive Distributed Lag (ARDL) test shows that there is a unidirectional relationship in Algeria that goes from renewable sources to GDP in the long run. Policymakers should enhance investments in renewable energy (Amri, 2017b). Bilgili used wavelet coherence and wavelet partial coherence analyses to test the relationship between renewable energy and economic growth, for the period 1981-2013. The author obtained empirical results showing that consumption from renewable sources has a considerable effect on industrial production and hence on economic growth (Bilgili, 2015).

One of the multi-country studies was done by a group of authors for 18 Latin American countries for the period 1980-2010. Using the panel Dynamic Ordinary Least Squares (DOLS) and the Vector Error-Correction (VEC) Granger causality model they obtained results that show that the consumption of energy from renewable sources has a significant effect on economic growth compared to the consumption from non-renewable sources. Looking at the results of this study, the advice to the analyzed countries would be to increase investments in renewable energy sources in order to increase the share of electricity from renewable sources (Al-mulali et al., 2014). Using the Pedroni cointegration test, Inglesi-Lotz conducted a study for 34 OECD countries in 1990-2010, with estimates as follows: "an increase of 1% of renewable energy consumption will increase GDP by 0.105% and GDP per capita by 0,1%, while increasing the share of renewable energy in the energy mix of countries will increase GDP by 0.089% and GDP

per capita by 0.09%” (Inglesi-Lotz, 2016). The policy recommendation is promoting consumption from renewable energy. Ito explored the link between carbon dioxide emissions, renewable, and non-renewable sources of consumption and economic growth for 42 developed countries. Research has shown that renewable energy sources make a positive contribution to long-term economic growth. Such results suggest that developing countries should invest in the development of the renewable energy sector. In this way, they increase energy autonomy and create sustainable economic growth as well as employment. However, for developing countries in order to achieve these goals, it is essential that these countries receive financial and technological assistance from developed countries (Ito, 2017). Similar results were obtained by Magnani and Vaona, who worked to measure the effects of renewable energy production on 20 Italian regions. Using various econometric methods, the authors have shown that energy production encourages economic growth, and policies promoting the use of renewable energy sources should be adopted (Magnani & Vaona, 2013). A group of authors investigated the impact of renewable energy on economic growth in 15 West African countries using the panel ordinary dynamic least squares (DOLS) from 1995-2014. The results showed that there is a negative impact, that is, renewable energy consumption is slowing economic growth in these countries (Maji et al., 2019).

Review of literature supporting conservation hypothesis

The first author to address the topic of renewables and economic growth was Sadorsky, and he has confirmed the conservation hypothesis in his two papers, for emerging countries and the G7 countries. Although the observation period is different, both studies have shown that an increase in GDP per capita is a major driver of renewable energy consumption (Sadorsky, 2009a, 2009b). Furuoka explored the relationship between electricity consumption from renewable sources and economic growth for the Baltic countries in 1992-2011. Statistical analysis obtained empirical results in favor of the conservation hypothesis for all observed three countries - Estonia, Latvia and Lithuania. The results thus obtained suggest that the Baltic countries’ governments are free to implement conservation policies without impeding economic development (Furuoka, 2017). Rahman and Velayutham also researched a group of South Asian countries and came up with similar results for all 5 countries observed. Conservation hypothesis has been confirmed, and the authors believe that energy policies should be designed in a way that supports and promotes increased use of energy from renewable sources (Rahman & Velayutham, 2020). Some single-country studies also support conservation hypothesis. Ocal and Aslan did research for Turkey, Azlina, Law and Mustapha for Malaysia, and Brini, Amara and Jemmali for Tunisia, and in all three cases empirical results confirmed conservation hypothesis. However, in developing countries, there is a possibility that economic growth may be adversely affected by the impact of renewables, precisely because of large and expensive investments. This claim is supported by the empirical results obtained for Tunisia and Turkey, which confirmed the negative effect on economic growth coming from renewable energy consumption (Azlina et al., 2014; Brini et al., 2017; Ocal & Aslan, 2013).

Review of literature supporting feedback hypothesis

Apergis and Payne tested the causal relationship between renewable energy consumption and economic growth on several occasions. They chose a panel of 20 OECD countries, 13 Eurasia countries, 6 Central American countries, and 80 countries in four different papers. These studies examine the renewable consumption-economic growth nexus over a different period of time, nevertheless, feedback hypothesis was confirmed for all the above (Apergis & Payne, 2010, 2011b, 2012). Investigating the causal relationship between economic growth and renewable energy consumption in BRIC countries for the period 1971-2010, Sebri and Ben-Salha obtained the results that support the feedback hypothesis. “The empirical evidence from the ARDL approach indicates that renewable energy consumption has a positive effect on economic growth and vice versa” (Sebri & Ben-Salha, 2014). Group of authors investigated renewable energy consumption effects on economic growth using the Westerlund cointegration test in the period 1990-2015 for Asia-Pacific Economic Cooperation (APEC) countries. “This empirical evidence suggests that countries should increase investment in renewable energy sectors and plan for development in renewable energy for sustainable energy growth” (Zafar et al., 2019). Aydin explored the relationship between renewable and non-renewable electricity consumption and economic growth using two different panel causality approaches in order to make a comparison. Results for 26 OECD countries, confirmed the feedback hypothesis, so the author indicates that “policy-makers should promote renewable electricity consumption to ensure energy security, reduce energy dependence, and encourage economic growth” (Aydin, 2019).

Pao and Fu used Brazil yearly statistics for the period 1980-2010 to examine the causal relationship between GDP and four types of energy consumption. Authors used vector error correction models and revealed the following: “A unidirectional causality from non-hydroelectric renewable energy consumption to economic growth and bi-directional causality between economic growth and total renewable energy consumption” (Pao & Fu, 2013). Results from this study suggest that economic growth plays an important role in renewable sector development. On the other hand, the expansion of renewable projects can enhance Brazil’s economic growth. That being said, policymakers should include incentive mechanisms in their strategies for renewable energy development. (Pao & Fu, 2013). Lin and Moubarak explored renewable consumption and economic growth nexus in China using ARDL approach and Johansen cointegration techniques. The results showed bidirectional causality between variables, which implies that the growing economy in China is favorable for the development of the renewable energy sector, and at the same time, renewable consumption helps to boost economic growth (Lin & Moubarak, 2014). Group of authors used ARDL and a rolling window approach to investigate economic growth and renewable energy consumption in Pakistan. The study results detected a feedback effect between these variables (Shahbaz et al., 2015). Ibraheim also got similar results for Egypt, where the result confirmed the feedback hypothesis. The author suggests investments as well as a clear and comprehensive strategy for renewable energy development (Ibraheim, 2015).

Review of literature supporting neutrality hypothesis

Bowden and Pyne used Toda-Yamamoto long-run causality test to explore the relationship between renewable energy consumption by sector and economic growth in the USA. For the period of 1949-2006, they found “the absence of Granger-causality between commercial and industrial renewable energy consumption and real GDP, respectively” (Bowden & Payne, 2010). The group of authors found similar results for the USA in the period 1949-2010. They explored the relationship between GDP and different kinds of renewable energy by applying a Toda–Yamamoto procedure and bootstrap-corrected causality test. Only one causality was found biomass-waste-derived energy consumption to real GDP, while for total renewable energy consumption and other kinds of renewable energy, the neutrality hypothesis was confirmed (Yildirim et al., 2012). Menegaki investigated the causal relationship between renewable energy and economic growth for 27 European countries in a multivariate panel framework over the period 1997–2007 using a random effect model. Empirical results support the neutrality hypothesis which implicates that renewable energy consumption has no effect on economic growth in Europe (Menegaki, 2011). Dogan also investigated electricity consumption from renewable energy and economic growth in Turkey and found the evidence of neutrality hypothesis. Since the author found that only consumption from non-renewable sources stimulate GRP growth, a suggestion for Turkish government is a reduction of electricity share from renewable sources (Dogan, 2015).

Review of literature with mixed results across counties

In this section, the findings of multi-country studies on the causal relationship between renewable energy consumption and economic growth relationship are summarized. The results are mixed across different countries therefore it cannot be argued that either of these studies supports a certain hypothesis. Bildirici and Ozaksoy investigated the causality between biomass energy consumption and economic growth in 10 European countries by using the Autoregressive Distributed Lag bounds testing approach and vector error-correction models. The results support the conservation hypothesis for Austria and Turkey and growth hypothesis for Hungary and Poland. Bidirectional causality was found for Spain, Sweden, and France (Bildirici & Özaksoy, 2013). Group of authors investigated the bi-directional long-run relationship between renewable energy consumption and GDP growth in countries with different income. “The results revealed that 79% of the countries have a positive bi-directional long-run relationship between renewable energy consumption and GDP growth. On the other hand, 19% of the countries showed no long-run relationship between the variables, while 2% of the countries showed a one-way long-run relationship from GDP growth to renewable energy consumption, and from renewable energy consumption and GDP growth” (Al-mulali et al., 2013). Although results vary across countries, it is found that the higher the income countries are, the bi-directional relationship is significant. Group of authors investigated if there is a causal relationship between renewable energy consumption and economic growth in G7 countries, for the period 1990-2011. “The empirical results support the existence of a bi-directional causal

relationship for overall panel. However, looking at the individual results for each country, the neutrality hypothesis is confirmed for Canada, Italy and the US; while for France and UK there is unidirectional causality from GDP to renewable energy, and the opposite for Germany and Japan” (Chang et al., 2015). Koçak and Şarkgüneşi explored renewable energy and economic growth nexus in the Black Sea and Balkan countries for the period of 1990-2012. The research has shown the following: “...there is a long term balance relationship between renewable energy consumption and economic growth and renewable energy consumption has a positive impact on economic growth. Heterogeneous panel causality analysis results support growth hypothesis in Bulgaria, Greece, Macedonia, Russia and Ukraine; feedback hypothesis in Albania, Georgia and Romania; neutrality hypothesis in Turkey and according to the panel data set including all nine countries the results support feedback hypothesis” (Koçak & Şarkgüneşi, 2017). Authors are of the opinion that policies promoting renewable energy consumption should be supported in Black sea and Balkan. Bao and Xu investigated the linkage between renewable energy consumption and economic growth in China’s provinces and regions. For the purposes of this paper section, we consider that this study is a multi-country study, although it is based on one county. The study results show no causality in 53% of provinces and 43% of geographical regions for the nexus of renewable energy consumption and economic growth (Bao & Xu, 2019). Alper and Oguz investigated the causality between economic growth and renewable energy in 8 new EU countries and they found mixed results across countries. The empirical results “support the neutrality hypothesis for Cyprus, Estonia, Hungary, Poland, Slovenia, conservation for Czech Republic and growth for Bulgaria” (Alper & Oguz, 2016). Destek and Aslan also investigated renewable energy – economic growth nexus for a group of emerging counties for the period 1980-2012. The results showed no causality for 12 countries, growth effect is found for Peru, conservation effect for Colombia and Thailand and feedback effect for Greece and South Korea (Destek & Aslan, 2017).

Conclusions

This survey provides a review of empirical literature related to the causal relationship between renewable energy consumption and economic growth. Understanding the causal link between renewable energy consumption and economic growth plays an important role in defining renewable energy policies. The goal was to consolidate the results found by various authors and thus propose some ideas for renewable energy policy-makers. Also, a path for future researchers in this field is made, since this paper is the only one that deals exclusively with renewable energy consumption-economic growth nexus. Based on the literature reviewed, the findings from various studies are at least contradictory. While some authors found causal relationship running from renewable energy to economic growth and vice versa, from economic growth to renewable energy, there are others that found no causal relationship. As mentioned earlier, a possible reason for these inconsistent results hides in selected countries, periods of time and econometric techniques used in studies. However, based on the research which includes 50 papers, only 16% of total results supports neutrality hypothesis, which means that

causality between renewable energy consumption and economic growth was found in most of the studies.

Based on findings of this article, it can be argued that in most cases, energy policies should be oriented towards the expansion of energy use from renewable sources. The need for renewable energy expansion can be viewed from two different angles. Promoting and investing in renewable energy projects can lead to the fulfillment of Sustainable Development Goals, in order to fight against climate change. Furthermore, increased consumption from renewable sources can help countries who are dependent on energy import to reduce their expenses and what is more important, to become self-reliant.

On the other hand, the importance of investing in renewable energy can be justified by their positive effect on economic growth. In the majority of studies, reviewed for the purpose of this literature survey, consumption from renewable energy can lead to an increase in economic growth. That being said, in general, energy policies should promote renewable energy development, except in cases where a negative impact on economic growth was found. In those cases, a possible solution is to find an adequate ratio of renewables and non-renewables.

Conflict of interests

The authors declare no conflict of interest.

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THE POSITION OF PUBLIC ENFORCEMENT OFFICERS WITH REFERENCE TO ENFORCEMENT ON AGRICULTURAL LAND

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ABSTRACT

The subject of this paper is the analysis of the legal nature of public enforcement officers as holders of public authority, their place in the judicial system of the Republic of Serbia with special reference to enforcement on agricultural land owned by the enforcement debtor and the process of supervision and control of public enforcement officers. Fast and efficient collection of creditors' claims is one of the basic tasks of the enforcement procedure and as such, it is a precondition for the efficient functioning of the judicial system. In the Republic of Serbia, these goals are ensured by the introduction of first (private) enforcement officers, and afterward, public enforcement officers as a new judicial profession, to which some of the public authorities have been delegated, i.e. authorities that only courts once had.

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Introduction

The most important part of the whole, of any legal order, is the system of protection of subjective rights. On the other hand, the enforcement procedure also aims to maintain the legal order. The broadest observed principle of constitutionality and legality cannot be separated from the respect and realization of the subjective rights of all subjects in the legal system. Such a request is an imperative and the ultimate goal of the principles of constitutionality and legality (Šarkić, 2016).

Enforcement proceedings are a legally prescribed way of enforcing or securing a creditor's claim, through a court as a state authority as well as through a public

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enforcement officer as a holder of an executive human rights function. The basic meaning of the enforcement procedure is realized in the efficient settlement of the claims of the enforcement creditor, which is determined by an enforceable or credible document. The enforcement procedure completes the system of providing legal protection (Lazarević, 2014) that is the right to legal protection ends only with the successful completion of the enforcement procedure. If there were no efficient enforcement system litigation would not have the legal meaning, given that the creditor would obtain an enforceable document that would not be collectible, and the meaning of such litigation would be questionable. The enforcement document, as a rule, represents the legal basis for determining and conducting the enforcement procedure. The enforceable document, more precisely the claim of the enforcement creditor contained in it, is the essence due to which the enforcement procedure is conducted (Ličina Smiljanić, 2018).

The most important authority delegated to the public enforcement officers is the enforcement on the entire property of the enforcement debtor, which certainly includes the enforcement on the agricultural land owned by the enforcement debtor. This matter, although it is in the Law on Enforcement and Security Interest (“Official Herald of RS”, no. 106/2015, 106/2016 – authentic interpretation, 113/2017 – authentic interpretation and 54/2019 – hereinafter: Law on Enforcement and Security Interest, current law, LESI) is insufficiently processed, given the frequency of this method of enforcement in the Republic of Serbia and thus and its significance in enforcement proceedings.

Methodology

In addition to general scientific methods, special methods have been applied in the paper for a more comprehensive study of the specifics of the position of public enforcement officers in the legal system of Serbia and analysis of the powers prescribed by law that have been delegated to them. That primarily refers to historical law, theoretical law, and normative, legal-dogmatic, and sociological methods of understanding the law. The historical-legal method will be used to study the development of the institute itself and the need for return and to introduce public enforcement officers into the legal system of the Republic of Serbia. The normative method will be used during the legal analysis of normative solutions within our legal system, but also international legal standards, and the practice of domestic and international courts and other relevant institutions. Dogmatic method of observation of specific legal provisions will indicate possible and necessary improvements to make certain legal solutions in our legal system “better”. Sociological interpretation of the institute of public enforcement officers will give an account of their significance in society and justification of the need for the development of enforcement in Serbia. Starting from the basic principles of theoretical legal method, consulted and presented are the authors who have dealt with this and related issues such as issues of enforcement, public authority, control of the work of public enforcement officers, notaries, etc.

Reasons for returning private enforcing officers to the judicial system of the Republic of Serbia

Alignment of national legislation with Chapters 23 and 24 of the EU *acquis* is one of the highest priorities of the RS Government, as stated in its key strategic document for judicial reform, the National Strategy for Judicial Reform (hereinafter: NSRP) for the period from 2013 to 2018, for which the Government of the RS on 31 July 2013, at the proposal of the Ministry of Justice, adopted an Action Plan for its implementation. The need to establish a more efficient and sustainable enforcement system has resulted from many judgments by the European Court of Human Rights (hereinafter text: ECHR) against Serbia, given that most of them referred to the shortcomings of the enforcement system, which as such was regulated by the laws on enforcement proceedings of 1978, 2000 and 2004, i.e. in the period when the courts and court enforcement officers were competent to enforcement procedures.

The Yugoslav Law on Enforcement Procedure from 1978 was the legal basis for enforcement in the countries that were once part of the SFRY. The main reasons for non-enforcement, until 2011, were complex procedures, excessive formalism, procedural repetition, an abundance of legal remedies, the privileged position of the state, lack of interest in the field of enforcement, etc. All this has led to an increasing backlog of enforcement cases and an overburden of judges, which has led the RS government to decide to drastically change the enforcement system and introduce a system that has already proved successful in other countries: private enforcement officers. The National Assembly of the Republic of Serbia adopted the Law on Enforcement and Security Interest in 2011, which introduced private (self-employed) enforcement officers. However, the Law on Enforcement and Security Interest from 2011 failed to solve all the shortcomings of the enforcement procedure, so in 2015 a new Law on Enforcement and Security Interest was passed, the implementation of which began in 2016. It introduces – public enforcement officers. The legislator, therefore, decided to give the public enforcement officers significant public powers. The public enforcement officers also received a part of the judicial power, such as making a writ of execution based on a credible document to settle a monetary claim arising from communal services and related activities, and he can even take some repressive measures either with the assistance of state bodies. Amendments to the Law on Enforcement and Security Interest from 2019 (hereinafter LESI), which began to be applied on 1 January 2020, the public enforcement officer was given even broader powers (more on this below).

Position of public enforcement officers and public authorities

The Constitution of Serbia enables certain public authorities to be entrusted by law to companies, institutions, organizations, and individuals (Pajvančić, 2009). Given that the entrusting is regulated by the same article that regulates the entrustment of affairs to local self-government units and autonomous provinces, then the entrustment should be guided by the same criteria, which is defined by the Constitution so that it

is performed “in the interest of more efficient and rational realization of rights and obligations meeting their needs of immediate interest for life and work.” However, this is only a guideline for legislative policy, and the formal restriction refers to the possibility of entrusting only certain public powers, and not the whole business, that is, the competencies of the state. In this respect, public enforcement officers become holders of public authority in the function of judicial activity.

LESI defines a public enforcement officer as an enforcer of public authorities entrusted to him by (this or another) law, who performs activities as an entrepreneur or as a member of a partnership whose members are exclusively public enforcement officers. The public enforcement officer is therefore a private judicial profession with entrusted public authority. A public enforcement officer is an individual appointed by the Minister of Justice. He has a status of an official, conducts the enforcement within the limits of the writ of execution, and performs other authorities entrusted to him by the Law. The public enforcement officer must meet conditions prescribed by Law for his appointment. Public enforcement officers act as holders of public authority who perform their activities independently and on their own. Independence is not a determinant of legal status, but more of a guaranteed absence of influence on work and conduct. It is realized in relation to state bodies, and also concerning parties where the state still regulates public enforcement officer activities by legal rules, in a way that controls and supervises the work of public enforcement officers.

The principles of public and private law are mixed in the activities of the public enforcement officer. Although he represents a private profession, he is the bearer of public authority, which gives him a special character and determines his mixed nature. The public enforcement officer is obliged to really and constantly deal with public enforcement and to exercise the entrusted powers responsibly and with dignity, using all available material and human resources (Đurđević, 2014).³ Per the principle of formality, the public enforcement officer is obligated to act by the law and under the rules prescribed by the law. The full application of the principle of formality is reflected in the fact that the public enforcement officer cannot refuse to perform a certain action, i.e. he cannot be released from the obligation to act in the process. The possibility of refusing to take certain actions is exclusively prescribed in situations provided by the law, and this is mainly when the public enforcement officer must observe the principle of proportionality. The public enforcement officer, therefore, must carry out the procedure once to the end, just as the court has such an obligation. On the other hand, in those legal situations in which the competitive jurisdiction of public enforcement officers is prescribed – the principle of disposition dominates, which is certainly one of the basic principles of the

3 Speaking about the goals of notarial activity, Đurđević states that it should fulfill three important legal-political tasks: 1) to contribute to the full realization of the purpose of form in modern civil law; 2) to relieve the courts and administrative bodies and 3) to facilitate access to justice for legal entities.

executive law. It characterizes the enforcement procedure in its basic determination. As a rule, the holder of an enforceable document has the right to dispose of his right. Whether he will request enforcement or not is in his exclusive competence (Šarkić, 2016).

The public enforcement officer is obligated to apply the law objectively because his position is not the position of the party's commissioner or judge in party disputes. The principle of impartiality is an inseparable part, in a broader sense, of the principle objectivity – primarily because the initial premise of the principle is the duty of the public enforcement officer to provide and offer equal treatment to the parties in the enforcement procedure, even though the general concept of LESI is such that the enforcement creditor comes to the fore. From that point of view, the principle of protection of the enforcement debtor is a global principle in which the enforcement debtor is protected so that no action against him can be carried out contrary to the law. The principle of protection of the enforcement debtor in the broadest sense implies the ability of the enforcement debtor to challenge the allegations of the enforcement creditor, to contest for the most appropriate means of enforcement, to reduce the harmful consequences of enforcement and otherwise protect his interests (Šarkić, 2016) with, on the other hand, the application of the principles and efficiency which implies rapid protection of the rights of the parties in the procedure, especially the enforcement creditor. However, as stated above, the principle of efficiency must not be to the detriment of the rights of the enforcement debtor or third parties, but above all must provide rapid and effective protection.

For the sake of more efficient and rational realization of the rights and obligations of citizens, the state sometimes in a special legal procedure, prescribed by the Constitution, renounces exclusivity to exercise certain prerogatives, its powers to act for public interests (hence the term public powers) and entrusts them to others entities, whereby these entities (only in the exercise of these powers) have the same rights and obligations as state administrative bodies (Art. 51 par. 1 of the Law on State Administration), but retaining responsibility for their timely and proper enforcement. Thus, it does not waive its right to exercise public authority. It does not transfer them to other subjects, but in some cases, entrusts them to perform, which still keeps them for itself (Milkov, 2009).⁴ These are those entities for which the state has assessed that certain jobs have such a social significance (general interest) that requires efficiency and quality to improve their actions or to make the realization of their rights necessary for the citizens, for the realization of which it is necessary to exercise public authority, more efficiently.

4 Speaking about the nature of public authorizations, Milkov states: “The decision on which subjects will be ‘entrusted’ with the exercise of public authorizations is not free. It does not depend on the discretion of the legislator, but is conditioned by the nature of the activity...” According to him, these are vital, not derived interests, and the performance of those activities must be continuous, uninterrupted and equally accessible to everyone.

By public authorizations, therefore, we imply one of the forms of exercising power, i.e. one of the functions of the authority. Public authorization differs from state legal functions by the entities entrusted with this function, as well as by the grounds on which the authorization to perform this function arises.

Having in mind the section of Art. 51 of the Law on State Administration, which sanctions that holders of public authority in performing entrusted tasks of state administration have the same duties as state administration bodies, it follows that in the part where they exercise public authority, holders of public authority for timely and proper performance, based on provision Art. 136 st. 1 of the Constitution, are held accountable by the Government (Tomić, 2016). However, as the Government even after entrusting public authorities retains responsibility for their implementation, through the ministry responsible for the subject area, e.g. it supervises the proper work, directs them, issues instructions, etc. The question arises whether in that way the executive power seizes the jurisdiction of the judiciary, that in the part of the authority regarding the supervision of the work of public enforcement officers, where it discusses and resolves issues motioned by legal remedies, on which the competent court also decides on.

Given the above, the question of justification for entrusting public authorities to entities outside the system of regular authorities can also be raised. As a result of the great need to establish a more efficient and sustainable enforcement system in the Republic of Serbia, inter alia, and due to numerous judgments of the European Court of Human Rights in the field of non-enforcement of court decisions, issued due to lengthy enforcement proceedings (see case Ilic against Serbia), a backlog of enforcement cases in the courts (see case Samardzic and AD Plastika v. Serbia), excessive remedies (see subject Bulovic v. Serbia), etc.⁵, and the fact that the ECHR has found in various cases that the State is responsible for the proper functioning of the enforcement system (see EVT v. Serbia), the Government of the Republic of Serbia has decided to drastically change the enforcement system. The Government assessment was that it is justified, at the point of view on realizing human rights more rationally and purposefully, to entrust part of the public authority to entities outside the system of classical government (Markovic, 2015). On the other hand, the legislator entrusted the enforcer with the performance of part within the judicial function in a broader sense, which raises the question of the existence of a constitutional basis for such a decision (Andrei et al., 2017). According to the part of a procedural theory, the enforcement procedure has no technical character, because in this procedure it is decided on the subjective right to enforcement of a decision in which the existence of claims is established authoritatively and undoubtedly, and if the preconditions for enforcement are met the application of direct and indirect coercion is determined. Enforcement officers,

5 Author's note: Cases against State of Serbia in the area of non-enforcement of court decisions in which the ECHR issued a final decision are mainly based on the 2000 ZIO and the 2004 ZIO. It should be noted that in Art. 304 of the 2004 ZIP stipulated that all enforcement proceedings initiated before 23 February 2005 should be completed in accordance with the previous law.

although representatives of the new judicial profession, who are entrusted with the exercise of judicial power in enforcement matters, are not courts already established by law (Zoroska-Kamilovska, 2015).

In practice, the question arose as to whether the extension of the powers of the enforcers would be following Art. 32 par. 1 of the Constitution of the Republic of Serbia and Art. 6 ECHR. In this regard, the Constitutional Court of Serbia considered the competence of the enforcement officer to determine enforcement and in its decision on the subject of IUz no. 782/12 adopted on 27 February 2014 and concluded that the constitutional guarantees under Art. 32 st. 1 of the Constitution of the Republic of Serbia, which guarantees everyone the right to have their rights and obligations decided by an independent, impartial, and legally established court, cannot be interpreted as mandatory at all stages of the proceedings. This opinion is in line with the case-law of the ECHR, according to which states do not have to ensure that a judicial body decides at every stage on any dispute concerning rights and obligations – if one stage of the proceedings is conducted before another body; the requirements of this provision are met if the dispute is decided at a later stage by a court that has full jurisdiction and decides on it.

Enforcement officers as a new judicial profession

The very notion of judicial activity, in the organizational sense, is broader than the notion of judicial power, because in addition to the court as holders of judicial activity, therefore, prosecutors, attorneys and other judicial professionals (...), social bodies and individuals who have a role of judicial or para-judicial body (...) (Rakić-Vodinelić, 2012), are included, therefore public enforcement officers also. In functional terms, judicial activity, unlike the judiciary, does not consist only in the pronouncement of judgments (judicates) – it includes the organization of the judiciary and the organization of judicial activity; i.e. resolving the issue of jurisdiction (...). The most significant difference is reflected in the fact that only courts exercise power and only through the pronouncement and enforcement of court decisions that power exists, while other bodies of judicial activity help the court to exercise power as the legal order dictates (Rakić-Vodinelić, 2012), with certain entrustments of the exercise of certain elements and segments of the judiciary to other bodies or entities. This entrustment is regulated by law, based on constitutional authority.

The general characteristic of all judicial professions is that they must meet certain criteria arising from the basic content of the judicial system. It is, above all, strict abidance of international legal standards, the Constitution, laws, bylaws, and other rules of the judicial profession. All practitioners of the judicial profession must be very sensitive to the ethical rules that apply in general to all judicial professions or each of the judicial professions individually. It is certainly important for all of them that they serve the fulfillment and protection of the basic goals guaranteed and proclaimed by the Constitution and the law, including their property (Nikolic et al., 2012).

Structure of enforcement procedure with reference to the enforcement procedure on agricultural land and enforcement supervision mechanisms

Public enforcement officers have standard authorities, but their application is determined by certain specifics concerning the procedure itself, which prescribes certain restrictions, but also the specifics of the procedure.

According to the valid law, the enforcement procedure is divided into two parts: the enforcement procedure and the security interest procedure. According to the Serbian model, enforcement, as a rule, is determined by the court and only exceptionally by the public enforcement officer in the case of settling the monetary claim of the enforcement creditor arising from utility services and related activities and when it comes to settling the monetary claim against the enforcement debtor from Art. 300 par. 2-4 of LESI (so-called budget cases). The stage of enforcement occurs when a writ of execution is made. In the enforcement procedure, enforcement is carried out to realize the claims from the executive or credible document, which means that if there are no claims, enforcement cannot be requested (Lazarević, 2014).

Enforcement documents that are enforced by the application of the Law on Enforcement and Security Interest most often originate from the procedure before the court or, if they are a monetary claim, from the procedure before the administrative body and represent acts of state bodies. However, in the last ten years, enforcement documents have become more frequent, which are not created in proceedings before state bodies, but before para-state bodies, holders of public authority, the will of the parties, or an act of private law entities. They are regulated by special laws, such as, for example, the Labor Law, the Law on Protection of the Right to Trial within a Reasonable Time, the Law on Peaceful Settlement of Disputes, the Law on Mortgage, the Law on Financial Leasing, etc. The reason for the creation of such enforcement documents is the desire to speed up the path from the occurrence of a legal obligation to its enforcement and avoid litigation, which is claimed to take a long time and is slow-paced (Ličina Smiljanić, 2018).

By analyzing the current model of enforcement, we conclude that with the introduction of public enforcement officers, the entire structure of the enforcement procedure has largely passed from the court's jurisdiction to the jurisdiction of public enforcement officers.

Thus, the public enforcement officer is also authorized for conducting enforcement on agricultural land, by entering the writ of execution annotation in the real estate cadaster, assessing the value of agricultural land, selling and settling the enforcement creditor from the sale price. During the enforcement, the public enforcement officer is obliged to take into account the proportion between the amount of the enforcement creditor's claim and the value of the agricultural land on which the enforcement is determined. The subject of enforcement may not be agricultural land of a farmer with an area of up to 10 acres, except when settling a monetary claim secured by a contractual mortgage or pledge statement (Art. 164 LESI). This means that the enforcement must be carried out on the real estate, agricultural land, and for there to be the status of a farmer of the owner. The law in Art. 164 and Art. 2 did not precisely define the term farmer, and it

remains insufficiently precise whether the term farmer refers only to a person who has a registered agricultural household or it can also be a person-farmer who lives exclusively or predominantly from agricultural activities. Law on Agriculture and Rural Development (“Official Herald of RS”, No. 41/2009, 10/2013 – dr. Law and 101/2016 – hereinafter: the Law on Agriculture and Rural Development) in Art. 2 par. 1 pt. 4 defines an agricultural holding as a production unit on which a business company, agricultural cooperative, institution, or other legal entity, entrepreneur, or farmer performs agricultural production. In par. 8 of the same article, the law defines a farmer as a person who is the holder or member of a family farm that is exclusively engaged in agricultural production and par. 10 defines that agricultural land includes fields, gardens, orchards, vineyards, meadows, pastures, fishponds, reeds and swamps, as well as other lands (sinkholes, abandoned riverbeds, a land overgrown with low shrubs, etc.), which by their natural and economic conditions can be rationally used for agricultural production. From the above, it would be logical for the public enforcement officer, and given that there is room for him to decide for himself whether it is agricultural land or not, and whether it is a farmer, apply the provisions of Art. 2 of the Law on Agriculture and Rural Development.

Therefore, during the enforcement, the farmer must be left with a minimum area of 10 acres, except in the case when the owner of the plot – the farmer – has encumbered this plot with a contractual mortgage or a pledge statement. In this case, the minimum amount of land will not be determined for the enforcement debtor, since the subject of the mortgage can be immovable property, and thus the right of ownership on the land.

The public enforcement officer determines the value of agricultural land with a conclusion, most often by hiring a certified appraiser of the appropriate profession to assess the market price of agricultural land, to which the parties have no right to object, but may challenge the assessment (both height and other elements) in a request for rectification of irregularities. Under the provisions of Article 271 par. 2 of the Law on Civil Procedure (“Official Herald of RS”, No. 72/2011, 49/2013 – decision of Constitutional Court 74/2013 – decision of CC, 55/2014, 87/2018 and 18/2020 – hereinafter: LCP), a party may hire an expert or other expert registered in the register of court experts, who will make objections to the submitted finding and opinion, or a new finding and opinion in writing. The public enforcement officer will try to coordinate the given findings and opinions, and if he fails to coordinate them, e.g. if he considers that the important facts have not been sufficiently discussed, he will entrust another expert witness to give findings and opinions and inform the parties (Art. 271 par. 3 and 4 of the LCP). The assessment of the value of agricultural land must not significantly deviate from the market price on the day of assessment. The value certainly depends on whether there are certain encumbrances on it, i.e. rights on the property that will remain after the sale. If such rights exist, the value of the real estate will certainly be lower. After the assessment and the conclusion on the determination of real estate, the public enforcement officer schedules the sale with a conclusion, and when the agricultural land is sold ex officio, he approaches the settlement of the enforcement creditor and

other persons who aspire to be settled. If the sale is made by public auction, at the first public auction the agricultural land cannot be sold below 70% of the estimated value (initial price), and at the second public auction, it cannot be sold below 50% of the estimated value. If the agricultural land is sold through a direct agreement, the enforcement creditor is considered settled in the amount of the achieved price, but if it is lower than 30% of the estimated value, it is considered settled in the amount of 30% of the estimated value of the real estate or agricultural land. If the agricultural land is not registered in the real estate cadaster, the enforcement creditor must submit documents, along with the enforcement motion, that would make it suitable for registering the ownership on the agricultural land in favor of the enforcement debtor. The court is obliged to immediately forward the submitted document to the body that maintains the real estate cadaster and to stop the procedure until the registration of the property ownership to the enforcement debtor is complete. If the motion for enforcement indicates agricultural land or its part that is not registered in the real estate cadaster and on which ownership cannot be registered, the enforcement creditor must state that registration of the property is not possible and attaches it to the motion for enforcement. In that case, the court issues a writ on execution on agricultural land that is in the unregistered ownership of the enforcement debtor, provided that the enforcement creditor submits or appoints, as proof of unregistered ownership, one of the documents determining the unregistered ownership of the enforcement debtor.

Chamber of Public Enforcement Officers and Supervision Mechanisms

In regards to the supervision of enforcing proceedings, there are certain international standards. In Recommendation No. 17 (2003) par. IV4. it is prescribed that “The enforcement officer should perform his duties honorably and professionally, and always act per recognized high professional and ethical standards. In their treatment of the parties to the proceedings, they should be impartial and subject to professional monitoring and supervision (...)”, and in par. IV.6. “Disciplinary, civil, and/or criminal proceedings should be initiated against the perpetrators of abuse of office, and appropriate sanctions should be provided for the established abuse.” CEPEJ Guidelines from 2009, no. 80-82 compels countries that have enforcement officers in their legal system to subject enforcement officers who violate the law, regulations, or ethical rules, even outside the performance of their duties, to disciplinary sanctions, which does not exclude possible civil and criminal sanctions. Disciplinary proceedings should take place before an independent body to avoid conflicts of interest and ensure transparency, and “the powers and obligations of the enforcement officer should be clearly defined and delineated concerning the powers and obligations of the judges.” by Recommendation no. 17 (2003) par. IV5. The 2009 CEPEJ Guidelines emphasize the importance of establishing a professional organization.

According to the LESI, all public enforcement officers and deputy public enforcement officers are obligatory members of the professional association, the Chamber of Public

Enforcement Officers. The work of the Chamber is supervised by the ministry, according to the law governing the state administration. The Supervisory Board is one of the bodies of the Chamber that supervises the legality of work and financial operations of the Chamber. The public enforcement officer is disciplinary liable for the violation of the law, other regulations, non-fulfillment of obligations determined by the Statute, other regulations or general acts of the Chamber, or due to violation of the reputation of public enforcement officers (Art 525 LESI). In this regard, is obligated to adopt the Code of Ethics of Public Enforcement Officers and to initiate disciplinary proceedings against public enforcement officers who do not comply with the provisions of the Code, under the law and the statute. In addition to ensuring that public enforcement officers respect the provisions of the Code of Ethics and initiating disciplinary proceedings the Chamber of Public Enforcement Officers also has supervisory powers. At least once in two years, it performs regular supervision, during which it checks the application of the Standard of Professional Conduct of Public Enforcement Officers, and it can also perform extraordinary supervision upon the complaint of a party or participant in the procedure. The Chamber may order the public enforcement officer to eliminate the deficiencies within a certain period if that is possible due to the nature of the matter. The minutes on supervision and evidence are forwarded to the disciplinary prosecutor of the Chamber and the disciplinary prosecutor of the ministry. Based on such supervision, the request for initiating disciplinary proceedings may be submitted by the President of the Chamber of Public Enforcement Officers, as well as upon the complaint and initiative of the parties in the proceedings. The disciplinary prosecutor of the Chamber supervises the work of public enforcement officers in the procedure upon complaints of the parties or participants in the procedure.

From the above, it is clear that the part of the Chamber is great, generally speaking, self-governing. It could, in the most general way, be divided into two components: 1) self-governing in the narrow sense and 2) supervisory. The role of the Chamber is that the Chamber is obliged, on the one hand, to adopt a Code of Ethics, preserve the reputation, honor, and rights of the profession, represent enforcement officers in front of state bodies to protect the rights and interests of the profession, take care of professional training, meetings, seminars, and consultations in the field of enforcement, establishes and realizes cooperation with chambers of enforcement officers of other countries, etc. (self-governing role in a narrower sense); on the other hand, it supervises *ex officio*, orders the enforcement officers to eliminate the deficiencies within a certain period and initiates disciplinary proceedings (through its competent authorities). Having in mind that the subject of supervision is the realization of duties or goals determined by law, the Chamber is endowed with powers. Self-governing powers enable the Chamber of Public Enforcement Officers to regulate the profession and take care to achieve all those goals listed in Art. 514 of LESI.

Ministry of Justice and control mechanisms

The work of the Chamber is supervised by the ministry, according to the law governing the state administration. The LESI itself does not contain any additional provisions on the procedure, frequency, on whose initiative supervision is performed, etc. The Ministry of Justice supervises the legality of the work of the enforcement officers on its own initiative, at the proposal of the president of the court for whose territorial jurisdiction the public enforcement officer is appointed or on the complaint of another public enforcement officer, party or participant in the procedure. The Ministry of Justice supervises the legality of work of the enforcement officers on its own initiative, at the proposal of the president of the court for whose territorial jurisdiction the public enforcement officer is appointed or on the complaint of another public enforcement officer, party or participant in the procedure. The Ministry is authorized to: 1) obtain, from the parties and participants in the procedure and the presidents of the courts for whose territorial jurisdiction the public enforcement officer is appointed, all data on the manner in which the public enforcement officer made decisions and conclusions and undertook enforcement and security interest actions; 1a) collects and processes data, referred to in Article 503 of LESI, in accordance with the law governing the protection of personal data; 2) request documentation on the amount of costs of the enforcement and security interest procedure; 3) requests reports and evidence on how the acts of courts and public enforcement officers and writs for parties and other participants in the procedure were delivered; 4) makes an insight into the choice of means and objects of enforcement and their changes during the enforcement procedure or security interest procedure; 5) requests a report on whether and how many times the same act of enforcement or security interest has been repeated; 6) makes an insight into the work of the office of the public enforcement officer in order to check the application of the Standard of Professional Conduct of Public Enforcement Officers; 7) makes an insight into the records on enforcement and security interest procedures and financial operations; 8) obtains other information necessary to decide whether disciplinary proceedings will be initiated against the public enforcement officer. The civil servant who performed the supervision is obliged to forward the report on the supervision and evidence to the disciplinary prosecutor of the ministry and the disciplinary prosecutor of the Chamber. If we analyze in detail the powers of the Ministry of Justice in terms of supervising the work of public enforcement officers, we can answer the above “question” whether the executive seizes the competence of the judiciary. Unlike the authority of the Ministry of Justice, which is limited when it comes to courts (control of the legality of judges’ actions, i.e. whether deadlines are met, whether a judge performs his work conscientiously, etc.), or the prosecutor’s office, such a limitation does not exist when it comes to controlling work of public enforcement officers. It seems that the Ministry of Justice, by introducing the possibility of controlling the manner of decision-making of a public enforcement officer in a specific case (e.g. it can control the choice of means and subject of enforcement), has “entered” the jurisdiction that belongs to the courts. The Ministry of Justice should have a central role in the so-

called administrative supervision, and by no means have a control function, which should certainly belong only to the court. The Ministry should perform regular and extraordinary supervisions (controls) related to e.g. control of fulfillment of working conditions, general criteria, such as name board, seal, working hours, archiving of cases, tidiness of records, etc. and in no way to interfere in the actions and decisions of the public enforcement officers made in a specific case.

If the disciplinary prosecutor of the ministry concludes that disciplinary violations have occurred, he/she submits a request for establishing disciplinary responsibility to the disciplinary commission, which decides upon it after an oral hearing.

Judicial control of public enforcement officers

Courts are the only bearers of judicial power who exercise decision making. In the exercise of judicial power, and when it comes to the enforcement procedure, one part of the work is performed by other bodies, i.e. individuals. Regarding that, the division of tasks and powers, all bodies must cooperate, share the adopted positions, educate and improve together, all with the aim of better functioning of the entire judicial system, and thus the enforcement procedure.

The public enforcement officer decides on the motion for enforcement based on a writ of execution or credible document to settle a monetary claim arising from communal services and related activities, and on the motion for enforcement to settle a monetary claim against the enforcement debtor from Art.300 LESI.⁶ The public enforcement officer decides on such a submitted motion in the form of a writ of execution against which an objection is allowed, upon which is decided by the appropriate court. If the decision is made based on a motion submitted on an executive document, claim that arises from utility services and related activities, an appeal is allowed, which is decided by the appropriate second instance court. Therefore, when the public enforcement officer is authorized by law to make a writ of execution, the parties in the procedure have the right to object or appeal against such decisions. Judicial control of the legality and regularity of the enforcement officers' actions whilst composing writ of execution, as well as other decisions in which the right to object or appeal is allowed, is obvious and present. The public enforcement officer has jurisdiction for carrying out almost all enforcement's (except those reserved for the court). With the amendments to the LESI has undergone major changes in the provisions of Art. 4 relating to the competence

6 Author's note: By intervening in Art. 3 of the Law, the competence of public enforcement officers is expanded, so that in cases of settling a monetary claim arising from communal services and related activities, the public enforcement officer decides on the writ of execution on the basis of the executive document. In regards with deciding on the enforcement proposal, the enforcement proposal on the basis of an enforcement or credible document in order to settle a monetary claim against the enforcement debtor, under Art. 300 para. 2, 3 and 4 shall be decided by the public enforcement officer. In the opinion of the author, this will enable relieving the courts in enforcement matters, considering that these are a large number of proceedings.

of enforcement and gave public enforcement officers broader powers.⁷ During the enforcement, most decisions that are made by public enforcement officers are in the form of a conclusion, to which no objection or appeal is allowed. However, to provide some kind of protection, first to the enforcement debtor, the legislator prescribed that the parties or participants in the procedure have the opportunity to submit a request for elimination of irregularities during, and on the occasion of enforcement proceedings, within eight days from the day of the irregularity. The request can be submitted primarily against irregularities committed during the enforcement proceedings – actions performed during and on the occasion of the enforcement, and only exceptionally against the conclusion of the public enforcement officer. While against the writ of execution made by the court or public enforcement officer it can't be submitted. The request is

7 Paragraph 4 in Art. 1 is changed, so that it now reads: “The court is exclusively competent to perform an act that can be undertaken only by the enforcement debtor, inaction or suffering (Art. 363, 364 and 366), return of the employee to work and enforcement of executive documents related to family relations, except for the collection of legal support.” The first change in paragraph one refers to the issue of jurisdiction for the joint sale of real estate and movables, which is now in the exclusive jurisdiction of the public enforcement officer, and not the court. Even if such situations were rare in practice, there was no reason why the legislator prescribed that the enforcement of joint sale of real estate and movables be in the exclusive jurisdiction of the court, since public enforcement officers are certainly exclusively competent to carry out execution on both real estate and movable things. Most often, during the enforcement procedure itself, it became known that within the real estate on which the court allowed the enforcement, there were also movables, accompanying installations or equipment that would be suitable for enforcement on them, by joint sale of real estate and those movables, this caused problems in practice. In this phase of enforcement it was impossible to change and substantially comply with the imperative norm of the law on the exclusive jurisdiction of the court. The second change in paragraph one refers to the limitation of the exclusive jurisdiction of the court with regard to the enforcement of an act, so that the restriction refers to acts that can be undertaken only by the enforcement debtor. These are issues from Chapter IV and they imply actions that can be taken only by the enforcement debtor (Art. 363), while other actions are now in the exclusive competence of the public enforcement officer. The third change in paragraph one refers to the enforcement of executive documents related to family relations, where the court is now exclusively competent to enforce all executive documents related to family relations, except when it comes to collecting legal support, which is now in the exclusive jurisdiction of the public enforcement officer. With these changes, the legislator removed the dilemma that existed in practice and now clarified that the term family relations means all family relations except those related to the collection of monetary claims for child support, spousal or kinship support (legal support). However, the division of exclusive jurisdiction of the court and the public enforcement officers in this area, in our opinion, may cause new problems in practice and of a technical nature, given that the content of the operative part of the judgment in family disputes (mostly in divorce cases) is regulated imperative norm of family law (which in the above situations can lead to situation where one enforcement document is enforced by two different bodies. For example, the manner of seeing the child will be carried out by the court, and the collection of legal support will be carried out by the public enforcement.

submitted to the court or the public enforcement officer, it all depends on who carries out the enforcement, and they are obligated to decide on it within eight days, provided that the request does not delay the enforcement. If the request is founded, the court, i.e. the public enforcement officer shall resolve the issue with a decision and if it is possible to eliminate irregularities, i.e. order the elimination of irregularities committed during and on the occasion of the enforcement. The motion for the elimination of irregularities is decided by a decision, against which an objection is allowed. The court that issued the writ of execution based on an executive or credible document shall decide on the objection made on the decision of the public enforcement officer, by which the request for elimination of irregularities was rejected or adopted. The court will, if possible, first order that the irregularities be eliminated, that is to restore the previous state that existed before an “illegal” action was taken.

It follows from the above that the control role of the court exists during the entire enforcement procedure, for all actions taken by the public enforcement officer, which adequately protects the interest of the participants in the procedure.

Conclusion

The public enforcement officer is a private judicial profession with entrusted public authority. The public enforcement officer exercises the public powers entrusted to him by the Law on Enforcement and Security Interest or another law. He performs the activity as an entrepreneur or as a member of a partnership whose members are exclusively public enforcement officers. He has a status of an official and conducts the enforcement within the limits of the writ of execution and performs other authorities entrusted to him by the Law on Enforcement and Security Interest and other laws. From all the above, it can be concluded that the state (justifiably) transferred to public enforcement officers' part of its powers, namely those that were within the jurisdiction of the courts. In that way, public enforcement officers became a part of the judicial system. By establishing such a system of enforcement, introducing public enforcement officers, with the tendency to transfer increasing jurisdiction from the courts to public enforcement officers, the Republic of Serbia has finally got an efficient and effective enforcement system. Especially in enforcement proceedings when the object of enforcement is the real estate of the enforcement debtor, amongst all agricultural land, which was difficult to enforce by the courts and even more difficult to complete (by selling the real estate and settling the enforcement creditor from the sale price).

Such a system of enforcement is subject to great control. The control is performed at three levels: by the competent courts, the Chamber, and the Ministry of Justice. There are different opinions on whether established control is adequate. The authors of this paper are of opinion that enhanced control is always welcome, and that public enforcement officers, as a new profession, must be controlled in their work by courts for legal remedies, as well as by the competent bodies of the Chamber and the Ministry of Justice, but that a correction must be made concerning the powers that these bodies have. Interference of the executive in the legislative or judicial power is not abided by the

Constitution, and the LESI enables exactly that. In practice, it is not so rare that different decisions on the same legal matter or legal issue were made by the competent court and the Ministry of Justice, where the court, for example, took the position that the public enforcement officer did not commit an irregularity in the case, for taking or not taking specific actions, and the Ministry of Justice found an irregularity and imposed some of the disciplinary measures despite the court's decision that there were no irregularities. We consider that it is necessary to pass the Law on Public Enforcement Officers as soon as possible, following the example of other professions (e.g. notaries) and to separate the procedural part, adequately and necessarily, and regulate in more detail all areas and issues concerning public enforcement officers, their work, organization, supervision, and control.

Conflict of interests

The authors declare no conflict of interest.

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PRIVATIZATION OF AGRICULTURE AFFECTED BY FOREIGNERS

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ABSTRACT

The collapse of socialism changed the global picture of the world order and on international plan shifted most of the ex-communist countries of Europe towards Euro-Atlantic integration and membership in the European Union. The economic and social transition of most post-socialist states under the influence of Euro-Atlanticists and domestic pro-Western reformers, is taking place under Washington's consensus. The proposal of international mentors was the urgent privatization, liberalization and decentralization of the economy and society. The aim of the paper is to analyze the privatization of Serbian agriculture according to the shock model, both from the aspect of the application of regulations and the work of institutions, as well as the evaluation of the success of the procedure and privatization effects. Privatization of agricultural enterprises in Serbia has shown numerous weaknesses, which manifest in the work of institutions, inadequate strategy and vision, and in economic terms of stagnation of livestock breeding, reduction of the number of agricultural holdings and increase of unemployment. In this context, the experiences of Germany and China and some European Union countries were presented, which in the choice of transition path were guided primarily by their state and national interests.

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Introductory remarks

The social experiment, as most Western analysts call the construction of a socialist society based on the principles of social justice, almost seven decades long, ended, in most countries with a reversible social transformation. The return of ex socialist states to capitalism, in addition to radical changes on the ideological plan, required changes to the political system and the introduction of multiparty parliamentarism and, above all, tectonic ownership and economic transformation.

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The political metamorphosis of the post-socialist states, with the exception of the Republic of China, had a more or less unique methodological pattern. The wave of overall transitional change, especially in the economy, however, had essentially different national approaches dictated by internal historical determinants, ethnic narratives, and economic heritage. However, the decision to choose the optimal transition path was almost equally influenced by external factors, such as the leading Western countries and their geopolitical sphere of influence and international creators of the global world order, the International Monetary Fund and the World Bank.

Most transition countries, including the Federal Republic of Yugoslavia, and by its disintegration, Serbia, have accepted the rules of the Washington Consensus based on the Atlantic strategy of neoliberal economic development.

In paper authors analyze the process of implementation and the impact of the Washington Agreement reform policies on privatization of the Serbian economy, with special reference to the effects it produced in agricultural production. In this context, the normative legal framework for agricultural privatization, the strategy of agricultural development and the work of state institutions will be presented, as constitutive elements of functioning of the legal state. The overriding goal of this paper is to show the effects of privatization of agricultural land.

In addition to the analytical method, the paper will have a comparative dimension as it will also look at the results of transitional reforms in other countries, which have opted for the choice of another transition path. A comparative analysis of the economic results will confirm or refute the hypothesis that the unconditional application of the Washington “manifest” was the best option for realizing the state and national interests of the Republic of Serbia. At the same time, we will show the extent to which the Euro-Atlantic protagonists of the Washington Consensus apply the reform principles in the implementation of their national agricultural policies, and whether the agricultural policy measures of the United States and the European Union and its Member States contribute to liberalizing the world market or protecting the national interests of farmers and their own economies. But first, about the end of the Cold War as a precondition for transition.

About the “Cold War” and the Washington Consensus

The export of the socialist revolution in the world, advocated by the USSR from the October Revolution until the end of World War II, was based on the Universalist ideology of the second half of the 20th century, replaced by the regional concept of socialism. At the global level, as a consequence of the balance of military potentials and the harmonized division of geopolitical and ideological planetary influence of the East and the West, international relations to the last decade of the second millennium is characterized by the so-called period “of the Cold War”. The demolition of the Berlin Wall was a symbolic beginning of the end of socialism as a world process.

Realistically, in a world economic game, socialism laden with bureaucratic procedures was losing the battle with a more efficient and competitive capitalist economy. The

comparative weaknesses of socialist economy were manifested by the slow growth of the life standard of the population and, in the Western media, by informatively “inflated” restrictions on human rights and freedoms. On the other hand, globalization, logically fueled by the fourth technological revolution, to which neoliberal philosophy further gave wind to the back has further accelerated the transition of the state. Reforming the socialist state and economy was the *conditio sine qua non* of the further progress of the socialist socioeconomic system.

The collapse of socialism has changed the global picture of the world order, and has shifted Southeast European countries on international plan towards Euro-Atlantic integration and European Union membership, a path that Central European³ countries have already pursued. (Avramović, 2019). Of course, this determination was contributed by the self-destructive reaction of the political establishment of the USSR. Actively encouraged and supported by the Western centers of power, the crisis resulted in the dissolution of the Soviet Union, followed by the SFR Yugoslavia and the partition of Czechoslovakia (Andrei et al., 2020). There is a reason to ask: in the history of civilization, and in particular of capitalism, were there any peaceful breaches of the borders by which world powers voluntarily renounced their territories?

Thus, “with the fall of the Berlin Wall at the end of 1989, one of the most significant economic and social transitions with an uncertain outcome began. It was the second economic and social experiment of the 20th century in the post-socialist countries of Eastern Europe and the Western Balkans, guided by the ideas of Western allies and mentors, directly implemented by pro-Western and market-oriented domestic elites. The first social experiment was the October Revolution in Russia, which projected a path to communism almost a century earlier. (Stiglic, 2000).

The bipolar world collapsed and the unipolar hegemon through *power soft* politics dictated a transition path - a return to capitalism. “And the choice comes down to two basic types: Anglo-Saxon and German-Japanese. The first exists in the US, UK, Canada, Australia and New Zealand, and the second in Germany, the Nordic countries, Japan and “Asian dragons”. The Anglo-Saxon pattern is “individualistic capitalism” and German-Japanese “social-market capitalism”. In the German-Japanese pattern, the role of the state is greater than in the Anglo-Saxon. Germany is the first in the West in terms of public entity’s ownership of share capital. In Japan and the “Asian dragons” the role of the state is so great that these countries are referred to as “guided market” societies by scientists. (Babić, 2015).

In parallel with the organization of the International Monetary Fund in 1989, a project of the Economic Institute for International Economics aimed at solving the problem of indebtedness of Latin American countries, called the Washington Consensus, was realized.

3 Of the 10 countries that became members of the European Union in 2004 through the Big Bang policy, as many as eight were former socialist republics (Latvia, Estonia, Lithuania, Poland, Czech Republic, Slovakia, Hungary and Slovenia), which had previously become full members of the NATO alliance.

The agreement, which beside the IMF was verified and by the World Bank and the US Treasury, giving it informal international legal validity, envisaged ten reform policies as a solution to the Latin American crisis: a tax policy that favors the wealthy, fiscal discipline, interest rate liberalization, a shift in public spending priorities on economic growth and support for basic health care, education and infrastructure, liberalization of foreign trade and foreign direct investment, competitive exchange rate policy, privatization of public companies, effective protection of property and deregulation or removal of administrative barriers in the area of opening and closing of economic entities.

Through its international support, the Latin American neoliberal reform project has grown from a regional to a universal model applicable (un) planned and to the transition of post-socialist states. Consistent implementation of neoliberal measures of privatization, liberalization and deregulation has meant the state's socialization, and the opening of the market has created conditions for companies from developed Western countries to acquire ownership of domestic businesses under favorable conditions, and then a dominant position in the new market. "The former slogan of the Bolsheviks" the cadres solve everything "- replaces the foreign exchange of rigid economic liberalism," all this will be settled by the private owners." (Popov, 2003).

There was a hurry to implement market logic and build democratic institutions at all costs, fearing from the restoration of the previous system, without considering the opportunities and situation in individual countries. Two fundamental mistakes were made: first, the epochality of the process was not recognized, in the context of the fact that by its inefficiency socialism had lost its historical battle with capitalism, and that there was no place for fear of systemic relapse, and second, the artificial, overnight, transplantation of basic postulates and market institutions democratization are not possible without governments, declining growth rates, tremendous growth in unemployment, distrust of reforms and market democracy, the return of the left to power in the next elections, however not socialism, considering the fact that the reforms could not even be abandoned, but only slowed down. (Josifidis, 2004).

Acceptance of the Anglo-Saxon capitalist model by invasive intervention was generally more acceptable to Euro-Atlantic economic integrationists as well as to domestic corporate governance structures, part of state officials of neo-liberal views, chameleon-colored politicians, and emerging speculators in the interregnum of normative-legal redefinition of state jurisdiction. Ideal opportunity for express entry into the emerging capitalist class.

"The Nomenclature" (the emerging capitalist class - the author's remark) assured the "working people" that it was in his interest. It is enough to identify business owners and "liberate" the market for the prosperity to come. So too did the former "working class" become a worshiper of the Anglo-Saxon pattern, carried by the wings of "folk capitalism" Margaret Thatcher and "high technology, small business" by Ronald Reagan. Members of the former "working class" saw themselves as "small capitalists" and no one in the role of hired workers. Thus, in the "transition" everyone was involved in fraud: the nomenclature appropriated social property on fraud, and the others were deceived or they were deceived and agreed to it. (Babić, 2015).

Privatization - betrayed expectations

Thus, the Euro-Atlanticists and domestic insiders who advocate the Washington mantra as a transitional pattern have reached a consensus on the need for privatization following a shock therapy model. Privatization to many ex socialist countries, including in Serbia, was a poorly designed project without a final vision aimed at urgency and the national interests of the state in the background. The objective problem was that in the state-planned and even self-governed economy, the turnover of enterprises and their market value were not realized in practice. And of course, in the absence of a methodology for assessing the market value of companies, foreigners offered “expensive” services of their agencies and significantly influenced on the control of the sales procedures of the companies they were interested in. Generally, in the absence of a clear state strategy based on the principles of a conscientious businessman, an unjustifiably imposed time limit for the privatization process and lack of competition, the process of ownership transformation of social and state capital into private took place. As a result of high supply and low demand in the privatization market, the selling price was below the real and market value.

Along with the privatization, the liberalization of regulations governing the freedom of movement of goods, services and capital took place, the national treatment was given to foreigners, and the state, by deregulation of customs policy, waived budget revenues while abandoning the protection of domestic economic entities by customs policy measures.

Exposed neoliberal economic policies have led to a series of transition countries leading to the economic devastation of domestic industry as well as agricultural production, and the ensuing negative economic and social consequences chain has taken catastrophic proportions; rising unemployment, restrictions on further growth and development due to the weakening of industries that create new tangible assets and allow exports to the world market, although this was one of the “promised” advantages of opening up national economies. Such economic trends were, as a rule, followed by a dominant focus on imports and trade, that is, commodities of industrialized countries, as well as continued external borrowing. (Jovanović, Eškinja, 2008).

The combination of privatization, liberalization and decentralization should have quickly led, perhaps after a brief transitional recession, to a huge increase in productivity. It was expected that the benefits of the transition would be greater in the long run than in the short term, as old, inefficient machines are replaced and a new generation of entrepreneurs is created. Full integration into the global economy, with all the benefits it will bring, would also follow quickly, if not immediately. (Stiglic, 2018).

Expectations of economic and social revival in most transition countries, and especially in Serbia, remained an unfulfilled wish, and “the transition process, i.e. privatization as its central part, was accompanied by enormous structural breakdowns, a fall in the real social product, a fall in employment, an increase in inflation and a weakening of state institutions, especially the judiciary through the devolution of the law and the rise of corruption and

crime.” (Obradović, 2017). Regardless of the facts whether the municipalities have inherited companies - giants with a large ‘dead’ capital, it is necessary for them to orient in a timely manner towards creating a suitable business infrastructure (Lakićević, 2019).

Definitely bad privatization effects of the Serbian economy can be derived from these two data. Namely, although the initial stagnation of the privatized economy is behind us, and for the last three to four years there are positive tendencies “it is evident that Germany and Austria have 3.5 times higher standard of living than, say, Serbia, and that Central European countries, such as the Czech Republic, Hungary, Poland and Slovakia are about 80 percent more developed than Serbia. This is logical given that Serbia’s economic growth is at the level of 1976 and is only 78.1% of that of 1990. With an average growth rate of 4%, it will take another seven years to reach 1990 GDP.” (Jakopin, 2018).

Controversies in agricultural privatization

The aforementioned experiential arguments, and many others of an economic and social character, seriously call into question the axiom: that a privatized market economy on Washington’s regulations is more efficient than planned. It is already clear from the above general statement that the privatization of agriculture cannot have a positive sign. “Agriculture has always been one of the most important branches of the Serbian economy, but its importance for Serbia has grown tremendously after the collapse of industrial production caused by sanctions and wrongful privatization. The events in and around agriculture are crucial to the state of the Serbian economy. (Popov, 2013).

According to the size and structure of available agricultural land, the Republic of Serbia is one of the European countries with favorable land resources, since it has 0.7 hectares of agricultural, or 0.46 hectares of arable land per capita. At the same time, the ratio of arable land and permanent crops to meadows and pastures is more favorable than other European countries (71% : 29%). (Agriculture Strategy, 2014). The existing statistical classification of settlements is most often used for defining rural areas (Sagić, 2019). Agricultural land accounts for 60% of the total territory of the Republic of Serbia, while that percentage in Vojvodina is as high as 82% and is mostly of high quality arable land.

The Republic of Serbia has 5.06 million hectares of agricultural land, of which 71% of the area is intensively used (in the form of arable land, orchards and vineyards), while 29% of the agricultural area consists of natural grasslands (meadows and pastures). The dominant agricultural area of 3.3 million hectares or 65% is used as arable land, of which about 7% is not used annually for agricultural production. (Agriculture Strategy, 2014). However, the lack of economic growth and, consequently, the gross domestic product, which is lower than three decades ago, undoubtedly indicate the insufficient effects of agricultural production at the country level. How much and what impact on the economic indicators has the privatization of agricultural combined plants had?

Privatization of agricultural companies in Serbia was carried out in accordance with the Privatization Act of 2001, without having previously regulated the status of state and cooperative property, which was used and managed by socially owned enterprises. The

main problem was the fact that buyers of social capital in privatized agricultural entities in real estate cadastres changed their form from social and state to private property only upon confirmation of the Privatization Agency that they fulfilled the obligations stipulated in the privatization contract. And, in accordance with the Law on Conversion of Social Property on Agricultural Land into Other Forms of Ownership (Official Gazette of RS, 1992) and the Instruction on the Method and Procedure for Determination and Registration of Agricultural Land in Social Property Used by Legal Entities (Official Gazette of RS, 1994) obligation to register and record agricultural land that they also use to make appropriate changes to the public records on real estate records by 31 December 1997. on special forms, which with the complete documentation on the legal basis of land use are submitted to the RGA. The Real Estate Cadastre Service, which carried out the check and verification of the facts stated in the form, was obliged to take ex officio the implementation of the changes made on the real estate and to submit to the Ministry of Agriculture data on the ownership of the land. (Anti-Corruption Council, 2017).

Therefore, the economic operator could not transform the state and social property into private property, before listing into the agricultural land and registering and updating it in the real estate Cadastre. The Cadastre would inform the Ministry of Agriculture about these facts, which would then, before conducting the privatization process, issue a certificate on the completed census, records and status of agricultural land to the Privatization Agency, which had the responsibility of conducting the privatization process.

Of the 148 privatizations of agricultural plants, carried out from 2002 to 2015 in only 84 cases or less than 57%, analyzed by the Anti-Corruption Alliance, the status of ownership of agricultural land is clearly determined. The legal validity of the privatizations carried out on the basis of the above would be highly questionable in over 43 percent.

The legal basis for the transfer of state, cooperative and even social property is also debatable. "For example, there are opinions that agricultural land as a public good of public interest could not and cannot be subject of privatization." (Popov, 2013). Namely, land with state and co-operative ownership has its title holder, and agricultural combines on the same had only the right of use, but not the right of ownership that could be transferred to new owners. Admittedly, in the period of self-governing socialism, cooperative property was transformed into social, and with the restoration of the cooperative, its legal status was largely not restituted, so it was treated as social in the privatization process. A similar situation is with social property, which was an expression of the socialist socioeconomic system of the *sui generis* institute and the abolishing factor of alienation of the working class from the means of production, so in the earlier philosophical-ideological concept its privatization would be heresy. To make this legal galimatias an even more complex privatization concept, it is contrary to the basic legal principle in the derivative, translational acquisition of rights - *nemo plus iuris ad alium transferre potest quam ipse habet*.⁴

4 No one can transfer to another more right than he or she has.

There is no doubt that the privatization scenario of agricultural combines was conceived, interpreted and implemented by the neoliberal shock matrix of international mentors and the ruling notion that state ownership of land is a recurrence of past times. The protagonist of such views, of course, was the Privatization Agency. However, the Privatization Agency also sold the land over which they were entitled to use by selling the combines. The Agency claims the opposite - it never sold the land, but solely the capital of an enterprise, that is, the entire enterprise! This is where the problem arises because the value of the land was not in the balance sheets and it did not enter into the valuation of the firm. However, the price was also built through the land which was obtained for use. (Gulan, 2015).

It is clear that the privatization of the economy was a politically delicate, economically complex, legally complicated, socially frustrating and historically retrograde process. Negative experiences in the privatization of industrial enterprises in the Serbian economy and international sanctions were not enough warning to draw up a strategic concept of privatization of agrarian, which would include the widest possible range of the agricultural population and promote the rural household. Instead, “in the context of such privatization there was the formation of huge land holdings and land ownership structures that do not exist in the European Union, most reminiscent of the situation in Imperial Russia in pre-revolutionary times with all the attendant socioeconomic consequences.” (Popov, 2013).

Instead of a conclusion

Instead of privatization of agricultural land as a step towards establishing an agricultural model on which the family farm will be integrated into the renewed cooperative system, as it exists in the countries of the European Union, the transition process went towards the creation of huge agricultural estates, which are, *per se*, oriented towards crop production and seasonal employment. The operational implementer of such privatization was the Privatization Agency, which acted as an independent body within the Ministry of Economy. The accession of the ex socialist economy of the Democratic Republic of Germany to the economy of the Federal Republic 1990 opened up the problem of its integration into the economic system of the unique state. And how the privatization of the DDR, the world’s tenth largest economy, was solved by the Germans?

In most countries of Eastern and Central Europe, this process took place through market mechanisms (through auctions, vouchers, capital markets, various funds...) The Germans chose for themselves a different path. He ran through a state agency (THA), formed before the unification, which through state decree became the owner of all state-owned enterprises DDR. Thus, in order for privatization to have a real economic rationale, it was started by a decree on nationalization of 85 percent of the economy sector, with a total of four million employees and 40 percent of the land fund. The Agency employed 4,500 professionals in the headquarters and numerous regional departments. In every privately owned enterprise, at least as many employees worked directly with THA, resulting in an estimated figure of nine thousand experts - government officials who were specialists and

knowledgeable about the economic practices and the impact of individual businesses on local and regional communities. Finally, the deadlines for taking all the necessary actions were relatively comfortable. The original plan was for them to be up to five years old. Even such a well-conceived venture, backed by the funds of one of the most developed economies in the world and driven by typically Prussian precision, could not have gone without great disappointments. (Bulatović, 2012).

Unlike the Federal Republic of Germany, despite transitional examples from other countries, such as China, where privatization of agricultural enterprises has not been completed, as well as political transition, the Federal Republic of Yugoslavia or Serbia has chosen the expedited privatization of agricultural combines, without having a strategic vision of a model that would lead to nationwide prosperity. The institutions of the system, all in transition, and some, such as the Privatization Agency, without experience and vision, often acted in the shadow of the staff and instructions of international factors. And, in order to build a neoliberal state and ensure the rule of law, institutions must outgrow their personal composition and consistently respect the legal order. The consequences of the privatization of agrarians in Serbia have a negative sign and are manifested through: decrease in the number of agricultural holdings, extinguishing and abandonment of villages, stagnation of livestock production, increase in unemployment, a large number of agricultural professionals without jobs, inadequate subsidy policy and underdeveloped cooperatives... Thereby, the additional doubt to the legal validity of the privatization left the suspicion that for most of the time of the privatization, no state institution, not even the Privatization Agency, had an obligation to check the origin of the money used for the privatization. On the other hand, agricultural policy practice in France, Germany, Austria and other EU countries is conceptualized on other grounds.

Therefore, it is no wonder that, for example, the Netherlands, which has less arable land than Serbia as many as three times, simultaneously exports over \$ 70 billion per year in agriculture, while exports of Serbia's farmers is a little over \$ 3 billion. At the same time, for example, there is a special bank in China that deals with rural development, and it is the most populous country in the world, while Serbia does not have a bank in charge of agricultural production. On the other hand, agriculture and food industry of Serbia participates in the gross domestic product of the country with over twenty percent.

For the absurd to be complete, swift and complete privatization was carried out at the behest of monetarists from the International Monetary Fund and the World Bank. The proposal was also made to Slovenians, but the creator of Slovenian privatization, Jože Mencinger, replied: "Do you want to teach us how to destroy our economy so that it can be better later?"

Conflict of interests

The authors declare no conflict of interest.

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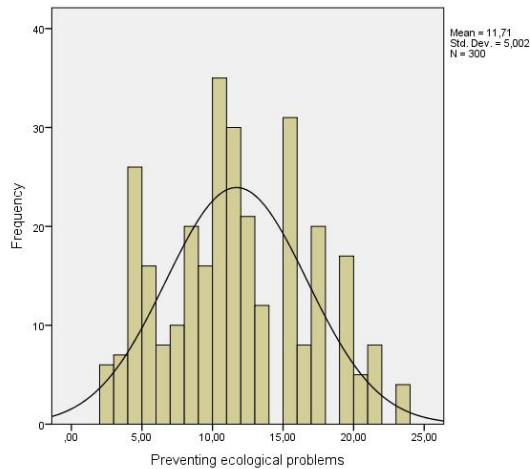
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Indicators	Period			Total
	Month 1	Month 2	Month 3	
Distance crossed (km)	12.926	11.295	13.208	37.429
Fuel consumption (litre)	3.231	2.823	3.302	9.356
Value of fuel consumption (RSD)	242.378	211.790	247.653	701.821
Total time spend on touring (hour)	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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Figure 1. Agriculture, value added (% of GDP)

Source: Authors' calculations

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