Aleksandra TOŠOVIĆ-STEVANOVIĆ*, Vladimir RISTANOVIĆ, Goran LALIĆ***, Milena ŽUŽA****, Sebastian STĘPIEŃ***** and Michał BORYCHOWSKI*******

Determinants for the viability of small-scale family farms in Serbia: an example of the use of a multi-criteria assessment tool

Agriculture is a pillar of Serbia's economic development. Consequently, this paper provides an overview and analysis of the status of farms in Serbia, with a special focus on finding factors influencing the sustainable development of small-scale family farms. To facilitate simpler and more precise problem-solving and decision-making processes for improving the farms' operations, the analytic hierarchy process (AHP) model is used in this paper. This model is applied to the selection of key economic determinants for small farms' viability, illustrated through the results of the authors' own survey of 550 small farms in Serbia, which refers to the economic, social and environmental aspects of small farms' operation. By applying the criteria for selecting key economic indicators of a small farm, the multi-criteria assessment results can be utilised to inform more effective business and policy decisions directed at improving the operation of small-scale family farms. The survey results show that the best-ranked determinants for the viability of small farms in Serbia are first, the price of agricultural products, and next, well-structured agricultural product distribution channels.

Keywords: small family farms, economic indicators, multicriteria assessment, analytic hierarchy process, Serbia
JEL classifications: D81, Q12, Q13, Q18

** Department of Economics, Faculty of Business, Economics and Entrepreneurship, Belgrade, Serbia.
** Institute of European Studies, Belgrade, Serbia
*** Faculty of Social Sciences, University Business Academy, Belgrade, Serbia
**** Faculty of Biofarming, Megatrend University, Belgrade, Serbia
***** Department of Macroeconomics and Agricultural Economics, Poznań University of Economics and Business, Al. Niepodległości 10, 61-875, Poznań, Poland. Corresponding author: sebastian.stepien@ue.poznan.pl
Received: 11 November 2020, Revised: 29 January 2021, Accepted: 3 February 2021.

Introduction

The issue of economic efficiency in the case of small-scale[1] and large-scale farms is not clear-cut. When comparing the economic results, the productivity per 1 ha of arable land is often taken into account. When this approach is taken, small farms lose to large farms, because the latter usually use monoculture systems with a high degree of mechanisation. Moreover, large farms generally achieve better labour productivity indicators, which result from so-called scale effects (Błażejczyk-Majka *et al.,* 2012; Duffy, 2009). However, when comparing the effectiveness of two different types of farms, one should really consider the overall productivity of factors of production, a figure which takes into account the consumption of land, labour and capital. The productivity of small-scale farms calculated in this way turns out to be higher on account of better organisation of production factors (e.g. Barret, 1993; Binswanger *et al.,* 1995; Galluzzo, 2016). Family farming offers a means to guarantee agricultural production, based on small holdings managed by a family. In small farms, much of the labour comes from the household. Thus, it is characterised by self-supervision, the motivation to work with care and flexibility so as to accommodate the unpredictable timing of some farm operations (Wiggins *et al.,* 2010).

However, a full comparative analysis should consider other aspects as well, including social and environmental contexts. Family farms play a crucial role in the supply chain of agricultural products, and they combine production and consumption functions (Tilman *et al.*, 2002). By providing food and other goods, they are the basis of the family's livelihood. Their multifunctional nature manifests itself in actions taken to maintain the sustainability of rural areas. The functioning of small farms determines the development of the local environment. They ensure that continued biodiversity, ecological balance, higher quality and tastier food are all guaranteed. They constitute a buffer against poverty in the countryside, shape the rural landscape, and pass on intangible cultural and historical values. The experience of the 20th century has shown that it is a major challenge to implement agricultural policies that support small farmers in a way that ensures both their viability and their fulfilment of 'public goods' functions (Birner and Resnick, 2010). Such activities are particularly important in those parts of the world where small-scale family farming dominates. As far as Europe is concerned, this mainly concerns the central-eastern regions, including post-communist countries. These economies have been subjected to a historic attempt at transforming the system from a socialist economy into a market economy and are currently characterised by a fragmented agrarian structure, as is the case in Serbia.

Agriculture constitutes a relatively big share of the structure of Serbia's economy as indicated by GDP (more than 6%). This places Serbia among other 'agricultural economies' in the region, similar to Bosnia and Herzegovina, Georgia, Kosovo, Montenegro and Turkey, according to data from World Bank (2020). The result for Serbia is comparable to countries in the 'upper middle income' group, but much higher than for Central Europe and the Baltics (2.7%). Because of this, agriculture is a very impor-

[1] "Small-scale farms" and "small farms" are used interchangeably in the article.

tant sector for Serbia, with a significant influence on the entire economy (Pavlović, Knežević and Bojičić, 2019). Despite the fact that Serbia has favourable factorial and commercial conditions for developing intense and competitive agriculture, it is characterised by a fragmented agrarian structure, just like other countries of Central and Eastern Europe (Fritz *et al.*, 2010). The average physical size of a farm in 2018 was about 6.1 ha per farm, and it is only 40% as big as the average farm in the 28 states of the European Union (EU28). The largest proportion of farms (27.7%) is classified as being of the lowest economic size, with standard output below €2000/year, although back in 2012, the figure for this was over 45% (Statistical Office of the Republic of Serbia, 2013; 2018). Thus, data indicate that a slow land consolidation process is taking place (the average area of individual farms was 15% more than in 2012), which results in a decrease in the overall share of the weakest farms that is mainly due to the adverse demographics in Serbia, the ageing of villages, migration, globalisation and intensified capital concentration in agriculture (Paraušić and Cvijanović, 2014). At the same time, the problems faced by small farms in Serbia include lack of one's own capital, difficulty obtaining favourable loans, market fluctuations and low prices for agricultural products (Kočović *et al.,* 2016). Nevertheless, it can be assumed that small farms will represent the future of sustainable Serbian agriculture. They provide multiple benefits for society, including food and nutrition security, high-quality agricultural products, employment and family income, environmental protection and adaptation to local resources, while at the same time preserving tradition and cultural heritage (FAO, 2020). However, besides their social and environmental relevance, it is also important to consider their economic aspects. According to the estimates, family farms in Serbia, usually occupying a small area, produce about 70% of food, but only 20% of profit is directed to them (the other 80% goes to big corporations, according to the Statistical Office of the Republic of Serbia, 2018). It is evident that changes are necessary.

With the current competitive environment and demographics trends in both Serbia and other countries, the survival of farms is threatened. The inferior status of the agricultural sector is characterised by a lack of regular income, decades-long downward trends in prices for agricultural products, an ageing population, outdated machines, unresolved problems of agricultural pensions, and inaccessible sources of borrowing. Combined with institutional problems, such as closed agricultural cooperatives, lack of collection points and a small level of state support (only some animal producers can count on production premiums, and even then not all of them due to the minimum limits of production value or animal pieces), it is clear why the number of people staying in rural areas and living solely on agriculture has been decreasing. In fact, cultivated areas have not grown and the rural population and the number of agricultural producers has dropped. As a result, the production volume and share of agriculture in Serbia's GDP has remained unchanged for several decades. Even the selection of crops has not changed significantly (Tošović-Stevanović *et al.*, 2020). Therefore, it is crucial for farmers to restructure assets and to increase investment outlays, using state incentives (subsidies) as well as finding additional sources of income both on-farm and off-farm. The aim of the current article is to find an answer to the question as to which factors can contribute to strengthening the economic condition of small-scale family farms in order to increase their viability, which is the overriding goal for the agricultural sector in Serbia.

Paraušić and Cvijanović (2014) have noted that efficient management of small farms starts with identifying potential determinants for successful management of agricultural activity and food supply chain. For aims assessment, this paper proposes criteria for selecting factors influencing the viability of small family farms in Serbia using the analytic hierarchy process (AHP). Our analysis is based on a survey conducted at 550 small farms in Serbia between June and September 2019. Generally, the survey focused on economic, social and environmental aspects of small farm operation, but this work refers to a specific aspect related to the assessment of variables that determine the economic position of the analysed units (social and environmental issues are not an interest of this study). From among many variables, selected are those which, according to the authors, are of key importance for the improvement of viability of farms – the top goal of the APH analysis. Assessing economic position and its determinants is crucial for understanding the foundations of resilience and sustainable development of this kind of household.

Understanding these effects is also of relevance for the state, as creators of economic policy must have a clear insight into improving the performance of the agricultural sector, and thus, the development of small farms. Taking into account the previously mentioned agrarian structure in Serbia and the problems of the agricultural sector on the one hand, and care for multifunctional rural development on the other hand, our analysis may assist the development of strategic plans for the functioning of family farms in the country. Hence, we have created a policy recommendations list, which we present at the end of the paper. The additional aim of the study is to define simpler and more precise problem-solving and decision-making procedures for improving small family farm operation. Using AHP for operational problem-solving is a rather unusual approach, but it is a suitable tool for implementing various business solutions and decision-making procedures. In this paper's case, the results of the analysis – namely, identified key determinants of the viability of farms – can be used in decision-making by agricultural producers or as an aid to the process of planning agricultural policy objectives. In addition to selecting factors, the analysis can be used both for determining the relevance of the criteria weightings and for ranking priority indicators. The prioritisation method we apply in the analysis of small-farm economic indicators is the method of own values. The advantage of such an approach is that the selection of indicators is based on objective and verifiable values. Moreover, the decision is not based on one criterion, but on a combination of multiple criteria. In this context, the decision-making process includes applying the AHP model.

Materials and Methods

Spatial scope of the study

Family farms with a small utilised area and a small scale of production constitute the foundations of the agricultural sector in Serbia. Historically, they have been subjected to attempts to transform their systems from a socialist economy to a market economy. Within one decade (the 1990s), thousands of farms had to reorganise in recognition of a new market reality. As a result, a dual structure of agriculture has developed, with industrial food companies operating alongside small-scale but multifunctional farms. Although still family farms are the basic economic-production units in a Serbian village (Prodanović *et al.*, 2017), their total number is continuously decreasing as a result of the disagrarisation of rural areas and a process of agricultural land concentration. In the years 2012-2018, the total number of farms dwindled by ten percent and in 2018, amounted to almost 570 thousand (Statistical Office of the Republic of Serbia, 2020). The majority of farms are low-area units with low economic strength. The proportion of farms below 10 ha of utilised agricultural area (UAA) and €15,000 of standard output accounts for almost 90% of the total number of farms. They cultivate an area of just over 60% of the total arable land in Serbia (see Table 1).

Definition of a small-scale family farm

There is no general definition of a family farm, small farm or small-scale farm (Davidova and Thomson, 2014). It depends on what criteria have been adopted by researchers and what issues investigated (different regions and countries, farms with different production types etc.). In the literature, the term 'small farm' is often used synonymously with terms such as 'subsistence farm', 'semi-subsistence farm', 'resource-poor farm', 'low-sales farm', 'non-commercial farm', 'low-input farm' or 'family farm'. However, these terms may differ in their meanings, especially for the last one, and should not be used interchangeably in each case. Mainly, family farms are treated as entities where the majority of labour resources (for example 50% or 75%) and farm management comes from the farm (farmer's head and family members). In turn, small farms are defined according to such criteria as structural size (e.g. farmland area, number of animals, number of labour force), economic size (standard output, gross cash farm income or farm revenue, annual sales or turnover, etc.) and market participation (e.g. purchased inputs, foodstuff sales) (European Commission, 2011; Guiomar *et al.*, 2018). In this context, very small farms could be defined as those with an agricultural area less than 2 ha or 5 ha (Lowder *et al.,* 2016), while small farms are those with the area up to 10-20 ha. The criterion of the economic size is applied in the European Union, where a threshold of €8,000 of standard output is used to define a very small farm, and €25,000 for small farms (FADN, 2018).

Table 1: Basic statistics for agricultural sector in Serbia (2018).

Total number of farms (thousand)	569.3
– including smaller than 10 ha	501.0 (88%)
Average farm size (ha of UAA)	6.1
Number of farms below EUR 4 thousand of SO*	289.1 (51%)
Number of farms with EUR 4-15 thousand of SO	213.2 (37%)
Number of farms more than EUR 15 thousand of SO	67.0 (12%)
Total utilised agricultural area (thousand ha)	3,486.9
– in farms smaller than 10 ha	2,162.0 (62%)

*SO – Standard Output, the average five-year production of the crop or animal expressed in thousands of euro per one year in the region's average production conditions.
Source: Statistical Office of the Republic of Serbia (2018)

Dataset

Small-scale family farms in Serbia were analysed due to the role they play in the agricultural sector and their importance in shaping the sustainable development of rural areas. The study is based on surveys conducted in 2019 (June-September), the sample numbered 550 farms covered all regions in the country. We used purposeful random sampling. Data were collected in the form of direct interviews by agricultural advisors. A structured questionnaire concerned four areas: general farm features, economic and social sustainability, environmental sustainability and connections with the market. Pilot studies on a group of several farms were carried out before the main study to avoid the possibility of misunderstandings arising during the actual survey. Finally, after eliminating questionnaires that were incomplete, incorrectly completed or that contained outliers, 527 farms were analysed. To define a small farm as well as take into account farm structure in Serbia, the following criteria were adopted for this research: up to 15 ha of utilised agricultural area and €15,000 of standard output. At the same time, in order to meet the criterion of a family farm, the share of family members' own work was taken into account – it had to be at least 75% of the labour inputs of farm members. The latter criterion resulted from earlier studies by authors (surveys as part of a scientific project) among a group of small-scale farms in Poland. As previous research has indicated, adopting a lower limit, e.g. 50% or even slightly more, means that the greater part of the household budget comes from non-agricultural activities. Setting the threshold up to 75% involves only 'real' farmers. The same method of qualifying units for research was used in the other works, including, *inter alia*, Stępień *et al.* (2021) and Poczta-Wajda *et al.* (2020). In Table 2, there are some basic descriptive statistics for the analysed group, including those elements involved into AHP analysis.

Modelling Decision-making Problems by the AHP

The idea of the analytic hierarchy process was developed by Thomas Saaty (1980). In the past four decades, this concept has become one of the most used methods for solving various multicriteria decision-making tasks. The key features of AHP are that it supports individual and group decision-making and that it includes classification of decision-making problems in a multi-level hierarchy. Initially, a problem structure is defined, followed by a comparison of all elements at the same hierarchy level against higher-level elements. The defined goal – selecting the most relevant eco-

Table 2: Basic descriptive statistics for the analysed small-scale family farms in Serbia.

Specification	Average	Stand. dev.	Median
Production value (EUR/year/farm)	5,715	3,637	5,063
Average farm area (UAA in ha)	3.86	2.41	3.50
Family Work Unit* (FWU/farm)	1.65	0.84	1.63
Capital assets value (EUR/farm)	25,978	25,301	15,570
Household income (EUR/month/farm)	737	707	608
Subsidies (% in agricultural income)	2.26	8.62	1.20
Manager age	54.4	13.2	54.0

Education (% of the analysed population)				
no educ./primary	secondary	vocational	general	higher
22.1	31.0	35.5	7.0	4.4

Number of household members (% of the analysed population)					
1	2	3	4	5	6 and more
13.4	26.2	16.8	22.8	12.0	17.8

Production type** (% of the analysed population)		
Crop production	Animal production	Mixed production
40.1	8.6	51.3

Quality (fertility) of agricultural land*** (% of farms' land in a specified class)				
I	II	III	IV	V
15.4	36.7	27.3	14.0	6.6

* FWU - is the full-time equivalent employment; one family work unit corresponds to the work performed by the member of a farm family who is occupied on an agricultural holding on a full-time basis.
** Production type – for crop or animal production at least 2/3 of total production comes from the specified production. If not, there is mixed production.
*** Quality of land on a five-point scale, where class I - the best quality, class V - the worst.
Source: own calculations based on the survey data

Table 3: Criteria for the AHP analysis influencing the economic situation of farm.

Criterion	Justification
Total farm income	Total farm income shapes the economic situation of a farm and affects its viability and development capacity in the long term
State support	State support for small-scale farms is crucial due to the low level of income and capital necessary for current production and investment activities
Distribution channel	Shortening the supply chain and strengthening the level of market integration increase the economic surplus of a farm
Agricultural prices	The higher the selling prices of agricultural products, the higher the farm's revenue
Arable area of farm	The increase in the area of small-scale farms most often leads to an increase in the scale of production and positive effects for agricultural income
Number of household members	The greater the number of family members involved in agricultural activities, the lower capital resources needed for production - the effect of capital-labour substitution typical for small farms - which reduces capital expenditure and improves income situation
Quality of agricultural land	Higher quality of land increases its productivity and income per hectare

Source: own composition

nomic determinants for the viability of small family farms in Serbia – is at the highest level. In line with the defined goal, four criteria were assessed: C_1 – total farm income, C_2 – state support, C_3 – agricultural products distribution channels and C_4 – agricultural products price. The alternatives are A_1 – the arable area of a farm, A_2 – the number of household members and A_3 – the quality of the arable land of a farm.

The process of selecting elements for the AHP analysis was carried out in two stages. In the first stage, 28 variables determining the economic condition and market position of small farms were adopted, including income, assets, liabilities, labour inputs, land area and quality, access to financial market, type of production, support instruments, distribution channels, market prices, promotional channels, production risk, etc. It was a selection based both on the earlier work of the co-authors and a literature review (e.g. Bowman and Zilberman, 2013; Safa, 2005; Mutimura *et al.*, 2018). Then, using the brainstorming method, the final list of criteria and alternatives was determined. The authors, invited experts in the field of agricultural economics, agro-policy and rural development (mainly academic staff members with minimum 10-years working experience in a managerial position), representatives of local authorities and regional advisory centres took part in the brainstorming session. The closing choice was also limited by the availability of data from a survey.

After defining the goal and establishing the criteria and alternatives, in the next phase of the AHP method, the decision-maker compares the criteria to the goal. The comparisons are made in pairs, using Saaty's scale of relative importance, comprising the following:

Table 4: Saaty's scale of relative importance in an analytic hierarchy process model.

Scale of importance	Definition
1	Equally important
3	Weak importance
5	Strong importance
7	Demonstrated importance
9	Absolute importance
2, 4, 6, 8	Intermediate values

Source: Saaty (1980)

The next step, the selection of economic indicators by applying the AHP method, is to create a problem hierarchy. Then the criteria are evaluated (based on Saaty's nine-degree scale), to define the weight coefficients required to assess and select small farm economic indicators. In the fifth phase, alternatives are evaluated against each criterion. Each alternative is given a value. In the final phase, the decision is made, and the alternatives are selected. The economic indicator with the highest value rate is the most favourable small farm solution.

Saaty's scale of relative importance is useful for making decisions because paired analysis compensates for any uncertainty caused by small changes in decision-makers' assessments. All results of the comparison of elements are positioned in adequate comparison matrices. Thus, when we compare n elements against a corresponding element on the next higher level of the hierarchy, the indicator of the importance of the element i ($i = 1, 2, ..., n$) against the element j ($j = 1, 2, ..., n$) upon Saaty's scale is marked as a_{ij}, and it is positioned adequately in the comparison matrix A.

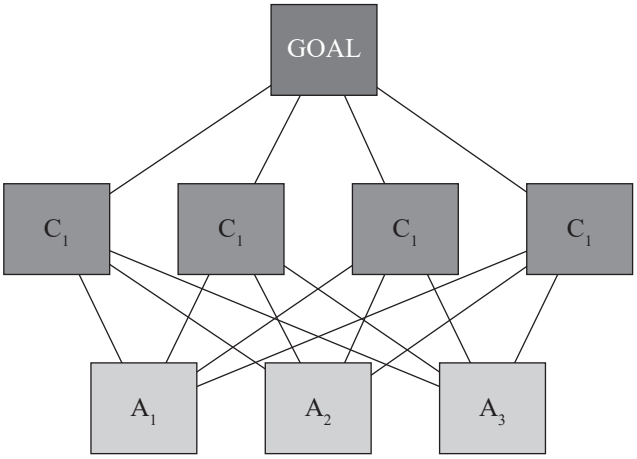

Figure 1: Saaty's hierarchy of criteria (C) and alternatives (A) in the analytic hierarchy process model.

Source: Saaty (1980)

Methodologically observed, AHP is a hierarchically structured decision model, comprising goal, criteria and alternatives (Figure 1). A goal is always at the top of the hierarchical structure, and it is not compared with other elements. The first level of the structure comprises criteria which are mutually compared in pairs against the first element on the next higher level. When the criteria are defined, alternatives are assessed by comparing pairs against each of them. Thus, a hierarchical or network problem presentation is created for determining solutions to the defined goal. All numerical values are entered into the matrix, in a sequence matching the matrix order in mathematics. The matrix diagonal has a value of 1. Values are entered in the upper matrix triangle, while their reciprocal values are entered in the lower matrix triangle. The method of own values is used for comparing elements in pairs, with vectors of the element weight defined using the linear system:

$$A\omega = \lambda\omega, e^T = 1 \quad (1)$$

where A is the matrix of comparison of dimensions $n \times n$, ω is the vector of own values (eigenvector), λ is the own value and e is the unit vector. Using the distributive aggregation model, weight vectors are synthesised, followed by assessing the consistency rate (CR) and consistency index (CI).

$$CI = \frac{\lambda \max - n}{n - 1} \quad (2)$$

$$CR = CI/RI \quad (3)$$

where RI is the random index (matrix consistency index of n randomly generated pair comparisons). Calculated values of the random index are presented in Table 5.

Table 5: The values of the random index (RI) for the analysed AHP model.

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14
R.I.	0.00	0.00	0.58	0.89	1.11	1.25	1.35	1.40	1.45	1.49	1.51	1.48	1.56	1.57

Source: own calculations based on the survey data

In order to assess the consistency of results, it is necessary first to calculate a maximum own value of the comparison matrix (λmax). The upper limit for assessing the consistency index is 0.1. If the consistency index is higher than 0.1, the evaluation in the matrix should be corrected. That is, the comparison of rules by using the method of own values should be repeated.

The analytic hierarchy process method was widely documented in a variety of problem areas, including agricultural economics. Broad research on using AHP adopted to various fields (mainly in agriculture) was conducted by Garcia *et al.* (2014). Alphonce (1997) presented the use of AHP in different decision areas in developing countries, including (1) determination of the choice of agricultural production; (2) resource allocation to agricultural activities; (3) the best location for a village store; (4) choice between subsistence and cash crops production; (5) determination of the crop production technology. According to Optiz *et al.* (2019), consumer-producer interactions (CPI) may be considered as key factor in community-supported agriculture farm economic stability. Farmers should take into account the consumer needs concerning qualities and quantities of production especially. Besides, some authors addressed the AHP to the agriculture in Central and Eastern European countries. Bogdanović and Hadzic (2019) used Net Present Value and AHP when investigating Serbian farms to prove that choosing the perennial plantations is a better long-term investment strategy than the typical crop production. Huehner *et al.* (2016) claimed that organic fruit, wine and horticultural production seem to be the most important agri-environmental measures in Slovenian agriculture. Therefore, our analysis supplements the scope of the AHP method application with further evaluation criteria.

Results

During the study, authors selected the criteria, compared them in pairs against the goal (using Saaty's scale), and then performed the paired comparison of alternatives against each criterion. Table 6 shows that the most relevant criterion, based on weight, was agricultural products price, followed by agricultural products distribution channels. Total farm income and state support reached much lower weights. To avoid mistakes while formulating conclusions and determining the value of criteria in the paired comparison matrix, the rate of deviation from consistency was assessed. First, the maximum own value of the comparison matrix was calculated (λmax = 4.16), then the consistency index (CI = 0.06) and consistency rate (CR = 0.05) were defined. As the value of the consistency index is lower than 0.1, it means that the comparison matrix is well defined.

The next step in the AHP concept was to evaluate the alternatives against each criterion separately. Table 7 shows comparison matrices of alternatives against the four criteria and related weight factors.

After the priorities of criteria against the goal and priorities of alternatives regarding the criteria are calculated, priorities against the goal were determined. This was done by multiplying weights. At the end of the procedure, a synthesis of the whole selection problem was executed. At this point, it was possible to rank economic indicators for a small farm (Table 8). Making a final decision (selecting an optimal economic indicator) was identified as the alternative with the highest rank in value with the highest total weight.

In Table 8, if the sum of all values for alternatives (last column), namely criteria (last row) is equal to 1, it confirms that the procedure is precise and accurate. The final decision indicates that the size of arable land is dominant and vital for small farms, with the number of household members and land quality playing a less significant role. Among the criteria, the impact of the price of agricultural products and distribution channels dominates.

Table 6: Matrix of comparison for criteria and computed weights for the analysed AHP model.

GOAL	C_1	C_2	C_3	C_4	WI
C_1	1	3	¼	1/3	0.14
C_2	1/3	1	1/5	1/5	0.07
C_3	4	5	1	1/2	0.34
C_4	3	5	2	1	0.45

C_1 – Total farm income, C_2 – State support, C_3 – Agricultural products distribution channels, C_4 – Agricultural products price. W – weight.
Source: own calculations based on the survey data

Table 7: Decision making matrices with respect to criteria and computed weights for the analysed AHP model.

C_1	A_1	A_2	A_3	W_i
A_1	1	1/7	1/7	0.07
A_2	7	1	1/7	0.23
A_3	7	7	1	0.70

C_3	A_1	A_2	A_3	W_i
A_1	1	1/5	3	0.30
A_2	5	1	1/3	0.37
A_3	1/3	3	1	0.33

C_2	A_1	A_2	A_3	W_i
A_1	1	3	3	0.55
A_2	1/3	1	1/5	0.12
A_3	1/3	5	1	0.33

C_4	A_1	A_2	A_3	W_i
A_1	1	3	2	0.52
A_2	1/3	1	3	0.30
A_3	½	1/3	1	0.17

C_1 – Total farm income, C_2 – State support, C_3 – Agricultural products distribution channels, C_4 – Agricultural products price. The alternatives are A_1 – Farm arable area, A_2 – Number of household members, and A_3 – Arable land quality. W – weight.
Source: own calculations based on the survey data

Table 8: Total weight and rank of variants for the analysed AHP model.

GOAL	C_1	C_2	C_3	C_4	Rank
A_1	0.02	0.04	0.113	0.26	**0.433**
A_2	0.04	0.01	0.113	0.13	0.293
A_3	0.08	0.02	0.113	0.06	0.273
Total	0.14	0.07	0.34	0.45	1

Source: own calculations based on the survey data

Discussion and policy recommendations

This illustrative example provides a realistic picture of Serbian agriculture. The structure of farms is dominated by small-scale farms with a low degree of marketisation, although the food and beverage sector is the largest export sector in Serbia (12% out of the total export). The main export commodity are raspberries, which constitute approx. 60% of foreign sales, and Serbia is one of the largest European producers of raspberries (apart from plums, quinces and peppers). Nevertheless, this does not mean that the supply chain in this sector is well-structured; in actual fact, there is still much space to increase commercialisation and supply chain extension. The problem of the sector is an extremely low concentration of producers (Herfindahl-Hirschman index of only 62), low diversification of sale (almost only frozen fruits), obsolete technical infrastructure, and a lack of investment capital or low quality of human resources (Stojanović and Radosavljević, 2020; Stojanović *et al.,* 2018). A particularly low level of market integration exists in the milk and meat sector. In the first case, natural consumption and the informal market have a combined share of almost 50% of the total amount of skimmed raw milk, only every second letter is purchased by the dairy. In the case of meat, the number of animals slaughtered outside slaughterhouses ranges between 40% and 60%, depending on the type of meat (Center for Advanced Economic Studies – CEVES, 2017). As a result, the influence of small-scale producers on shaping the terms of transactions in the food supply chain is slight. In such conditions, the economic surplus escapes to middlemen, processors, wholesalers and retailers, and finally consumers. Agricultural producers play a negligible part in the final price of the product.

On the other hand, small farms in Serbia have a very significant role in agricultural production, self-employment and provision of family income, adjustment to local resources and preservation of tradition. Therefore, one should strive to maintain their viability by identifying those areas that largely shape the economic condition. The conducted AHP analysis shows that the key factors for improving the efficiency of farming are the prices of agricultural products and the level of market integration. In general, these results can be confirmed by other studies. Firstly, market prices, by shaping the production value, are the main determinant

of the economic situation of farms (Gupta, 1980; Beckman and Schimmelpfennig, 2015; Madre and Devuyst, 2016; Czyżewski and Kryszak, 2017). Secondly, the level of prices obtained by the agricultural producers depends on their position in the food supply chain. Basically, small farms have lower bargaining power and lower selling prices compared to large agricultural enterprises. Smaller players participate in the distribution of the added value to an inadequate degree (Mulligan and Berti, 2016; de Schutter, 2010; le Vay, 2008). These negative – from the point of view of a small-scale farm – effects of the market mechanism may be limited by a coordinated integration system (long-term contracts, vertical and horizontal integration, participation in cooperatives and producer groups, etc.), which would not only improve the farmer's position in input-output flows, but also reduce the risk of activity and improves labour and capital productivity and decision efficiency through access to information (Bachev, 2017; Galdeano-Gómez *et al.*, 2006; Ray *et al.,* 1997). Simultaneously, it is important to limit the number of intermediaries and create shorter distribution channels, which would make it possible to increase the margin at the level of the agricultural producer (Palmioli *et al.*, 2020; Yaméogo *et al.*, 2018). In turn, the positive impact of the farm's physical size on the economic results and development abilities of family farms was confirmed, among others, by Galdeano-Gómez *et al.* (2017), Ren *et al.* (2019) and Therond *et al.* (2017).

Taking into account the above considerations, the vitality of small family farms and improving their economic operation have created the need for more significant state influence on the development of small farms. However, Serbia's agricultural policy has not defined clear and adequate measures of incentives for small farms. According to the Law on Incentives in Agriculture and Rural Development (Government of the Republic of Serbia, 2013, 2014, 2015 and 2016), 'beneficiaries of state support for agriculture and rural development can be agricultural holdings and family agricultural holdings registered in the farm register, units of local self-government, and other persons and organizations', with an agricultural land area above 0.5 ha. Out of all the support, only some programmes can be treated as targeting small-scale family farms.

One of the priorities of the Serbian Strategy of Agriculture and Rural Development for 2014–2024 is to strengthen the social structure and social capital in rural areas, which could be taken to refer to small-scale family farming. The operational goals within this priority include, *inter alia*, reducing rural poverty and improving the status of the deprived rural population, improving the social status of agricultural labour and access to state support for small agricultural holdings (FAO, 2020). Due to the fact that the funds for this purpose in the entire support pool are insignificant, one could legitimately state that the aid for this group of entities is insufficient. Such a situation may lead to irregularities in the distribution of support observed in the European Union countries. As the beneficiaries of direct payments can be all farms registered in the system with an area of more than 1 ha, a large part of the funding goes to the largest units (80% of support: 20% of the biggest farms) (European Commission, 2018).

To avoid the problem, and taking into consideration the reality that the economic efficiency of agricultural production on small farms in Serbia is not satisfactory compared to the resources at its disposal, our study, using an AHP procedure for multicriteria decision-making, enables the ranking by relevance of selected criteria for pinpointing small farm economic performance based on decision-makers' opinions. The results obtained thereby also have an application dimension and may constitute the basis for formulating the specific goals of agricultural support policy in Serbia and other countries with a similar agrarian structure. It can be concluded that the support policy for this part of the agricultural sector should be directed towards guaranteeing profitable and stable prices for agricultural products. However, it is not about direct price regulation by the state, because such instruments are included in the WTO's 'amber box' of measures considered to distort production and trade (World Trade Organization, 2021), but rather about policy exerting an indirect influence on the shape of the food supply chain. The proposed solution is to introduce greater transparency of contracts between farmers and intermediaries, with the price element included. It might be a good idea to create a standardised template for a contract at national or regional level. Additionally, it is recommended that policymakers introduce an obligation to report on the market situation in a given agricultural sector, so that it is easier to determine the price conditions of contracts.

The other aim should focus on strengthening the farmer's position in the food supply chain, making it possible to take over the greater part of the margin generated in the food processing process, even in the relatively competitive fruit and vegetable sub-sectors. Farmers could strengthen their position by conquering new phases of added value within the established traditional chain (retail packaging and deeper processing), by developing new chains – fresh consumed products, organic food, hot processing (jams, juices) and also through diversification to other sub-sectors (e.g. blueberries and strawberries). An example of stimulating these processes is financing the activities of agricultural producer groups and industry organisations, creating an infrastructure for the development of short sales channels, such as local bazaars. Due to the low awareness of the benefits of market integration and the lack of knowledge of solutions, the education of farm managers through participation in training, courses, training, etc. becomes crucial. Such events could be organised by agricultural advisory centres, agricultural unions, representatives of academic environment etc. It is also suggested that mechanisms be implemented to facilitate increase in the area of farms, e.g. land consolidation support programmes, structural pensions for older farmers transferring the farm, preferential lending to young farmers and land allocation from state ownership.

When assessing the development potential of Serbian agriculture, and of Serbian family farms in particular, it is necessary to take into account the perspective of including the country within the structures of the European Union and the implementation of the mechanisms of the common agricultural policy (CAP). Opinions on the effectiveness of CAP instruments vary from positive (Galanopoulos *et al.,* 2011; Pechrová, 2015; Guth *et al.,* 2020), through moderate

(Latruffe *et al.,* 2017), to negative (Zbranek, 2014; Bojnec and Latruffe, 2008). In the field of environmental support and so-called greening, the low efficiency of CAP was indicated by the European Court of Auditors (2017). Appropriate institutional solutions should therefore be prepared in advance so as not to repeat the mistakes of the EU countries. In the case of Serbian agriculture, area payments, which are the main source of support under EU agricultural policy, have a positive impact on the economic efficiency of farms. Therefore, they can become the engine of rural development in Serbia, provided that their proper distribution is ensured (the point is to avoid the aforementioned problem of unequal allocation of funds between small and large farms). The same research shows that investment subsidies were found to have an insignificant impact on farm technical efficiency. Yet they will be an important part of the rural development program (II pillar of CAP). It is therefore important to adapt these programs to the needs of Serbian agriculture. Taking into account the fact that it is dominated by semi-subsistence family farms with small capital, some of the funds should be in the form of grants, without the need to involve one's own expenditure.

Acknowledgment (funding details)

The paper was written as a part of the project titled 'The role of small farms in the sustainable development of agri-food sector in the countries of Central and Eastern Europe', financed by the Polish National Agency for Academic Exchange, Poland, project no. PPI/APM/2018/1/00011/DEC/1.

References

Alphonce, C. B. (1997): Application of the Analytic Hierarchy Process in Agriculture in Developing Countries. Agricultural Systems, **53** (1), 97 –112. https://doi.org/10.1016/S0308-521X(96)00035-2

Bachev, H. (2017): An Assessment of Sustainability of Bulgarian Farms. MPRA Paper **77463**. https://doi.org/10.2139/ssrn.2928202

Barret, C. B. (1993): On Price Risk and the Inverse Farm Size–Productivity Relationship. Staff Paper Series **369**. Wisconsin: University of Wisconsin–Madison, Department of Agricultural Economics.

Beckman, J. and Schimmelpfennig, D. (2015): Determinants of farm income. Agricultural Finance Review, **75** (3), 385 – 402. https://doi.org/10.1108/AFR-06-2014-0019

Birner, R. and Resnick, D. (2010): The political economy of policies for smallholder agriculture. World Development, **38** (10), 1442–1452. https://doi.org/10.1016/j.worlddev.2010.06.001

Binswanger, H.P., Deininger, K. and Feder, G. (1995): Power, Distortions, Revolt and Reform in Agricultural Land Relations. IN: Chenery, H. and Srinivasan, T.N. (eds.) Handbook of Development Economics (1st edition). Amsterdam: Elsevier, 2659–2772.

Błażejczyk-Majka, L., Kala, R. and Maciejewski, K. (2012): Productivity and efficiency of large and small field crop farms and mixed farms of the old and new EU regions. Agricultural Economics – Czech, **58** (2), 61–71. https://doi.org/10.17221/48/2011-AGRICECON

Bogdanović, S. and Hadzic, M. (2019): Strategic multicriteria decision-making process in agriculture. Economics of Agriculture (Ekonomika Poljoprivrede), **66** (1), 89–106. http://doi.org/10.5937/ekoPolj1901089B

Bojnec, Š. and Latruffe, L. (2008): Measures of farm business efficiency. Industrial Management & Data Systems, **108** (2), 258–270. https://doi.org/10.1108/02635570810847617

Bowman, M. S. and Zilberman, D. (2013): Economic Factors Affecting Diversified Farming Systems. Ecology and Society, **18** (1), 33. https://doi.org/10.5751/ES-05574-180133

Center for Advanced Economic Studies – CEVES (2017): Performance and Value Chain Analysis of Selected Sectors. Washington: World Bank. Retrieved from: https://ceves.org.rs/wp-content/uploads/2019/04/Integralni-izvestaj-analize-performansi-i-lanaca-vrednosti-odabranih-sektora.pdf (Accessed: June 2020).

Czyżewski, A. and Kryszak, Ł. (2017): Agricultural income and prices: The interdependence of selected phenomena in Poland compared to UE-15 member states. Managerial Economics, **18** (1), 47–62.

Davidova, S. and Thomson, K. (2014): Family farming in Europe: challenges and prospects. In-depth analysis. Brussels: Directorate-General for Internal Policies, Policy Department B: Structural and Cohesion Policies.

Duffy, M. (2009): Economies of Size in Production Agriculture. Journal of Hunger & Environmental Nutrition, **4** (3-4), 375–392. https://doi.org/10.1080/19320240903321292

European Commission (2011): What is a small farm? EU Agricultural Economics Brief, 2. Brussels: European Commission, Agriculture and Rural Development.

European Commission (2018): Direct payments. Brussels: DG Agriculture and Rural Development, Unit Farm Economics. Retrieved from: https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/direct-payments_en.pdf (Accessed: June 2020).

European Court of Auditors (2017): Greening the CAP: income support more complex and not yet environmentally effective, say EU Auditors. Luxembourg: ECA Press.

Farm Accountancy Data Network FADN (2018). Retrieved from: https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/farms-farming-and-innovation/structures-and-economics/economics/fadn_en (Accessed 20 September 2020).

Food and Agriculture Organisation of the United Nations FAO (2020): Smallholders and family farms in Serbia. Country study report 2019. Budapest: FAO. Advance online publication. https://doi.org/10.4060/ca7449en

Fritz, J., Wegener, S., Buchenrieder, G., Curtiss, J. and Palona, S. (2010): Economic Prospects for Semi-subsistence Farm Households in EU New Member States: JRC Scientific and Technical Reports (EUR 24418 EN). Brussels: European Commission.

Galanopoulos, K., Abas, Z., Laga, V., Hatziminaoglou, I. and Boyazoglu, J. (2011): The technical efficiency of transhumance sheep and goat farms and the effect of EU subsidies: Do small farms benefit more than large farms?. Small Ruminant Research, **100** (1), 1–7. https://doi.org/10.1016/j.smallrumres.2011.05.008

Galdeano-Gómez, E., Céspedes-Lorente, J. and Rodríguez-Rodríguez, M. (2006): Productivity and environmental performance in marketing cooperatives: An analysis of the Spanish horticultural sector. Journal of Agricultural Economics, **57** (3), 479–500. https://doi.org/10.1111/j.1477-9552.2006.00061.x

Galdeano-Gómez, E., Zepeda-Zepeda, J. A., Piedra-Muñoz, L. and Vega-López, L. L. (2017): Family farm's features influencing socio-economic sustainability: An analysis of the agri-

food sector in southeast Spain. New Medit: Mediterranean Journal of Economics, Agriculture and Environment, **16** (1), 50–61.

Galluzzo, N. (2016): An analysis of the efficiency in a sample of small Italian farms part of the FADN dataset. Agricultural Economics – Czech, **62** (2), 62–70. https://doi.org/10.17221/37/2015-AGRICECON

Garcia, J. L., Alvarado, A., Blanco, J., Jimenez, E., Maldonado, A. A. and Cortes, G. (2014): Multi-attribute evaluation and selection of sites for agricultural product warehouses based on an Analytic Hierarchy Process. Computers and Electronics in Agriculture, **100**, 60–69. https://doi.org/10.1016/j.compag.2013.10.009

Government of the Republic of Serbia (2013, 2014, 2015 and 2016): Official Gazette of the Republic of Serbia No. 10/2013, No. 142/2014, No. 102/2015 and No. 101/2016.

Guiomar, N., Godinho, S., Pinto-Correia, T., Almeida, M., Bartolini, F., Bezák, P., Biró, M., Bjørkhaug, H., Bojnec, Š., Brunori, G., Corazzin, M., Czekaj, M., Davidova, S., Kania, J., Kristensen, S., Marraccini, E., Molnár, Zs., Niedermayr, J., O'Rourke, E., Ortiz-Miranda, D., Redman, M., Sipiläinen, T., Sooväli-Sepping, H., Šūmane, S., Surová, D., Sutherland, L. A., Tcherkezova, E., Tisenkopfs, T., Tsiligiridis, T., Tudor, M.M., Wagner, K. and Wästfelt, A. (2018): Typology and distribution of small farms in Europe: Towards a better picture. Land Use Policy, **75** (201), 784–798. https://doi.org/10.1016/j.landusepol.2018.04.012

Gupta, G.S. (1980): Agricultural Prices Policy and Farm Incomes. Economic and Political Weekly, **15** (39), A123–A131.

Guth, M., Smędzik-Ambroży, K., Czyżewski, B. and Stępień, S. (2020): The Economic Sustainability of Farms under Common Agricultural Policy in the European Union Countries. Agriculture, **10** (2), 1–20. https://doi.org/10.3390/agriculture10020034

Huehner, M., Rozman, C. and Pazek, K. (2016): A Case Study on the Application of the Analytic Hierarchy Process (AHP) to Assess Agri Environmental Measures of the Rural Development Programme (RDP 2007–2013) in Slovenia. IN de Felice, F. (eds.), Applications and Theory of Analytic Hierarchy Process. Decision Making for Strategic Decisions. London: IntechOpen, 37–54. https://doi.org/10.5772/63924

Kočović, J., Rakonjac-Antić, T. and Jovović, M. (2016): Possibilities for the development of agriculture insurance in Serbia. State and prospects of agrarian economy and villages in Serbia. Belgrade: University of Belgrade, Faculty of Economics.

Latruffe, L., Bravo-Ureta, B.E., Carpentier, A., Desjeux, Y. and Moreira, V.H. (2017): Subsidies and technical efficiency in agriculture: evidence from European dairy farms. American Journal of Agricultural Economic, **99** (3), 783–799. http://doi.org/10.1093/ajae/aaw077

Lowder, S. K., Skoet, J. and Raney, T. (2016): The number, size, and distribution of farms, smallholder farms, and family farms worldwide. World Development, **87**, 16–29. https://doi.org/10.1016/j.worlddev.2015.10.041

Madre, Y. and Devuyst, P. (2016): How to tackle price and income volatility for farmers? An overview of international agricultural policies and instruments. Retrieved from: https://www.farm-europe.eu/travaux/how-to-tackle-price-and-income-volatility-for-farmers-an-overview-of-international-agricultural-policies-and-instruments/ (Accessed: October 2020).

Mulligan, C. and Berti, G. (2016): Competitiveness of Small Farms and Innovative Food Supply Chains: The Role of Food Hubs in Creating Sustainable Regional and Local Food Systems. Sustainability, **8** (7), 616. https://doi.org/10.3390/su8070616

Mutimura, M., Guthiga, P., Haug, R., Dechassa, N., Ketema, M., Hundessa, F.,Mwaseba, D. (2018): Socio-economic status affecting smallholder farming and food security: A study from six case countries in Africa. Brussels: European Union Funding for Research and Innovation.

Optiz, I., Zoll, F., Zasada, I., Doernberg, A. and Siebert R. (2019): Consumer-producer interactions in community-supported agriculture and their relevance for economic stability of the farm: An empirical study using an Analytic Hierarchy Process. Journal of Rural Studies, **68**, 22–32. https://doi.org/10.1016/j.jrurstud.2019.03.011

Palmioli, L., Grando, S., Di Iacovo, F., Fastelli, L., Galli, F., Prosperi, P., Rovai, M. and Brunori G. (2020): Small farms' strategies between self-provision and socio-economic integration: Effects on food system capacity to provide food and nutrition security. Local Environment, **25** (1), 43–356. https://doi.org/10.1080/13549839.2019.1697869

Paraušić, V. and Cvijanović, D. (2014): Economic size of holding in Serbia and measures for their strengthening. Paper presented at the Final Conference: Using data from the Census of Agriculture 2012 in analysing agriculture and planning agrarian policies in the Republic of Serbia. Retrieved from: http://media.popispoljoprivrede.stat.rs/2014/Dokumenta/Radovi/Economic%20size%20of%20holding%20in%20Serbia%20and%20measures%20for%20their%20strengtheining.pdf (Accessed: September 2020).

Pavlović, V., Knežević, G. and Bojičić, R. (2019): Does board of director's age diversity affect financial performance in agricultural sector? Evidence from an emerging country. Custos e Agronegócio, **15** (3), 313–340.

Pechrová, M. (2015): The effect of subsidies on the efficiency of farms in the Liberecký region. Ekonomická revue – Central European Review of Economic Issues, **18**, 15-24.

Poczta-Wajda, A., Sapa, A., Stępień, S. and Borychowski, M. (2020): Food Insecurity among Small-Scale Farmers in Poland. Agriculture (Switzerland), **10** (7), 1–18. https://doi.org/10.3390/agriculture10070295

Prodanović, R., Nedeljković, M. and Škorić, S. (2017): Pravni režim i njegov uticaj na razvoj porodičnih poljoprivrednih gazdinstava u Republici Srbiji i Republici Srpskoj. Ekonomija - teorija i praksa. Novi Sad: University Business Academy, Faculty of Economics and Engineering Management, 67–79.

Ray, J., Boehlje, M. and Hurt, C. (1997): Opportunities in Coordinated Hog Production. West Lafayette: Purdue University, Department of Agricultural Economics.

Ren, C., Liu, S., van Grinsven, H., Reis, S., Jin, S., Liu, H. and Gu, B. (2019): The impact of farm size on agricultural sustainability. Journal of Cleaner Production, **220**, 357–367. http://doi.org/10.1016/j.jclepro.2019.02.151

Saaty, T.L. (1980): The analytic hierarchy process. New York: McGraw Hill.

Safa, M.S. (2005): Socio-Economic Factors Affecting the Income of Small-scale Agroforestry Farms in Hill Country Areas in Yemen: A Comparison of OLS and WLS Determinants. Small-scale Forest Economics, Management and Policy, **4** (1), 117–134. https://doi.org/10.1007/s11842-005-0008-7

de Schutter, O. (2010): Addressing Concentration in Food Supply Chains: The Role of Competition Law in Tackling the Abuse of Buyer Power. UNHR Briefing Note 03. Retrieved from: https://www.ohchr.org/Documents/Issues/Food/BN3_SRRTF_Competition_ENGLISH.pdf (Accessed 02 October 2020).

Statistical Office of the Republic of Serbia (2013): Census of Agriculture 2012. Agriculture in the Republic of Serbia. Retrieved from: http://www.stat.gov.rs (Accessed 23 September 2020).

Statistical Office of the Republic of Serbia (2018): Farm Structure Survey – FSS 2018. Retrieved from: http://www.stat.gov.rs (Accessed 28 September 2020).

Statistical Office of the Republic of Serbia (2020): Statistical Yearbook of the Republic of Serbia, Belgrade.

Stępień, S., Czyżewski, B., Sapa, A., Borychowski, M., Poczta, W., Poczta-Wajda, A. (2021): Eco-efficiency of small-scale farming in Poland and its institutional drivers. Journal of Cleaner Production, **279**, 1–15. http://doi.org/10.1016/j.jclepro.2020.123721

Stojanović, Ž. and Radosavljević, K. (2013): Food chain, agricultural competitiveness and industrial policy: A case study of the Serbian raspberry production and export. Ekonomika Preduzeca, **61** (3-4), 174–182. http://doi.org/10.5937/ekopre1304174S

Stojanović, Ž., Manic, E., Dragutinovic-Mitrovic, R., Randelovic, S., Jankovic, I., Popovic, S., Rakonjac-Antic, T., Ristic, B. and Jojovic, M. (2018): Serbia National Report (WP 2 – Deliverable 2.2.). Belgrade: University of Belgrade, Faculty of Economics. Retrieved from: https://www.sufisa.eu/wp-content/uploads/2018/09/D__2.2-Serbia-National-Report.pdf (Accessed: July 2020).

Therond, O., Duru, M., Roger-Estrade, J. and Richard, G. (2017): A new analytical framework of farming system and agriculture model diversities. Agronomy for Sustainable Development, **37** (21), 1–24. https://doi.org/10.1007/s13593-017-0429-7

Tilman, D., Cassman, K. G., Matson, P. A., Naylor, R. and Polasky, S. (2002): Agricultural sustainability and intensive production practices. Nature, **418**, 671–677. https://doi.org/10.1038/nature01014

Tošović-Stevanović, A., Ćalović, D., Lalić, G., Žuža, M., & Grzelak, A. (2020): Small farms in the Republic of Serbia. IN Stępień, S. and Maican, S. (eds.) Small farms in the paradigm of sustainable development: Case studies of selected Central and Eastern European countries. Toruń: Adam Marszałek Publishing House, 123–138.

le Vay, C. (2008): Agricultural co-operative theory: A review. Journal of Agricultural Economics, **34** (1), 1–44. https://doi.org/10.1111/j.1477-9552.1983.tb00973.x

Wiggins, S., Kirsten, J. and Llambi, L. (2010): The Future of Small Farms. World Development, **38** (10), 1341–1348. https://doi.org/10.1016/j.worlddev.2009.06.013

World Bank (2020): Agriculture, forestry, and fishing, value added. Retrieved from: https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS (Accessed: September 2020).

World Trade Organisation (2021): Domestic support in agriculture: The boxes. Retrieved from: https://www.wto.org/english/tratop_e/agric_e/agboxes_e.htm (Accessed: January 2021).

Yaméogo, T.B., Bossa, A.Y., Torou, B.M., Fusillier, J.L., Da, D.E., Yira, Y., Serpantié, G., Somé, F. and Dama-Balima, M.M. (2018): Socio-Economic Factors Influencing Small-Scale Farmers' Market Participation: Case of Rice Producers in Dano. Sustainability, **10** (12), 4354. http://doi.org/10.3390/su10124354

Zbranek, P. (2014): Impact of CAP subsidies on technical efficiency of Slovak crop and livestock farms. Paper presented at the 13th International Conference 'Improving performance of Agriculture and Economy: Challenges for Management and Policy', May, 21-23, High Tatras, Slovak Republic.