SCIENTIFIC REVIEW

RANKING OF PROFITABILITY OF SERBIAN AGRICULTURE

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ABSTRACT

In modern business conditions, the imperative of all enterprises is sustainability, constant business improvement and development. In order to achieve this, among other things, it is necessary to regularly monitor and review all production and financial performances, with profitability being among the most important. Profitability is one of the most important categories used to measure the overall quality of an enterprises' operations. The article analyzes and ranks the basic profitability indicators of enterprises that, according to the official classification of activities, belong to sector A - Agriculture, forestry and fishing over a six-year time period (2015-2020). The primary goal of the article is to rank the profitability of these enterprises using the modern multi-criteria decision-making method MABAC. The research results clearly show that the profitability of Serbian agriculture is not at a satisfactory level, and the best results were recorded in 2016 and 2020.

Keywords: *profitability, agriculture, MABAC method*

JEL: Q14
DOI: 10.5937/intrev2404157S
UDC: 330.13:338.43(497.11)
005.216.1
COBISS.SR-ID 160139017

INTRODUCTION

Agriculture represents one of the most important branches of the economy of the Republic of Serbia. Its importance is primarily reflected in the fact that it contributes about 6.5% to the creation of the GDP. If the contribution of this branch is viewed more comprehensively, via related economic activities (producers of inputs and users of raw materials), the stated percentage participation is significantly higher and more pronounced. Agriculture, together with the food industry, participates significantly in the total foreign trade exchange and they are the only branches of the economy that have been achieving a positive foreign trade balance for the last sixteen years.

However, there is an evident discrepancy between the business results achieved by agricultural companies in Serbia and their real potential at their disposal. That is why it is necessary to regularly monitor, analyze, measure, rank and improve their performance [1]. The criteria for performance measurement are determined by the type of company which is the subject of evaluation and the goals that are to be achieved [2]. The way in which the company is viewed by different stakeholders also has a significant impact. We distinguish between two basic types of performance, financial and non-financial. The assessment of financial performance is mainly based on data from financial reports [3]. Within the framework of financial performance, profitability, which is essentially the best representative of the success of the company's entire operation, stands out the most.

Profitability is one of the key determinants of the success of business entities, branches, sectors and the national economy [4]. Profitability reflects a company's competitive position in the market, and by extension, the quality of its management [5]. Efficient companies usually reinvest their profits in order to grow, and on that basis, we can conclude that more efficient companies achieve higher growth rates [6].

Reliable and effective profitability assessment and ranking plays a very important role for all enterprises which aim to keep the market and defend their market share against any challenges that abound in today's highly competitive business environment. In order to evaluate and rank the financial performance of enterprises in recent years, researchers around the world are increasingly applying multi-criteria decision-making methods [7], [8], [9], [10], [11], [12], [13], [14]. Higher-criteria decision-making methods are very useful for decision-makers, especially in the case of complex business environment. They represent a powerful tool that can be used to identify optimal options for selected criteria and their weights [15]. Decision-making is constantly present in the agricultural sector as well [16].

MATHERIALS AND METHODS

The subject of analysis in this paper is primarily agriculture, i.e. its profitability, which is observed during a six-year time interval (2015-2020). The analysis is based on data from the consolidated balance sheets of enterprises in this sector, which are regularly collected, processed and stored by the Serbian Business Registers Agency (SBRA).

For the purposes of ranking the profitability of Serbian agriculture, the multi-criteria analysis method MABAC (Multi-Attributive Border Approximation area Comparison) was applied; it was created by Pamučar and Ćirović in 2015. The basic assumption of the MABAC method is reflected in the definition of the distance of the criterion function of each observed alternative from the border approximate area. The mathematical formulation of the MABAC method consists of the following six steps (Fig. 1).

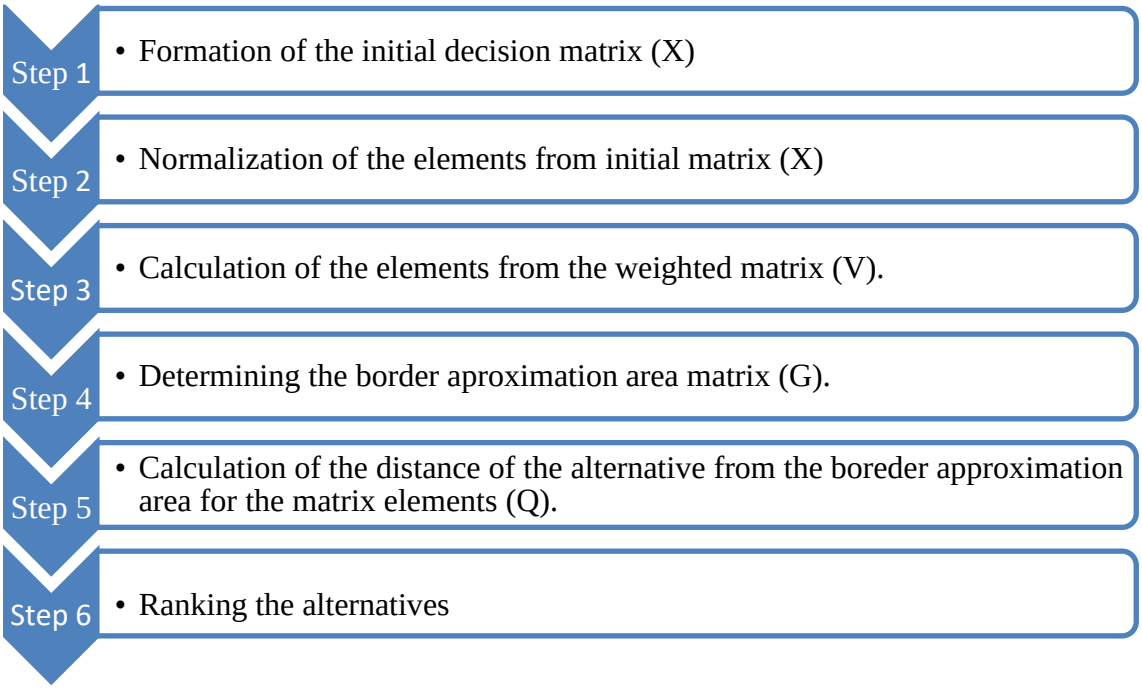

Figure 1. Implementation of the MABAC method step by step
Source: Adapted by the authors according to [17]

The results of the ranking of the profitability of Serbian agriculture by years of observation were performed using MABAC Excel Software, while the results of the correlation analysis were obtained using the SPSS 26 statistical software.

RESULTS AND DISCUSSIONS

Basic indicators of profitability were used as ranking criteria for the agriculture of the Republic of Serbia, the values of which are shown in Table 1. The following years of observation were taken as alternatives: A1- 2015, A2- 2016, A3- 2017, A4- 2018, A5- 2019 and A6- 2020.

Table 1. Ranking criteria and their values

Years	Ranking criteria			
	C1	C2	C3	C4
	Rate of return on total assets (RRTA)	Rate of return on own capital (RROC)	Rate of business result (RBR)	Rate of net result (RNR)
2015	1,78	0,63	2,64	0,56
2016	2,49	2,44	5,38	2,35
2017	0,90	-0,25	2,82	-0,29
2018	1,53	1,50	2,30	1,84
2019	0,08	-0,97	2,50	-1,26
2020	1,59	1,95	4,77	2,53

Source: Author's calculation based on SBRA data

It is noticeable that the agricultural companies of Serbia in all years of the observed period have positive, but very moderate-income rates on total assets. The growth of the income rates in the last analyzed year may be a hint of more successful operations of these companies in the future. The profitability rate of its own capital is also unfavorable, which is confirmed by the fact that it was negative in 2017 and 2019, while its growth was noticeable in the last year of observation. It is clear that the profitability rates on total assets and equity can be more or less different, but they are not independent. Usually, a higher income rate on total assets also means a higher growth of income rate on its own capital, because it is the relationship

between the segment and the whole within the same phenomenon. The rate of business results of agricultural companies with pronounced variations in all years is positive, which is of course a favorable circumstance and indicates that these companies usually record a positive result from the ratio of business income and expenses, i.e. regular business.

However, unlike the rate of business profit, which is positive, the rate of net result was negative in 2017 and 2019, which means that agricultural enterprises in these years did not have enough incomes to cover the total expenses. Nevertheless, the progress of agriculture and leaving the loss zone in the last analyzed year is encouraging. In 2020, the maximum rate of net financial result of 2.53% was recorded. The results of the analyzes in the coming years will show whether this is the beginning of a trend of longer-term growth in the profitability of agricultural enterprises. Before the ranking procedure, it is necessary to conduct a correlation analysis and determine the possible existence of a conflict between the criteria, i.e, the degree of their relationship. The obtained results of the correlation coefficient indicate that there is a statistically significant positive relationship between the selected criteria (Table 2).

Table 2. Correlation analysis

		RRTA	RROC	RBR	RNR
RRTA	Pearson Correlation	1,00	,902	,638	,844
	Sig. (2-tailed)	-	,014	,173	,035
RROC	Pearson Correlation	,902	1,00	,731	,986
	Sig. (2-tailed)	,014	-	,099	,000
RBR	Pearson Correlation	,638	,731	1,00	,685
	Sig. (2-tailed)	,173	,099	-	,133
RNR	Pearson Correlation	,844	,986	,685	1,00
	Sig. (2-tailed)	,035	,000	,133	-

Source: Authors' calculation using SPSS

Also, for a successful ranking of alternatives, it is necessary to calculate the weighting coefficients of the criteria. Their calculation was realized using the AHP (Analytical Hierarchical Process) method [18]. The results of the calculation of the weighting coefficients of the criteria are presented in Table 3.

Table 3. The weight coefficients of the criteria

Criterion	Weights of criteria
C1	0,619
C2	0,219
C3	0,109
C4	0,053

Source: Authors' calculation

The results of the initial decision matrix together with the values of the weighting coefficients of the criteria are shown in Table 4.

Table 4. The initial decision matrix

weights of criteria	0,619	0,219	0,109	0,053
kind of criteria	1	1	1	1
	C1	C2	C3	C4
A1	1,78	0,63	2,64	0,56
A2	2,49	2,44	5,38	2,35
A3	0,9	-0,25	2,82	-0,29
A4	1,53	1,5	2,3	1,84
A5	0,08	-0,97	2,5	-1,26
A6	1,59	1,95	4,77	2,53

Source: Authors' calculation

The next thing that is done is the normalization of the elements of the initial matrix (table 5).

Table 5. Normalized matrix

weights of criteria	0,619	0,219	0,109	0,053
kind of criteria	1	1	1	1
	C1	**C2**	**C3**	**C4**
A1	0,7054	0,4692	0,1104	0,4802
A2	1,0000	1,0000	1,0000	0,9525
A3	0,3402	0,0000	0,1688	0,0000
A4	0,6017	0,7243	0,0000	0,8179
A5	0,0000	0,0000	0,0649	0,0000
A6	0,6266	0,8563	0,8019	1,0000

Source: Authors' calculation

After the normalization of the elements of the initial matrix, the calculation of the elements of the difficult matrix is performed (table 6).

Table 6. Normalized weighted matrix

	C1	C2	C3	C4
A1	1,0556	0,3218	0,1210	0,0785
A2	1,2380	0,4380	0,2180	0,1035
A3	0,8296	0,2190	0,1274	0,0530
A4	0,9914	0,3776	0,1090	0,0964
A5	0,6190	0,2190	0,1161	0,0530
A6	1,0068	0,4065	0,1964	0,1060

Source: Authors' calculation

In the following, the matrix of border approximate areas is determined and the elements of the distance matrix of alternatives from the border approximate area are calculated (tables 7 and 8).

Table 7. The border approximation area matrix

Border Approximation Area Matrix (G)	0,9354	0,3182	0,1424	0,0784

Source: Authors' calculation

Table 8. Distance of alternatives from the border approximation area matrix

	C1	C2	C3	C4
A1	0,1202	0,0036	-0,0214	0,0000
A2	0,3026	0,1198	0,0756	0,0250
A3	-0,1058	-0,0992	-0,0150	-0,0254
A4	0,0560	0,0594	-0,0334	0,0179
A5	-0,3164	-0,0992	-0,0264	-0,0254
A6	0,0714	0,0883	0,0540	0,0276

Source: Authors' calculation

Finally, all alternatives are ranked according to the order from the most favorable to the least favorable, with the best alternative being assigned number 1 and the least favorable being number 6 (table 9). The alternative whose relative distance value is closest to unity is considered the best ranked, while the other alternatives are ranked in descending value.

Table 9. Ranking of alternatives

Alternatives	Q	Q	Ranking
A1	0,1024	0,1024	3
A2	0,5230	0,5230	1
A3	-0,2455	-0,2455	5
A4	0,0999	0,0999	4
A5	-0,4674	-0,4674	6
A6	0,2413	0,2413	2

Source: Authors' calculation

The results of the ranking using the MABAC show that the agricultural enterprises of Serbia were the most profitable in 2016, being followed by 2020, 2015, 2018 and 2017, while the most moderate success of these enterprises was recorded in 2019. According to the data of the Ministry of Agriculture [19], such good results in 2016 were primarily the result of significant growth in trade in agricultural and food products. The realized value of the export of agricultural and food products amounted to 2.9 billion euros, while the value of agricultural and food products was imported in the amount of about 1.4 billion euros. In 2016, the trend of growing surplus in the agriculture and food industry sector continued, with a level of around 1.6 billion euros. In the structure of exports, primary agricultural products still dominate with a share of 73%, while in imports they participate with about 64%. The improvement of the profitability of Serbian agriculture in the last year of the analyzed time series is encouraging. Vojteški- Kljenak and Lukić [10] point out that due to the improvement of the business environment, lower interest rates, growth in the number of workers, more extensive subsidies and grants, better regulation of the market of agricultural products, greater application of modern mechanization and agrotechnical measures, there has been a certain improvement in the efficiency of agriculture in recent years.

CONCLUSION

During the analyzed period (2015-2020), agricultural enterprises in Serbia were the most profitable in 2016, being followed by 2020, 2015, 2018, 2017 and 2019. The calculated values of profitability indicators show that enterprises from this sector still face the problem of insufficient success. Taking into account the fact that this research is based on collective data for the entire sector, there is no doubt that a significant part of agricultural enterprises have problems with securing and maintaining profitability. Of course, there are also very successful agricultural enterprises that are constantly operating with a profit.

In order to improve the profitability and other financial performance of agricultural enterprises in Serbia, it is necessary to undertake a series of well-designed measures at the micro and macro level, which include: greater support from state authorities and other institutions in terms of equal inclusion of enterprises in the subsidy system, development of marketing (especially digital), breaking the monopolies of traders and processors, establishing forward trading and developing the financial derivatives market. Finally, it is evident that modern multi-criteria decision-making methods are very useful tools, especially for company management, but also for higher levels for a more comprehensive overview of profitability and other financial performances, as they significantly contribute to rationalization and efficient financial decisions.

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Article history:

Received 26 March 2023

Accepted 2 October 2024