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DETERMINANTS OF PROFITABILITY OF GRAIN PRODUCTION ENTERPRISES FROM AP VOJVODINA

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SUMMARY

This study calculates profitability and identifies the determinants influencing the profitability of enterprises engaged in growing cereals (except rice), leguminous crops and oilseeds in AP Vojvodina in 2022. The analysis is based on data from 320 small and medium-sized agricultural enterprises using multiple linear regression, with Return on Assets (ROA) as the dependent variable. Descriptive statistics showed a median ROA of 2.62%, indicating relatively low profitability. The regression model revealed that liquidity, indebtedness, asset structure, total asset turnover ratio and company size significantly impact profitability. Liquidity and indebtedness negatively affect profitability, suggesting unproductive resource use and high debt levels. Asset structure also negatively impacts profitability, indicating inefficient use of fixed assets. Conversely, the total asset turnover ratio and company size positively influence profitability, reflecting efficient asset use and better investment opportunities. The study recommends better liquidity management, debt reduction, optimizing asset structure, increasing asset turnover efficiency, and leveraging company size to improve profitability. These strategies can enhance financial performance and competitiveness, contributing to the sustainable growth of agricultural enterprises in Vojvodina.

Key words:

agricultural enterprises, profitability, regression, Vojvodina

INTRODUCTION

Agriculture, as a fundamental sector of the economy, holds vital importance for provision of food, raw materials and energy, as well as for preservation of rural communities and cultural identity. Agricultural production, as a primary sector, significantly contributes to the overall value of the Gross Domestic Product (GDP) of the Republic of Serbia. In the period from 2012 to 2021, agricultural production accounted for approximately 7% of the total GDP of the Republic of Serbia (Milić et al., 2024). Given the increasing impact of climate change, price fluctuations in the market, changes in consumer habits and technological innovations, the agrarian sector faces complex challenges that require precise monitoring and analysis of the economic performance of enterprises to ensure their sustainability and competitiveness. In this regard, particularly in our country, Vojvodina stands out as a region with exceptional potential for agricultural production, owing to its fertile land and favorable climatic conditions, which are changing significantly. All this indicates that comprehensive monitoring of enterprise performance becomes crucial for identifying growth factors, challenges, and potential for improving the competitiveness and sustainability of the agrarian sector, especially in Vojvodina. Agriculture in Vojvodina encompasses a wide range of activities, from the production of grains, fruits and vegetables to livestock and viticulture, contributing to both the local and national economy. Grains play a crucial role, not only in meeting the nutritional needs of the population and livestock but also

in their increasing use as industrial raw materials and their strategic importance in the country's long-term policies. Grain crops are grown on an area of over two million hectares, which is nearly half of the total arable land. Grains, primarily corn, are also a significant export product. Grain production occupies 1.8 million hectares, accounting for 46% of the total agricultural land. Organic grain production covers over four thousand hectares. Grain production in the Republic of Serbia amounts to 10.2 million tons (2021), with some annual variations. Corn dominates the grain production structure with over six million tons, which accounts for more than half of the total grain production (57%), followed by wheat with 3.4 million tons (32%). Family households are the main producers, with a dominant share, while agricultural-industrial enterprises (economic entities) are significantly smaller producers. The highest grain production is achieved in the region of Vojvodina (59%) (Vlahović & Radojević, 2020).

In developed market economies, enterprises engaged in production and provision of services in agriculture and food industry make business decisions independently, based on their own profit-creating interests. Their mission is not to provide agricultural and food products and services to meet the demands of an ever-growing population but to generate profit through activities in agricultural and food production and services. These profit-driven interests emphasize the need to analyze the factors influencing enterprise profitability. According to the literature, these factors are most commonly divided into microeconomic and macroeconomic ones (Tekić et al., 2022).

Numerous studies have been conducted at national and international levels to assess the impact of microeconomic and/or macroeconomic determinants on the profitability of enterprises in the agricultural industry. Andrašić et al. (2018) analyzed the factors influencing the profitability of medium and large agricultural enterprises in AP Vojvodina from 2006 to 2015. The sample included 420 enterprises. Based on three regression models, the authors concluded that all observed factors have a statistically significant impact on the profitability of the analyzed enterprises. Company size and financial leverage negatively affect profitability, while all other factors have a positive impact on profitability. Tekić et al. (2022) analyzed the determinants of profitability for small enterprises in the agricultural and food sectors of the Republic of Serbia from 2010 to 2019. Based on panel regression model results, the authors concluded that indebtedness, asset structure, total asset turnover ratio, current asset turnover ratio, accounts receivable turnover ratio, gross domestic product, and inflation have a statistically significant impact on the profitability of agricultural enterprises. In the case of food enterprises, liquidity, indebtedness, asset structure, total asset turnover ratio, gross domestic product, and inflation are significant factors affecting profitability. Tekić et al. (2023) analyzed the determinants influencing the profitability of micro-agricultural enterprises in the Republic of Serbia from 2010 to 2019. Using panel regression analysis, the authors concluded that the total asset turnover ratio, current asset turnover ratio, and GDP growth rate have a statistically significant and positive impact on the profitability of the observed enterprises, while indebtedness, asset structure indicator, and fixed asset turnover ratio have a statistically significant and negative impact. Milošev (2023) found that internal factors, such as profitability, labor costs, and financial leverage, significantly influence the development of agricultural enterprises in Serbia, while external factors are less significant. Financial leverage emerged as the most important factor affecting profitability, suggesting that managers should pay special attention to debt policies. The study emphasizes the importance of understanding and adjusting internal factors to improve the performance and competitiveness of agricultural enterprises in the market. Odalo & Achokija (2016) analyzed the impact of liquidity on the financial performance of agricultural enterprises listed on the Nairobi Stock Exchange. Analyzing data from 2003 to 2013, the results showed a positive impact of liquidity on return on assets (ROA) and return on equity (ROE), while the relationship with earnings per share (EPS) is not significant. This confirms the importance of liquidity management for improving financial performance in the agricultural sector. Pokharela et al. (2020) analyzed the impact of company size and specialization on the financial performance of agricultural cooperatives in the USA. Their findings demonstrated that company size and specialization significantly affect the financial success of agricultural cooperatives. Larger cooperatives and those specialized in certain activities tend to achieve better financial results compared to smaller and less specialized cooperatives. These findings highlight the importance of size and specialization management strategies to improve the financial stability and competitiveness of agricultural cooperatives. Lehenchuk et al. (2022) analyzed the determinants of financial performance of Slovak agricultural enterprises using bibliometric and panel regression analysis on a sample of 527 Slovak agricultural companies from 2015 to 2019. The study found that company size, capital intensity, and financial leverage have a significant impact on profitability, while other observed independent variables do not significantly affect financial performance.

In consideration of the preceding discussion, this research is focused on agricultural enterprises classified under activity code 0111, which encompasses the cultivation of cereals (excluding rice), leguminous crops, and oilseeds, operating within the Autonomous Province of Vojvodina in 2022. The primary objective of this study is to analyze the profitability of these enterprises and to identify the determinants affecting their financial performance.

MATERIAL AND METHODS

The data used in this research were obtained from the financial statements of small and medium-sized agricultural enterprises operating under the activity code 0111 – growing cereals (except rice), leguminous crops, and oilseeds. The data were sourced from the website of the Serbian Business Registers Agency (<https://www.apr.gov.rs>) and pertain to enterprises that were actively operating in 2022 in the region of Vojvodina. The initial set of observed enterprises was refined to exclude enterprises that did not submit financial statements, those undergoing bankruptcy or liquidation, and enterprises with extreme values of profitability indicators. Finally, the sample included 320 enterprises.

To determine the factors influencing the performance of agricultural enterprises engaged in growing cereals (except rice), leguminous crops and oilseeds, the method of multiple linear regression was applied. The goal of the regression analysis is to identify the functional form (regression model) that best fits the variations of the observed phenomena. In other words, it aims to determine how the dependent variable changes in response to changes in the independent variables and, based on the degree of their variation alignment, enables the assessment and prediction of the dependent variable's behavior. Regression analysis can also be defined as the process of estimating the value of a dependent variable based on one or more independent variables. Multiple regression, whether linear or nonlinear, offers a powerful tool for analyzing complex relationships in data. The relationship between variables in multiple linear regression is given by the function:

$$Y = f(X_1, X_2, \dots, X_p)$$

Based on this, multiple linear regression in the general case has the following form (Uyanık & Güler, 2013):

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_p X_{pi} + \varepsilon_i$$

Where Y_i represents the individual value of the dependent variable; α , β_1 , β_2, \dots, β_p represent the parameters of the multiple regression, and ε_i represents the part of the variation caused by variables that are not included in the model. To effectively perform a regression analysis, it is essential to first verify the fundamental assumptions underlying the analysis. Following this, the statistical significance of the overall regression model is assessed through an Analysis of Variance (ANOVA) of the regression.

To determine the impact of certain factors on the performance of the observed agricultural enterprises from AP Vojvodina, dependent and independent variables that will figure in the regression model were selected. The return on assets (ROA) was observed as the dependent variable, while various business performance indicators of the enterprises were selected as the independent variables (Tab. 1).

Table 1. List of variables used in the regression analysis

Variable	Notation	Measurement	Predicted sign
Return on assets	ROA	Net income/Average total assets	/
Liquidity	LIQ	Current assets-Inventories/Short-term liabilities	+/-
Financial leverage	LEV	Total liabilities/Total capital	+/-
Debt ratio	DEBT	Total liabilities/Total assets	+/-
Tangibility	TANG	Fixed assets/Total assets	+/-
Total asset turnover ratio	TOAT	Sales revenue/Average total assets	+/-
Size of enterprise	SIZE	log Total assets	+/-

Source: Authors' review

This research was conducted using SPSS 21 software.

RESULTS AND DISCUSSION

For the observed variables used in this analysis, basic descriptive statistics indicators were first calculated (Tab. 2).

Table 2. Descriptive statistics of the observed variables

Variable	Median	Minimum	Maximum	Standard deviation
ROA	2.621	-12.567	26.626	4.583
LIQ	0.714	0.040	57.215	6.025
LEV	1.279	0.000	180.465	12.311
DEBT	0.573	0.002	1.091	0.293
TANG	0.417	0.000	0.993	0.282
TOAT	0.811	0.000	8.498	1.551
SIZE	5.529	4.469	7.049	0.577

Source: Authors' calculation

The median value of the return on assets (ROA) indicator for the observed year was 2.621%. This median value of 2.621% does not reach the 5% threshold generally considered necessary for successful business operations. This value indicates that for every 100 dinars of invested capital in various forms of assets, small and medium-sized agricultural enterprises engaged in growing cereals, leguminous crops, and oilseeds achieve a return of 2.621 dinars. The enterprises in the sample exhibit significant differences in this indicator, as evidenced by a wide range of variation and a high standard deviation. The liquidity indicator has a median value of 0.714. Similar to the ROA, a wide range of variation is observed in the sample for the liquidity indicator. The median value of financial leverage is 1.279, which suggests a predominant ratio of liabilities relative to the equity of the companies. This indicator also shows high variability, confirmed by a wide range of variation and a very high standard deviation. The indebtedness indicator has a median value of 0.573, indicating that 57.3% of the company's assets are financed through debt, while the remaining 42.7% are financed from own sources. The median value of the asset structure indicator is 0.417, meaning that fixed assets constitute 41.7% of the total assets of these companies. This indicator has the lowest standard deviation value. The total asset turnover ratio has a median value of 0.811, indicating that for every dinar invested in total business assets, 0.811 dinar of sales revenue is generated. The company size, measured by the logarithm of total assets, has a median value of 5.529.

In the following sections, a regression model was formed to assess the factors influencing the performance of the observed enterprises, starting with testing the presence of multicollinearity (Tab. 3).

Table 3. Multicollinearity testing

Variable	TOL	VIF
LIQ	0.837	1.194
LEV	0.867	1.153
DEBT	0.552	1.813
TANG	0.431	2.037
TOAT	0.570	1.755
SIZE	0.532	1.879

Source: Authors' calculation

The results in Table 3 show that all TOL values are above 0.10 and all VIF values are below 10, indicating that multicollinearity is not present in the model. In the following section, the overall significance of the regression model was tested using Regression Analysis of Variance (Tab. 4).

Table 4. Regression Analysis of Variance

Model	Sum of Squares	df	Mean Square	F-value	p-value
Regression	905.552	6	150.925	8.153	0.000
1 Residual	5794.398	313	18.512		
Total	6699.950	319			

Source: Authors' calculation

The previous table shows that the F-value is 8.153 with a p-value of 0.000. Since the p-value is less than the significance level of 0.05, we can conclude that the regression model is statistically significant. This indicates that at least one of the independent variables is significantly related to the dependent variable, thus confirming the model's validity in explaining the variability in the performance of the observed agricultural enterprises.

The estimated parameters of the regression model for the observed agricultural enterprises are presented in Table 5.

Table 5. Estimated parameters of the regression model

Variable	Unstandardized Coefficients		Standardized coefficients	t-value	p-value
	b	Std. Error	b*		
Constant	-3.688	3.307		-1.115	0.266
LIQ	-0.088	0.044	-0.115	-2.010	0.045
LEV	-0.019	0.021	-0.052	-0.920	0.358
DEBT	-4.765	1.108	-0.304	-4.301	0.000
TANG	-4.157	1.217	-0.256	-3.416	0.001
TOAT	0.850	0.206	0.288	4.132	0.000
SIZE	1.925	0.572	0.242	3.364	0.001

R=0.368; R²=0.135; Adjusted R²=0.119
Source: Authors' calculation

Based on the results from Table 5, the regression model can be formulated as follows:

$$\hat{Y} = -3.688 - 0,088X_1 - 0,019X_2 - 4.765X_3 - 4.157X_4 + 0.850X_5 + 1.925X_6 + \varepsilon$$

The obtained regression coefficients (b) indicate a high statistical significance ($p < 0.05$) of the parameter β , which profiles the independent variables representing liquidity, indebtedness, asset structure, total asset turnover ratio, and company size. The regression coefficient of the liquidity indicator suggests a negative impact of this independent variable on the dependent variable; thus, as this indicator increases by 1, a decrease in the return on assets (ROA) by 0.09% can be expected. This negative impact of liquidity on the profitability indicator aligns with the findings of Andrašić et al. (2018) in their study on agricultural enterprises in Vojvodina. Similarly, it can be observed that indebtedness had a statistically significant and negative impact on the return on assets; with an increase in indebtedness by 1, a decrease in ROA by 4.76% can be expected. The negative impact of indebtedness on enterprise performance was previously found in the studies by Buia et al. (2020), Tekić et al. (2022) and Muchdiarti et al. (2023). The asset structure indicator also had a negative impact on ROA; with an increase in this indicator by 1, a decrease in ROA by 4.16% can be expected. This finding is consistent with the results obtained by Tekić et al. (2023). Conversely, the total asset turnover ratio had a significant and positive impact on ROA; with an increase in this ratio by 1, an increase in the dependent variable by 0.85% can be expected. The positive impact of the total asset turnover ratio on the performance of agricultural enterprises was confirmed in the studies by Galić (2023) and Tekić et al. (2023). Similarly, company size also positively influenced ROA; with an increase in this indicator, an increase in ROA by 1.92% can be expected. The positive impact of company size on the performance of agricultural enterprises in the Republic of Serbia was also established in previous research by Tomašević (2020).

CONCLUSION

The results of the descriptive statistical analysis indicate that the average profitability of the observed enterprises was 2.62%, which is relatively low. The low profitability of these enterprises can be explained by the generally low profitability of companies in the agricultural sector. In this study, a multiple linear regression model was applied to determine the impact of various determinants on the profitability of the observed enterprises. The multiple linear regression model revealed that liquidity, indebtedness, asset structure, total asset turnover ratio, and company size have statistically significant effects on the profitability of the observed agricultural enterprises. The regression model results indicated a negative impact of liquidity on profitability, suggesting that holding too many resources in unproductive forms may limit opportunities for new investments. Indebtedness also had a significant and negative impact on profitability, which is expected given that these enterprises are heavily indebted (average value of 0.57). The asset structure indicator also negatively impacted profitability, implying that existing fixed assets might be used inefficiently or are outdated. In contrast to the previous indicators, the total asset turnover ratio had a positive impact on profitability, indicating that more efficient use of total assets would lead to increased profitability. Company size also emerged as a factor positively influencing profitability, which aligns with expectations, as larger enterprises have more resources and greater opportunities for investment and profit increase.

In conclusion, the analysis highlights several key areas that can be addressed to enhance the profitability of agricultural enterprises. Improving liquidity management by identifying and liquidating unproductive assets and implementing efficient cash flow practices can help utilize available funds more effectively and explore new investment opportunities. Managing indebtedness through strategies to reduce debt levels and increasing equity financing can alleviate the negative impact of high indebtedness on profitability.

Optimizing asset structure by evaluating the current use of fixed assets, investing in modernization, and implementing effective maintenance programs can improve productivity and efficiency. Enhancing asset turnover efficiency by streamlining operations, adopting advanced technologies, and regularly reviewing asset management strategies can lead to better utilization of total assets. Leveraging company size to negotiate better terms, invest in research and development, and expand market reach through strategic partnerships can also contribute positively to profitability.

By addressing these key areas, agricultural enterprises can enhance their profitability and achieve more sustainable growth. These strategies not only help in improving current financial performance but also in building a more robust and competitive position in the market.

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