Do vaic components contribute to profitability? Case study from the Serbian agricultural sector

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Abstract

In the agricultural sector, the use of physical capital dominates, while the use of intellectual capital is minimal. The analyzes carried out on the importance and level of development of intellectual capital and its contribution to the profitability of this sector are modest for now. VAIC method was applied in the paper. This method is based on monitoring the efficiency of the use of human capital, the efficiency of structural capital, and the capital employed efficiency. The study aims to analyze the VAIC component's contribution to the profitability of agricultural enterprises in Serbia. Profitability is monitored through ROA, ROE, and ROS indicators. The sample includes 177 active agricultural enterprises that operated in Serbia in 2021. It is concluded that intellectual capital does not significantly contribute to the profitability of agricultural enterprises. Capital employed efficiency contributes to the ROE of agricultural enterprises.

Keywords: Intellectual capital; Profitability; Agriculture sector. VAIC method.

1. Introduction

The agricultural sector represents the primary activity that has significant results in the overall world economy - the global agro-industry participates with 10% in the global GDP,

i.e. the value of sales of the food industry in the world is about 6 billion dollars (Čavlin et al., 2022). The awareness that the agricultural sector is necessary for the development of the population and the entire national economy led, in fact, to numerous activities of agricultural enterprises "aimed at increasing productivity, ensuring a decent standard of living for workers, and a suitable territorial distribution of income between the various regions" (Migliaccio & Pavone, 2022, p. 2894). Improving the traditional methods that have been used for decades in the food production process is necessary since research shows that, due to the growth of the global population, food production will increase by 70% (Radić et al., 2022). The contemporary agricultural sector has several challenges, the most prominent of which are: "population growth, environmental degradation, lack of natural resources, reduction of arable land, climate change" (Radić et al., 2022, p. 148) and decline in productivity and profitability. These challenges have increased in recent years in the agricultural sector as a result of the negative effects caused by the Covid-19 pandemic crisis (Migliaccio & Pavone, 2022). According to some calculations, the prices of agricultural products tend to fall more than industrial products, taking into account the rigidity of the supply in relation to the length of the production cycle, product perishability, and sensuality (Migliaccio & Pavone, 2022).

The selection of the agricultural sector of Serbia, as the subject of the paper analysis, is based on the contribution of this sector to the overall economic activities (Stevanović et al., 2021), as well as the need to modernize operations through stronger use of intellectual capital (IC). Data from the Statistical Office of the Republic of Serbia (Statistical office of the Republic of Serbia, 2022) show that the agricultural sector of Serbia has significant results in overall economic trends. Production of agricultural goods and services in Serbia, expressed in current prices for 2021, amounts to RSD 724,332.4 million (Statistical office of the Republic of Serbia, 2022, p. 220). The sector of agriculture, forestry, and fishing Serbia participated with 6.3% in the value of the gross domestic product, which is a 0.3% higher share compared to 2019 (Statistical office of the Republic of Serbia, 2022, p. 147). In the same sector, registered employment in 2021 amounted to 29,801 workers (Statistical office of the Republic of Serbia, 2022).

The reasons for the multi-decade crisis faced by the agricultural sector are: "the industrialization of agriculture, the liberalization of food and agricultural production markets, and the rise of food empires in the food supply chain" (Cavicchi & Vagnoni, 2018, p. 694). Also, this sector is known for its intensive use of physical capital (Vukoje et al., 2022), while the use of IC is minimal. Some authors (Cavicchi & Vagnoni, 2018) recommend that it is necessary to analyze the relationship of several components of IC in agricultural enterprises,

focusing on how agricultural activities can be transformed by the use of IC and how these activities can affect value creation. Based on the above-mentioned reasons, there is a need to analyze the contribution of IC to overcoming modern challenges and crises, as well as to research the nature of the relationship between the components of physical and intellectual property. IC of agricultural enterprises in the paper is observed by application of *Value added intellectual coefficient* (VAIC) method and its components: Human capital efficiency (HCE), Structural capital efficiency (SCE), and Capital employed efficiency (CEE).

Profitability is one of the key factors for sustainability and successful business on the market (Callado & Jack, 2017; Mitrović et al., 2021; Knežević et al., 2022). As profitability is conditioned by the engagement of internal and external resources (Youssef et al., 2022) and as an improvement in profitability was noticed in Serbian medium-sized agricultural enterprises in the previous decade (Stevanović et al., 2021), it is necessary to analyze whether and how much contribution IC provides profitability of agricultural enterprises. Therefore, the aim of the study is to analyze the contribution of VAIC components (HCE, SCE, CEE) to the profitability of agricultural enterprises in Serbia.

The literature review revealed research gaps. First, previous research analyzed the role of various business factors on the profitability of an agricultural enterprise (Detre et al., 2011; Vanhuyse et al., 2021; Vukoje et al., 2022), while the analysis of the role of IC has not been sufficiently investigated. Second, research on the effects of management practices is limited and tends "to focus on improving efficiency and productivity, excluding any assessment of managerial ability and associated financial performance" (Vanhuyse et al., 2021, p. 416). Previous studies that analyzed IC in the agricultural sector point to gaps in the strategic identification and measuring of the competencies required for sustainable competitive advantage (Cavicchi & Vagnoni, 2018). In the paper, IC components, important for creating a competitive advantage, are monitored through coefficients that indicate the efficiency of the use of human and structural capital (HCE, SCE). Third, Xu & Li (2019) conclude that few studies have analyzed the relationship between IC and internal performance, such as profitability, in developing countries. The paper deals with the analysis of the contribution of IC to profitability indicators of agricultural enterprises in a developing country - Serbia. The aim of the study is in line with the recommendations of Vukoja et al. (2022) that "further research should focus on the analysis of the financial performance of small and medium farms which, based on the available capacities and income, are the main drivers of the development of the entire agricultural sector" (p. 1031). According to the aim of the study and observed research gaps, the study should answer the following research questions:

- What is the level of development of IC and its components in the agricultural sector of Serbia?
- How much the efficiency of the use of IC (HCE and SCE) contributes to the profitability of the agricultural sector?
- What is the contribution of the efficiency of the use of physical and financial capital (CEE) to the profitability of the agricultural sector?

2. Literature Review

2.1. Intellectual capital in agricultural enterprises

Agricultural enterprises contribute to economic growth and development of the national economy through employment, export, and the creation of new value (Aničić et al., 2021). Mishra et al. (2009) state two typical characteristics of the agricultural sector: chronic low returns to factor production and this sector has experienced cycles of growth and decline. One of the ways to increase the rate of returns on the assets of agricultural enterprises is to increase the share of knowledge work (Dharni & Jameel, 2022), i.e. to engage more intellectual resources in the operations of these enterprises.

The agricultural sector is a labor-intensive activity (Čavlin et al., 2022), which indicates the need to create conditions for the wider use and development of human and intellectual property in this sector. IC represents a type of intangible asset that is important for gaining and maintaining the competitive advantage and business success of an enterprise, regardless of its type of activity and size. IC can be defined as "the sum of knowledge, information, intellectual property and employees' experience" (Stewart, 1997; Xu et al., 2022, p. 3). IC differs significantly from physical capital "because it is characterized by high risk and uncertainty, high firm specificity, long-term nature, and human capital intensity" (D'Amato, 2021, p. 1339). Common to all definitions of IC is that it is an asset of an intangible nature (Xu et al., 2022) which makes identifying, recognizing, and measuring IC challenging. That is why some authors calculate the IC value as the difference "between the balance sheet and the investor evaluation" (Edvinsson, Malone, 1997; Xu, Li, 2019, p. 489-490).

The contribution of IC to value creation depends on the approach to the use of IC and its components in business processes (Cavicchi & Vagnoni, 2018). The IC contains two components: human capital and structural capital (Xu & Li, 2019; Ognjanović & Slavković, 2022). Human capital includes the knowledge, skills, ability to innovate, and professional

behavior of each employee (Hatane et al., 2022). For Dharni & Jameel (2022), human capital is a key element of IC and a key driver of firm and economic performance. Structural capital provides "organizational mechanisms and architecture for creating, acquiring, leveraging, and exploiting innovation and knowledge initiatives along the business activities" (Dharni & Jameel, 2022, p. 938). Specifically, it is an asset that provides the organizational infrastructure for the application of human capital - business culture, databases, systems, procedures, software. Structural capital includes the internal culture of enterprises and processes that enable employees to become more productive, efficient, and innovative (Hatane et al., 2022).

IC in agricultural enterprises creates value in combination with the use of physical capital. Farms have a large share of fixed assets in total assets due to the significant "value of land, perennial crops, livestock unit, machinery, and facilities" (Vukoje et al., 2022, p. 1037). For this reason, the availability of physical infrastructure and production machinery for agricultural production is one of the key factors of profitability (Domeher & Abdulai, 2012) and productivity (Hadelan et al., 2022). Therefore, the analysis of the role of IC in agricultural enterprises should be expanded through the analysis of the importance of physical capital, which will be monitored through the CEE. This is the third component of the VAIC method through which the efficiency of the engaged physical and financial capital of agricultural enterprises is analyzed. Capital employed helps enterprises maintain good relations with different stakeholders - customers, suppliers, employees, and financial institutions (Ognjanović & Slavković, 2022).

Meeting the global growth in demand for food implies an increase in agricultural production. An increase in agricultural production requires the growth of the profitability of agricultural enterprises (Vukoje et al., 2022), which can be achieved through the efficient use of intellectual and physical capital in the process of agricultural production (Vanhuyse et al., 2021).

2.2. Profitability in the agricultural sector

An integral part of the business strategy of every enterprise is market determinants of its future appearance - growth in market demand, profitability, future competitive position (Aničić et al., 2021). Business profitability is one of the key factors for sustainability and successful business on the market (Mitrović et al., 2021). A highly profitable business can create a higher return on invested funds for investors (Youssef et al., 2022). Creating a suitable environment for investing in agriculture, will increase investment returns and

improve profitability, which will stimulate farmers to be more ready and motivated to engage in commercial farming (Domeher & Abdulai, 2012).

Profitability indicators are often used to assess farms' financial viability (Vukoje et al., 2022). The level of achieved profitability of farms is conditioned by the interventions of state authorities in the agricultural sector (Migliaccio, Pavone, 2022). "Farm profitability is one of the indicators that can be used to reliably assess the level of the economic viability of farms" (Vukoje et al., 2022, p. 1039). Profitability in the paper will be monitored through return on assets (ROA), return on equity (ROE) and return on sales (ROS) indicators. The selection of these performances is based on their objectivity, simplicity of calculation, the possibility of comparison between enterprises, and the monitoring of the success of agricultural enterprises in 2021.

IC is one of the factors in creating higher profits for enterprises (Radonić et al., 2020; Hatane et al., 2022). Analyzing the relationship between IC and profitability indicators helps investors and policymakers fine-tune their investments and ensure investment sustainability (Dharni & Jameel, 2022). As a key factor in gaining and maintaining a competitive advantage, IC helps improve the value and profitability of enterprises (D'Amato, 2021). Support for the analysis of IC and profitability in agricultural enterprises is provided by the resource-based view and the knowledge-based theory. According to the resource-based view, internal resources (intellectual and physical) within the enterprise possess the characteristics of unique resources: valuable, rare, inimitable, and nonsubstitutable, which lead to the generation of competitive advantage (Barney, 1991) and profitable business. Second, "the knowledge-based theory of the firm claims that knowledge-based resource, intellectual capital, is a central factor contributing to sustainable competitive advantage via lower cost, innovation and creativity, efficiencies, and customer benefits and considered as a whole organizational performance" (Kengatharan, 2019, p. 1056).

Studies that analyzed the IC of agricultural enterprises showed that this capital provides a significant contribution in a competitive environment (Cavicchi & Vagnoni, 2018; Xu & Li, 2019). Cavicchi & Vagnoni (2018) conduct research on Italian farms and concluded that the interaction between the elements of human capital contributes to the efficient use of structural capital in farms.

The profitability of the agricultural sector has been the subject of numerous papers. Čavlin et al. (2022) conclude that the analyzed business performance (debt ratio, quick liquidity ratio, dynamic solvency) are statistically significant predictions of the ROA of agricultural farms in the period before the Covid crisis. Detre et al. (2011) conclude that farm

profitability (ROA) is positively influenced by the scale of operation and leverage. The profitability of agricultural enterprises is also influenced by other business factors: operator, demographic, and financial characteristics (Detre et al., 2011); banking derivatives (Shen & Hartarska, 2013); business planning and benchmarking (Vanhuyse et al., 2021); "production management, financial management, human resources management and subsidies and natural factors" (Vukoje et al., 2022, p. 1031). However, research (Mishra et al., 2009) indicates that one of the causes of the low profitability of agricultural enterprises is lower asset efficiency. Given that the agricultural sector of Serbia has positive business results (Stevanović et al., 2021), it is necessary to analyze how the efficiency of using VAIC components contributes to the profitability of the agricultural sector. Accordingly, the following research hypotheses were defined:

Hypothesis$_1$: VAIC components contribute to the ROA of agricultural enterprises.

Hypothesis$_2$: VAIC components contribute to the ROE of agricultural enterprises.

Hypothesis$_3$: VAIC components contribute to the ROS of agricultural enterprises.

3. Materials and Methods

3.1. Data collection and sample

The database on the number and type of agricultural enterprises was taken from the website of the Ministry of Finance of the Republic of Serbia, Treasury Administration. The calculation of dependent and independent variables is based on the value of individual balance positions from the financial statements of observed agricultural enterprises. Financial reports for the observed enterprises were available on the website of the Serbian Business Registers Agency. Since financial reports were not available or were not complete for some enterprises, the sample includes 177 agricultural enterprises. The data was collected for the year 2021.

The sample was observed from the aspect of legal form, size of enterprises, and the number of employees. Looking at the legal form, the largest number of observed enterprises were registered as a limited liability company (65.5%) and a cooperative (28.2%). The sample is dominated by micro enterprises (57%) and small enterprises (28%), as well as enterprises employing up to 9 employees (62%).

3.2. Methods

The analysis of the relationship between variables in the research model is based on the application of the VAIC model, defined by Pulić (2004). The VAIC model allows management to examine the efficient use of components of intellectual capital (human and structural capital) and physical and financial capital in the process of creating value for shareholders (Xu & Li, 2019; Pavlović et al., 2021; Xu et al., 2022). Applying the VAIC method measures how many new values can be created per invested unit of capital (Pulić, 2004, p. 65). A high VAIC value indicates high-value creation through the use of enterprise resources (Pulić, 2004, p. 65). According to this method, the sum of the value of human and structural capital represents IC. Accordingly, HCE will be calculated first and then SCE. To calculate these coefficients, value-added (VA) will be calculated first (Pulić, 2004):

$$VA = OP+EC+D+A \quad (1)$$

Where OP = Operating; EC = Employee costs; D = Depreciation; A = Amortization. Human capital efficiency is calculated as follows (Pulić, 2004):

$$HCE = VA/HC \quad (2)$$

Where HCE = Human capital efficiency; VA = Value added and HC = total salaries and wages of the firm.

Structural capital efficiency is calculated as follows (Pulić, 2004):

$$SCE = SC/VA \quad (3)$$

Where SCE = structural capital efficiency; SC = Structural capital = VA – HC; VA = Value added

Intellectual capital efficiency (ICE) represents the sum of previously calculated coefficients (Pulić, 2004):

$$ICE = HCE + SCE \quad (4)$$

Where: ICE = Intellectual capital efficiency; HCE = Human capital efficiency; SCE = Structural capital efficiency.

IC can not independently create value. Information about the efficiency of capital employed (physical and financial) is necessary, which is calculated as (Pulić, 2004):

$$CEE = VA/CE \quad (5)$$

Where: CEE = Capital employed efficiency; VA = Value added; CE = Book value of net assets.

Value added intellectual coefficient (VAIC) represents the sum of the previous two coefficients (Pulić, 2004):

$$VAIC = ICE + CEE \quad (6)$$

Using the VAIC method, the efficiency of the use of IC (HCE + SCE) as well as the efficiency of the use of physical and financial capital is monitored (CEE) (Ivanović et al., 2021). The calculation of the mentioned coefficients is based on the values of the positions shown in the financial statements. Also, the choice of dependent variables - indicators of business profitability was calculated based on the value of the positions presented in the financial statements. The following profitability indicators are observed in the paper:

Return on assets (ROA) "is a ratio of returns to agricultural assets to the value of total farm assets" (Mishra et al., 2009, p. 53). ROA is a measure of profitability that shows how efficiently a farm operator is using capital to generate income (Detre et al., 2011).

Return on equity (ROE) is calculated as the ratio of net profit and value of equity of agricultural enterprises (Ognjanović & Slavković, 2022). This ratio shows how efficient the company's management of equity is, how successfully the company serves the interests of the owners, and how effectively it uses financial leverage (Marković & Azdejković, 2016).

Return on sale (ROS) represents the ratio of operating profit to sales income and measures the profitability of business operations (Marković & Azdejković, 2016, p. 278).

The relationship between the observed dependent and independent variables is shown in Figure 1.

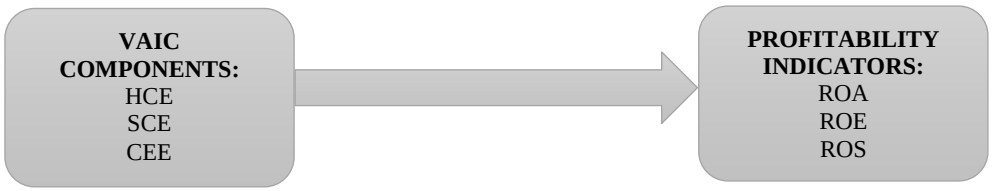

Figure 1: Research model
Source: Authors

3.3. Statistical methods

Data processing and testing of research hypotheses were performed using the statistical package for social sciences IBM SPSS Statistics, Version 23. A confidence interval ά = 0.05 was used to determine statistical significance. The paper uses descriptive statistics, correlation analysis, and regression analysis to test research hypotheses.

4. Results

4.1. Descriptive statistics

Mean, standard deviation, kurtosis, and skewness values were analyzed and monitored using descriptive statistics. The results are shown in Table 1. If independent variables are observed, the highest mean has recorded by CEE (mean = 408.20), while the lowest value is recorded by SCE (mean = 0.47). Among the dependent variables, ROE has the highest mean value. Vukoje et al. (2022) suggest that ROE values greater than 0.05 are considered economically profitable, which was achieved in the example of the observed sample. The standard deviation value is the highest for the variable CEE (St. dev. = 2297.70). Based on the kurtosis value for all observed variables, it can be concluded that the distribution is sharper than normal because the kurtosis value for all variables is positive. By observing the skewness values, it can be concluded that most of the values are positive, which means that these values are positioned closer to the lower values. Negative skewness values are positioned closer to higher values.

Table 1: Descriptive statistics

Variables	Mean	St. Deviation	Kurtosis		Skewness	
			Statistics	St. Error	Statistics	St. Error
HCE	7.64	43.25	153.63	0.36	12.06	0.18
SCE	0.47	0.88	33.46	0.36	-3.12	0.18
CEE	408.20	2297.70	67.95	0.36	7.80	0.18
ROA	-0.17	1.81	88.77	0.36	-9.39	0.18
ROE	137.19	1144.89	118.74	0.36	10.46	0.18
ROS	1.31	4.79	52.16	0.36	6.89	0.18

Source: Author's calculation

The next step is to test the normality of the distribution. The Kolmogorov-Smirnov test is used to check the normality of the distribution. For all observed variables, the value of the Kolmogorov-Smirnov test is > 0.05, which means that the normality of the sample distribution is not confirmed.

4.2. Correlation analysis

Correlation analysis is carried out using Spearman's rho coefficient since the normality of the distribution is not confirmed. The value of the correlation coefficient indicates the

direction and strength of the relationship between the observed variables. The strength of the correlation is determined by the value of the correlation coefficient. Values of this coefficient from 0.10 to 0.29 indicate weekly correlation, values from 0.30 to 0.49 indicate moderately correlation, while values greater than 0.50 indicate a strong correlation between variables (Pallant, 2011). The direction of the correlation is determined by whether Spearman's rho coefficient has a positive or negative value. The results of the correlation analysis are shown in Table 2.

Table 2: Correlation analysis

Variables	HCE	SCE	CEE	ROA	ROE	ROS
HCE	1					
SCE	0.591**	1				
CEE	0.309**	-0.102	1			
ROA	0.488**	0.143	0.484**	1		
ROE	0.373**	0.108	0.775**	0.743**	1	
ROS	-0.036	0.111	-0.035	0.065	-0.095	1

** Correlation is statistically significant on the level of 0.050*

*** Correlation is statistically significant on the level of 0.000*

Source: Author's research

The results of the correlation analysis show that the strongest and most significant correlation is present between CEE and ROE (ρ = 0.775; p = 0.000). ROS has a negative, weak, and insignificant correlation with VAIC components. SCE has no statistically significant correlation with any profitability performance. By observing the independent variables, the strongest correlation was observed between HCE and SCE (ρ = 0.591; p = 0.000), while the weakest correlation was observed between HCE and CEE (ρ = 0.309; p = 0.000). A negative and non-significant correlation was noted between SCE and CEE (ρ = -0.102; p = 0.178). By observing the value of the correlation coefficient for profitability indicators, the strongest correlation is present between ROA and ROE (ρ = 0.743; p = 0.000).

4.3. Regression analysis

VAIC components' contribution to the profitability of agricultural enterprises is determined using a simple regression analysis. The use of simple analysis requires the absence of multicollinearity and autocorrelation. A high value of multicollinearity makes it

difficult to carry out regression analysis because it indicates a high level of correlation between the observed variables. Recommended value of the VIF coefficient (which monitors multicollinearity) is up to 10 (Field, 2009). Autocorrelation is monitored based on the Durbin-Watson coefficient. If the value of this coefficient is < 4, the regression analysis is justified. All observed models met the minimum conditions of multicollinearity and autocorrelation.

Within Model 1, the influence of VAIC components and ROA was analyzed. The results indicate that **Hypothesis 1 is rejected**, ie. there is no contribution to the VAIC component of the ROA of agricultural enterprises. The results are shown in Table 3.

Table 3: Model 1 – VAIC components and ROA

Independent Variables	Standard regression model		
	β	t-value	Sig.
HCE	0.034	0.443	0.658
SCE	0.066	0.866	0.388
CEE	0.023	0.308	0.759
Dependent variables: ROA			
*Significant: ** p ≤ 0.01; * p ≤ 0.05*			
DW =2.061			
R^2 = 0.006			
F = 0.376			
p = 0.770			

Source: Author's calculation

Based on the results shown in Table 4 for the observed Model 2, it can be concluded that **Hypothesis 2 is partially accepted**. Only the CEE component has a statistically significant influence on the ROE of agricultural enterprises (p = 0.000), while HCE and SCE do not have a statistically significant influence.

Table 4: Model 2 – VAIC components and ROE

Independent Variables	Standard regression model		
	β	t-value	Sig.
HCE	0.011	0.338	0.736
SCE	0.022	0.673	0.502
CEE	**0.905**	**28.05**	**0.000**
Dependent variables: ROE			
*Significant: ** p ≤ 0.01; * p ≤ 0.05*			
DW =2.021			
R^2 = 0.820			
F = 263.24			
p = 0.000			

Source: Author's calculation

The coefficient of determination R^2 is 0.820, which means that 82% of the variability of ROE is explained by the regression model, while the rest is influenced by other factors. The value of the β coefficient of CEE is 0.905, which means that an increase in CEE by 1 unit of standard deviation, leads to an increase in ROE by 0.905 units of standard deviation.

Table 5: Model 3 – VAIC components and ROS

Independent Variables	Standard regression model		
	β	t-value	Sig.
HCE	-0.024	-0.317	0.752
SCE	0.015	0.197	0.844
CEE	-0.021	-0.273	0.785
Dependent variables: ROS			
*Significant: ** p ≤ 0.01; * p ≤ 0.05*			
DW =2.066			
R^2 = 0.001			
F = 0.068			
p = 0.977			

Source: Author's calculation

The analysis of the relationship between VAIC components and ROS was carried out within Model 3 - Table 5. Based on the presented results, **Hypothesis 3 is rejected** which means that VAIC components do not contribute to the ROS of agricultural enterprises.

5. Discussion and Implication

The obtained research results lead to answers to the research questions. IC in the Serbian agricultural sector is not at a satisfactory level of development, nor does it show a significant contribution to the profitability and success of the operations of these enterprises. This means that the agricultural sector of Serbia still chooses the use of physical assets as a key resource for creating a profitable business. These results are in the line with the conclusion of Firrer & William (2003). Underutilization of intellectual property can lead agricultural enterprises to two types of scenarios (Mishra et al., 2009). "First, low asset turnover ratios imply that the revenues generated from commercial agriculture are insufficient to justify the observed asset base. Consequently, agriculture in such a region with low asset turnover appears overcapitalized. A second possibility involves low-profit margins on sales. Aggregate agricultural sales are a function of the aggregate demand for food and fiber in both domestic and international markets. Therefore, unlike the individual firm that may expand

sales through marketing efforts, aggregate sales for the agricultural sector is largely exogenous" (Mishra et al., 2009, p. 60).

The research results indicate that farmers must use intellectual resources more strategically and efficiently, which is in line with the research results (Vanhuyse et al., 2021). One way to achieve this is to develop more comprehensive and detailed techniques for measuring, reporting, and managing the components of IC to provide more clarity on the sustainability and levels of vulnerability in agricultural enterprises (O'Donoghue et al., 2016; Vukoje et al., 2022). Applying appropriate cost reduction strategies in vulnerable areas can be one of the significant actions/ways to improve the level of profitability (Temelkov, 2022). Also, the financial statements do not show the full value of IC, which can also reduce the effect of this capital on the company's profitability.

The results of the study showed that the efficient use of physical and financial capital (CEE) significantly contributes to the ROE of agricultural enterprises, which means that the use of this capital contributes the most to the creation of value and satisfactory returns on equity (Xu et al., 2022). It can be concluded that the high value of CEE produces a higher return from each unit of invested capital (Soewarno & Tjahjadi, 2020). The impact of CEE on the ROE of enterprises was confirmed by the authors (Firer & Williams, 2003; Xu et al., 2022; Soewarno & Tjahjadi, 2020). Soewarno & Tjahjadi (2020) believe that the positive impact of CEE on ROE indicates good capital management of agricultural enterprises. For manufacturing enterprises, which include agricultural ones, physical assets constitute a significant part of the total assets and their engagement is necessary for the process of transformation of the industrial structure in the Industry 4.0 era (Xu et al., 2022). For these purposes, an IC will be required. The study did not confirm the impact of CEE on ROA and ROS. This means that the use of physical and financial capital was not properly utilized in order to increase the volume of sales. Growth in sales volume can be achieved by engaging intellectual rather than physical capital, which management must pay more attention to in further development directions.

5.1. Practical implication

The results of the research indicate that owners and managers of agricultural enterprises must improve the efficiency of the use of IC. First, they must look for the causes of ineffective IC use and take action to eliminate them. Also, based on the value of the mean, it can be concluded that the value of the coefficient of HCE and SCE is quite lower compared

to the mean of CEE. This implies additional investments in intellectual property, especially bearing in mind the requirements of modernization and computerization of physical property, which agricultural enterprises expect. The introduction and application of modern technology will not give great results if the agricultural sector is not prepared for their installation and use through the development of IC. In order to rationally invest the company's money, it is necessary to perform a cost-benefit analysis on the basis of which the management can project the possible benefits and costs of additional investment in intellectual property.

CEE contributes to the ROE of agricultural enterprises. However, the contribution of this VAIC component to ROA and ROS has not been confirmed. This leads to the conclusion that the profitability of agricultural enterprises to a very small extent depends on the efficiency of the use of physical capital and especially IC. Such results are worrisome since this is the opposite of the resource-based view, that the company's internal resources create a competitive advantage and good financial results. The management of agricultural enterprises can use different tools to improve the efficiency of asset use and thus profitability - different human resource management practices, organizational innovations, modern mechanization, etc.

5.2. Limitation of research

The first limitation refers to criticisms of the VAIC model, which is applied in the process of calculating HCE, SCE, and CEE. Xu et al. (2022) point out that “the VAIC model does not reflect an accurate measure of IC efficiency, because it only quantifies the efficiency of the firm’s labor and capital investment” (p. 3). Furthermore, in this model, the synergistic connection between physical and intellectual resources is ignored (Xu et al., 2022). However, the advantage of this model is that the data is presented quantitatively for a specific period of time. Lukić et al. (2020) believe that the analysis of the performance of agricultural firms is very current and complex, which is why priority is given to the application of mathematical models in their calculation and the calculation of independent variables.

The second limitation follows from the previous one since IC is considered in work as a sum of human and structural capital. A significant component of IC consists of relational (customer) capital and innovation capital (Xu et al., 2022). Some researchers (Xu & Li, 2019) overcome this deficiency in the literature by viewing the value of relational capital as part of the value of human capital, so IC is viewed as a set of human customer capital and structural capital.

5.3. Direction for future research

Future research can be based on comparing the level of use of IC by year and forecasts of its use in the future in the agricultural sector. It would be useful to extend the analysis of the observed profitability performance to some other business indicators - liquidity, capital structure indicators, market indicators. The analysis of future research should include two additional components of IC - relational and innovation capital.

6. References

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