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APPLICATION OF GRAY DIBR II AND ROUGH MABAC METHODS IN THE EVALUATION OF TRADE PERFORMANCE IN SERBIA

ABSTRACT: The analysis of trade performance is by nature very important, complex, and challenging. It points to the critical factors of business success in trade. Their adequate control can influence the achievement of targeted performance in trade. The issue of performance analysis in a sector is especially challenging if it is based on multi-criteria decision-making methods. Compared to classic analyses, this approach provides a more accurate representation of the achieved performance in trade. In this study, trade performance in Serbia is analyzed using the Gray DIBR II—Rough MABAC method. The results show that the best performance of trade in Serbia was achieved in 2023. The following years in descending order of performance are: 2022, 2021, 2020, 2019, and 2018. Recently, trade performance in Serbia has been continuously improving. This is the result of effective control of all relevant macro and micro factors. In this context, special attention should be paid to the application of new business methods (multichannel sales—store and online, private brands, and the sale of organic products), application of the concept of sustainable development (economic, social, and environmental dimensions), and the digitization of the entire business.

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Keywords: performance, trade, Serbia, Gray DIBR II – Rough MABAC

INTRODUCTION

This study aims to assess trade performance in Serbia as realistically as possible using the Gray DIBR II - Rough MABAC method. Based on this assessment, appropriate measures should be proposed to facilitate improvement. Knowing the real situation is a prerequisite for improving trade performance in Serbia. This is effectively enabled by multi-criteria decision-making methods (Ersoy, 2017), in the specific case of the Gray DIBR II and Rough MABAC methods. Multi-criteria decision-making methods rely on a mathematical approach, which greatly mitigates the subjectivity of performance assessments, as illustrated in the case of trade in Serbia. This is also confirmed by the results of this study.

Recently, numerous methods of multi-criteria decision-making have been developed. They are applied in different contexts and are increasingly used in trade as well. The relevant literature in this study provides guidance for the most effective application of the Gray DIBR II - Rough MABAC method in evaluating trade performance in Serbia, with the aim of improving it in the future through the implementation of appropriate measures.

In this study, all relevant literature serves as a theoretical, methodological, and empirical basis. It is extensive at the global level (Ersoy, 2017), and similarly comprehensive in Serbia (Lukić, 2023a).

METHODOLOGY

In this study, the evaluation of trade performance in Serbia is based on the Gray DIBR II and Rough MABAC methods. Their characteristics are shown below.

Grey DIBR II method

The application of gray theory is suitable in situations where there is incomplete information and a small sample (Badi et al., 2019; Eshtaiwi et al., 2017). According to Liu et al., (2012) the basic concept in all gray systems is interval gray numbers. Interval gray number $(\otimes X)$is represented as $\otimes X = \left[\underline{X}, \overline{X}\right]$, where $\underline{X}$and are $\overline{X}$the lower and upper bounds of gray number $\otimes X$and $\underline{X} < \overline{X}$(Lui et al., 2012; Tesic et al., 2023). Given that experts are not sure of

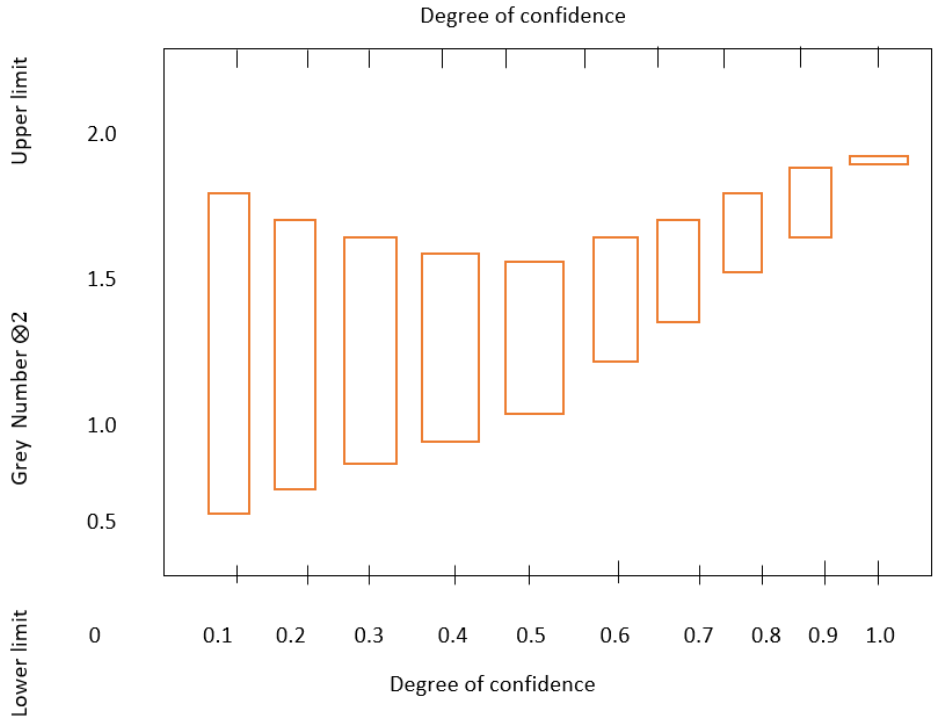
their claims when expressing their position on certain problems, for this research, the confidence level $(\delta)$was used to form the boundaries of the gray number interval (Tesic et al., 2024b; Bozanic et al., 2016):

$$\otimes X = \left(\underline{X}, \overline{X}\right) = \begin{cases} \underline{X} = \delta X, 0 < \delta \leq 1, X \geq 0 \\ \overline{X} = X - \left((1-\delta)\underline{X}\right) \\ \overline{X} > \underline{X} \end{cases} \quad (1)$$

Where X represents a clear number, that is, in this case, the value of the comparison of criteria given by experts or decision makers (DM). If the DM is 100% sure of his claim, then the value is $\delta 1.0$, if 90% $\delta = 0.9$, etc. For example, if an expert compares criterion C1 with criterion C2 and states that the comparative value is 1.5 and if he is 90% sure of that statement, the number of intervals is formed as follows: $X = \delta X = 0.9\ x\ 1.5 = 1.35$i $\overline{X} = X - \left((1-\delta)X\right) = 1.5 - \left((1-0.9)\ x\ 1.35\right)$=1.365, i.e. $X = \left(\underline{X}, \overline{X}\right)$= (1.35, 1.365). By applying expression (1), an interval number is formed whose crisp value depends on the degree of confidence. Specifically, by decreasing the DM's confidence level in a given statement, the crisp value of the comparison decreases, and if the confidence level is 1.0, the crisp value remains unchanged. All these changes in crisp value maintain the DM's actual opinion. The comparative values are reduced to a crisp value of 1, which in this method indicates that the two criteria are equally important. If the criteria are equally important, it means that all criteria have the same weighting coefficient, that is, they have the same influence on the final decision. Or if the DM is unsure of his claims, then all criteria have equal weight. Also, during other empirical research by the author (Tesic et al., 2024a; Tesic et al., 2022), in which the level of conviction was used, it was established that experts who are sure of their claims $\delta \leq 0.5$have a very low competence coefficient, and due to frequent inconsistencies of their opinions with other experts and low level of competence, their opinions were rejected.

Figure 1 shows an example of an interval gray number $\otimes 2$depending on the confidence level.

Figure 1. Example of interval gray number with a degree of confidence
Example of interval gray number with a degree of confidence



Source: Tesic et al., 2024b

Based on the step DIBR (Defining Interrelationships Between Ranked criteria) of the II method (Bozanic and Pamucar, 2023) and the basic regularities and arithmetic operations of the interval gray number, the method has been improved, according to the following:

Step 1. Defining a set of m criteria $C = \{C_1, C_2, \dots, C_m\}$that determine the choice and importance of each of the criteria $C_1 > C_1 > \cdots > C_M$.

Step 2. Determining the relationship between adjacent criteria $(\Omega_{m-1,\ m})$.

$$\otimes w_1 : \otimes w_2 = \otimes \Omega_{1,2} : 1 \mapsto \frac{\otimes w_1}{\otimes w_2} = \otimes \Omega_{1,2} \quad (2)$$

$$\otimes w_2 : \otimes w_3 = \otimes \Omega_{2,3} : 1 \mapsto \frac{\otimes w_2}{\otimes w_3} = \otimes \Omega_{2,3} \quad (3)$$

$$\otimes w_{m-1} : \otimes w_m = \otimes \Omega_{m-1,\ m} : 1 \mapsto \frac{\otimes w_{m-1}}{\otimes w_m} = \otimes \Omega_{m-1,\ m} \quad (4)$$

$$\otimes w_1 : \otimes w_m = \otimes \Omega_{1,\ m} : 1 \mapsto \frac{\otimes w_1}{\otimes w_m} = \otimes \Omega_{1,\ m} \quad (5)$$

where $\otimes w$represents the gray value of the weighting coefficients of the criteria. Relationships between adjacent criteria are defined based on the level of DM's confidence in given claims, that is, by using the first equation (1), with the condition that $\Omega\overline{\Omega} < 1$then is $\Omega\overline{\Omega} = 1$, and due to the specificity of the concrete method.

Step 3. Based on certain relationships, the relationships between the most significant criteria and the others are $\mp$defined, using the following equations (6) - (8).

$$\otimes w_2 = \frac{\otimes w_1}{\otimes \Omega_{1,2}} \quad (6)$$

$$\otimes w_3 = \frac{\otimes w_1}{\otimes \Omega_{1,2} \bullet \otimes \Omega_{2,3}} \quad (7)$$

...

$$\otimes w_n = \frac{\otimes w_1}{\otimes \Omega_{1,2} \,.\, \otimes \Omega_{2,3} \bullet \ldots \bullet \otimes \Omega_{m-1,\ m}} \quad (8)$$

Step 4. According to equations (7) to (9), the gray value of the weight coefficient of the most significant criterion is defined by the following equation (9)

$$\otimes w_1 = \frac{1}{1 + \frac{1}{\otimes \Omega_{1,2}} + 1\frac{1}{\otimes \Omega_{1,2} \bullet \otimes \Omega_{2,3}} + \cdots + \frac{1}{\otimes \Omega_{1,2} \bullet \otimes \Omega_{2,3} \bullet \ldots \bullet \otimes \Omega_{m-1,\ m}}} \quad (9)$$

Step 5. After obtaining the gray weight value of the most important criterion, the gray weight values of the other criteria are determined based on equations (6) to (8).

Step 6. After obtaining the gray weight values for each of the criteria, the values are converted into crisp numbers, using equation (10) (Tesić et al., 2023b; Pamučar et al., 2021).

$$w_\lambda = (1 - \lambda) \,.\, \underline{w} + \lambda \,.\, \overline{w} \quad (10)$$

where λrepresents the bleaching coefficient$\lambda \in [0,1]$ (Tesić et al., 2023b; Pamučar et al., 2021).

Step 7. To check the quality of the relationship between the criteria, it is necessary to calculate the control value $w_m^K$and the deviation W_m, whereby the above must satisfy the condition by taking the values of the weighting of the criteria and the comparison values when δ=1.

Step 8. Due to the specificity of the method and conditions from Step 2, $\left(if\ \underline{\Omega},\ \overline{\Omega} < 1\ then\ \underline{\Omega},\ \overline{\Omega} = 1\right)$since the values of the comparison of adjacent criteria are in the range $\Omega_{m-1} \in (1, \infty)$and the lower and upper limit values do not decrease by the same percentage, the quality control of the relationship between the criteria must be performed on crisp values, i.e. the

criterion weight coefficients are calculated when $\delta = 1$, using equation (2). After obtaining the crisp value of the criterion weights, the control value and the deviation value are calculated in the next sub-step.

Step 9. Checking the quality of the relationship between the criteria.

$$W_m = \left|1 - \frac{w_m}{w_m^K}\right| \quad (11)$$

$$w_m^K = \frac{w_1}{\Omega_{1,\ m}} \quad (12)$$

If the realizations are well defined $(0 \leq W_m \leq 0.1)$, it can be stated that the weighting values of the criteria from Step 7 are final, if not, the relationships must be redefined, as described in the article (Bozanic and Pamucar, 2023).

Rough MABAC

MABAC (Multi-Attributive Border Approximation Area Comparison) is a newly developed and widely accepted multi-criteria decision-making method (Pamučar and Čirović, 2015) that primarily ranks a set of alternatives based on their distance from the border approximation area for each criterion. However, it has been modified over time to develop purposeful hybrid models. In this study, MABAC is interpolated with rough numbers that are further fed into a DoE (design of experiments) model (Chattopadhyay et al., 2022; Božanić et al., 2024) to provide a generalized metamodel for evaluating and ranking a set of alternatives (e.g., supplier). Considering a decision problem that has n alternatives $(A_1, A_2, \dots, A_i, \dots, A_n)$ and m criteria $\left(C_1, C_2, \dots, C_j, \dots, C_m\right)$, the procedural steps of the rough MABAC method are listed below (Chakraborty et al., 2020; Božanić et al., 2024):

Step 1: The decision matrix X is constructed using rough numbers while taking into account the judgment of a team of experts/decision-makers when evaluating the relative performance of alternatives (for example suppliers) in terms of evaluation criteria:

$$X = \begin{matrix} A_1 \\ A_2 \\ M \\ A_n \end{matrix} \begin{bmatrix} RN(x_{11}) & RN(x_{12}) & \wedge & RN(x_{1m}) \\ RN(x_{21}) & RN(x_{22}) & \wedge & RN(x_{2m}) \\ M & M & M & M \\ RN(x_{n1}) & RN(x_{n2}) & K & RN(x_{nm}) \end{bmatrix} \quad (13)$$

$$= \begin{matrix} A_1 \\ A_2 \\ M \\ A_n \end{matrix} \begin{bmatrix} [x_{11}^-, x_{11}^+] & [x_{12}^-, x_{12}^+] & \wedge & [x_{1m}^-, x_{1m}^+] \\ [x_{21}^-, x_{21}^+] & [x_{22}^-, x_{22}^+] & \wedge & [x_{2m}^-, x_{2m}^+] \\ M & M & M & M \\ [x_{n1}^-, x_{n1}^+] & [x_{n2}^-, x_{n2}^+] & K & [x_{nm}^-, x_{bm}^+] \end{bmatrix}$$

where $RN\left(x_{ij}\right) = \left[x_{ij}^-, x_{ij}^+\right]$.

Step 2: Depending on the type of criteria, the initial decision matrix X is normalized to obtain the corresponding normalized decision matrix $N = \left[n_{ij}^{-}, n_{ij}^{+}\right]_{n\,x\,m}$.

$$RN(n_{ij}) = \left\{ \begin{array}{l} \left[\frac{x_{ij}^{-} - x_{ij}^{+}}{x_j^{+} - x_j^{-}}, \frac{x_{ij}^{+} - x_{ij}^{-}}{x_j^{+} - x_j^{-}}\right]; if\ j\ \in B, \\ \left[\frac{x_{ij}^{+} - x_j^{+}}{x_j^{-} - x_j^{+}}, \frac{x_{ij}^{-} - x_j^{+}}{x_j^{-} - x_j^{+}}\right]; if\ j \in C, \end{array} \right\} \quad (14)$$

where $x_j^{+} = \max_i\left(x_{ij}^{+}\right), x_j^{-} = \min_i\left(x_{ij}^{-}\right)$, B is the set of utility criteria and C is the set of cost criteria.

Step 3: Determine the weight assigned to each criterion $W = \left(w_1, w_2, \ldots, w_j, \ldots, w_m\right)$so that $\sum_{j=1}^{m} w_j = 1$. The Weight-normalized decision matrix $Y = \left[y_{ij}^{-}, y_{ij}^{+}\right]_{n\,x\,m\mathcal{M}}$is now calculated using equation (3):

$$y_{ij}^{-} = \left(n_{ij}^{-} + 1\right)w_j; y_{ij}^{+} = \left(n_{ij}^{+} + 1\right)w_j, i = 1,2, \ldots, n, j = 1,2, \ldots, m \quad (15)$$

Step 4: The Boundary Approximation Area (BAA) matrix is derived based on the geometric aggregation of the rough numbers.

$$Q = [RN(q_1)\ RN(q_2)\ \wedge\ RN(q_m)]$$

$$q_j^{-} = \left(\prod_{i=1}^{n} y_{ij}^{-}\right)^{1/n}, j = 1,2, \ldots, m \quad (16)$$

$$q_j^{+} = \left(\prod_{i=1}^{n} y_{ij}^{+}\right)^{1/n}, j = 1,2, \ldots, m$$

Step 5: The Euclidean distance of the alternative from the BAA is estimated based on the difference between the boundary approximation area and the weighted normalized matrix, and is presented $K = \left[RN\left(k_{ij}\right)\right]_{n\,x\,m}$.

$$k_{ij} = D\left(y_{ij}, q_j\right) = \sqrt{\frac{1}{2}\left(\left(y_{ij}^{-} - q_j^{-}\right)^2 + \left(y_{ij}^{+} - q_j^{+}\right)^2\right)}\ if\ RN\left(y_{ij}\right) > RN\left(q_j\right) \quad (17)$$

$$k_{ij} = -D\left(y_{ij}, q_j\right) = -\sqrt{\frac{1}{2}\left(\left(y_{ij}^{-} - q_j^{-}\right)^2 + \left(y_{ij}^{+} - q_j^{+}\right)^2\right)}\ if\ RN\left(y_{ij}\right) < RN\left(q_j\right)$$

Step 6: The considered alternatives are finally ranked in descending order according to S_i value.

$$S_i = \sum_{j=1}^{m} k_{ij} \ (i = 1,2,\wedge,n) \quad (18)$$

RESULTS AND DISCUSSION

Various indicators can be used as criteria for measuring trading performance. In this study, the relevant criteria for measuring the performance of trade in Serbia were selected based on their characteristics. These are: number of employees (C1), assets (C2), capital (C3), sales (C4), and net profit (C5). Various methods have been developed in the literature for determining the weight of criteria. The significance of the analyzed criteria in this study is determined using the Gray DIBR II method. The results of the Gray DIBR II method are shown in Table 1. (All calculations and results presented in this study are the authors' own.)

Table 1. Weight criteria

					0.5
Relationships between criteria					Crisp
C1		C2	1,200	1,600	1.40
C2		C3	1,100	1,200	1.15
C3		C4	1,300	1,400	1.35
C4		C5	1,000	1,100	1.05
C1		C5	1,500	2,500	2.00

	w_i		Crisp w_i
C1	0.266212	0.350133	0.30817
C2	0.221843	0.218833	0.22034
C3	0.201675	0.182361	0.19202
C4	0.155135	0.130258	0.14270
C5	0.155135	0.118416	0.13678
Sum	1	1	1.00000
C5K		0.154086	
d5		0.112343	
			$0 \leq dn \leq 0.1$

The most important criterion is therefore C1 - the number of employees. Next comes C2 – assets. The ranking of the criteria is: C1>C2>C3>C4>C5. The target profit in the trade of Serbia can be successfully achieved by effective control of human resources and investments. Effective control of the other analyzed criteria is also a function of this.

The ranking of alternatives about the importance of the analyzed criteria in this study was performed using the Rough MABAC method (Table

2, 3, 4, 5, 6, 7, 8). The original empirical data for Serbian trade were collected from the Agency for Economic Registers of the Republic of Serbia. (The number of employees is expressed in whole numbers. Other variables are in millions of dinars.)

Table 2. Initial decision-making matrix

	Initial decision matrix											
		0.350133	0.350133	0.218833	0.218833	0.182361	0.182361	0.130258	0.130258	0.118416	0.118416	2.000002
		max	max	max	max	max	max	max	max	max	max	
		C1		C2		C3		C4		C5		
2018	A1	219373	219373	2524897	2524897	1007972	1007972	3361094	3361094	121816	121816	
2019	A2	222049	222049	2682931	2682931	1073056	1073056	3608329	3608329	139409	139409	
2020	A3	227618	227618	2837599	2837599	1183026	1183026	3664505	3664505	171010	171010	
2021	A4	234727	234727	3166529	3166529	1318126	1318126	4754169	4754169	170703	170703	
2022	A5	234011	234011	3490398	3490398	1426553	1426553	5511864	5511864	214917	214917	
2023	A6	239429	239429	3882976	3882976	1600734	1600734	5737589	5737589	234843	234843	

Table 3. Quantified initial decision-making matrix

	Quantified initial decision matrix									
w	0.350133	0.350133	0.218833	0.218833	0.182361	0.182361	0.130258	0.130258	0.118416	0.118416
	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum
	C1		C2		C3		C4		C5	
A1	219373	219373	2524897	2524897	1007972	1007972	3361094	3361094	121816	121816
A2	222049	222049	2682931	2682931	1073056	1073056	3608329	3608329	139409	139409
A3	227618	227618	2837599	2837599	1183026	1183026	3664505	3664505	171010	171010
A4	234727	234727	3166529	3166529	1318126	1318126	4754169	4754169	170703	170703
A5	234011	234011	3490398	3490398	1426553	1426553	5511864	5511864	214917	214917
A6	239429	239429	3882976	3882976	1600734	1600734	5737589	5737589	234843	234843
minimum	219373.000	219373.000	2524897.000	2524897.000	1007972.000	1007972.000	3361094.000	3361094.000	121816.000	121816.000
maximum	239429.000	239429.000	3882976.000	3882976.000	1600734.000	1600734.000	5737589.000	5737589.000	234843.000	234843.000

Table 4. Normalized matrix

Normalized matrix										
	0.350133	0.350133	0.218833	0.218833	0.182361	0.182361	0.130258	0.130258	0.118416	0.118416
	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum
	C1		C2		C3		C4		C5	
A1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A2	0.133	0.133	0.116	0.116	0.110	0.110	0.104	0.104	0.156	0.156
A3	0.411	0.411	0.230	0.230	0.295	0.295	0.128	0.128	0.435	0.435
A4	0.766	0.766	0.472	0.472	0.523	0.523	0.586	0.586	0.433	0.433
A5	0.730	0.730	0.711	0.711	0.706	0.706	0.905	0.905	0.824	0.824
A6	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Table 5. Weighted matrix

Weighted matrix										
	0.350133	0.350133	0.218833	0.218833	0.182361	0.182361	0.130258	0.130258	0.118416	0.118416
	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum
	C1		C2		C3		C4		C5	
A1	0.350	0.350	0.219	0.219	0.182	0.182	0.130	0.130	0.118	0.118
A2	0.397	0.397	0.244	0.244	0.202	0.202	0.144	0.144	0.137	0.137
A3	0.494	0.494	0.269	0.269	0.236	0.236	0.147	0.147	0.170	0.170
A4	0.618	0.618	0.322	0.322	0.278	0.278	0.207	0.207	0.170	0.170
A5	0.606	0.606	0.374	0.374	0.311	0.311	0.248	0.248	0.216	0.216
A6	0.700	0.700	0.438	0.438	0.365	0.365	0.261	0.261	0.237	0.237

Table 6. GAO

											0.138
GAO											
	0.350133	0.350133	0.218833	0.218833	0.182361	0.182361	0.130258	0.130258	0.118416	0.118416	
	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	
	C1		C2		C3		C4		C5		
GAO	0.448	0.448	0.238	0.238	0.194	0.194	0.130	0.130	0.119	0.119	

Table 7. Distance from GAO

Distance from GAO										
	0.350133	0.350133	0.218833	0.218833	0.182361	0.182361	0.130258	0.130258	0.118416	0.118416
	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum	maximum
	C1		C2		C3		C4		C5	
A1	-0.098	-0.098	-0.019	-0.019	-0.012	-0.012	0.001	0.001	-0.001	-0.001
A2	-0.051	-0.051	0.007	0.007	0.008	0.008	0.014	0.014	0.018	0.018
A3	0.046	0.046	0.031	0.031	0.042	0.042	0.017	0.017	0.051	0.051
A4	0.170	0.170	0.084	0.084	0.084	0.084	0.077	0.077	0.051	0.051
A5	0.158	0.158	0.137	0.137	0.117	0.117	0.118	0.118	0.097	0.097
A6	0.252	0.252	0.200	0.200	0.171	0.171	0.131	0.131	0.118	0.118

Table 8. Rank

						Rank				
2018	A1	-0.128	-0.128	-0.1283	-0.257	6		[-0.128,-0.128]	-0.257	6
2019	A2	-0.004	-0.004	-0.00412	-0.132	5		[-0.004,-0.004]	-0.132	5
2020	A3	0.188	0.188	0.188046	0.060	4		[0.188,0.188]	0.060	4
2021	A4	0.466	0.466	0.466122	0.338	3		[0.466,0.466]	0.338	3
2022	A5	0.627	0.627	0.627018	0.499	2		[0.627,0.627]	0.499	2
2023	A6	0.872	0.872	0.871696	0.743	1		[0.872,0.872]	0.743	1
		-0.128								
			0.872							

The results of the Gray DIBR II - Rough MABAC method show that the best performance of trade in Serbia was achieved in 2023. The following years rank in descending order of performance: 2022, 2021, 2020, 2019, and 2018. Recently, the performance of trade in Serbia has been continuously improving. This improvement is the result of effective control over all relevant factors.

The application of different methods of multi-criteria decision-making enables a realistic assessment of trade performance, given that these methods are based on a mathematical approach. This is confirmed by the results of this study. Therefore, their application in the evaluation of trade performance is recommended. An additional advantage is that the results can be compared internationally without restriction, as they are the “product” of mathematical analysis.

CONCLUSION

The goal of the analysis is **to** assess as realistically as possible the performance of trade**.** This assessment enables the application of various multi-criteria decision-making methods, which are based on a mathematical

approach**.** This is confirmed by the results of this study. In this particular case, the results of the Gray DIBR II - Rough MABAC method show that the best performance of trade in Serbia was achieved in 2023. The following years rank in descending order of performance: 2022, 2021, 2020, 2019, and 2018. Recently, the performance of trade in Serbia has continuously improved as a result of effective control over all relevant factors.

The general recommendation is that, in addition to classic analysis, different multi-criteria decision-making methods should be used in evaluating trade performance in Serbia to obtain the most accurate results. This, in turn, indicates the measures that should be taken to achieve target performance.

REZIME
PRIMENA METODE GRAY DIBR II I ROUGH MABAC U PROCENI TRGOVINSKE PERFORMANSE U SRBIJI

Analiza trgovinskih performansi (učinka) je po prirodi stvari veoma važna, složena, i izazovna. Ukazuje na kritične faktore poslovnog uspeha u trgovini. Njihova adekvatna kontrola može uticati na postizanje ciljnog učinka u trgovini. Pitanje analize učinka u trgovini je posebno izazovno ako se zasniva na višekriterijumskim metodama odlučivanja. U poređenju sa klasičnom analizom, na ovaj način se dobija tačniji prikaz ostvarenog učinka u trgovini. U ovoj studiji, trgovinski učinak u Srbiji je analiziran primenom Gray DIBR II—Rough MABAC metode. Rezultati pokazuju da je najbolji učinak trgovine u Srbiji ostvaren u 2023. godini. To su: 2022, 2021, 2020, 2019, i 2018. U poslednje vreme trgovinski učinak u Srbiji se kontinuirano poboljšava. Ovo je rezultat efektivne kontrole svih relevantnih makro i mikro faktora. U tom kontekstu posebnu pažnju treba posvetiti primeni novih metoda poslovanja (višekanalna prodaja – prodavnica i elektronska, privatni brend, prodaja organskih proizvoda), primeni koncepta održivog razvoja (ekonomske, socijalne i ekološke dimenzije) i digitalizaciji celokupnog poslovanja.

Ključne reči: performanse, trgovina, Srbija, Gray DIBR II – Rough MABAC

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ASPECTS OF ECONOMIC SUSTAINABILITY IN TRADITIONAL AND ORGANIC AGRICULTURE: A COMPARATIVE ANALYSIS OF METHODS AIMED AT IMPROVING MANAGEMENT, MARKETING ACTIVITIES, AND BUSINESS PERFORMANCE

ABSTRACT: In this research on the economic sustainability of organic agriculture in comparison with conventional agriculture, the costs and benefits of organic production were analyzed, while also considering farmers' attitudes, with the aim of improving management and marketing activities and overall business performance. The results show potential advantages of organic agriculture, such as lower variable costs and improved yields, but

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also challenges, including higher initial investments. The respondents evaluated the economic sustainability of organic agriculture differently, although the majority perceived a positive impact on the environment and the local economy. This research provides useful guidelines for understanding and supporting organic agriculture, emphasizing the need for further research and education on this topic.

Keywords: management, marketing, production costs, profitability, economic sustainability, agricultural systems.

INTRODUCTION

Agriculture is a key sector in every society, providing food and basic resources for life. In today's world, there is an increasing need to consider different approaches to agricultural production in order to ensure sustainability and the long-term ability to meet the needs of the global population. In this context, the study of the economic sustainability of traditional and organic agriculture, from management and marketing aspects, becomes crucial, with the aim of understanding the factors that influence the success of these systems and informing the decisions of relevant actors in the agricultural sector.

The topic of the economic sustainability of traditional and organic agriculture is becoming increasingly relevant due to the growing awareness of the need to provide safe and high-quality food, as well as the demand for efficient use of resources. With the growing interest of consumers in organic products and the pressure for changes in agricultural practices, the examination of the economic sustainability of these systems through management and marketing perspectives becomes necessary in order to make informed decisions and support the sustainable development of agriculture.

The aim of this research paper is to examine the economic viability of these practices through the analysis of organic and conventional agricultural production methods in Serbia. The scientific contribution of this research lies in the detailed analysis of the economic sustainability of organic and conventional agriculture through the lens of production costs, market prices, productivity, and profitability. The study of farmers' preferences, the analysis of production costs and yields, and the assessment of the impact on the local economy provide an understanding of the factors that shape the economic sustainability of both agricultural systems.

Previous research on this topic has highlighted various aspects of the economic sustainability of agricultural systems. For example, Ma et al. (2017) compared production costs in traditional and organic farming systems, while

Jones et al. (2015) conducted a detailed analysis of the costs and benefits of these systems. Barnes et al. (2009) investigated the factors that influence production costs in traditional and organic agriculture. De Backer et al. (2009) analyzed the profitability of different systems, while Mondelaers et al. (2009) evaluated the overall costs and benefits of organic agriculture. Baležentis et al. (2019) explored economic challenges at the local level, and Tomar et al. (2023) analyzed broader economic aspects. Tzouvelekas et al. (2002) focused on technical efficiency, while Beharrell et al. (1992) investigated the efficiency of water use. McEachern et al. (2004) examined socioeconomic factors.

New approaches and strategies are key to improving the economic sustainability of agriculture. With the goal of achieving a better understanding of the economic characteristics and long-term implications of both approaches, this research provides the necessary information for decision-makers in the agricultural sector.

REVIEW OF PREVIOUS RESEARCH

Previous research on the economic sustainability of traditional and organic agriculture has provided significant insights into various aspects of these systems. In this review, we will focus exclusively on the economic dimension of sustainability.

Babić, Rajačić, and Stanković (2022) investigated the determinants of the competitiveness of agricultural producers in the Republic of Serbia. Their study offers insight into the economic factors that influence competitiveness, which is useful for understanding the economic aspects of agricultural production in Serbia. They concluded that competitiveness is closely linked to the availability of resources and technological innovations.

Baležentis et al. (2019) investigated whether there were sufficient incentives for the development of sustainable agriculture in Lithuania. Their research focused on the economic aspects of sustainable agriculture, analyzing policies and incentives that support this development. Their conclusion was that additional support measures are required in order to stimulate sustainable development.

Barnes, Vergunst, and Topp (2009) conducted a study on consumer perceptions of the term "organic" using the citizens' jury approach. Their study contributes to understanding how consumers perceive organic agriculture, which may affect the economic performance of this system. They found that consumers often associate organic agriculture with higher quality standards and profitability.

Beharrell and Crockett (1992) examined changes in consumer preferences regarding organic food. Their study focused on the economic aspects of organic food consumption, emphasizing trends and consumer preferences that may affect the organic agriculture market. They concluded that increasing awareness of healthy nutrition is a key factor driving the demand for organic products.

Calabro and Vieri (2024) studied the potential of organic agriculture to contribute to the sustainability of the European agri-food system. Their study analyzed the economic limitations and potentials of organic agriculture, providing important insights for policymaking. They concluded that organic agriculture can significantly contribute to sustainable development with appropriate policy support.

De Backer et al. (2009) conducted an assessment of the economic sustainability of organic and conventional agriculture using life cycle analysis (LCA). Their study offered economic comparisons of these two systems, providing insight into the sustainability of agricultural practices. They found that organic agriculture demonstrates greater economic sustainability in comparison to conventional agriculture.

Galić (2024) investigated internal factors affecting profitability in companies engaged in organic production in the Republic of Srpska. His study contributes to a better understanding of the economic determinants of profitability in organic agriculture. He concluded that certification costs and market access are key factors in determining profitability.

Jin (2023) examined the economic consequences of the transition from organic livestock production into conventional value chains in Ireland. His research analyzed the economic effects of this transition, providing insight into the sustainability of different agricultural practices. He concluded that the transition may have negative economic consequences for long-term sustainability.

Jones, Escalante, and Rusiana (2015) investigated differences in financing between organic and conventional farms. Their research offered insight into the financial challenges faced by organic farmers in comparison to conventional ones. They concluded that organic farmers are often confronted with higher financing costs.

Kučević et al. (2023) studied organic beef production as a sustainable solution for the EU market. Their study provided economic analyses of the potentials of organic beef, highlighting its importance for the sustainability of agricultural production. They concluded that organic beef has significant potential for growth in the EU market.

Kumar et al. (2023) explored the factors that influence the adoption of organic agriculture in developing economies, with a particular focus on India. Their study analyzed the economic and social obstacles and advantages of

adopting organic agriculture. They concluded that education and financial support are key to increasing the adoption of these practices.

Ma et al. (2017) investigated how the availability of agricultural information affects the willingness of Chinese apple producers to adopt organic agriculture. Their study offered insight into the economic and educational factors influencing the adoption of organic farming. They concluded that better access to information significantly increases the likelihood of adopting organic agriculture.

McEachern and Willock (2004) examined the attitudes and motivations of producers and consumers of organic meat. Their study contributed to understanding the economic aspects of the organic meat market through an analysis of the attitudes of key actors. They found that ethical and health reasons predominated as motivations for the consumption of organic meat.

Mitić and Čolović (2022) investigated economic indicators of profitability in the production of organic and conventional food, as well as psychological strategies for overcoming crises among managers during the COVID-19 pandemic. Their study offered insight into economic performance and management under crisis conditions. They concluded that managerial skills and adaptability are key factors for success during crises.

Mondelaers et al. (2009) conducted a meta-analysis of the differences in financial impacts between organic and conventional agriculture. Their study provided a broad overview of the economic aspects of these two systems. They concluded that organic agriculture generally has a lower economic impact.

Tomar et al. (2023) developed a model of sustainable rural entrepreneurship based on organic agriculture in India. Their study analyzed the economic advantages and challenges of organic entrepreneurship in rural areas. They concluded that organic entrepreneurship can significantly contribute to rural development and employment.

Tzouvelekas et al. (2002) measured technical efficiency in organic agriculture using data from Greek wheat farms. Their study offered insight into the economic aspects of technical efficiency in organic production. They concluded that organic systems are more efficient in resource use compared to conventional systems.

METHODOLOGY OF THE RESEARCH

The research was conducted in several steps to determine how production costs affect the economic sustainability of agricultural systems and how the financial aspects of traditional and organic agriculture differ.

The first step of this research was the definition of its objectives, with a special focus on identifying the economic factors that influence the sustainability of agricultural systems. Key elements such as production costs, market prices, profitability, and resource-use efficiency were analyzed, both in traditional and organic agriculture. The aim was to identify the differences and similarities between these two systems and to provide concrete data to assist farmers and decision-makers in optimizing agricultural practices.

Based on the defined objectives, a questionnaire was developed, consisting of 18 carefully formulated questions. The questions were divided into several key areas. The first area covered production costs, including seeds, fertilizers, pesticides, labor, and machinery. The second area focused on farmers' perceptions of economic sustainability, covering topics such as profitability and long-term viability. The third area analyzed the efficiency of resource use, including water, land, and energy. Finally, the questionnaire included other relevant economic factors such as market access, subsidies, and certification costs. The structure of the questionnaire comprised demographic questions about agricultural holdings, financial questions about production costs and income, as well as perceptual questions about farmers' attitudes toward economic sustainability.

The questionnaire was distributed through several key channels to ensure access to a wide range of farmers. Social networks such as Facebook were used, where the target groups were agricultural communities and forums for farmers. In addition, the questionnaire was sent via the email lists of agricultural associations in the Republic of Serbia. This approach enabled the collection of responses from farmers of different farm sizes and types of production, including crop, livestock, and mixed producers. The sample was carefully selected to reflect the diversity of agricultural practices in Serbia, including both organic and conventional production.

The questionnaires were distributed between April 2 and April 7, 2024. Responses were collected from 100 agricultural holdings, which were then thoroughly analyzed to identify perceptions, attitudes, and differences in financial aspects between organic and conventional agriculture. The quantitative analysis included the use of descriptive statistics, t-tests, and analysis of variance (ANOVA) for group comparisons, which enabled the identification of statistically significant differences between the different agricultural systems. In addition to the quantitative analysis, a qualitative analysis of open-ended questions from the questionnaire was conducted to obtain deeper insights into the attitudes and perceptions of farmers regarding the economic sustainability of their systems.

Variable costs were examined in this research in the context of organic and conventional agriculture. Variable costs include expenses that directly vary with production, i.e., costs that change according to the quantity of

organic products produced. The definition of variable costs in this research is based on the economic principles of agricultural production, as defined by Pindyck and Rubinfeld in their work *Microeconomics* (2012).

Crop production technology refers to costs related to the use of technological innovations and practices applied in crop cultivation. This includes the costs of procurement and maintenance of agricultural equipment, tools, irrigation systems, crop monitoring systems, and other technological solutions that improve productivity and production efficiency.

Calculations of the entire production line refer to the analysis of the costs of all elements in the production chain, including input costs, processing, packaging, transportation, and distribution of products. This implies a detailed review of all stages of production to determine how much each stage contributes to the total production costs.

Calculations of livestock feed costs, when livestock is present on the farm, include the estimation of the costs of purchasing feed for the livestock, as well as the costs related to storing, processing, and distributing that feed.

The costs of additional soil nutrients and biopesticides include all expenses related to the application of additional nutrients and biopesticides intended to improve soil fertility and pest control.

Additional labor includes the costs of hiring extra or seasonal workers during periods of intensive crop or livestock production or processing. These costs cover wages, insurance, and other benefits for workers employed on the agricultural holding.

This concept enables a clear distinction between costs that are directly related to the scope of production and allows for further analysis of the economic aspects of organic and conventional agriculture.

The research results were interpreted in accordance with the defined research objectives. Preferences, attitudes, and perceptions of farmers regarding the economic sustainability of their production systems were analyzed, with a particular focus on identifying the key economic factors that influence sustainability. The conclusions provided useful information for further planning and management of agricultural production, enabling farmers and decision-makers to make informed decisions based on concrete data. This methodology enabled a comprehensive understanding of the economic aspects of the sustainability of traditional and organic agriculture in Serbia, thereby contributing to improved optimization of agricultural practices and enhanced economic sustainability.

RESEARCH RESULTS AND DISCUSSION

The results of the research conducted among farmers indicate a significant difference in preferences between organic and conventional agriculture. The majority of respondents (55%) hold a certificate for organic production, while 45% do not have a certificate and practice conventional agriculture. If we assume that the research was targeted at organic producers, a result showing a significant preference for organic agriculture would be expected. In such a case, the sample was drawn with an emphasis on organic farms, which led to a greater probability that a larger number of respondents would express a preference for organic agriculture. However, although these results may align with expectations in such a scenario, it is still important to take into account all factors that influence the validity of the results, including the size and representativeness of the sample, as well as potential biases in the research methodology.

In the cost analysis of organic agriculture, it can be observed that although there is potential for lower variable production costs due to the limited use of chemical inputs, higher prices of organic inputs, resulting from the low presence of organic products, create certain difficulties. This means that although organic agriculture may have lower costs in certain segments, such as pesticides or chemical fertilizers, the higher prices of organic inputs, such as organic seeds or organic fertilizers, may reduce those potential savings. This situation arises from the relatively low demand and supply of organic products on the market, which leads to increased prices of these inputs. Therefore, although organic agriculture may be considered more environmentally friendly due to the reduced use of chemical agents, the high prices of organic inputs may represent a challenge for producers.

When analyzing costs in organic agriculture, it is essential to use a quantitative approach that relies on actual data on production costs. Instead of relying solely on the subjective opinions of respondents, it is necessary to thoroughly map and quantify all relevant costs and revenues.

Cost-benefit analysis

In organic agriculture, a detailed cost-benefit analysis is essential for evaluating the economic sustainability and success of agricultural operations. This process includes mapping and quantifying all relevant costs and revenues, as well as applying appropriate economic models and tools to assess profitability. The introduction of organic production may bring challenges and changes in financial flows**, and therefore it is** important to carefully analyze all aspects of the business in order to make informed decisions. In this

context, the development of strategies for cost reduction and income growth becomes crucial for the long-term success of organic farming operations.

Variable costs refer to expenses that directly depend on the volume of production and vary accordingly. For the purpose of the research, it was assumed that the price of seeds was 120 dinars per seed, and 2,000 seeds were planned to be planted, so the variable cost for seeds amounted to 240,000 dinars. Furthermore, it is necessary to use organic fertilizers and pesticides for crop protection**, and** it was assumed that the price of organic fertilizers and pesticides was 1,028,000 dinars per hectare, and thus the variable cost for fertilizers and pesticides on an area of 1 hectare amounted to 1,028,000 dinars. In our example, an irrigation system was used, which required additional water and energy consumption, with the monthly cost for water and energy amounting to 10,000 dinars, so the monthly variable cost for irrigation was 10,000 dinars. Finally, the costs of acquiring additional supplements amounted to 50,000 dinars per month, so the variable cost for these inputs was 50,000 dinars per month. The total variable costs amounted to 1,328,000 dinars. In doing so, we relied on the prices of the Agricultural Cooperative Sto-Vet (Stovet, 2024).

The most important indicator of the economic sustainability of an agricultural holding is the annual profit achieved, which is determined as the difference between sales revenue and variable costs, taking into account fiscal expenditures, with an emphasis on investing in quality biological production to improve economic efficiency.

In our case, the price per unit of organic products was 500 dinars, and the number of units sold during one month was 3,000, so the total sales revenue in this case amounted to 1,500,000 dinars.

The total net profit from organic agriculture was 172,000 dinars, after all costs had been subtracted from the total revenue.

This includes the identification and quantification of input costs, labor, technology, transportation, marketing, and other factors that influence the economic performance of the agricultural system. The analysis used appropriate economic models and tools to conduct a detailed analysis of the costs and profitability of organic agriculture. This included the application of methodologies such as Total Cost of Ownership (TCO), Net Present Value (NPV), Internal Rate of Return (IRR), and other financial evaluation methods.

Calculation of net present value

Net Present Value (NPV) is a financial indicator that takes into account the time value of money and allows us to assess whether an investment is profitable in relation to expected future cash flows. To calculate NPV, the following formula is used:

$$NPV_{1 \text{ do } T} = \sum \frac{X_t}{(1+R)^t} - X_o$$

Where:
Xt = total cash inflow for period t
Xo = net initial investment expenditures
R = discount rate
t = total number of time periods

To calculate NPV, it is first necessary to identify the net cash flows for each year during the three-year period, and then discount them to present value. After that, the discounted values are summed, and the initial investment is subtracted.

In this case, Xt represents the total cash inflow for each time period, which amounts to 1,500,000 dinars annually. Since the analysis period is 3 years, this means there will be three such inflows. The net initial investment expenditures Xo amount to 1,328,000 dinars. The discount rate R is 6.5%.

Using the formula for the period from year 1 to year 3, the NPV for the given period amounts to approximately 2,651,404 dinars. This means that, taking into account the discount rate of 6.5%, the organic agriculture project has a positive value at the present time, which indicates that the investment would be profitable.

Analysis of respondents attitudes

Specifically, 40% of respondents emphasize the potential for lower variable costs due to the limited use of chemical inputs, while as many as 30% note that the higher prices of organic seeds and fertilizers may compromise this advantage. Furthermore, 20% of respondents highlight the importance of aligning crop and livestock production to reduce costs, while 10% emphasize the negative impact of purchasing inputs from the market on overall production costs. These results indicate the complexity of economic factors in organic agriculture and suggest the need for further research to better understand the impact of costs on the economic sustainability of organic farming.

In accordance with the defined research objective, the analysis of the results identifies significant factors that contribute to the economic sustainability of organic agriculture compared to conventional farming. The primary factor is the high cost of external inputs, which 30% of respondents identify as a key challenge in conventional production. However, according to 40% of respondents, replacing these inputs with on-farm resources can lead to a significant reduction in costs in the organic production system. In addition, 20% of respondents point to lower costs of fertilizers and pesticides in organic

systems, which further supports the economic sustainability of organic agriculture. Nevertheless, 10% of respondents highlight that additional variable costs due to packaging and processing may offset these advantages. These results emphasize the complexity of the economic sustainability of organic farming, while also underscoring the potential benefits of the organic production system.

The research on costs in organic and conventional agriculture points to significant differences that may have implications for the economic sustainability of these systems. According to the analysis, production costs in organic agriculture are often lower compared to conventional production, suggesting potential economic advantages of the organic approach. For example, variable costs for dairy cows are on average 22% lower, while fertilizer and pesticide costs are significantly lower in organic systems, often by approximately 15%. However, there are also additional variable costs in organic production, such as higher costs for seeds and seedlings, which can partially reduce these benefits. Therefore, although there is potential for cost reduction in organic agriculture, it is important to consider the complexity and specific characteristics of this system to adequately assess economic sustainability in comparison with conventional agriculture.

The research identified significant cost savings and improved yields as key characteristics of organic agriculture relative to conventional production. According to the obtained data, up to 40% of farmers expressed the view that organic agriculture brings significant cost savings and improved yields. These results indicate differences in economic sustainability between organic and conventional production. The differentiation in costs and yields in organic agriculture highlights the importance of this research in understanding the factors that contribute to the economic sustainability of different agricultural systems.

The analysis of depreciation costs in organic agriculture provides insights into the financial challenges and differences compared to conventional methods. According to the results, 35% of respondents believe that depreciation costs are lower in organic agriculture, while 25% report the opposite. On the other hand, 30% of respondents consider that the costs are similar in both systems. These results provide important insights into the economic characteristics of organic agriculture and facilitate further research to better understand the economic sustainability of organic systems relative to conventional ones.

The analysis of responses to the question regarding the impact of production costs on the sustainability of agricultural systems reveals various opinions among the respondents. Although there is diversity in views, the majority of respondents (35%) perceive production costs as a factor that negatively affects the sustainability of agriculture. This view may reflect the

perception that high costs reduce the profitability of agricultural operations, potentially leading to financial difficulties for farmers and jeopardizing the long-term sustainability of their systems. On the other hand, 25% of respondents see a positive impact of production costs on sustainability. This view may stem from the perception that investment in high-quality resources, technology, and practices can result in more efficient production, reduced losses, and long-term profitability. These results emphasize the importance of analyzing production costs when making sustainable decisions in agriculture.

Considering that 30% of respondents expressed a neutral attitude, it can be concluded that there is also a certain degree of uncertainty or lack of information on this topic among the surveyed individuals. This underscores the need for additional education and information regarding the economic aspects of agriculture in order to enhance the ability to make informed decisions.

Furthermore, the financial analysis of traditional and organic agriculture reveals significant differences in production costs and benefits. Organic agriculture has proven to be more economically viable in the long term, as stated by 55% of respondents, despite higher initial investments, due to reduced pesticide and fertilizer costs. On the other hand, conventional agriculture may involve lower direct costs, according to 45% of respondents, but in the long run it incurs higher expenses due to the need for agrochemicals, which may negatively affect soil health and the environment. These results provide useful guidelines for making informed decisions regarding the choice of agricultural practices, emphasizing the importance of understanding the economic aspects and long-term consequences for the sustainability of agricultural systems.

Finally, different factors can significantly influence production costs in both conventional and organic agriculture. Based on the results of the research, labor emerges as the most significant factor, with 30% of respondents highlighting its impact. The use of pesticides and chemical fertilizers is also important, accounting for 25%, while the type of arable land contributes 20%. Access to water and irrigation is also significant, with 15%, while certification costs are considered a less important factor, at 10%. This research emphasizes the need for a detailed understanding of these differences in order to effectively plan and manage agricultural production.

The research results on the economic sustainability of organic and conventional agriculture indicate significant variations in perceptions regarding their profitability. Upon analyzing the responses, 45% of respondents believe that organic agriculture is more profitable in the long term, while 25% favor conventional agriculture. These findings suggest the complexity of the issue of economic efficiency within agricultural systems and highlight the need for further research on this topic. Monitoring the economic

sustainability of organic agriculture is essential for informed decision-making regarding agricultural practices. Accordingly, the research was conducted to assess the profitability of organic agriculture relative to conventional practices.

The results show diverse perspectives, with the majority of respondents (40%) considering organic agriculture to be economically competitive in the market. However, a significant portion of respondents (25%) believe that conventional agriculture is more economically competitive. These findings point to the importance of continued research to better understand the economic aspects of both approaches to agriculture.

The analysis of the economic sustainability of organic agriculture at the local level through case studies provides insight into the complex factors affecting this branch of agriculture. Production costs were identified as the most significant factor, with a high percentage of 30%, while market prices and subsidies also play key roles, with 25% and 20%, respectively. Access to financial resources is also an important factor, although less prominent, with a share of 15%. These results emphasize the need for a comprehensive approach to the analysis of the economic sustainability of organic agriculture, considering local specificities and contextual factors in order to make informed decisions and support further development of this sector.

The research results highlight the significant role of organic agriculture in environmental protection. The analysis showed that the majority of respondents (40%) hold a positive attitude toward the impact of organic agriculture on the environment, while 30% expressed a negative attitude. Interestingly, 20% of respondents remained neutral on this issue, while 10% had no formed opinion. These results point to the importance of further research and the promotion of organic agriculture as a sustainable alternative.

Furthermore, a meta-analysis of several studies from Serbia was conducted to assess the environmental performance of organic agriculture, with a specific focus on energy use and greenhouse gas emissions that contribute to global warming. The results suggest that organic agriculture may have a smaller ecological footprint in certain areas of Serbia, with 55% of respondents supporting this claim, indicating its potentially lower negative environmental impact. Differences in water use efficiency between organic and conventional agriculture were also examined, aiming to identify potential sustainability differences between these systems. Research results suggest that organic agriculture is more efficient in the use of water resources compared to conventional farming, with 60% of respondents supporting this view. These findings may have significant implications for agricultural planning and management designed to preserve water resources and increase sustainability.

Finally, in discussing the perception of the impact of organic agriculture on biodiversity conservation, the results indicate a high rate of

positive perception, with 70% of respondents believing that organic agriculture contributes positively to biodiversity preservation. This finding supports the hypothesis of the positive impact of organic agriculture on biodiversity. However, it is important to note that a smaller percentage (5%) of respondents expressed a negative perception or had no formed opinion (5%), which may indicate the need for additional education or information on this topic. These results suggest strong support for organic agriculture as a sustainable practice that contributes to biodiversity preservation.

The research examined the impact of organic agriculture on the local economy and community through the analysis of factors such as employment rates, household income, and rural development. The results showed that the majority of respondents (60%) held a positive perception of the impact of organic agriculture on the local economy and community, while 25% were neutral, 10% negative, and 5% did not know or had no opinion. These findings suggest support for the notion that organic agriculture can have a positive impact on the economy and community at the local level.

Furthermore, based on a study that explored market access in organic agriculture as a key factor for socioeconomic development, 60% of respondents expressed a positive view regarding the impact of this factor on the economic prosperity of rural communities, while 25% were neutral, 10% negative, and 5% had no opinion. Following the analysis of the socioeconomic performance of traditional and organic agriculture, significant differences in the perception of their distinctions were revealed. While 40% of respondents observed positive differences, 30% expressed a neutral opinion, and 20% identified negative differences. There are also those (10%) who stated that they did not have sufficient information to make a decision.

The results of the research on respondents' attitudes toward organic agriculture provide insight into perceptions of various aspects of this agricultural sector. The majority of respondents emphasized the potential of organic agriculture to reduce costs and improve yields, which aligns with the cost-benefit and NPV analysis. For example, 40% of respondents highlight the potential for lower variable costs due to the limited use of chemical inputs, consistent with the analysis showing that fertilizer and pesticide costs are significantly lower in organic systems. On the other hand, 30% of respondents noted that higher prices of organic seeds and fertilizers may compromise this advantage, reflecting the complexity of economic factors in organic agriculture.

Additionally, the analysis of the research results indicates significant factors that contribute to the economic sustainability of organic agriculture relative to conventional systems. The majority of respondents (45%) consider organic agriculture to be more profitable in the long term, corresponding with the conclusion that organic agriculture can have a positive net present value

(NPV). Moreover, 40% of respondents expressed the opinion that organic agriculture provides significant cost savings and improved yields, further supporting the notion of a positive NPV in organic farming.

However, the research also identifies certain challenges and negative aspects of organic agriculture. For example, 10% of respondents emphasize the negative impact of input procurement from the market on increasing production costs, which may relate to the identified additional variable costs in organic production, such as higher costs for seeds and seedlings.

The limitations of the research on the economic sustainability of organic and conventional agriculture include a limited sample of respondents, which may reduce the representativeness of the results, the subjectivity of responses, and the possibility of bias in data analysis. Additionally, the lack of longitudinal data makes it difficult to track changes over time, while the limited geographical scope and lack of detailed analysis of ecological impacts may reduce the generalizability of the results to different contexts and aspects of agriculture.

CONCLUSION

The research provided a deeper insight into the economic aspects of organic agriculture, with the aim of improving management and marketing activities of organizations as well as enhancing business performance, and assessing the overall impact of organic agriculture on economic sustainability in comparison with conventional production. The combination of cost-benefit analysis and the results of the survey of respondents' attitudes enabled a holistic overview of the complexity of organic agriculture.

The research results indicate potential economic advantages of organic agriculture, including lower variable costs and improved yields, both of which contribute to a positive net present value (NPV). However, challenges have also been identified, such as higher initial investments and potential additional costs associated with input procurement. It is important to emphasize that there is a diversity of opinions among respondents regarding organic agriculture, reflecting the complexity of this topic.

Nevertheless, the majority of respondents view organic agriculture as economically competitive on the market and as a positive factor for environmental protection and the local economy. Overall, this research provides useful guidelines for decision-makers in agriculture and society as a whole, highlighting the importance of further research and education on the economic aspects of organic agriculture to support its continued development and sustainability.

REZIME

ASPEKTI EKONOMSKE ODRŽIVOSTI TRADICIONALNE I ORGANSKE POLJOPRIVREDE: POREĐENJE METODA SA CILJEM UNAPREĐENJA MENADŽMENT I MARKETING AKTIVNOSTI I REZULTATA POSLOVANJA

U istraživanju ekonomske održivosti organske poljoprivrede u poređenju s konvencionalnom, analizirani su troškovi i koristi organske proizvodnje, uzimajući u obzir i stavove poljoprivrednika, a sa ciljem unapređenja menadžment i marketing aktivnosti i rezultata poslovanja. Rezultati pokazuju potencijalne prednosti organske poljoprivrede, poput nižih varijabilnih troškova i poboljšanih prinosa, ali i izazove kao što su veće početne investicije. Ispitanici su različito ocenili ekonomsku održivost organske poljoprivrede, dok većina vidi pozitivan uticaj na životnu sredinu i lokalnu ekonomiju. Ovo istraživanje pruža korisne smernice za razumevanje i podršku organske poljoprivrede, naglašavajući potrebu za daljnjim istraživanjima i edukacijom o ovoj temi.

Ključne reči: menadžment, marketing, troškovi proizvodnje, profitabilnost, ekonomska održivost, poljoprivredni sistemi

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FINANCIAL STATEMENTS AS AN INFORMATIONAL BASIS FOR FINACIAL DUE DILIGENCE

ABSTRACT: Financial reporting is a fundamental element of corporate governance and a key foundation for making informed economic decisions. Historically, financial information was not given adequate importance, even though it forms the basis for assessing financial health and business sustainability. Financial due diligence, as a comprehensive analytical process, combines financial, legal, and market analysis with the aim of identifying risks, opportunities, and the actual state of a company. It goes beyond standard auditing by considering both internal and external data sources. The primary financial statements – the balance sheet, income statement, cash flow statement, and statement of changes in equity – serve as a starting point for this process and provide a comprehensive "financial diagnosis" of the company. A systematic analysis of these reports enables insight into profitability, liquidity, efficiency, and risks, which are crucial for investors, creditors, and other stakeholders. Special attention must be paid to uncovering potential manipulations in financial reports, and therefore a high level of professional skepticism and analytical precision is required.

Key words: financial reporting, due diligence, financial analysis, financial manipulations, financial statements, financial position

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INTRODUCTION

When observing the development and evolution of financial reporting throughout history, it is evident that this segment of corporate governance was not given appropriate significance for a long time. The information that underpinned managerial decision-making was often limited in scope and depth, even though crucial strategic and financial decisions were based on it (Mitrović et al., 2019, p. 19). Users of public funds are legally obligated to prepare financial statements, which provide information about the financial position, performance, and changes necessary for management to make economic decisions (Dimitrijević et al., 2023, p. 65). Financial reporting, as a central component of financial management, encompasses not only the basic financial statements – the balance sheet, income statement, cash flow statement, and statement of changes in equity – but also the interpretation and explanation of these reports, including the business report and the independent auditor's opinion, which confirms the accuracy and objectivity of the presented data.

With the introduction of International Financial Reporting Standards (IFRS), which officially came into force on January 1, 2004, a globally recognized framework was established to precisely define the criteria for preparing, evaluating, and presenting each economic category contained in the financial statements. These standards contribute to enhancing transparency, comparability, and reliability of information, forming the basis for making rational and informed business decisions (Bulajić, 2017, pp. 37–41).

In the modern business environment – characterized by a growing number of users of financial information, as well as institutions responsible for quality control – the need for high-quality financial reporting has become increasingly pronounced. Within this context, the application of the due diligence concept plays a significant role, serving as a structured and analytically oriented process that enables detailed verification, assessment, and validation of financial data. Through the practical application of due diligence, it becomes possible to identify weaknesses and risks, as well as to confirm the accuracy and reliability of financial reports, which is essential for all capital market participants.

Additionally, the introduction of the Total Quality Management (TQM) concept into the field of financial reporting emphasizes the necessity of continuous improvement in education and professional competence within the accounting profession. The enhancement of quality control systems and compliance with international professional accounting standards are prerequisites for building trust in both financial reports and the business decisions based on them (Bulajić, 2017, pp. 37–41).

THE FINANCIAL POSITION AS A FOUNDATION FOR FINANCIAL ANALYSIS AND ASSESSMENT

The term due diligence (дју дилигенс) refers to a comprehensive process of systematically and thoroughly examining all aspects of the operations of a potential business partner or target company in cases of acquisitions. In the context of Mergers & Acquisitions transactions, due diligence represents a thorough and systematic assessment of the business activities of a company that is subject to a potential acquisition. The purpose of due diligence is to provide a fundamental understanding of why an M&A deal is carried out and what the implications of the deal are (Bhagwan, V., 2020). This process, initiated by the buyer, aims to identify all relevant risks—financial, legal, and operational—in order to establish an appropriate safety net and prevent potential unpleasant surprises after the transaction is completed. For practitioners, "the goal (of due diligence) is to make the buyer comfortable enough to go through with the deal and close" (Daley, B., and others, 2024). However, aside from the buyer, the seller—i.e., the target company—may also conduct a due diligence process, known as *vendor due diligence*. From the seller's perspective, this process serves as a tool to improve their negotiating position. Through self-assessment, the seller gains insight into their own weaknesses and risks that could affect the company's valuation, while simultaneously confirming its competitive advantages, stability, and the accuracy of internal documentation. This increases transparency in the process, builds trust between the parties, and enables negotiations to be conducted on more objective and reliable grounds (Vidaković, S., 2007, pp. 21–22). In this context, the due diligence procedure becomes essential—a tool that helps identify and mitigate potential risks, evaluates operational and financial efficiency or inefficiency, and provides a clear understanding of the overall financial situation of the target company (Ulian, E., 2024).

The primary purpose of due diligence is to evaluate the economic, financial, legal, and market conditions in order to identify all potential benefits, obligations, risks, and liabilities that may arise from the planned transaction. Compared to a standard audit—which often focuses on the analysis of official financial statements or accounting books—due diligence represents a much deeper and more comprehensive analysis that encompasses both financial and non-financial parameters.

A particularly important segment of this process is *financial due diligence*, as it provides key information about the actual financial condition of the entity and the factors that influence the sustainability and profitability of its operations. Financial due diligence is a systematic process of investigating and evaluating a company's financial information to ensure

sound decision-making in significant transactions, such as mergers, acquisitions, or investments. This comprehensive appraisal involves an in-depth review of financial statements, tax returns, cash flow projections, and other relevant documents, providing critical insights into the financial health of the company and mitigating potential risks (Asamoah, E., and others, 2025). The financial health of a company is reflected in its basic financial statements. Therefore, financial statements serve as the basis for exploring and analyzing the financial situation, providing insight into the financial position, results achieved, and cash flows—thus forming a diagnosis of the company's financial health (Vidaković, S., 2007, pp. 26–27). Each group of interested users, according to their needs and interests, focuses on specific aspects of financial statements. These reports can provide significant information about the company's operations, especially to users who possess adequate accounting knowledge necessary for their proper interpretation. Thus, the primary objective of financial reporting—and therefore financial due diligence—is to provide reliable, relevant, and timely information that will assist various stakeholders, from investors to creditors, in making informed economic decisions. Financial due diligence can be conducted either by the internal resources of the acquiring company or by external consultants. However, it is important to note that when additional parties are involved in the transaction, such as financial organizations that may require access to the financial due diligence report, an independent analysis is necessary, which requires the engagement of external consultants (Honcharenko, O. E., 2024).

In addition to financial due diligence, market and legal due diligence also play a significant role in the overall due diligence process. Market due diligence enables the assessment of a company's positioning relative to competitors, demand trends, and growth potential. On the other hand, legal due diligence identifies all existing and potential legal risks that could affect the legality and stability of operations. It also analyzes property relations and the ownership structure of the target company's capital, which is why it is often considered more demanding than the previously mentioned types of due diligence. However, the most common link occurs between financial and market due diligence. Specifically, financial due diligence often overlaps significantly with market due diligence, as both address a large number of similar questions. What fundamentally differentiates these two types of due diligence is the source of the information: financial due diligence relies on the financial statements of the target company, whereas market due diligence primarily gathers data from outside the target company—so-called external information.

All three types of due diligence—financial, market, and legal—together provide an objective, impartial, and comprehensive picture of a

company's business, which forms the basis for making strategic decisions in processes such as acquisitions, mergers, or investments.

The key objective of due diligence is to answer the question of whether undertaking a proposed business venture is justified and worthwhile. Due diligence is the ideal tool for exercising intelligent management and supporting decision-making in carrying out the sale of a company or in any other investment that requires a thorough prior analysis (Álvarez-Ferrer, A., 2022). The reliability of the expected answer is directly dependent on the quality and credibility of the information on which the due diligence conclusion is based. This conclusion is presented in the form of specific recommendations to the decision-makers, advising them either to proceed with negotiations or to withdraw from the transaction.

Both domestic and international capital markets insist on a high degree of transparency in business activities. In this context, financial reporting serves as a reliable source of objective and unbiased information, allowing for a better assessment of a company's true value and improving the quality of strategic investment decisions.

Failure to conduct due diligence significantly increases the risk of unsuccessful acquisitions and possible financial losses due to insufficient or unreliable information about the actual financial, legal, or operational condition of a company. This is precisely why due diligence is now applied as an integral part of nearly every significant business transaction—regardless of the type or scope of the tangible or intangible assets being evaluated (Ekonomska enciklopedija II, 1986).

FINANCIAL STATEMENTS AS A SOURCE OF FINANCIAL INFORMATION

Financial statement analysis (FSA) is a process that examines past and current financial data to evaluate performance and estimate future risks and potential (Olayinka, A. A., 2022). The purpose of financial analysis is to provide a comprehensive, systematic, and clear overview of a company's financial position, serving as a foundation for an adequate and objective business performance assessment. The analysis of financial statements enables a deeper understanding of the structure and dynamics of operations, an evaluation of the current financial state, and the determination of a company's future potential (Mitrović, A., et al., 2019, pp. 16). This type of analysis is particularly significant in the context of evaluating recent performance results, valuing target companies in mergers or acquisitions, and creating business projections for newly formed corporate entities.

Financial analysis holds considerable analytical value, as it integrates all key elements of a company's operations. In this process, financial statements serve as the primary data source and the starting point for assessing the financial health of an enterprise. The basic financial statements – the balance sheet, income statement, cash flow statement, and the statement of changes in equity, as well as the notes to the financial statements, including accounting policies – serve as a kind of "financial diagnosis" or a snapshot of the company's overall financial health (Vidaković, 2007, pp. 26). Their role is essential in evaluating business performance because they provide comprehensive insights into the financial position, performance, and sustainability of the business model. Financial statements can indicate stability, efficiency, and business success, but they can also reveal certain risks, structural weaknesses, or financial "hotspots" that require further, more detailed analysis. Through systematic interpretation and analysis, it is possible to draw relevant conclusions about a company's financial stability, liquidity, profitability, and long-term viability – all of which are crucial for stakeholders, including investors, creditors, management, and regulatory bodies.

The financial due diligence process is predominantly based on the financial statements of the target company. The business and financial situation is diagnosed through key performance indicators, the so-called *key ratios*, which are derived from the financial reports. Financial ratio analysis is an indispensable tool in corporate finance for assessing firm performance, comparing industry benchmarks, and informing strategic decision-making (Zhang, Y. et al., 2025).

The balance sheet, or *statement of financial position*, provides an overview of the company's asset strength — that is, what the company owns (*assets*) and how those assets are financed (*liabilities* and *equity*). It portrays the financial position of the organization at a particular point in time (Raju, K. P., 2022). For due diligence purposes, the balance sheet allows for the assessment of liquidity, indebtedness, and asset strength, as well as the identification of potentially risky positions, such as short-term liabilities exceeding current assets.

The income statement, or *statement of profit and loss*, shows how the company has generated and used financial resources during a given accounting period. Key components of this report include revenue from sales of goods and/or services, expenses (including operating costs and financial obligations such as interest), and net profit or loss — the difference between total revenues and total expenses. It provides insight into operational efficiency, revenue structure, and profitability, which is essential for investors aiming to evaluate the future potential for profit and return on invested capital.

However, the income statement includes only a portion of changes in equity. Comprehensive changes – including capital contributions and withdrawals by owners – are presented in the statement of changes in equity, which gives a broader view of the structure and movements in equity over the reporting period, offering a more complete picture of internal sources of financing.

The cash flow statement is one of the key financial statements and serves to monitor cash movement through operating, investing, and financing activities. It provides a clear view of cash sources and uses, enabling an assessment of liquidity and payment capacity. Operating cash flows reflect cash inflows and outflows from regular business operations, investing cash flows relate to investments in fixed assets and financial instruments, and financing cash flows cover borrowings, loan repayments, and other financial transactions. Within due diligence, this statement is a critical tool for identifying financial risks and assessing the sustainability of the business model.

In capital-intensive industries, many users of financial statements consider the cash flow statement to be the most relevant source of financial information. When interpreted in combination with the balance sheet and income statement, this report provides a deeper analysis of key financial ratios, an objective assessment of historical performance, and more reliable forecasting of future operations.

Ratio analysis is one of the most important tools for assessing a company's financial condition and is rightly considered a fundamental instrument of financial analytics (Rodić, J., and others, 2011, pp. 133). Its essence lies in calculating relationships between specific items from the financial statements — most often from the balance sheet and the income statement — yielding relevant indicators for evaluating liquidity, debt levels, efficiency, profitability, and other aspects of financial performance. Ratio figures alone do not provide sufficient information, but when combined with historical data, current benchmarks, or values from comparable companies, they offer deeper insight into the financial stability and performance of a business entity.

In the due diligence process, ratio analysis plays a crucial role because it enables the identification of key financial risks, weaknesses, and strengths of the company under review. Since due diligence is conducted to assess the actual financial standing and future business prospects, ratio analysis serves as the foundation for making informed investment decisions. In addition to static analysis (examining indicators at a specific point in time), ratio analysis is often complemented by trend analysis, which allows for tracking the movement of financial indicators over time and comparing them with projections and financial plans.

A detailed analysis of financial statements is of fundamental importance, particularly given the possibility of intentional concealment of weaknesses or distorted presentations of the company's financial position. Financial manipulations, which are defined in professional literature as the deliberate misrepresentation of core financial elements, can range from minor exaggerations to serious and systematic fraud — such as falsely reporting profits. Such actions pose the greatest threat to the credibility and validity of financial analysis.

POSIBILITIES OF MANIPULATION

Under national and international accounting and reporting standards in force, financial records should provide true and relevant information, since the accounting unit is required to record all economic transactions in such a way that the financial records present a true and fair view of the facts that are the subject of accounting. The manner of reporting economic transactions clearly indicates the earnings quality and financial stability of the company (Svabova, L. et al., 2020). One of the most significant challenges faced by professionals during the due diligence process is the existence of financial fraud and deliberately distorted representations in financial statements. Financial manipulations are defined as the intentional distortion of key elements within financial reports, aimed at creating a misleading picture of a company's financial position and performance (Cvetković, D. et al., 2018, pp. 82-83). For this reason, financial analysts are expected to approach the evaluation process with a high degree of professional skepticism, attention, and analytical precision. The reliability and credibility of the available financial data should never be taken for granted but must be continuously re-examined for realism and objectivity.

Particular attention must be paid to specific strategies for manipulating accounting data. One of the most common is artificial profit inflation in the current period, achieved by overstating revenues and/or understating expenses. The purpose of such actions is to present the company in a better light in order to attract potential investors or to secure more favorable financing conditions from creditors. Conversely, there is the opposite strategy: deliberate understatement of profit in the current accounting period, achieved by understating revenues and/or overstating costs. The aim of this technique is to defer profit recognition to a future period, creating the appearance of weaker performance in the present year, which may serve various internal or external interests (Vidaković, S., 2007, pp. 27).

Companies often overstate revenues by artificially increasing amounts on the credit side of revenue accounts and the debit side of accounts receivable. These adjustments affect both the income statement and the balance sheet, and they represent fraudulent activities (Eremić Đođić, J., et al., 2017, pp. 232).

According to Howard Schilit, the literature identifies the so-called "*seven deadly sins of accounting*" which represent the most common forms of manipulative practice and should therefore be carefully analyzed in every financial review process (Vidaković, S., 2001).

The first and most common abuse refers to premature revenue recognition or recognition of revenue with questionable validity – e.g., when a service has not yet been fully performed or the buyer has not formally accepted the goods, but the revenue is already recorded.

The second form of manipulation involves fictitious (false) revenue recognition – recording revenue without meeting the legal requirements, such as recognizing revenue from property sales at the full selling price, recognizing revenue from business combinations, or recording financial and other income as sales revenue.

The third form of abuse is reflected in earnings inflation through non-operating gains, such as selling previously written-off assets, using gains from real estate sales to offset current expenses, or including such gains in regular sales revenue.

The fourth technique involves timing manipulation of expenses – shifting them to previous or future periods to influence the current period's result. Examples include changing accounting policies, reducing asset impairment, or slowing down depreciation of costs in order to reduce expenses over a certain period, i.e., the so-called "stretching" of depreciation.

The fifth technique of manipulation refers to the omission or understatement of liabilities – avoiding recording existing obligations that must be settled or covering them up using arbitrary accounting assumptions.

The sixth strategy includes the deferral of revenue to future periods – creating unnecessary and fictitious reserves, or altering accounting assumptions to reduce liabilities.

The seventh type of abuse involves accelerated recognition of future expenses in the current period – shifting future costs into the present through reserve creation, then recognizing those reserves later as income. This also includes recognizing revenue from a merger that was actually earned before the merger took place (Cvetković, D. et al., 2018, pp. 88-89).

CONCLUSION

In contemporary business environments, the optimality of decision-making is no longer based solely on the quantity of available financial and accounting information, but primarily on its quality. The traditional approach, which emphasized accuracy, comprehensiveness, and timeliness of data, has evolved into a model that increasingly values deeper, more substantial, and analytically meaningful information. The modern business setting, marked by high dynamism and complexity, often results in information overload, which does not in itself guarantee relevance in the decision-making process.

The volume of information represents only a starting point for establishing an efficient and sustainable business system—whether on a micro- or macro-level—but this foundation must be complemented by a careful analysis of the structure and content of the information. In this context, the application of the due diligence concept plays a key role. As a tool for in-depth analysis, it enables the systematic collection, evaluation, and filtering of relevant financial and accounting data. Its importance lies not only in identifying potential risks but also in enhancing the quality of the information itself, thereby directly contributing to informed, sustainable, and responsible decision-making.

The consistent application of due diligence reflects a trend toward returning to sound business practices and ethical standards. Only through synchronized consideration of both the quantitative and qualitative aspects of financial information can accounting consistently fulfill its primary function—serving as the foundation for effective management and the long-term stability of the business system (Vidaković, S., et al., 2017, pp. 115-116).

REZIME
FINANIJSKI IZVEŠTAJI KAO INFORMACIONA PODLOGA FINANIJSKOG DUE DILIGENCE-A

Finansijsko izveštavanje predstavlja temeljni element korporativnog upravljanja i ključnu osnovu za donošenje informisanih ekonomskih odluka. Istorijski gledano, finansijskim informacijama nije pridavan dovoljan značaj, iako one čine osnovu za procenu finansijskog zdravlja i održivosti poslovanja. Finansijski due diligence, kao sveobuhvatan analitički proces, objedinjuje finansijsku, pravnu i tržišnu analizu, sa ciljem identifikacije rizika, potencijala i stvarnog stanja preduzeća. On prevazilazi okvire standardne revizije, uzimajući u obzir kako unutrašnje tako i eksterne izvore

podataka. Osnovni finansijski izveštaji – bilans stanja, bilans uspeha, izveštaj o tokovima gotovine i izveštaj o promenama na kapitalu – predstavljaju polazište u ovom procesu i pružaju „finansijsku dijagnozu“ kompanije. Sistematična analiza ovih izveštaja omogućava uvid u profitabilnost, likvidnost, efikasnost i rizike, što je od suštinske važnosti za investitore, kreditore i druge zainteresovane strane. Posebnu pažnju zahteva otkrivanje eventualnih manipulacija u finansijskim izveštajima, zbog čega je neophodan visok nivo stručne skepse i analitičke preciznosti.

Ključne reči: finansijsko izveštavanje, due diligence, finansijska analiza, finansijske manipulacije, finanijski izveštaji, finanijska situacija

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PRESSURES ON THE COMPLIANCE FUNCTION IN MODERN BUSINESS

ABSTRACT: The modern business environment is marked by increasing complexity in regulatory requirements, the strengthening of ESG criteria, and accelerated digitalization — all of which create new and multifaceted pressures on the compliance function. This paper explores how organizations can respond to the challenges of contemporary due diligence, particularly with regard to risk management, supply chain integrity, and the ethical use of emerging technologies. Instruments such as the OECD Competition Compliance Programs, *Compliance Without Borders Handbook*, and *Business Principles for Countering Bribery* are analyzed, highlighting the need for a comprehensive compliance approach grounded in strategic relevance, ongoing employee education, and a strong culture of integrity. Special attention is given to proactive analytics, data protection, and mechanisms for identifying and reporting misconduct, as well as to the importance of designing compliance systems proportionately.

This paper brings together insights and practices from various sources and offers recommendations for strengthening organizational resilience through the full engagement of available resources, public–private sector partnerships, and strong support for open communication. It concludes that the compliance function must evolve from a traditional control role to a proactive one. We argue that compliance should be regarded as a strategic

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tool for managing regulatory, ethical, and reputational risks — a key component of sustainable business operations.
It is important to note that in the modern approach to the compliance function, financial due diligence is increasingly becoming an indispensable tool. Its role goes beyond conventional financial checks and is evolving into a continuous instrument for monitoring and assessing risk, particularly through the analysis of liquidity, solvency, profitability, and capital structure. The classification and interpretation of financial indicators, as systematized by Vidaković, enable the integration of a company's financial health into the broader compliance framework, strengthen the strategic role of the function, and affirm the need for compliance to operate not only as a control mechanism but also as an advisory partner to management teams.

Key words: compliance, due diligence, ESG, risk, integrity, management, digitalization, anti-corruption.

INTRODUCTION

The modern business environment is characterized by its dynamism, driven not only by the rapid development of markets, but also by the continuous evolution of regulatory frameworks, the growing pressures from stakeholders, and constant technological innovation. As the Institute of Internal Auditors observes: "Organizations are human undertakings operating in an increasingly uncertain, complex, interconnected, and volatile world." (The Institute of Internal Auditors, 2020).Business operations are no longer confined within national borders or governed solely by domestic regulations. Companies are increasingly subject to the scrutiny of international institutions, which impose binding standards, with the preservation of business integrity emerging as a critical imperative.

In today's business context, the compliance function is no longer merely a formality or a checkbox for meeting minimum regulatory requirements. Compliance now stands as one of the core pillars of long-term business sustainability — and, in many cases, a prerequisite for a company's survival in competitive markets. As emphasized by the OECD *Competition Compliance Programs* (2021), organizations are expected to build forward-looking compliance systems tailored to their specific risks — systems capable of identifying and responding promptly to various forms of unethical or unlawful conduct.

It is particularly important to highlight the focus of Chapter 10 of the e-handbook *The New Era of Due Diligence*, which underscores that the compliance function is under unprecedented pressure. These pressures originate from multiple directions. On one hand, there are expanded expectations related to ESG factors. Companies are not only expected to operate legally, but also to contribute to environmental preservation, uphold human rights, and demonstrate a commitment to the communities in which they operate.

The concept of due diligence has significantly broadened to include the financial aspects of operations. However, financial due diligence is no longer limited to reviewing financial statements — it now entails ongoing monitoring of partners' financial capabilities through detailed analysis of performance indicators, creditworthiness, and capital structure. This approach empowers the compliance function to identify potential vulnerabilities proactively.

The development of advanced technologies — especially artificial intelligence and a variety of digital tools for data summarization — brings numerous benefits, but also introduces new forms of risk and opportunities for misconduct.

The compliance function must be grounded in top management's commitment and a culture of integrity throughout all levels of the organization. Compliance with anti-corruption regulations must not be confined to a single department, but rather should reflect a company-wide strategy actively promoted and supported from the top.

For all these reasons, due diligence is no longer a one-time process carried out prior to an acquisition, sale, or merger. It must now be viewed as a set of ongoing activities embedded in overall business operations. Financial due diligence, through standardized models for assessing financial position and creditworthiness, offers additional tools for detecting early signs of financial, reputational, and regulatory risks.

REGULATORY AND ANTI-CORRUPTION FRAMEWORK

Modern regulatory initiatives, such as the EU Corporate Sustainability Due Diligence Directive (CSDDD), introduce additional obligations for companies to identify and address risks throughout their entire value chain — including risks related to human rights and environmental protection. This significantly expands the scope of due diligence beyond traditional financial and legal checks, transforming it into a tool for comprehensive risk management within the context of sustainability.

The U.S. Foreign Corrupt Practices Act (FCPA) and the UK Bribery Act globally impose high standards for the prevention of bribery of foreign public officials. These acts have extraterritorial reach and often serve as a basis for regulatory action by authorities in other jurisdictions. In practice, the absence of a well-integrated compliance system can make a company more vulnerable to reputational damage and expose it to multi-million-dollar fines and penalties. As Eremić Đođić and collaborators emphasize, "Internal controls provide significant protection for the company, but they can be compromised if their weaknesses are exposed." (Eremić Đođić et al 2017, p. 228)

Monitoring the financial position of partners — through assessments of solvency, liquidity, profitability, and creditworthiness — is a key element in preventing fraud, abuse, and long-term financial instability, all of which can lead to reputational and regulatory consequences. Financial due diligence thus serves as a complement to traditional legal and corporate checks, offering deeper insight into the financial health of business entities and providing a stronger basis for decisions related to partnerships, investments, or acquisitions. As Eremić Đođić and collaborators note precisely, "Whistleblowing, internal control, and internal audit are the best methods for detecting criminal activity." (Eremić Đođić et al 2017, p. 228) This approach is particularly relevant in the context of the CSDDD directive, which requires companies to conduct ongoing assessments not only of the legal compliance but also of the financial sustainability of their suppliers across the entire value chain. As the European Bank for Reconstruction and Development notes: "There is growing momentum among governments around the world to require companies to undertake due diligence and report on sustainability in their supply chains."(EBRD 2024, p. 1)

The compliance function must cover the full spectrum — from risk assessment, through education and monitoring, to the response to irregularities. The key lies in ensuring that the program is tailored to the company's specific risks, flexible, and open to continuous improvement. A zero-tolerance policy toward bribery must be clearly communicated and reinforced from the top of the organization.

Additionally, it is important to understand the principle of proportionality: a compliance program does not need to be as complex in a small company as in a multinational corporation, but it must be sufficiently robust to address all relevant risks specific to the company's sector and the market in which it operates. As the FATF guidance notes: "Implemented properly, a risk-based approach is more responsive, less burdensome, and delegates more decisions to the people best-placed to make them." (Financial Action Task Force 2021, p.5)

PRESSURES ON THE COMPLIANCE FUNCTION

The compliance function today faces increasingly complex and multifaceted pressures. These pressures stem not only from tightening regulatory frameworks, but also from shifting societal expectations, accelerated digitalization, and the deepening interconnectedness of global markets. While compliance was previously focused primarily on fulfilling legal requirements and formally documenting processes, current trends demand a far more proactive and strategic approach.

According to Chapter 10 of the *The New Era of Due Diligence* e-handbook, the compliance function is now expected to rapidly integrate new technologies, actively advise senior leadership, and promote socially responsible business conduct. It states: “The asks on them now include: Reviewing a much broader range of sources to capture ESG risk…” (LexisNexis, 2023 p.19)

These expectations are further reinforced by documents such as the OECD *Competition Compliance Programs*: “The compliance programme should be characterised by a drive for continuous improvement…”(OECD, 2021). and the *Compliance Without Borders Handbook*: “The Peer-Learning Plan creates a platform for articulating shared goals and making expectations transparent…” (OECD, 2023). which emphasize that compliance must evolve beyond the role of a "watchdog" and become a full-fledged partner in business development and innovation. In practice, this means that the compliance function is tasked with using advanced analytical tools, responding more rapidly to new regulatory demands, and advising management in real time.

One of the most prominent new pressures is the rising expectation for companies to be proactive participants in protecting the environment, human rights, and social welfare. As UNODC points out: “Business integrity in transactions and business practices is key in ensuring integrity in international investment projects. Companies with an excellent proven record of compliance and integrity may have a stronger likelihood of winning tenders in international investment projects and obtaining financial support from public or private financial institutions.” (United Nations Office on Drugs and Crime, 2023, p. 16). The ESG concept has evolved from a voluntary initiative into a binding regulatory requirement, as evidenced by instruments such as the EU Corporate Sustainability Due Diligence Directive (CSDDD) and various national regulations mandating thorough risk assessment across value chains.

The fight against corruption and ESG standards are not separate realms — they are deeply interconnected through the principles of good governance and accountability. As *Transparency International* states: “Transparency International believes that integrity is good for business and we hope that the Business Principles will continue to be a reference for enterprises as they strive

to develop stronger and more effective anti-bribery programmes, resulting in a higher and more uniform standard of practice worldwide." (Transparency International, 2013). The concept of financial analysis as part of a comprehensive due diligence framework can offer additional support — for example, using financial indicators to assess the economic viability of suppliers and identify those whose financial distress may signal potential ESG failures or even corrupt practices. As the Basel Institute on Governance emphasizes: "Collective Action aims to level the playing field through sustained engagement and concrete actions." (Basel Institute on Governance, 2025, p.5)

Globalization has led to supply chains that include hundreds — sometimes thousands — of business partners across different jurisdictions, each with its own legal and ethical standards. As a result, the risks they carry — from corruption and environmental incidents to labor rights violations — are no longer peripheral, but directly impact the lead company.

There is a growing need for compliance teams to adopt a proactive approach through continuous due diligence — involving ongoing information gathering, established procedures, and the use of modern software tools that enable real-time monitoring of reputational indicators as they emerge.

In this context, the integration of financial aspects of due diligence — as described by Vidaković — becomes particularly relevant: "In the process of financial due diligence, special attention should be given to the following two main strategies of accounting manipulation: the strategy of overstating current-period earnings (by inflating revenues and/or underreporting expenses) to appear more attractive to investors and creditors; and the strategy of understating current-period earnings (by deflating revenues and/or inflating expenses) with the aim of deferring profit to future periods and presenting current financial results as worse than they really are." (Vidaković, 2007, p. 27) Such integration can strengthen the capacity to assess complex supply chains. Periodic ratio analysis, creditworthiness assessments, and monitoring key financial indicators of partners enable early identification of risks — before they escalate into serious issues for the parent company. This is especially important in sectors where contracts involve numerous suppliers across various countries, increasing the likelihood of unforeseen financial or reputational shocks.

This approach requires significant resources — both in terms of skilled personnel and budgets for advanced IT systems. Furthermore, management is often unaware of how complex and dynamic supply chain risk has become, placing additional pressure on compliance departments to continuously educate and inform decision-makers.

RISK MANAGEMENT – RISK ANTICIPATION

Risk management today requires continuous and dynamic assessment of all potential threat sources — not only to identify risks, but also to anticipate them before they escalate and jeopardize business operations.

The *OECD Competition Compliance Programs* clearly emphasize that risk assessment must be the foundation of any successful compliance system. This means that companies must map out reputational risks, financial risks in terms of fines and potentially lost contracts, as well as regulatory risks stemming from new legal requirements. As the document states: "A firm should regularly identify and assess its compliance risks, in particular when entering new markets or hiring for key staff." (OECD, 2021)

Risk management is not an activity performed once a year, but a process that must be integrated into regular decision-making. It involves evaluating risk probabilities, identifying warning signs such as unusual financial flows, and continuously collecting information from multiple relevant sources — including media monitoring and internal reports.

In this context, financial due diligence is a valuable addition to compliance methodology, as it enables the systematic evaluation of a partner's financial standing and the identification of hidden risks that could threaten business operations. The application of ratio analysis — such as liquidity, debt, and profitability indicators — provides the compliance function with a powerful tool to anticipate potential weaknesses through quantifiable metrics, thereby improving risk foresight.

It is essential to build capacities for anticipation — the compliance function should not remain a passive observer, but must become an active advisor to management. This highlights the importance of advanced analytics and predictive models that can identify early warning signs of fraud, conflicts of interest, or corrupt practices. This is precisely where Vidaković's concept of financial due diligence proves valuable — ratio indicators allow for continuous monitoring of a partner's financial health, reducing the likelihood of sudden financial collapses that could have reputational or regulatory consequences. As the World Bank underscores: "Detecting fraud and corruption requires proper guidance and training for auditors. Detecting corruption is neither easy... The more auditors know about what perpetrators are likely to do, the better are their chances of finding the red flags associated with potential fraud and corruption. With good understanding of fraud and corruption schemes and professional skepticism, auditors can distinguish anomalies or potential red flags from regularity." (World Bank Group 2020, p. 306)

Risk management must also rely on a robust third-party assessment mechanism, as a significant portion of risk is transmitted through business

partners and suppliers. As Transparency International warns: "The insufficient disclosure of lobbying activities — due to the absence of lobbying regulations, legal loopholes, or inadequate enforcement — can facilitate influence peddling that runs counter to international standards or shareholder interests." (Transparency International 2024, p.22) Particularly important is the obligation of ongoing supplier monitoring — including integrity evaluations, tracking of reputational risks, ownership verification, and assessment of political connections.

Given the complexity of global supply chains, third-party due diligence can no longer be limited to initial checks during contract signing — it must become a continuous, periodic activity. As Directive (EU) 2024/1760 stipulates: "Member States shall ensure that companies carry out periodic assessments of their own operations and measures, those of their subsidiaries and, where related to the chain of activities of the company, those of their business partners…" (European Union 2024, p.40)

ORGANIZATION AND RESOURCES OF THE COMPLIANCE FUNCTION

The effectiveness of the compliance function largely depends on how it is organized, its position within the company hierarchy, and the resources available to it. Modern demands show that compliance can no longer be an isolated or marginalized department — it must play a truly strategic role and enjoy visible support from top management.

A prerequisite for an effective compliance system is positioning the function high enough within the decision-making structure to ensure genuine independence and authority to conduct oversight, investigate irregularities, and advise management without fear of conflicts of interest. Ideally, the head of compliance should report directly to the executive board or the audit committee, rather than only to operational management. This ensures the space for independent action and the freedom to make professional judgments. As ESMA stresses: "The proposed guidelines should also facilitate competent authorities' efforts to improve the overall compliance with MiFID requirements…" (European Securities and Markets Authority 2022, p.9)

Collective action and peer-learning programs are of particular importance, enabling smaller or resource-constrained entities to strengthen their capacities without large investments by leveraging the experiences and knowledge of other organizations. This approach is especially valuable for state-owned enterprises and organizations in transition, where there is pressure to quickly establish high integrity standards despite limited financial resources.

Financial literacy — particularly knowledge of financial indicators and analyses (ratio indicators, credit ratings) — holds significant value, as it allows for better risk assessment of partners or projects. Experts with such knowledge can identify potential financial weaknesses in third parties, significantly enhancing the overall quality of the due diligence process and, by extension, the stability of the compliance function.

Modern compliance programs are increasingly relying on digital solutions: software tools for third-party monitoring, real-time transaction monitoring, whistleblowing platforms, and even AI-driven predictive analytics systems. Technology can greatly enhance the capacity of the compliance function, but it must be carefully managed due to risks that accompany digitalization — including data protection and cybersecurity.

Neither the best structure nor the most advanced tools can substitute for a lack of genuine commitment from top management. Integrity must come "from the top." This means that senior leaders must actively promote and support compliance initiatives, participate in training, and communicate the importance of ethics and compliance at all levels of the organization.

Without such personal example, the compliance function may be perceived as a formality or a burden, which significantly diminishes its impact and effectiveness. OECD documents repeatedly emphasize that the "tone from the top" is one of the most critical factors for a successful compliance program. As stated in an OECD publication: "Genuine compliance programmes could prevent new cartels from forming, and that misconduct by a few should not discredit an otherwise effective programme." (OECD, 2021, p.9)

In this sense, as Vidaković points out regarding financial due diligence, the quality of managerial decision-making depends on reliable information and timely analysis of indicators — and the same applies to compliance: leadership must have clear, trustworthy, and timely reports in order to meaningfully support compliance initiatives.

TECHNOLOGICAL CHALLENGES

Modern compliance systems are inevitably shaped by accelerated digitalization, which brings immense opportunities for enhancing oversight, control, and prevention, but at the same time introduces new and complex risks. As such, it has a dual nature: on the one hand, digital transformation enables more efficient and faster compliance processes, while on the other, it increases organizational exposure to various threats — including manipulation, cyberattacks, and errors in data interpretation.

Experience from the field of financial due diligence shows that technological tools, if not properly integrated, can lead to inaccurate conclusions — especially in assessing a partner's financial stability or identifying potential risks. This makes it essential that the digital transformation of the compliance function be accompanied by the development of internal knowledge and employee skills, as well as the continuous evaluation of the limitations of algorithmic solutions.

Managing large volumes of data today is nearly impossible without automation. Software tools for due diligence, real-time transaction monitoring, and advanced platforms for assessing reputational risks are becoming indispensable instruments of modern compliance. The introduction of predictive algorithms — capable of identifying suspicious behavior patterns far earlier than a human could — is a key advancement.

However, the digitalization of the compliance function inevitably introduces cybersecurity and data protection risks. Information collected during the due diligence process — such as ownership structure, sanctions history, political affiliations, or financial results — is highly sensitive and may become a target for cyberattacks.

The implementation of strong security protocols, data encryption, and access controls is essential — a similar approach is recommended in financial due diligence, where the processing of confidential financial indicators (e.g., debt ratios or profitability metrics) is crucial for decision-making. As the UK Financial Conduct Authority emphasizes: "It is also important that firms regularly review their claims and any evidence that supports them, to ensure the evidence is still relevant… Firms should also ensure that their claims remain compliant with the anti-greenwashing rule on an ongoing basis." (UK Financial Conduct Authority, 2024, p.8). Compliance with GDPR and similar regulations requires that all such data be processed lawfully, fairly, and transparently — otherwise, serious reputational and regulatory consequences may follow.

RECOMMENDATIONS FOR PRACTICE

The literature on which this paper is based — primarily the *OECD Competition Compliance Programmes*, the *Compliance Without Borders Handbook*, and Transparency International's *Business Principles for Countering Bribery* — offers a range of concrete recommendations that can serve as a reliable foundation for further development. In this context, it is important to add that the methodology of financial due diligence, as analyzed through Vidaković's chapters, provides practical tools for assessing financial

sustainability, solvency, and creditworthiness, which can be applied as an integral part of a broader compliance framework.

The first step is to recognize that compliance can no longer be perceived as a "cost" or merely an administrative function, but rather as a strategic resource that contributes to a company's long-term success. The compliance function should be fully integrated into strategic planning, with its leader having direct communication with the board of directors and participating in all key business decisions where integrity or reputation is at risk.

Financial due diligence can be a highly practical tool in this regard, as the classification and analysis of financial indicators allow for a more objective assessment of the risks associated with strategic decisions. In doing so, compliance is positioned as a credible partner to management and provides a basis for informed and sustainable business decisions.

Risk assessment must be dynamic, continuous, and thorough. The introduction of tools for ongoing risk monitoring, along with regular employee education on emerging threats, is essential. The use of scenario analyses, stress testing, and predictive algorithms can help organizations go beyond being merely reactive — enabling them to detect potential problems in advance and prepare an appropriate response.

Ratio analysis and efficiency indicators can serve as valuable complements — since quantitative indicators of profitability, liquidity, or financial stability provide an additional layer of preventive evaluation for partners and contracts, which is crucial for forecasting and managing risks in complex business arrangements.

Collective learning, as well as collaboration with other organizations through peer-learning projects, can significantly increase capacity — particularly in resource-constrained environments. Similarly, transferring knowledge from financial due diligence — through concrete examples of how to analyze solvency indicators or over-indebtedness risks — can serve as a basis for internal compliance team training, strengthening the ability to respond in a timely and informed manner.

Strategic investment in digital solutions is recommended, but with clearly defined rules for the ethical use of technology. Mandatory impact assessments prior to the deployment of new technologies, transparent communication about data collection and processing methods, and the integration of control mechanisms to prevent discrimination, abuse, or excessive automation are essential.

Additionally, companies should have well-developed cybersecurity plans, including rapid incident response procedures and the protection of sensitive data.

Especially in complex international environments, no company can address all risks alone. It is crucial to promote the concept of collective action, partnerships with the public sector, and collaboration among companies to raise overall integrity standards. As the World Economic Forum stresses: "No organization can achieve this on its own, but even if it could, it would not have the desired scale and impact. That is why collective action is required." (World Economic Forum, 2020, p.9)

CONCLUSION

The analysis of contemporary trends and regulatory requirements clearly confirms that compliance has evolved from an administrative obligation into one of the key strategic pillars of successful business operations. Chapter 10 of the *The New Era of Due Diligence* e-handbook draws specific attention to the growing pressures on the compliance function — from the expansion of ESG requirements, to more complex supply chains, and the challenges posed by digitalization and automation.

In this context, financial due diligence reaffirms that the evaluation of financial indicators (profitability, liquidity, creditworthiness) remains an irreplaceable component in assessing overall business sustainability and risk management. This further strengthens the compliance function, as integrating these tools supports better risk forecasting, early detection of irregularities, and protection of creditors and investors. These elements demonstrate that due diligence must be a continuous, dynamic process — which is especially important in today's increasingly complex global business structures. As IOSCO highlights: "The recommendations also suggest that users of ESG ratings and data products could consider conducting due diligence on the ESG ratings and data products that they use within their internal processes." (International Organization of Securities Commissions, 2021, p.2)

The modern business environment requires compliance teams to be far more than guardians of procedures; they are expected to proactively anticipate risks, advise leadership on reputational consequences, and become an integral part of strategic decision-making. This brings forth a central challenge: how to balance growing regulatory expectations with the limited resources compliance departments realistically have at their disposal.

The documents used as the foundation for this paper — the *OECD Competition Compliance Programmes*, the *Compliance Without Borders Handbook*, and *Business Principles for Countering Bribery* by Transparency International — clearly emphasize that only a comprehensive approach can ensure the long-term resilience of an organization. This approach entails a strategic positioning of the compliance function, capacity-building through

education and technology, a culture of integrity, openness to whistleblowing, and the active application of financial due diligence as a tool for verifying business stability and transparency.

In an era of rapid change, geopolitical risks, and increasing demand for corporate accountability, compliance is no longer just a tool for avoiding penalties. It has, in fact, become a symbol of trust between a company and its stakeholders — including clients, employees, regulators, investors, and the wider community. Trust is the most valuable currency in modern business, and a robust compliance program is its strongest guarantee. As the European Banking Authority underlines: "A common understanding, which is applied consistently and enforced as necessary, is key to strengthening the EU's AML/CFT defences." (European Banking Authority, 2022, p.3)

Therefore, the recommendations outlined in this paper should be viewed as a foundation for continuous development. Compliance is a process that never truly ends — it must constantly adapt to changing environments and market demands. Only such a living, integrated approach — one that includes reliable due diligence procedures covering both financial and non-financial aspects — can enable organizations to maintain competitiveness, reputation, and stability in the modern and future business landscape.

REZIME
PRITISCI NA FUNKCIJU USKLAĐENOSTI U SAVREMENOM POSLOVANJU

Savremeno poslovno okruženje karakteriše rastuća složenost regulatornih zahtjeva, jačanje ESG kriterijuma i ubrzana digitalizacija, što predstavlja nove i višeslojne pritiske na funkciju compliance-a. Rad istražuje kako organizacije mogu odgovoriti na izazove savremenog due diligence-a, posebno imajući u vidu upravljanja rizicima, integriteta lanaca snabdijevanja i etičke upotrebe novih tehnologija. Instrumenti kao što su OECD Competition Compliance Programmes, Compliance Without Borders Handbook i Business Principles for Countering Bribery, su analizirani i ističu potrebu za sveobuhvatnim pristupom usklađenosti zasnovanom na strateškoj ulozi, kontinuiranoj edukaciji zaposlenih i izraženoj kulturi integriteta. Posebna pažnja posvećena je analitici koja je proaktivna, zaštiti podataka i mehanizmima za otkrivanje i prijavljivanje nepravilnosti, kao i važnosti proporcionalnosti u dizajnu compliance sistema.

Ovaj rad, objedinjuje razmišljanja i prakse iz više izvora i daje preporuke za unapređenje otpornosti organizacija kroz sveukupno angažovanje raspoloživih resursa, partnerstva između javnog i privatnog sektora i snažno podržava otvorenu komunikaciju. Zaključuje se da compliance funkcija mora

preći put od klasične kontrole ka proaktivnom. Stanovišta sam da se na compliance mora gledati kao na strateški alat pri upravljanju regulatornim, etičkim, reputacionim rizicima, u smislu važnog činioca održivog poslovanja. Važno je napomenuti da u savremenom pristupu compliance funkciji, finansijski due diligence sve više zauzima nezaobilazan alat. Uloga due diligence nadilazi ustaljenu finansijsku provjeru i sve više postaje stalni instrument praćenja i sagledavanja rizika, posebno kroz analizu likvidnosti, solventnosti, profitabilnosti i strukture kapitala. Klasifikacija i interpretacija finansijskih pokazatelja, kako ih sistematizuje Vidaković, omogućava integrisanje finansijskog zdravlja kompanije u širi compliance okvir, doprinosi strateškoj ulozi ove funkcije i potvrđuje potrebu da compliance djeluje ne samo kao kontrolni, već i kao savjetodavni mehanizam menadžmentu.

Ključne riječi: compliance, due diligence, ESG, rizik, integritet, upravljanje, digitalizacija, antikorupcija.

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TALENT MANAGEMENT: CHALLENGES AND OPPORTUNITIES OF THE 21ST CENTURY

ABSTRACT: The aim of this paper is to provide a systematic review of the literature in the field of talent management, its challenges, and perspectives in order to better understand its significance and to contribute to the existing knowledge in the area of human resource management (HRM). This topic has been highly relevant in recent years, sparking numerous studies, especially those based on the challenges that companies face when using artificial intelligence (AI) in the process of talent selection. The paper presents the evolution of human resources as an organizational function through three stages: personnel services, human resource management, and talent management. The concepts of talent and talent management, their importance, key success factors, and their connection with artificial intelligence are defined. Secondary data were used by analyzing recent scientific articles in the field of talent management from various academic sources to establish a theoretical foundation for defining talent and talent management. Literature sources included academic articles published in databases such as Google Scholar, Springer, Emerald, JSTOR, Taylor & Francis, and Wiley, among others. Companies face numerous challenges in the 21st century regarding talent management, and the use of artificial

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intelligence can help overcome these challenges, as applying AI has the potential to optimize human resource operations and improve overall workforce management.

Key words: talent management, human resource management, 21st century.

INTRODUCTION

Human capital is the most important resource of any organization. Therefore, managers should be aware of how to handle this strategic factor and learn how to effectively utilize this competitive advantage (Haerizadeh & Moradpour, 2018). In modern business conditions, there is a high demand for talents within organizations, but also many open questions that need answers (Poorhoseinzadeh & Subramaniam, 2013). Addressing these challenges may require additional managerial skills. Accordingly, talent management, as a strategic part of the organization, has become the subject of numerous studies. It refers to the process by which an organization's human talents are identified for key positions and prepared through various education and training programs for future challenges (Haerizadeh & Moradpour, 2018).

Globalization and internationalization have created a high demand for talents, which are very difficult to attract, develop and retain. For this reason, this research topic has become highly relevant in economic contexts, as well as in education, healthcare, and other fields (Poorhoseinzadeh & Subramaniam, 2013; Pruis, 2011).

Talent management has become one of the most important strategic topics for managers at the international level. Although it is a crucial area, studies on talent management are still limited and mainly conceptual (Al-Dalahmeh, 2020).

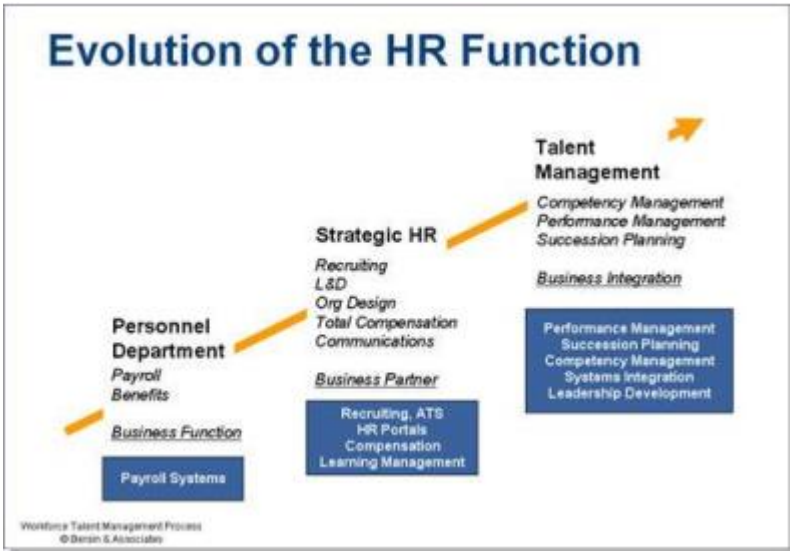
Since business conditions are constantly changing due to both external and internal organizational factors, such as rapid developments in information and communication technologies, demographic trends in human resources, or other factors, the focus remains on people. This resource plays a role as a strategic partner within organizations, as people are the organization's greatest asset. People from different parts of the world possess diverse talents, highlighting the importance of talent management and the organization's responsibility to manage workforce diversity to succeed in competitive markets. This area of research is still underexplored, although interest in this topic is growing in both the academic and business worlds (Garg & Rani, 2014).

The use of artificial intelligence tools in talent management includes optimizing various aspects of the employee lifecycle, from recruitment and selection to employee development and engagement. The following sections of the paper will present the historical development of human resources functions and the role of talent management in the 21st century (Khan, 2024).

DEVELOPMENT OF THE HUMAN RESOURCES FUNCTION

The term "talent" has gained popularity over the past two decades. Despite the increased interest in talent, the concept and practice of talent management lack theoretical depth and a standardized definition (Ansar & Baloch, 2018). The distinction between successful organizations and those that are not lies in the application of talent management. Top management must proactively engage in talent management programs to develop problem-solving skills related to human resource (HR) management (Oppong, 2013). To understand the importance of talent management, it is necessary to examine the evolution of corporate human resources, which consists of three stages. Development of the Human Resources Function (see Figure 1).

Figure 1. – Evolution of the HR function



Source: Li, F. F., Devros, P., (2008), Talent management: art or science, Master Thesis, Baltic Business School, Kalmar, p. 17; toward Bersin, J., (2006), Talent Management What is it? Why now?, https://www.atdla.org/resources/Documents/Website%20documents/KeyReferenceArticles.pdf (30.03.2024.)

1. Personnel Services

In the 1980s and 1990s, the business function responsible for managing people was known as the personnel department. This department's role was to hire employees and ensure appropriate compensation for their work.

2. Strategic Human Resources

By the late 1990s, organizations recognized the growing importance of human resources functions, leading to the emergence of strategic human resources concepts. The human resources department began to play a more significant role, responsible for recruiting suitable candidates, providing training, assisting in job design and organizational structure, and defining employee compensation and satisfaction. The personnel department became more than a mere business function; it became a business partner supporting business growth.

3. Talent Management

Talent management introduced a new era in human resources. While strategic human resources remain a focus, organizations are addressing questions such as: How can they make their hiring process more efficient through competency-based hiring? How can they better develop managers and leaders to strengthen our organization's culture and values? How can they quickly identify competency gaps and provide training or development programs to solve these gaps? How can they consistently and measurably manage people to ensure fair treatment and alignment with organizational goals? How can they identify top performers in key positions across the organization? These questions represent significant challenges in talent management, creating a need for new processes and systems that integrate human resources into business processes (Li & Devros, 2008; Bersin, 2006). Tools such as artificial intelligence and the Internet of Things are reshaping human resource functions, emphasizing employee security and well-being as primary dimensions in digitalized human resource management (Murugesan, Subramanian, & Srivastava, 2023).

Technological innovations have emerged as key strategies in talent management, bringing significant changes to organizations. Employees are increasingly developing the ability to adapt to new technological solutions. According to Ashif (2019), talent management focuses on recruiting and selecting the best individuals within the organization rather than relying solely on external hiring. Implementing talent management strategies yields numerous benefits, including addressing modern business challenges (Ashif, 2019).

According to Asrar and Alaulddin (2022), the implementation of talent management is important because of several reasons:

- It represents an influential resource within organizations and societies, primarily focusing on human capital, the most critical resource in

today's world, regardless of an individual's position within the organization.
- It is a part of an extensive organizational strategy that enables competition with the best.
- It encourages high performance and nurtures the development of future generations of talented employees.
- It serves as a competitive advantage for organizations, offering factors like access to new funding sources, setting trends in information technology, increasing demand for advanced technical knowledge, flexible work organization, and more.

Furthermore, organizational leadership should define clear job roles, precisely identify employees' skills and competencies, and establish appropriate incentives, rewards, and metrics for measuring employee success. In leading organizations, management sets the necessary parameters to ensure that the organization has the right people with the right skills in the right roles to achieve strategic goals at all levels. Ultimately, companies can benefit from applying artificial intelligence techniques in talent management (Khatri, Gupta, Gulati, & Chauhan, 2010). However, significant challenges include data quality, privacy issues, assessment skills, ethical principles, algorithmic bias, user acceptance and trust, and the need for a qualified, adaptable workforce. These are challenges that organizations must overcome to effectively use artificial intelligence in attracting, developing, and retaining talents (Khan, 2024).

Definitions of talent and talent management

Ready and Conger (2007) defined talents as a group of employees who possess above-average knowledge and skills and are prepared to advance to leadership positions, making them the best people in the organizations (Poorhoseinzadeh & Subramaniam, 2013). Additionally, Ansar and Baloch (2018) define talent as a natural ability that is distinct from learned knowledge or skills and can be further developed and strengthened through practice and learning. Talent is attributed to individuals who have the potential to contribute positively and impact business performance (Garg & Rani, 2014; Ford et al., 2010). Talented individuals are part of organizations that continuously compete for this "rare resource." The presence of talented workers does not ensure success or progress for an organization; instead, companies must invest in effectively utilizing talents to secure a competitive advantage. Furthermore, companies must manage their talents (Ansar & Baloch, 2018). In this context, two key perspectives shape the evolutionary process of the concept of "talent management":

1. Direct Perspective: introduces new terms and practices (militarily oriented perspective),
2. Indirect Perspective: characterized by incremental changes in dominant management thinking regarding the role of people (Dimitrov, 2015).

Talent management is a integrated approach that encompasses the entire organization and employee lifecycle (Štefko & Sojka, 2014). It focuses on how individuals enter and progress within an organization, emphasizing competency requirements and movement within and outside the organization. Talent management is not limited to attracting and retaining the best talents but also involves identifying and removing employees who are unnecessary or entirely unsuitable (Haerizadeh & Moradpour, 2018; Ulrich & Brockbank, 2009). Talent management refers to the strategic management of the flow of talents through an organization. Its purpose is to ensure an efficient talent pool to match the right people with the right roles at the right time in line with the organization's strategic goals (Haerizadeh & Moradpour, 2018; Duttagupta, 2005). Often referred to as human capital management, talent management is a strategy as essential as other primary organizational strategies (Haerizadeh & Moradpour, 2018; Khatri et al., 2010).

Organizations are made of people who create value through proven business processes, innovations, customer service, sales, and many other critical activities. To meet its business objectives, an organization must ensure a continuous, integrated process of recruiting, training, managing, supporting, and compensating its people. Figure 2 illustrates this comprehensive process.

Figure 2. – Integrated Talent Management

Source: Bersin, J., (2020), What is Talent Management?, https://joshbersin.com/2007/07/what-is-talent-management/ (30.03.2024.)

The figure illustrates the integration of talent management with other managerial functions and their interactions.

1. Workforce Planning: Integrated with the business plan, this process establishes workforce plans, hiring plans, compensation budgets, and recruitment goals for a specific time period.
2. Recruitment**:** Through an integrated recruitment process, including assessment, evaluation, and hiring, the company brings people into the organization.
3. Onboarding**:** The organization must equip and enable employees to become productive and integrate quickly into company processes.
4. Performance Management**:** With the help of the business plan, the organization establishes processes to measure and manage employees.
5. Employee Training and Support: Learning and development programs are offered across all organizational levels. This function evolves into a continuous support function.
6. Succession Planning**:** As the organization grows and changes, there is a constant need to place people in new roles. Succession planning, an essential function, allows managers and individuals to identify suitable candidates for specific positions. This function must also align with the business plan to understand and meet key position requirements over the next 3–5 years.
7. Compensation and Benefits: These are an integral part of human capital management. Organizations strive to directly link compensation plans with performance management so that rewards, incentives, and benefits align with business objectives and execution.
8. Critical Skills Analysis: This process is often overlooked but is essential in many industries and organizations. For example, sectors such as utilities, telecommunications, and energy face a large retiring workforce. Therefore, questions arise, such as: How do *th*ey identify roles, individuals, and competencies that are leaving? What can be done to fill these gaps? This is referred to as "critical talent management" and many organizations are undergoing this process (Bersin, 2020).

According to the definitions provided by management and human resource researchers, Haerizadeh & Moradpour (2018) identified three core concepts for "talent management":

1. In the first concept, talent management is a set of human resource tasks such as recruitment, selection, training, and development, suggesting that talent management may be more than a euphemism for human resources management.
2. The second concept emphasizes forecasting or modeling human resource management processes based on factors like skills, supply and

demand, attrition, and workforce growth, indicating that talent management is more or less synonymous with human resource planning.

3. The third concept focuses on talented individuals, their performance, and potential. When selecting a workforce, companies choose those with high potential. Regarding this, talent management encompasses all activities and processes related to key positions that lead to a long-term competitive advantage.

Talent management facilitates the identification, development, engagement, retention, and deployment of individuals who are of particular value to an organization (CIPD, 2012). Talent management refers to implementing integrated strategies or systems designed to increase workplace productivity, attract, retain, and utilize people with the necessary skills and abilities to meet current and future business needs. The core function of talent management is to prepare the organization for the future through human capital planning and development (Garg & Rani, 2014).

Talent management practices ensure that the right people join the company and deliver the desired outcomes that the organization sets. Talent management helps companies confront turbulent challenges, such as entering new markets and creating competitive advantages (Al-Haziazi, 2021).

The importance of talent management lies in enabling self-initiative, identifying potential change drivers, and developing talented employees. In the context of strategic renewal, talent management involves identifying key projects to address significant business opportunities and challenges (Järvi & Khoreva, 2019).

Talent management and human resource management are closely related. Poorhoseinzadeh and Subramaniam (2013) provide three perspectives of the definition of talent management:

1. Talent management as an extension of HRM: It includes all human resource management activities, suggesting that talent management is an innovative term derived from HRM, focused on strategic talent management.
2. Emphasis on talent pools: Talent management involves human resource management with a particular focus on talent pools within and outside the organization.
3. Focus on talent progression: Talent management is focused on developing capabilities through managing talent flow within the corporation, with an emphasis on career progression rather than a talent pool. Talent management programs are designed to secure talent pools qualified to perform complex organizational tasks (Poorhoseinzadeh & Subramaniam, 2013).

Ashif (2019) considered talent management as a platform for achieving competitive advantage. This includes fundamental HRM functions such as recruitment, selection, and development. Effective talent management aims to attract the best talents and retain it within the organization (Sindhura, 2022).

Talent management in the 21st century context

Rožman, Oreški, and Tominić (2022) demonstrated in their study that artificial intelligence applications in talent management foster a unique organizational culture, reduce employee workload, and improve retention of talented individuals within the company. A study performed by Qin, Zhang, Cheng, et. al (2023) provides a detailed overview of AI technologies used in talent analytics within human resource management. Their paper categorizes three main application scenarios: talent management, organizational management, and labor market analysis. Faqihi and Miah (2022) explored how AI can improve approaches to talent management through advanced automation. Their focus was on the development of intelligent solutions for career guidance, relying on modules for talent intelligence and the growth needs of individuals.

Considering the above, it is clear that there has been a strong interest in studying talent management concepts in recent years. Al-Dalahmeh (2020) suggests that this concept remains insufficiently defined and requires further theoretical development.

Kravariti and Johnston (2019) defined talent management in the public sector, describing it as the competencies, knowledge, and values of individuals who implement public service principles to create public good. Talented individuals should be engaged in the public sector's most complex challenges to achieve strategic goals. Their study focused on the public sector, highlighting its unique complexities and the influence of both external and internal factors that affect the successful implementation of talent management.

Bolander, Werr, and Asplund (2017) categorized four types of talent management: humanistic, competitive, elitist, and entrepreneurial. Organizations with a humanistic approach view all employees as talented, believing that talent can be developed throughout life and that the organization can serve as an important platform for this development by offering learning opportunities. Competitive types hold an exclusive view, where a small number of "stars" stand out in any employee group. Elitist types see talent as innate, which the organization nurtures for full potential. Entrepreneurial types believe all employees have the potential to become talented if they find the "right environment." According to Bolander, Werr, and Asplund, talent also

includes individuals' ambition to seek challenges and take on new responsibilities.

Managers must ensure strategic actions to retain talented employees. This practice has garnered attention from both academic and business communities, which seek answers to many unanswered questions where managing high-talent individuals presents both a challenge and an opportunity for further organizational development (Sigroha & Dahiya, 2023).

Talent management is considered an alternative platform for achieving competitive advantage by many worldwide. Through its unique and inspiring perspectives, talent management also addresses key HRM issues such as recruitment, selection, and development. An effective talent management approach aims to attract top talent and foster their loyalty to the company (Ashif, 2019).

Talent management is an emerging field that requires diverse contributions from various sectors and industries. Yildiz and Esmer (2021) researched talent management in the maritime industry, where a unique and talented workforce is essential to achieving business goals and maintaining a sustainable competitive advantage. The authors view talent management as a crucial factor enabling corporate strategy implementation. Unlike Yildiz and Esmer, Listwan (2010) believes that to create a competitive advantage, organizations need not only high-quality human resources but also effective strategies for managing those resources. The strategy's goal is to set guidelines and methods for the organization to utilize human resources effectively.

It is essential to emphasize that human resource strategies can support and advance the organization's overall strategy (Armstrong, 2010). In practice, this entails vertical integration of the organization's strategy with human resource strategies. Long-term goals in human resource management are therefore essential (Król & Ludwiczyński, 2006). Developing HR sub-strategies is also crucial, and Armstrong (2010) identifies key aspects like human capital management, corporate social responsibility, organizational development, HR development, commitment, knowledge management, rewards, employee relations, and talent management.

Components of a Talent Management Strategy include:

1. Precisely defining talents, determining who should be included in talent management programs, and specifying the requirements for talented employees;
2. Building the organization's image as a "preferred employer";
3. Using recruitment and selection methods that ensure outstanding employees have good career advancement opportunities, enhancing job design and organizational roles to support development and self-improvement;

4. Creating a favorable work environment, maintaining work-life balance, and offering an attractive reward system;
5. Developing succession planning procedures for key positions that consider talent recognition and identify workers at risk of leaving the organization (Armstrong, 2007).

The development and implementation of talent roles within strategic HR management require the commitment of top management, HR departments, and all organization members. Implementing a talent management program requires significant investment, and its effects are visible only in the long term. Talent management should therefore be viewed as an integral part of the overall corporate strategy. Consistent activities across the company's strategy and talent management strategy, along with their alignment, are the key success factors (Nedzwiecka, 2016; Ingram, 2011).
Ibrahim and Daniel (2018) examined the effects of talent management on human resource management. In their study, they concluded that employee productivity depends on their talent, which ultimately leads to the organization achieving a competitive advantage. Thus, the talent concept has long-term positive effects on human resource management, and it should be actively managed to increase the efficiency and productivity of organizations (Sindhura, 2022).

Meyers, Woerkom, Paauwe, and Dries (2020) investigated four different talent philosophies: exclusive/stable; exclusive/developmental; inclusive/stable; and inclusive/developmental, using a sample of 321 human resource managers and their connection to the organizational context (organization size, ownership structure, multinational orientation) as well as the perceptions of human resource managers regarding the application of talent management practices in their organizations. The results showed an equal representation of all four talent philosophies. It was found that organization size is associated with the talent philosophy, making it more likely that human resource managers working in smaller organizations hold an inclusive talent philosophy. Additionally, the relationship between talent philosophy and human resource managers' perceptions of workforce differentiation based on their talents was confirmed. Talent retention is one of the most critical challenges faced by enterprises worldwide. This is due to open questions about how and why to implement talent management in organizations (Gallardo-Gallardo, Thunnissen, Scullion, 2019). Managing talent on a global level is more complex and demanding than within national borders, so even large global corporations are not fully equipped to meet this challenge. Modern business conditions have crystallized numerous weak points in talent management, necessitating a comprehensive approach to understanding skills, abilities, key workforce, and top talents (Khatri, Gupta, Gulati, Chauhan, 2010).

Based on the aforementioned, it can be concluded that human capital with high work potential and clear visions for the future is crucial for achieving the organization's vision. Due to socio-economic and demographic changes in the labor market in Europe, there is already a deficit of high-quality workforce that fosters research and development. Organizations that recognize the significance of talents and identify this area as crucial and invest resources in it will undoubtedly be successful in the so-called "talent hunt" (Bostančič, Slana, 2018).

RESEARCH METHODOLOGY

For the purpose of writing this paper, secondary data was used, specifically the analysis of recent scientific articles in the field of talent management from various academic databases to create a theoretical foundation for defining talents and talent management. The sources included scientific papers published in academic databases: Google Scholar, Springer, Emerald, Jstor, Taylor and Francis, and Wiley, focusing on management in general and human resource management.

RESEARCH RESULTS

Based on the analysis of recent papers collected through a literature review, talent management is emphasized as a key tool for building the reputation of organizations, increasing productivity, and facilitating rapid growth. The paper identified several key challenges in implementing talent management, including: a) Talent retention – Organizations face difficulties in retaining key personnel, which has become particularly important in a globalized and competitive environment. b) Application of artificial intelligence – The use of this tool in selection and talent management processes shows potential but also carries challenges such as algorithmic bias, privacy issues, and ethical dilemmas. c) Development of organizational culture and structure – Talent management contributes to strengthening organizational culture and developmental opportunities within organizations, positively affecting employee engagement and satisfaction. d) Building strategies for talent management – Organizations that integrate talent management into their strategic plans respond better to market changes and more easily achieve competitive advantages. e) Lack of theoretical framework – The talent management concept remains insufficiently standardized and developed, posing challenges for managers in defining clear practices and policies for enterprises. The research results indicated that talent management

is a crucial area for the strategic growth of organizations, and that further research and standardization of approaches could significantly enhance the efficiency of this process.

CONCLUSION AND RECOMMENDATIONS

The goal of the paper was to provide an overview of the literature in the field of talent management. Based on everything previously discussed, it can be concluded that talent management and the management of human capital represent a highly relevant topic. Therefore, it is essential to consider the challenges organizations face in selecting, recruiting, and placing employees in appropriate roles. Clearly defining job roles, tracking, and leveraging employee talents is the key to the organization's success and securing a leading position in the market. The most critical challenges are, indeed, effectively managing the talent pool. Strategies are being developed to attract, develop, and retain key talented employees. Companies face numerous challenges in the 21st century regarding talent management, and the use of artificial intelligence can help overcome these challenges, as applying artificial intelligence has the potential to optimize human resource operations and improve overall workforce management. Recommendations for further research involve conducting primary studies that address the topic of talent management, focusing on practices for attracting and retaining talented workforce in Bosnian-Herzegovinian companies, aiming to enhance human resource management policies.

REZIME
UPRAVLJANJE TALENTIMA: IZAZOVI I MOGUĆNOSTI 21. VEKA

Cilj ovog rada je da pruži sistematski pregled literature iz oblasti upravljanja talentima, njegovih izazova i perspektiva kako bi se bolje razumelo njegovo značenje i doprinelo postojećem korpusu znanja iz oblasti upravljanja ljudskim resursima. Ova tema je veoma aktuelna i relevantna poslednjih godina, što je dovelo do brojnih studija, posebno o izazovima s kojima se kompanije suočavaju upotrebom umetne inteligencije (AI) pri odabiru talenata. U radu je prikazana evolucija ljudskih resursa kao organizacijske funkcije kroz tri faze: kadrovska služba, upravljanje ljudskim resursima i upravljanje talentima.
Definisani su koncepti talenta i upravljanja talentima, njegov značaj, ključni faktori uspeha i povezanost s umetnom inteligencijom. Sekundarni podaci

korišćeni su kroz analizu recentnih naučnih članaka iz oblasti upravljanja talentima iz različitih akademskih izvora kako bi se uspostavila teorijska osnova za definisanje talenata i upravljanja talentima. Izvori literature uključivali su akademske članke objavljene u bazama podataka kao što su Google Scholar, Springer, Emerald, Jstor, Taylor, Francis i Wiley i druge. Preduzeća u 21. veku suočavaju se s brojnim izazovima upravljanja talentima, a korišćenje umetne inteligencije može pomoći u prevazilaženju ovih izazova, jer primena iste ima potencijal da optimizira operacije i poboljša celokupno upravljanje radnom snagom.

Ključne reči: talent menadžment, menadžment ljudskih resursa, 21. vek.

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