Novi Ekonomist
Vol 17(1), Year XVII, Issue 33, january - june 2023.
ISSN 1840-2313 (Print) 2566-333X (Online)
DOI: 10.7251/NOEEN2333012L

Submitted: 06.04.2023.
Accepted: 24.05.2023.
Scientific article
UDK: 339.5/.9(4-672EU):339.5(497.11)

COMPARATIVE ANALYSIS OF THE TRADE PERFORMANCE OF THE COUNTRIES OF THE EUROPEAN UNION, SERBIA AND BOSNIA AND HERZEGOVINA - EMPIRICAL APPROACH

КОМПАРАТИВНА АНАЛИЗА ПЕРФОРМАНСИ ТРГОВИНЕ ЗЕМАЉА ЕВРОПСКЕ УНИЈЕ, СРБИЈЕ И БОСНЕ И ХЕРЦЕГОВИНЕ – ЕМПИРИЈСКИ ПРИСТУП

Radojko Lukić
University of Belgrade, Faculty of Economics, Belgrade, Serbia
radojko.lukic @ekof.bg.ac.rs
ORCID: 0000-0001-6529-0297

Paper presented at the 11th International Scientific Symposium „EkonBiz: Impact of geopolitical changes on the national economy“, Bijeljina, 22 – 23th June 2023.

Abstract: *The issue of measuring and analyzing trade performance is continuously relevant, significant and complex. It is particularly challenging to investigate trading performance using different multi-criteria decision-making methods. In this way, considering the comparison of a large number of alternatives in relation to several criteria, a more realistic knowledge of trade performance is gained in the function of improvement in the future by applying relevant measures. Based on that, this paper analyzes the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina based on the LMAW-DNMA method. According to the results of the LMAW-DNMA method, the top five countries of the European Union in terms of trade performance include: France, Germany, Spain, Poland and Italy. In terms of trade performance, the leading countries of the European Union (Germany, France and Italy) are well positioned. Malta is positioned in the last place. In terms of trade performance, Croatia is better positioned than Slovenia (21st and 23rd place, respectively). Serbia ranked twenty-second in terms of trade performance. It is positioned worse than Croatia, but it is better than Slovenia. The trade of Bosnia and Herzegovina took twenty-sixth place in terms of performance. It is worse positioned in relation to the performances of Croatia, Slovenia and Serbia. In order to improve the trade performance of European Union countries, especially Serbia and Bosnia and Herzegovina, it is necessary to manage more efficiently the number and size of companies, human resources, employee costs, turnover and added value. The target profit can be achieved by adequate control of these and other critical factors of business success.*

Key words: *performance, determinants, trade of the European Union, Serbia, and Bosnia and Herzegovina, LMAW-DNMA method*

Апстракт: *Проблематика мерења и анализе перформанси трговине је континуирано аклтуелна, значајна и сложена. Изазовно је посебно истраживати перформансе трговине применом различитих метода вишекритеријумског одлучивања. На тај начин се, с обзиром на компарацију већег броја алтернатива у односу на неколико критеријума, стиче реалније сазнање о перформансама трговине у функцији унапређења у будућности применом релевантних мера. Полазећи од тога, у овом раду се анализирају перформансе трговине земаља Европске уније, Србије и Босне и Херцеговине на бази LMAW-DNMA методе. Према резултатима LMAW-DNMA методе у врху пета земаља Европске уније по* *перформансама трговине спадају: Француска, Немачка, Шпанија, Пољска и Италија. У погледу перформанаси трговине водеће земље Европске уније (Немачка, Француска и Италија) су добро позициониране. Малата је позиционирана на последњем месту. По перформансама трговине Храватска је боље позиционирана од Словеније (двадесет и прво и двадесет и треће место, респективно). Србија је по перформансама трговине заузела дведесет и друго место. Она је лошије позиционирана од Хрватске али је боље него Словенија. Трговина Босне и Херцеговине по перформансама је заузела двадесет и шесто место. Она је лошије позиционирана у односу на перформансе тровине Хрватске, Словеније и Србије. У циљу унапређења перформанси трговине земаља Европске уније, посебно Србије и Босне и Херцеговине неопходно је ефикасније управљати бројем и величином предузећа, људским ресурсима, трошковима запослених, прометом и додатном вредношћу. Циљни профит се може остварити адекватном контролом ових и других критичних фактора пословног успеха.*

Кључне речи: *перформансе, детерминанте, трговина Европске уније, Србије, и Босне и Херцеговине, LMAW-DNMA метода*

JEL classification: L81, M31, M41, O32

1. INTRODUCTION

The research on the determinants of the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina is very current, significant and complex. At the same time, during the empirical analysis, different methodologies can be used. In this paper, the analysis of the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina is performed on the basis of the LMAW-DNMA method. Because, generally speaking, multi-criteria analysis methods provide a realistic assessment of the situation regarding the measurement and analysis of the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina.

There is a well-developed **literature** devoted to the issue of measuring and analyzing the performance of companies from all sectors, which means trade, using various methods of multi-criteria decision-making, including the LMAW-DNMA method. They are increasingly applied when solving complex decision-making problems, in addition to classical financial analysis (Harangi-Rákos & Fenyves, 2021; Lucas & Ramires, 2022; Baicu et al., 2022; Marques et al., 2022; Maxim, 2021; Senapati & Yager, 2020; Senapati & Yager, 2019a; Senapati & Yager, 2019b *;* Zavadskas et al., 2012; Zardari et al., 2014; Chakraborty & Zavadskas, 2014; Zavadskas, 2013a,b; Urosevic, 2017) . In recent times, due to their outstanding characteristics - the accuracy of measuring the results, their application is increasing in the evaluation of trade performance and efficiency (Saaty, 2008; Ersoy, 2017; Gaur et al., 2020; Görçün et al., 2022; Lukic et al., 2020; Lukic & Hadrovic Zekovic, 2021, 2022; Lukic, 2021a,b , 2022a,b,c,d,e,f,g, 2023; Lukic et al., 2021). All relevant literature in this paper serves as a theoretical, methodological and empirical basis for researching the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina.

Research through the literature reveals that there are wide possibilities of applying multi-criteria decision-making methods in trade. In his work, Ersoy (2017) theoretically analyzes the application of various methods of multi-criteria decision-making in retail, pointing out their characteristics and significance. This paper can, in our opinion, serve as a good basis for choosing a method that will be applied in a specific case in retail and in other trade sectors. A special paper is dedicated to identifying factors that influence the effectiveness of websites in retail based on the application of the Fuzzy DEMATEL method (Gaur et al., 2020). By the way, the importance of applying different methods in the analysis of the efficiency of electronic commerce is multiple. In the literature, considerable attention has been devoted to the analysis of the efficiency and performance of global retail chains using the integrated fuzzy SWARA and fuzzy EATWOS methods (Görçün et al., 2022). A separate study analyzed the efficiency and marketing growth of retail food companies (Harangi-Rákos & Fenyves, 2021). The subject of research in the literature is the evaluation and selection of suppliers in the context of the green economy (Keshavarz-Ghorabaee et al., 2020). In the literature, special attention is paid to the analysis of logistics efficiency based on the multi-criteria decision-making method (LMAW) (Pamučar et al., 2021). In a separate study, the importance of improving the procurement process for retail companies was pointed out (Maxim, 2021), and multi-criteria decision-making methods play a significant role in this. By the way, the possibilities of applying multi-criteria decision-making methods in the analysis of logistics efficiency are wide. With their help, the efficiency of individual distribution channels can be seen. Similarly, by means of multi-criteria decision-making methods, the selection of employees in retail and in supplementary activities, such as for example tourism, can be carried out (Urosevic et al., 2017). All in all, there are wide possibilities of applying multi-criteria decision-making methods in order to improve the performance and efficiency of trading companies.

As a result, works devoted to the analysis of financial performance and trade efficiency in Serbia have been published in Serbian literature based on various multi-criteria decision-making methods (Fuzzy AHP - TOPSIS, ELECTRE, MABAC, OCRA, WASPAS, ARAS, MARCOS, TRUST) (Lukic et al. , 2020; Lukic & Hadrovic Zekovic, 2021, 2022; Lukic, 2021a,b, 2022a,b,c,d, e,f,g; Lukic et al., 2021), as well as DEA approaches (Lukic, 2022g). Multi-criteria decision-making methods were applied in the performance analysis of trading companies in Serbia for the reason that they provide more realistic results compared to classical methods of financial analysis (for example, ratio analysis), given that several criteria treated as factors are simultaneously observed. When analyzing the performance of trading companies in Serbia using different methods of multi-criteria decision-making, the following criteria were most often used: number of companies, number of employees, assets, capital sales and net profit. This is because they are a good measure of performance and correspond to the nature of the trade.

Having in mind the financial - management the importance of determining the most accurate result by applying individual or integrated methods of multi-criteria decision-making, the subject of research in this paper is a comparative analysis of the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina using the LMAW-DNMA method. The aim and purpose of this is to look at the problem as complex as possible and propose an adequate solution in order to improve the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina in the future by applying relevant measures.

The basic research **hypothesis** in this work is reflected in the fact that determining the most accurate result is a fundamental assumption for improving the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina by applying adequate measures. The **LMAW-DNMA** method plays a significant role in this.

The necessary **empirical data** for the research of the treated problem in this paper were collected from Eurostat. They are "produced" according to the unique relevant methodology and, considering that, there are no restrictions regarding the international comparison of the obtained results.

2. METHODOLOGY

In this paper, the LMAW and DNMA methods are used to measure and analyze the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina. In further presentations of the treated issues, we will point out their characteristics (Demir, 2022).

The **LMAW** method is the latest method used to calculate the weight of criteria and rank alternatives (Liao, & Wu, 2020; Demir, 2022). It takes place through the following steps : *m* alternatives $A = \{A_1, A_2, \dots, A_m\}$are evaluated in comparison with *n* criteria $C = \{C_1, C_2, \dots, C_n\}$ with the participation *of* experts $E = \{E_1, E_2, \dots, E_k\}$ и according to a predefined linguistic scale (Pamučar et al, 2021) .

Step 1: Determination of weight coefficients of criteria

Experts $E = \{E_1, E_2, \dots, E_k\}$ determine the priorities of the criteria $C = \{C_1, C_2, \dots, C_n\}$ in relation to the previously defined values of the linguistic scale. At the same time, they assign a higher value to the criterion of greater importance and a lower value to the criterion of less importance on the linguistic scale. By the way, the priority vector is obtained. Label γ_{cn}^{e} represents the value of the linguistic scale that the expert $e(1 \leq e \leq k)$assigns to the criterion $C_t(1 \leq t \leq n)$.

Step 1.1: Defining the absolute anti-ideal point γ_{AIP}

The absolute ideal point should be less than the smallest value in the priority vector. To be calculated according to the equation:

$$\gamma_{AIP} = \frac{\gamma_{min}^{e}}{S}$$

where is $\gamma_{min}^{e}$the minimum value of the priority vector and *S* should be greater than the base logarithmic functions. In the case of using the Ln function , the value of *S* can be chosen as 3.

("Determining the weights of the criteria by the method of pairwise comparisons is based on a pairwise comparison of the criteria and the calculation of the weights using a certain prioritization method. The decision maker compares each criterion with the others and determines the level of preference for each pair of criteria. As an aid in determining the size of the preference of one criterion in relation to another an ordinal scale is used. One of the most commonly used methods is the Analytical Hierarchy Process (AHP) method. Based on pairwise comparisons of criteria - sub criteria, a pairwise comparison matrix is formed from which it is necessary to determine the priority vector of criteria - sub criteria w (weight of criteria - sub criteria). inherent inconsistencies, the vector w is only an estimate of the real priority vector, which is unknown" (Milićević & Župac, 2012, p. 52).

Step 1.2 : Determining the relationship between the priority vector and the absolute anti-ideal point

The relationship between the priority vector and the absolute anti-ideal point is calculated using the following equation:

$$n_{Cn}^{e} = \frac{\gamma_{Cn}^{e}}{\gamma_{AIP}} \quad (1)$$

So the relational vector $R^{e} = (n_{C1}^{e}, n_{C2}^{e}, \ldots, n_{Cn}^{e})$ is obtained.

Where it n_{Cn}^{e} represents the value of the relational vector derived from the previous equation, and R^e represents the relational vector of $e(1 \le e \le k)$

Step 1.3: Determination of the vector of weight coefficients

The vector of weight coefficients $w = (w_1, w_2, \ldots, w_n)^T$ is calculated by the expert $e(1 \le e \le k)$ using the following equation:

$$w_j^{e} = \frac{\log_A(n_{Cn}^{e})}{\log_A\left(\prod_{j=1}^{n} n_{Cn}^{e}\right)}, A > 1 \quad (2)$$

where w_j^{e} it represents the weighting coefficients obtained according to the experts' ratings e^{th} and the elements n_{Cn}^{e} of the real action vector *R*.

The obtained values for the weighting coefficients must meet the condition that $\sum_{j=1}^{n} w_j^{e} = 1$.

By applying the Bonferroni aggregator shown in the following equation, the aggregated vector of weight coefficients is determined $w = (w_1, w_2, \ldots, w_n)^T$:

$$W_j = \left(\frac{1}{k.(k-1)} \cdot \sum_{x=1}^{k} \left(w_j^{(x)}\right)^p \cdot \sum_{\substack{y=1 \\ y \ne x}}^{k} \left(w_{ij}^{(y)}\right)^q \right)^{\frac{1}{p+q}} \quad (3)$$

The value of *p* and *q* are stabilization parameters and $p, q \ge 0$. The resulting weight coefficients should fulfill the condition that $\sum_{j=1}^{n} w_j = 1$.

DNMA is a new method for showing alternatives (Demir, 2022).

Two different normalized (linear and vector) techniques are used, as well as three different coupling functions (full compensation - CCM, non-compensation - UCM and incomplete compensation - ICM). The steps of applying this method are as follows (Liao & Wu, 2020; Ecer, 2020):

Step 1: Normalized decision matrix

The elements of the decision matrix are normalized with linear $(\hat{x}_{ij}^{1N})$ normalization using the following equation:

$$\hat{x}_{ij}^{1N} = 1 - \frac{|x^{ij} - r_j|}{max\left\{\max_i x^{ij}, r_j\right\} - min\left\{\min_i x^{ij}, r_j\right\}} \quad (4)$$

The vector $(\hat{x}_{ij}^{2N})$ is normalized using the following equation:

$$\hat{x}_{ij}^{2N} = 1 - \frac{|x^{ij} - r_j|}{\sqrt{\sum_{i=1}^{m} (x^{ij})^2 + (r_j)^2}} \quad (5)$$

The value r_j is the target value for c_j the criterion and is considered $\max_i x^{ij}$ за useful $\min_i x^{ij}$ for cost criteria as well.

Step 2: Determining the weight of the criteria

This step consists of three phases:

Step 2.1: In this phase, the standard deviation (σ_j) for the criterion c_j is determined with the following equation where *m* is the number of alternatives:

$$\sigma_j = \sqrt{\frac{\sum_{i=1}^{m} \left(\frac{x^{ij}}{\max_i x^{ij}} - \frac{1}{m} \sum_{i=1}^{m} \left(\frac{x^{ij}}{\max_i x^{ij}} \right) \right)^2}{m}} \quad (6)$$

Step 2.2: Standard deviation values calculated for criteria normalize with the following equation:

$$w_j^{\sigma} = \frac{\sigma_j}{\sum_{i=1}^{n} \sigma_j} \quad (7)$$

Step 2.3: Finally, the weights are adjusted with the following equation:

$$\hat{w}_j = \frac{\sqrt{w_j^{\sigma}.w_j}}{\sum_{i=1}^{n} \sqrt{w_j^{\sigma}.w_j}} \quad (8)$$

Step 3: Calculating the aggregation model

Three aggregation functions (CCM, UCM and ICM) are calculated separately for each alternative.

The CCM (Complete Compensation Model) is calculated using the following equation:

$$u_1(a_i) = \sum_{j=1}^{n} \frac{\hat{w}_j . \hat{x}_{ij}^{1N}}{\max_i \hat{x}_{ij}^{1N}} \quad (9)$$

The UCM (Uncompensatory Model) is calculated using the following equation:

$$u_2(a_i) = \max_j \hat{w}_j \left(\frac{1 - \hat{x}_{ij}^{1N}}{\max_i \hat{x}_{ij}^{1N}} \right) \quad (10)$$

The ICM (Incomplete Compensation Model) is calculated using the following equation:

$$u_3(a_i) = \prod_{j=1}^{n} \left(\frac{\hat{x}_{ij}^{2N}}{\max_i \hat{x}_{ij}^{2N}} \right)^{\tilde{w}_j} \qquad (11)$$

Step 4: Integration of utility values

The calculated utility functions are integrated with the following equation using the Euclidean distance principle:

$$DN_i = w_1 \sqrt{\varphi \left(\frac{u_1(a_i)}{\max_i u_1(a_i)} \right)^2 + (1-\varphi)\left(\frac{m - r_{1(a_i)+1}}{m} \right)^2} - w_2 \sqrt{\varphi \left(\frac{u_2(a_i)}{\max_i u_2(a_i)} \right)^2 + (1-\varphi)\left(\frac{r_2(a_i)}{m} \right)^2}$$
$$+ w_3 \sqrt{\varphi \left(\frac{u_3(a_i)}{\max_i u_3(a_i)} \right)^2 + (1-\varphi)\left(\frac{m - r_3(a_i) + 1}{m} \right)^2} \qquad (12)$$

In this equation $r_1(a_i)$and $r_3(a_i)$represent an ordinal number of alternativesa_i sorted by CCM and ICM functions in descending value (higher value first). On the other hand, $r_2(a_i)$it shows the sequence number in the obtained order according to the increasing value (smaller value first) for the UCM function used.

The label $\varphi$is the relative importance of the child value used and is in the range [0.1]. It is considered that it can be taken as $\varphi = 0.5$. The coefficients w_1, w_2, w_3 are obtained weights of the used functions CCM, UCM and ICM, respectively.

The sum should be equal $w_1 + w_2 + w_3 = 1$. When determining the weight, if the decision maker gives importance to a wider range of performance alternatives, he can set a higher value for w_1. In case the decision maker is not ready to take risks, ie. to choose a poor alternative according to some criterion, he can assign a higher weight to w_2.

However, the decision maker can assign a higher weight to w_3 ако take into account overall performance and risk at the same time. Finally, the *DN* values are sorted in descending order, with the alternative with the higher value being the best.

3. RESULTS AND DISCUSSION

In the context of the analysis of the treated problem in this paper, by changing the LMAW-DNMA method, the following criteria were used: C1 - number of companies, C2 - number of employees, C3 - employee costs , C4 - turnover and C5 - added value.

According to Eurostat statistics, they are key performance indicators.

In addition, they correspond to the very nature of trade operations. The alternative is the countries of the European Union, Serbia and Bosnia and Herzegovina. Criteria, alternative and initial data are shown in Table 1 for 2020 (Eurostat statistics do not provide data for 2021 and 2022)

Table 1. Initial data

		Company number	Number of employees	Employee expenses – one million euros	Turnover - million euros	Added value – one million euros
		C1	C2	C3	C4	C5
A1	Belgium	144,610	646,944	26,719.00	472,683.60	53,268.50
A2	Bulgaria	138,125	498,112	3,352.40	67,379.30	7,350.60
A3	Czech Republic	224,407	720,273	10,774.20	159,941.20	19,844.70
A4	Denmark	40,496	470,203	20,572.30	187,951.80	31,628.90
A5	Germany	542,120	6,513,411	205,616.50	2,119,183.70	330,287.80
A6	Estonia	18,359	95,311	1,696.40	26,936.40	2,932.30
A7	Ireland	46,792	372,853	11,046.20	183,495.20	27,084.50
A8	Greece	221,763	747,649	8,471.10	106,976.00	12,734.20
A9	Spain	725,581	3,116,479	72,120.50	726,551.30	109,798.30
A10	France	697,283	3,565,852	139,143.70	1,331,409.70	193,620.00
A11	Croatia	35,393	238,580	3,182.70	35,379.70	5,822.60
A12	Italy	1,043,209	3,357,013	70,509.90	945,227.60	132,334.70

A13	Cyprus	16,895	72,127	1,301.50	12,673.70	2,079.20
A14	Latvia	25,272	148,270	1,753.30	28,555.40	3,110.80
A15	Lithuania	56,007	239,825	2,903.40	41,122.80	5,651.60
A16	Luxembourg	7,492	54,510	2,586.50	74,336.30	5,519.60
A17	Hungary	137,046	575,367	6,462.60	104,756.10	12,739.30
A18	Malta	8,297	36,480	594.7	8,603.80	993.6
A19	Netherlands	278,018	1,581,762	51,722.50	691,536.80	97,577.50
A20	Austria	76,938	676,322	25,727.40	249,457.70	39,101.80
A21	Poland	530,930	2,386,186	26,541.60	421,418.60	58,069.20
A22	Portugal	215,033	798,826	12,601.70	140,636.00	19,040.00
A23	Romania	174,754	889,711	8,392.90	128,164.30	19,613.70
A24	Slovenia	25,787	121,518	2,811.30	34,082.10	4,537.50
A25	Slovakia	102,841	327,772	4,270.70	58,303.80	7,558.20
A26	Finland	39,580	288,256	10,983.20	118,489.10	16,816.50
A27	Sweden	113,084	663,681	29,439.60	269,750.90	43,917.20
A28	Serbia	29,975	273,189	2,340.70	36,658.50	4,371.00
A29	Bosnia and Herzegovina	23,673	149,469	1,039.60	17,221.40	2,374.60

Source: Eurostat

Table 2 shows the descriptive statistics of the initial data.

Table 2. Deskriptive statistics

Statistics						
		Company number	Number of employees	Employee expenses – one million euros	Turnover - million euros	Added value – one million euros
N	Valid	29	29	29	29	29
	Missing	0	0	0	0	0
Mean		197922.7586	1021584.5170	26368.2103	303409.7517	43785.4621
Std. Error of Mean		48317.36290	270177.58250	8485.93528	87505.96673	13293.59008
Median		102841.0000	498112.0000	8471.1000	118489.1000	16816.5000
Std. Deviation		260196.96230	1454950.80900	45698.16001	471234.05240	71588.17347
Variance		67702459170.00	2116881856000.00	2088321829.00	222061532200.00	5124866580.00
Skewness		1.928	2.469	2.890	2.643	2.839
Std. Error of Skewness		.434	.434	.434	.434	.434
Kurtosis		3.294	6.639	8.903	7.674	9.059
Std. Error of Kurtosis		.845	.845	.845	.845	.845
Range		1035717.00	6476931.00	205021.80	2110579.90	329294.20
Minimum		7492.00	36480.00	594.70	8603.80	993.60
Maximum		1043209.00	6513411.00	205616.50	2119183.70	330287.80

Note: Author's statistics

Descriptive statistics data show that: the number of companies ranges from 7492.0 (Luxembourg) to 1043209.00 (Italy), the number of employees ranges from 36480.00 (Malta) to 6513411.00 (Germany), employee expenses range from 594.70 (Malta) to 205616.50 (Germany), turnover ranges from 8603.80 (Malta), and value added ranges from 993.60 (Malta) to 330287.80 (Germany). In Serbia and Bosnia and Herzegovina, all observed statistical variables are below the average. These differences in the size of statistical variables are maintained in their own way on the performance and positioning of individual countries of the European Union, Serbia and Bosnia and Herzegovina. Table 3 shows the correlation matrix of the initial data.

Table 3. Correlations

Correlations						
		1	3	4	5	6
1 Company number	Pearson Correlation	1	.828**	.701**	.744**	.722**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	29	29	29	29	29
2 Number of employees	Pearson Correlation	.828**	1	.953**	.965**	.967**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	29	29	29	29	29
3 Employee expenses	Pearson Correlation	.701**	.953**	1	.989**	.994**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	29	29	29	29	29
4 Turnover	Pearson Correlation	.744**	.965**	.989**	1	.998**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	29	29	29	29	29
5 Added value	Pearson Correlation	.722**	.967**	.994**	.998**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	29	29	29	29	29
**. Correlation is significant at the 0.01 level (2-tailed).						

Note: Author's statistics

Data from the correlation analysis show that there is a strong correlation between the observed statistical variables, at the level of statistical significance. Table 4 shows a non-parametric test, the Friedman test.

Table 4. NPar Tests. Friedman Test

NPar Tests	
Friedman Test	
Ranks	
	Mean Rank
Company number	3.45
Number of employees	4.97
Employee expenses	1.00
Turnover	3.59
Added value	2.00
Test Statistics[a]	
N	29
Chi-Square	109.131
df	4
Asymp. Sig.	.000
a. Friedman Test	

Note: Author's statistics

The null hypothesis is rejected. There is a significant difference between the observed statistical variables (Asymp. Sig. .000). Table 5 shows the prioritization scale.

Table 5. Prioritization Scale

Prioritization Scale	**Abbreviation**	**Prioritization**
Linguistic Variables	**AL**	1
Absolutely Low	**VL**	1.5
Very Low	**L**	2
Low	**M**	2.5
Medium	**E**	3
Equal	**MH**	3.5
Medium High	**H**	4
High	**VH**	4.5
Very High	**AH**	5

Source: Demir, 2022

Table 6 and Graph 1 shows the evaluation of criteria by decision makers and their weighting coefficients. (In this paper, all calculations and results are the author's.)

Table 6. Evaluation and weight coefficient of criteria

Evaluation of criteria

KIND	1	1	-1	1	1
	C1	**C2**	**C3**	**C4**	**C5**
E1	**H**	**AH**	**H**	**E**	**MH**
E2	**VH**	**VH**	**MH**	**H**	**H**
E3	**E**	**MH**	**VH**	**AH**	**AH**
E4	**MH**	**E**	**E**	**VH**	**AH**

ϒAIP

ϒAIP	0.5				

	C1	C2	C3	C4	C5	LN(Пη)
R1	8	10	8	6	7	10.199
R2	9	9	7	8	8	10.499
R3	6	7	9	10	10	10.540
R4	7	6	6	9	10	10.029

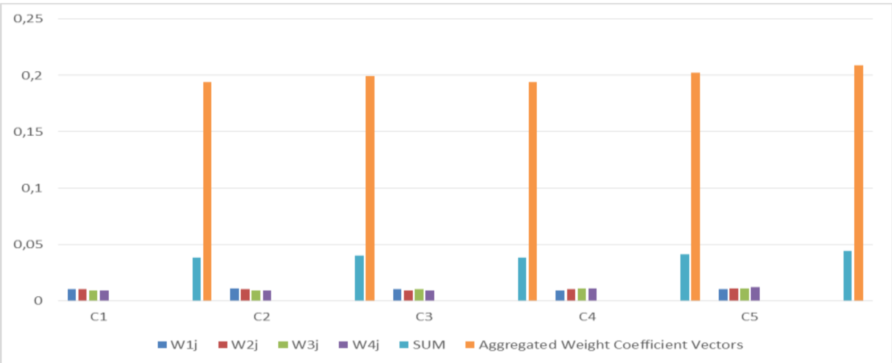
Weight Coefficients Vector

Weight Coefficients Vector	C1	C2	C3	C4	C5
W1j	0.204	0.226	0.204	0.176	0.191
W2j	0.209	0.209	0.185	0.198	0.198
W3j	0.170	0.185	0.208	0.218	0.218
W4j	0.194	0.179	0.179	0.219	0.230

Aggregated Weight Coefficient Vectors

Aggregated Fuzzy Vectors	C1	C2	C3	C4	C5
W1j	0.010	0.011	0.010	0.009	0.010
W2j	0.010	0.010	0.009	0.010	0.011
W3j	0.009	0.009	0.010	0.011	0.011
W4j	0.009	0.009	0.009	0.011	0.012
SUM	0.038	0.040	0.038	0.041	0.044
Aggregated Weight Coefficient Vectors	0.1941	0.1993	0.1940	0.2026	0.2090

Graph 1. Aggregated Weight Coefficient Vectors



Source: Author's picture

Tables 7-13 and Graph 2 show the calculations and results of applying the LMAW-DNMA method. (All calculations and results are by the authors.)

Table 7. Initial Matrix

INITIAL MATRIX	KIND	1	1	-1	1	1
	Weight	0.1941	0.1993	0.1940	0.2026	0.2090
		C1	C2	C3	C4	C5
	A1	144,610	646,944	646,944	26,719.00	472,683.60
	A2	138,125	498,112	498,112	3,352.40	67,379.30
	A3	224,407	720,273	720,273	10,774.20	159,941.20
	A4	40,496	470,203	470,203	20,572.30	187,951.80
	A5	542,120	6,513,411	6,513,411	205,616.50	2,119,183.70
	A6	18,359	95,311	95,311	1,696.40	26,936.40
	A7	46,792	372,853	372,853	11,046.20	183,495.20
	A8	221,763	747,649	747,649	8,471.10	106,976.00
	A9	725,581	3,116,479	3,116,479	72,120.50	726,551.30
	A10	697,283	3,565,852	3,565,852	139,143.70	1,331,409.70
	A11	35,393	238,580	238,580	3,182.70	35,379.70
	A12	1,043,209	3,357,013	3,357,013	70,509.90	945,227.60
	A13	16,895	72,127	72,127	1,301.50	12,673.70
	A14	25,272	148,270	148,270	1,753.30	28,555.40
	A15	56,007	239,825	239,825	2,903.40	41,122.80
	A16	7,492	54,510	54,510	2,586.50	74,336.30
	A17	137,046	575,367	575,367	6,462.60	104,756.10
	A18	8,297	36,480	36,480	594.7	8,603.80
	A19	278,018	1,581,762	1,581,762	51,722.50	691,536.80
	A20	76,938	676,322	676,322	25,727.40	249,457.70
	A21	530,930	2,386,186	2,386,186	26,541.60	421,418.60
	A22	215,033	798,826	798,826	12,601.70	140,636.00
	A23	174,754	889,711	889,711	8,392.90	128,164.30
	A24	25,787	121,518	121,518	2,811.30	34,082.10
	A25	102,841	327,772	327,772	4,270.70	58,303.80
	A26	39,580	288,256	288,256	10,983.20	118,489.10
	A27	113,084	663,681	663,681	29,439.60	269,750.90
	A28	29,975	273,189	273,189	2,340.70	36,658.50
	A29	23,673	149,469	149,469	1,039.60	17,221.40
	MAX	1043209.0000	6513411.0000	6513411.0000	205616.5000	2119183.7000
	MIN	7492.0000	36480.0000	36480.0000	594.7000	8603.8000

Table 8. Linear Normalization Matrix

Linear Normalization MATRIX		C1	C2	C3	C4	C5	MAX
	A1	0.1324	0.0943	0.9057	0.1274	0.2199	0.9057
	A2	0.1261	0.0713	0.9287	0.0135	0.0278	0.9287
	A3	0.2094	0.1056	0.8944	0.0497	0.0717	0.8944
	A4	0.0319	0.0670	0.9330	0.0974	0.0850	0.9330
	A5	0.5162	1.0000	0.0000	1.0000	1.0000	1.0000
	A6	0.0105	0.0091	0.9909	0.0054	0.0087	0.9909
	A7	0.0379	0.0519	0.9481	0.0510	0.0829	0.9481
	A8	0.2069	0.1098	0.8902	0.0384	0.0466	0.8902
	A9	0.6933	0.4755	0.5245	0.3489	0.3402	0.6933
	A10	0.6660	0.5449	0.4551	0.6758	0.6267	0.6758
	A11	0.0269	0.0312	0.9688	0.0126	0.0127	0.9688
	A12	1.0000	0.5127	0.4873	0.3410	0.4438	1.0000
	A13	0.0091	0.0055	0.9945	0.0034	0.0019	0.9945
	A14	0.0172	0.0173	0.9827	0.0057	0.0095	0.9827

	A15	0.0468	0.0314	0.9686	0.0113	0.0154	0.9686
	A16	0.0000	0.0028	0.9972	0.0097	0.0311	0.9972
	A17	0.1251	0.0832	0.9168	0.0286	0.0456	0.9168
	A18	0.0008	0.0000	1.0000	0.0000	0.0000	1.0000
	A19	0.2612	0.2386	0.7614	0.2494	0.3236	0.7614
	A20	0.0671	0.0988	0.9012	0.1226	0.1141	0.9012
	A21	0.5054	0.3628	0.6372	0.1266	0.1956	0.6372
	A22	0.2004	0.1177	0.8823	0.0586	0.0626	0.8823
	A23	0.1615	0.1317	0.8683	0.0380	0.0566	0.8683
	A24	0.0177	0.0131	0.9869	0.0108	0.0121	0.9869
	A25	0.0921	0.0450	0.9550	0.0179	0.0235	0.9550
	A26	0.0310	0.0389	0.9611	0.0507	0.0521	0.9611
	A27	0.1020	0.0968	0.9032	0.1407	0.1237	0.9032
	A28	0.0217	0.0365	0.9635	0.0085	0.0133	0.9635
	A29	0.0156	0.0174	0.9826	0.0022	0.0041	0.9826

Table 9. Vector Normalization Matrix

Vector Normalization MATRIX		**C1**	**C2**	**C3**	**C4**	**C5**	**MAX**
	A1	0.5573	0.4893	0.9355	0.4855	0.5498	0.9355
	A2	0.5541	0.4764	0.9512	0.4183	0.4390	0.9512
	A3	0.5966	0.4957	0.9277	0.4397	0.4643	0.9277
	A4	0.5060	0.4739	0.9542	0.4678	0.4720	0.9542
	A5	0.7531	1.0000	0.3155	1.0000	1.0000	1.0000
	A6	0.4951	0.4413	0.9938	0.4136	0.4280	0.9938
	A7	0.5091	0.4655	0.9645	0.4405	0.4708	0.9645
	A8	0.5953	0.4981	0.9248	0.4330	0.4499	0.9248
	A9	0.8435	0.7043	0.6745	0.6161	0.6193	0.8435
	A10	0.8296	0.7434	0.6270	0.8088	0.7846	0.8296
	A11	0.5035	0.4538	0.9786	0.4178	0.4303	0.9786
	A12	1.0000	0.7252	0.6491	0.6115	0.6790	1.0000
	A13	0.4944	0.4393	0.9962	0.4124	0.4241	0.9962
	A14	0.4985	0.4459	0.9882	0.4137	0.4284	0.9882
	A15	0.5136	0.4539	0.9785	0.4170	0.4319	0.9785
	A16	0.4897	0.4377	0.9981	0.4161	0.4409	0.9981
	A17	0.5536	0.4831	0.9431	0.4273	0.4493	0.9431
	A18	0.4901	0.4362	1.0000	0.4104	0.4230	1.0000
	A19	0.6230	0.5707	0.8367	0.5574	0.6097	0.8367
	A20	0.5240	0.4919	0.9324	0.4827	0.4888	0.9324
	A21	0.7476	0.6407	0.7517	0.4850	0.5358	0.7517
	A22	0.5920	0.5025	0.9194	0.4449	0.4591	0.9194
	A23	0.5721	0.5105	0.9098	0.4328	0.4557	0.9098
	A24	0.4988	0.4436	0.9910	0.4168	0.4299	0.9910
	A25	0.5367	0.4615	0.9692	0.4210	0.4366	0.9692
	A26	0.5055	0.4581	0.9734	0.4403	0.4530	0.9734
	A27	0.5418	0.4908	0.9337	0.4933	0.4944	0.9337
	A28	0.5008	0.4568	0.9750	0.4154	0.4306	0.9750
	A29	0.4977	0.4460	0.9881	0.4117	0.4253	0.9881
	Adj Wj	0.2062	0.1977	0.1951	0.1989	0.2021	

Table 10. CCM (Complete Compensatory Model)

CCM (Complete Compensatory Model)	**u1(ai)**	**C1**	**C2**	**C3**	**C4**	**C5**	**SUM**
	A1	0.0301	0.0206	0.1951	0.0280	0.0491	0.3228
	A2	0.0280	0.0152	0.1951	0.0029	0.0061	0.2472
	A3	0.0483	0.0233	0.1951	0.0110	0.0162	0.2940
	A4	0.0070	0.0142	0.1951	0.0208	0.0184	0.2555
	A5	0.1065	0.1977	0.0000	0.1989	0.2021	0.7051
	A6	0.0022	0.0018	0.1951	0.0011	0.0018	0.2019
	A7	0.0083	0.0108	0.1951	0.0107	0.0177	0.2425
	A8	0.0479	0.0244	0.1951	0.0086	0.0106	0.2866
	A9	0.2062	0.1356	0.1476	0.1001	0.0991	0.6886

	A10	0.2032	0.1595	0.1314	0.1989	0.1874	0.8804
	A11	0.0057	0.0064	0.1951	0.0026	0.0026	0.2124
	A12	0.2062	0.1014	0.0951	0.0678	0.0897	0.5602
	A13	0.0019	0.0011	0.1951	0.0007	0.0004	0.1991
	A14	0.0036	0.0035	0.1951	0.0011	0.0019	0.2053
	A15	0.0100	0.0064	0.1951	0.0023	0.0032	0.2170
	A16	0.0000	0.0006	0.1951	0.0019	0.0063	0.2039
	A17	0.0281	0.0179	0.1951	0.0062	0.0100	0.2574
	A18	0.0002	0.0000	0.1951	0.0000	0.0000	0.1952
	A19	0.0707	0.0620	0.1951	0.0651	0.0859	0.4788
	A20	0.0153	0.0217	0.1951	0.0271	0.0256	0.2847
	A21	0.1636	0.1126	0.1951	0.0395	0.0620	0.5728
	A22	0.0468	0.0264	0.1951	0.0132	0.0143	0.2958
	A23	0.0384	0.0300	0.1951	0.0087	0.0132	0.2853
	A24	0.0037	0.0026	0.1951	0.0022	0.0025	0.2061
	A25	0.0199	0.0093	0.1951	0.0037	0.0050	0.2330
	A26	0.0066	0.0080	0.1951	0.0105	0.0109	0.2312
	A27	0.0233	0.0212	0.1951	0.0310	0.0277	0.2982
	A28	0.0046	0.0075	0.1951	0.0018	0.0028	0.2118
	A29	0.0033	0.0035	0.1951	0.0004	0.0008	0.2032

Table 11. UCM (Uncompensatory Model)

	u2(ai)	**C1**	**C2**	**C3**	**C4**	**C5**	**MAX**
UCM (Uncompensatory Model)	A1	0.1761	0.1772	0.0000	0.1709	0.1530	0.1772
	A2	0.1782	0.1826	0.0000	0.1960	0.1960	0.1960
	A3	0.1579	0.1744	0.0000	0.1878	0.1859	0.1878
	A4	0.1992	0.1836	0.0000	0.1781	0.1837	0.1992
	A5	0.0998	0.0000	0.1951	0.0000	0.0000	0.1951
	A6	0.2040	0.1959	0.0000	0.1978	0.2003	0.2040
	A7	0.1980	0.1869	0.0000	0.1882	0.1844	0.1980
	A8	0.1583	0.1734	0.0000	0.1903	0.1915	0.1915
	A9	0.0000	0.0621	0.0475	0.0988	0.1029	0.1029
	A10	0.0030	0.0383	0.0637	0.0000	0.0147	0.0637
	A11	0.2005	0.1914	0.0000	0.1963	0.1994	0.2005
	A12	0.0000	0.0964	0.1000	0.1310	0.1124	0.1310
	A13	0.2043	0.1967	0.0000	0.1982	0.2017	0.2043
	A14	0.2026	0.1943	0.0000	0.1977	0.2001	0.2026
	A15	0.1963	0.1913	0.0000	0.1966	0.1989	0.1989
	A16	0.2062	0.1972	0.0000	0.1969	0.1958	0.2062
	A17	0.1781	0.1798	0.0000	0.1927	0.1920	0.1927
	A18	0.2061	0.1977	0.0000	0.1989	0.2021	0.2061
	A19	0.1355	0.1358	0.0000	0.1337	0.1162	0.1358
	A20	0.1909	0.1761	0.0000	0.1718	0.1765	0.1909
	A21	0.0427	0.0852	0.0000	0.1594	0.1400	0.1594
	A22	0.1594	0.1714	0.0000	0.1857	0.1877	0.1877
	A23	0.1679	0.1677	0.0000	0.1902	0.1889	0.1902
	A24	0.2025	0.1951	0.0000	0.1967	0.1996	0.2025
	A25	0.1863	0.1884	0.0000	0.1951	0.1971	0.1971
	A26	0.1996	0.1898	0.0000	0.1884	0.1911	0.1996
	A27	0.1829	0.1765	0.0000	0.1679	0.1744	0.1829
	A28	0.2016	0.1902	0.0000	0.1971	0.1993	0.2016
	A29	0.2029	0.1942	0.0000	0.1984	0.2012	0.2029

Table 12. ICM (Incomplete Compensatory Model)

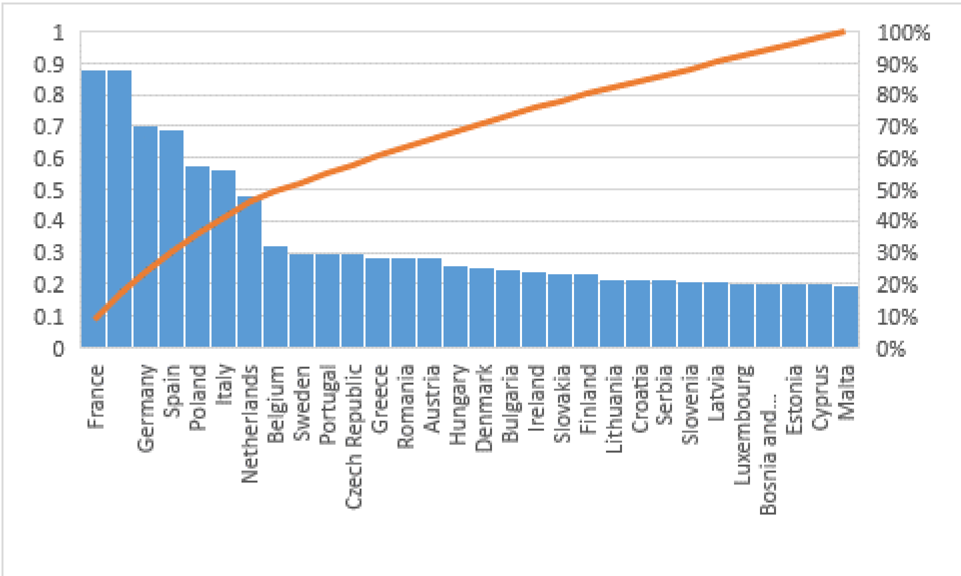
ICM (Incomplete Compensatory Model)	u3(ai)	C1	C2	C3	C4	C5	MAX
	A1	0.8987	0.8797	1.0000	0.8777	0.8982	0.6233
	A2	0.8945	0.8722	1.0000	0.8493	0.8554	0.5668
	A3	0.9130	0.8834	1.0000	0.8620	0.8695	0.6045
	A4	0.8774	0.8708	1.0000	0.8679	0.8674	0.5751
	A5	0.9432	1.0000	0.7985	1.0000	1.0000	0.7531
	A6	0.8662	0.8517	1.0000	0.8400	0.8435	0.5227
	A7	0.8766	0.8658	1.0000	0.8557	0.8651	0.5618
	A8	0.9132	0.8848	1.0000	0.8599	0.8645	0.6006
	A9	1.0000	0.9650	0.9573	0.9394	0.9395	0.8153
	A10	1.0000	0.9785	0.9469	0.9950	0.9888	0.9116
	A11	0.8719	0.8590	1.0000	0.8443	0.8470	0.5356
	A12	1.0000	0.9384	0.9191	0.9068	0.9248	0.7233
	A13	0.8655	0.8505	1.0000	0.8391	0.8415	0.5198
	A14	0.8684	0.8544	1.0000	0.8410	0.8446	0.5270
	A15	0.8755	0.8591	1.0000	0.8440	0.8477	0.5381
	A16	0.8634	0.8496	1.0000	0.8403	0.8478	0.5226
	A17	0.8960	0.8761	1.0000	0.8543	0.8608	0.5773
	A18	0.8632	0.8487	1.0000	0.8377	0.8404	0.5158
	A19	0.9410	0.9271	1.0000	0.9224	0.9380	0.7549
	A20	0.8879	0.8812	1.0000	0.8773	0.8777	0.6025
	A21	0.9989	0.9689	1.0000	0.9166	0.9339	0.8284
	A22	0.9132	0.8874	1.0000	0.8656	0.8691	0.6096
	A23	0.9088	0.8920	1.0000	0.8627	0.8696	0.6081
	A24	0.8680	0.8530	1.0000	0.8418	0.8447	0.5265
	A25	0.8853	0.8635	1.0000	0.8472	0.8511	0.5512
	A26	0.8736	0.8615	1.0000	0.8540	0.8568	0.5507
	A27	0.8938	0.8806	1.0000	0.8808	0.8794	0.6097
	A28	0.8716	0.8608	1.0000	0.8440	0.8478	0.5368
	A29	0.8681	0.8545	1.0000	0.8402	0.8434	0.5256

Table 13. Results of the LMAW-DNMA method

											w1	w2	w3	
											0.6	0.1	0.3	
			CCM	φ		UCM	φ		ICM	φ	Utility Values			Rank Order
		u1(ai)	Rank	0.5	u2(ai)	Rank	0.5	u3(ai)	Rank	0.5				
Belgium	A1	0.3228	7	0.6179	0.1772	6	0.6249	0.6233	7	0.7404	0.6553	0.6553		7
Bulgaria	A2	0.2472	16	0.3949	0.1960	15	0.7652	0.5668	16	0.5566	0.4804	0.4804		16
Czech Republic	A3	0.2940	10	0.5418	0.1878	9	0.6804	0.6045	11	0.6592	0.5909	0.5909		10
Denmark	A4	0.2555	15	0.4194	0.1992	19	0.8253	0.5751	15	0.5769	0.5072	0.5072		15
Germany	A5	0.7051	2	0.8871	0.1951	14	0.7510	0.7531	5	0.8443	0.8606	0.8606		2
Estonia	A6	0.2019	27	0.1779	0.2040	26	0.9441	0.5227	26	0.4170	0.3263	0.3263		27
Ireland	A7	0.2425	17	0.3721	0.1980	17	0.7954	0.5618	17	0.5389	0.4644	0.4644		17
Greece	A8	0.2866	11	0.5173	0.1915	12	0.7188	0.6006	13	0.6236	0.5694	0.5694		12
Spain	A9	0.6886	3	0.8599	0.1029	2	0.3563	0.8153	3	0.9129	0.8254	0.8254		3
France	A10	0.8804	1	1.0000	0.0637	1	0.2198	0.9116	1	1.0000	0.9220	0.9220		1
Croatia	A11	0.2124	21	0.2780	0.2005	21	0.8572	0.5356	22	0.4590	0.3902	0.3902		21
Italy	A12	0.5602	5	0.7576	0.1310	3	0.4553	0.7233	6	0.8107	0.7433	0.7433		5
Cyprus	A13	0.1991	28	0.1672	0.2043	27	0.9614	0.5198	28	0.4061	0.3183	0.3183		28
Latvia	A14	0.2053	24	0.2204	0.2026	24	0.9084	0.5270	23	0.4430	0.3560	0.3560		24
Lithuania	A15	0.2170	20	0.2997	0.1989	18	0.8109	0.5381	20	0.4834	0.4059	0.4059		20
Luxembourg	A16	0.2039	25	0.2042	0.2062	29	1.0000	0.5226	27	0.4120	0.3461	0.3461		25
Hungary	A17	0.2574	14	0.4415	0.1927	13	0.7327	0.5773	14	0.5939	0.5164	0.5164		14

Malta	A18	0.1952	29	0.1587	0.2061	28	0.9825	0.5158	29	0.4008	0.3137	0.3137	**29**
Netherlands	A19	0.4788	6	0.7002	0.1358	4	0.4757	0.7549	4	0.8630	0.7266	0.7266	**6**
Austria	A20	0.2847	13	0.4734	0.1909	11	0.7073	0.6025	12	0.6411	0.5471	0.5471	**13**
Poland	A21	0.5728	4	0.7833	0.1594	5	0.5599	0.8284	2	0.9376	0.8072	0.8072	**4**
Portugal	A22	0.2958	9	0.5645	0.1877	8	0.6726	0.6096	9	0.6970	0.6151	0.6151	**9**
Romania	A23	0.2853	12	0.4951	0.1902	10	0.6961	0.6081	10	0.6785	0.5702	0.5702	**11**
Slovenia	A24	0.2061	23	0.2378	0.2025	23	0.8926	0.5265	24	0.4338	0.3621	0.3621	**23**
Slovakia	A25	0.2330	18	0.3473	0.1971	16	0.7803	0.5512	18	0.5181	0.4419	0.4419	**18**
Finland	A26	0.2312	19	0.3262	0.1996	20	0.8403	0.5507	19	0.5044	0.4311	0.4311	**19**
Sweden	A27	0.2982	8	0.5875	0.1829	7	0.6501	0.6097	8	0.7151	0.6320	0.6320	**8**
Serbia	A28	0.2118	22	0.2588	0.2016	22	0.8749	0.5368	21	0.4707	0.3840	0.3840	**22**
BiH	A29	0.2032	26	0.1901	0.2029	25	0.9251	0.5256	25	0.4256	0.3342	0.3342	**26**
	MAX	0.8804			0.2062			0.9116					

Graph 2. Ranking



Source: Author's picture

According to the results of the LMAW-DNMA method, the top five countries of the European Union in terms of trade performance include: France, Germany, Spain, Poland and Italy. In terms of trade performance, the leading countries of the European Union (Germany, France and Italy) are well positioned. Malata is positioned in the last place.

In terms of trade performance, Croatia is better positioned than Slovenia (21st and 23rd place, respectively).

Serbia ranked twenty-second in terms of trade performance. It is positioned worse than Croatia, but it is better than Slovenia.

The trade of Bosnia and Herzegovina took twenty-sixth place in terms of performance. It is worse positioned in relation to the performances of Croatia, Slovenia and Serbia.

In order to improve the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina, it is necessary to more efficiently manage the number and size of companies, human resources, personal expenses, turnover and added value.

The performance positioning of the trade of the countries of the European Union, Serbia and Bosnia and Herzegovina was influenced by numerous macro and micro factors. These are: global political and economic climate, foreign direct investments, asset management, new business models (multichannel sales, private label, sales of organic products, etc.), new concepts of cost, sales and profit management (calculation of costs by activity, management customers, product category management, etc.), the Covid-19 pandemic, the energy crisis, etc. A key factor is the digitization of the entire business. The target profit of the trade of the countries of the European Union, Serbia and Bosnia and Herzegovina can be achieved by effective control of critical factors (price, costs, quality, innovation and growth) of business success. The research in this paper in itself indicates the importance of applying different methods of multi-criteria decision-making (Fuzzy AHP - TOPSIS, ELECTRE, MABAC, OCRA, WASPAS, ARAS, MARCOS, TRUST, etc.) in the analysis of trade performance and efficiency. It is recommended that they, especially in an integrated manner, be increasingly used during measurement and analysis in order to improve the performance and efficiency of trade.

CONCLUSION

Based on the empirical analysis carried out in this paper, we are able to summarize the following conclusions: Descriptive statistics data show that: the number of companies ranges from 7492.0 (Luxembourg) to 1043209.00 (Italy), the number of employees ranges from 36480.00 (Malta) to 6513411.00 (Germany), employee expenses range from 594.70 (Malta) to 205616.50 (Germany), turnover ranges from 8603.80 (Malta), and value added ranges from 993.60 (Malta) to 330287.80 (Germany). In Serbia and Bosnia and Herzegovina, all observed statistical variables are below the average. These differences in the size of statistical variables are maintained in their own way on the performance and positioning of individual countries of the European Union, Serbia and Bosnia and Herzegovina. Data from the correlation analysis show that there is a strong correlation between the observed statistical variables, at the level of statistical significance. The null hypothesis is rejected. There is a significant difference between the observed statistical variables. Based on the results obtained by applying the LMAW-DNMA method in measuring and analyzing the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina, the following can be concluded: According to the results of the LMAW-DNMA method, the top five countries of the European Union in terms of trade performance include : France, Germany, Spain, Poland and Italy. In terms of trade performance, the leading countries of the European Union (Germany, France and Italy) are well positioned. Malata is positioned in the last place. In terms of trade performance, Croatia is better positioned than Slovenia (21st and 23rd place, respectively). In terms of trade performance, Serbia took twenty-second place, and is positioned worse than Croatia, but better than Slovenia. Bosnia and Herzegovina's trade in terms of performance took twenty-sixth place, and is worse positioned compared to the performance of Croatia, Slovenia and Serbia. In order to improve the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina, it is necessary to more effectively manage the number and size of companies, human resources, personal expenses, turnover and added value. Numerous factors influenced the performance positioning of the trade of the countries of the European Union, Serbia and Bosnia and Herzegovina. These are: global political and economic climate, foreign direct investments, asset management, new business models (multichannel sales, private label, sales of organic products , etc.), new concepts of cost, sales and profit management (calculation of costs by activity, management customers, product category management, etc.), the Covid-19 pandemic, the energy crisis, etc. A key factor is the digitization of the entire business. The target trade profit of the countries of the European Union, Serbia and Bosnia and Herzegovina can be achieved by effective control of the critical factors of business success.

REFERENCES

[1] Baicu, C.G., State, O., Gârdan, D.A., Gârdan, I.P., & Țicău, I.R., (2022). Financial and Competitive Implications of the European Green Deal – Perceptions of Retail Managers. Amfiteatru Economic, 24(61), 683-700.

[2] Berman, B. R., Evans, J. R., & Chatterjee, P. M. (2018). Retail Management: A Strategic Approach. 13th Edition, Pearson.

[3] Chakraborty, S., & Zavadskas, E. K. (2014). Applications of WASPAS method in manufacturing decision making. Informatica, 25(1), 1- 20.

[4] Demir, G. (2022). Analysis of the financial performance of the deposit banking sector in the Covid-19 period with LMAW-DNMA methods. International Journal of Insurance and Finance, 2(2), 17-36. https://doi.org/10.52898/ijif.2022.7

[5] Ecer, F. (2020). Multi-criteriad Decision-making comprehensive approach from past to present. Seçkin Publications.

[6] Ersoy, N .(2017). Performance measurement in retail ındustry by using a multi-criteria decision making methods. Ege Academic Review, 17(4), 539–551. https://doi.org/10.21121/eab.2017431302

[7] Gaur, L., Agarwal, V., & Anshu ,K. (2020). Fuzzy DEMATEL Approach to Identify the Factors Influencing Efficiency of Indian Retail Websites. In: Kapur P., Singh O., Khatri S., Verma A. (eds) Strategic System Assurance and Business Analytics. Asset Analytics (Performance and Safety Management). Springer, Singapore. https://doi.org/10.1007/978-981-15-3647-2_6

[8] Görçün, Ö.F., Zolfani, S.H. & Çanakçıoğlu, M.(2022). Analysis of efficiency and performance of global retail supply chains using integrated fuzzy SWARA and fuzzy EATWOS

methods. Oper Manag Res. https://doi.org/10.1007/s12063-022-00261-z
[9] Harangi-Rákos, M., & Fenyves, V. (2021). Financial performance and market growth of the companies in Hungary and Romania: A study of the food retail companies [Special issue]. Corporate Ownership & Control, 18(3), 325–336. http://doi.org/10.22495/cocv18i3siart7
[10] Keshavarz-Ghorabaee, M., Amiri, M., Hashemi-Tabatabaei, M., Zavadskas, E. K., & Kaklauskas, A. A. (2020). New Decision-Making Approach Based on Fermatean Fuzzy Sets and WASPAS for Green Construction Supplier Evaluation. Mathematics, 8(12), 2202. https://doi.org/10.3390/math8122202
[11] Liao, H., & Wu, X. (2020). DNMA: A double normalization-based multiple aggregation methods for multi-expert multi-criteria decision making. Omega, 94, 102058. https://doi.org/10.1016/j.omega.2019.04.001
[12] Levy, M., Weitz, B., & Grewal, D. (2019). Retailing Management. 10th Edition, Mc Graw Hill.
[13] Lucas, A., & Ramires, A. (2022). Directions for management in small and medium hotels and restaurants companies. GeoJournal of Tourism and Geosites, 40(1), 210–217. https://doi.org/10.30892/gtg.40125-821
[14] Lukic, R, Hadrovic Zekic, B., & Crnjac Milic, D. (2020). Financial performance evaluation of trading companies in Serbia using the integrated Fuzzy AHP - TOPSIS Approach. 9th international scientific symposium region, entrepreneurship, development, Under the auspices of: Republic of croatia ministry of science and education, Osijek, Croatia, Josip Juraj Strossmaye, June, 690-703.
[15] Lukic, R. (2021a). Application of ELECTRE method in performance analysis of food retailers in Serbia. Business Excellence and Managemen, 1(3), 84-102. DOI: https://doi.org/10.24818/beman/2021.11.3-05
[16] Lukic, R. (2021b). Analysis of trade efficiency in Serbia based on the MABAC method. Economic outlook, 23(2), 1-18.
[17] Lukic, R., & Hadrovic Zekic, B. (2021). Evaluation of transportation and storage efficiency in Serbia based on ratio analysis and the OCRA method. Proceedings of the 21 th International Scientific Conference business logistics in modern management October 7-8, Osijek, Croatia, Josip Juraj Strossmayer University of Osijek, Faculty of Economics in Osijek, 189-200.
[18] Lukic, R., Vojteski Kljenak, D., Anđelic, S., & Gavilovic, M. (2021). Application WASPAS method in the evaluation of efficiency of agriccultural enterprises in Serbia. Economics of Agriculture, Year 68, No. 2, (pp. 375-388), Belgrade. DOI: https://doi.org/10.5937/ekoPolj2102375L
[19] Lukić, R., & Hadrović Zekić, B. (2022). Efficiency analysis of trade companies in Serbia using the ARAS method. 22 nd international scientific conference Business Logistics in Modern Management, Josip juraj strossmayer university of osijek faculty of economics in osijek, October 6-7, 2022, Osijek, Croatia, 105-119.
[20] Lukic, R. (2022a). Application of the MARCOS Method in Analysis of the Positioning of Electronic Trade of the European Union and Serbia. Informatica Economică, 26(3), 50-63. DOI: 10.24818/issn14531305/26.3.2022.05
[21] Lukic, R. (2022b). Analysis of Kosovo and Metohija Trade Performance. Management and Economics Review, 7(3), 379-391. DOI: 10.24818/mer/2022.10-08
[22] Lukic, R. (2022c). Employee costs of distribution trade of the European Union and Serbia. Business Excellence and management, 12(3), 60-76. DOI: https://doi.org/10.24818/beman/2022.12.3-05
[23] Lukic, R. (2022d). Analysis of Investment Efficiency of Distribution Trade of Selective Countries of the European Union and Serbia on the Basis of TRUST Method. Review of International Comparative Management, 23(2), 382-399. DOI: 10.24818/RMCI.2022.3.382
[24] Lukic, R.(2022e). Application of MARCOS method in evaluation of efficiency of trade companies in serbia. Ekonomski pogledi – Economic outlook, Vol. 24, No. 1/2022 pp. 1-14. DOI: 10.5937/ep24-38921
[25] Lukić, R. (2022f). Analysis of economic performance of trade companies in Serbia. Poslovna Ekonomija - Business Economics, Godina XVI, Broj 2 Str 32– 53. doi: 10.5937/poseko22-37860
[26] Lukic, R. (2022g). Measurement and Analysis of the Dynamics of Financial Performance and Efficiency of Trade in Serbia Based on the DEA Super-Radial Model. Review of International Comparative Management, 23(5), 630-645. DOI: 10.24818/RMCI.2022.5.630
[27] Lukic, R. (2023). Measurement and analysis of the information performance of companies in the European Union and Serbia based on the fuzzy LMAW and MARCOS methods. Informatica Economica, 27(1), 17 – 31. DOI: 10.24818/issn14531305/27.1.2023.02
[28] Pamučar, D., Žižović, M., Biswas, S., & Božanić, D. (2021). A new Logarithm Methodology of additive weights (LMAW) for multi-criteria decision-making: application in logistics. Facta Universitatis Series: Mechanical Engineering, 19(3), Special Issue: 361-380. https://doi.org/10.22190/FUME210214031P
[29] Marques, P.A., Jorge, D., & Reis, J. (2022). Using Lean to Improve Operational Performance in a Retail Store and E-Commerce Service: A Portuguese Case Study. Sustainability, 14, 5913. https://doi.org/10.3390/su14105913

[30] Maxim, L. G., (2021). The importance of efficiency of the supply process for retail companies: case study. Journal of Management, Marketing and Logistics (JMML), 8(4), 197-202. http://doi.org/10.17261/Pressacademia.2021.1527
[31] Milićević, R M., & Župac, Ž. G. (2012).Subjektivni pristup određivanju težina kriterijuma. Vojnotehnicki glasnik/Military Technical Courier, 60(2), no. 2, 48- 70.
[32] Saaty, T. L. (2008). Decision Making With The Analytic Hierarchy Process. Int J Serv Sci, 1(1), 83-98.
[33] Senapati, T., & Yager, R.R. (2020). Fermatean fuzzy sets. J. Ambient Intell. Humaniz. Comput. , 11, 663–674.
[34] Senapati, T., &Yager, R.R. (2019a). Some new operations over Fermatean fuzzy numbers and application of Fermatean fuzzy WPM in multiple criteria decision making. Informatica, 30, 391–412.
[35] Senapati, T., &Yager, R.R. (2019b). Fermatean fuzzy weighted averaging/geometric operators and its application in multi-criteria decision-making methods. Eng. Appl. Artif. Intell., 85, 112–121.
[36] Urosevic, S., Karabasevic,D., Stanujkic,D., & Maksimovic,M. (2017). An Approach Personel Selection in the Tourism Indystry Based on the SWARA and the WASPAS Methods. Economic computation and economic cybernetics studies and research, 51(1), 75-88.
[37] Zardari, N.H., Ahmed, K., Shirazi, S.M., & Yusop, Z.B. (2014). Weighting Methods and their Effects on Multi-Criteria Decision Making Model Outcomes in Water Resources Management. Springer: New York, NY, USA.
[38] Zavadskas, E.K., Turskis, Z., Antucheviciene, J., & Zakarevicius, A. (2012). Optimization of weighted aggregated sum product assessment. Elektron. Elektrotechnika, 122, 3–6.
[39] Zavadskas, E. K., Antucheviciene, J., Saparauskas, J., & Turskis, Z. (2013a). Multi-criteria assessment of facades' alternatives: peculiarities of ranking methodology. Procedia Engineering, 57, 107-112.
[40] Zavadskas, E. K., Antucheviciene, J., Saparauskas, J., & Turskis, Z. (2013b). MCDM methods WASPAS and MULTIMOORA: verification of robustness of methods when assessing alternative solutions. Economic Computation and Economic Cybernetics Studies and Research, 47(2), 5-20.

SUMMARY

Based on the empirical analysis carried out in this paper, we are able to summarize the following conclusions:Descriptive statistics data show that: the number of companies ranges from 7492.0 (Luxembourg) to 1043209.00 (Italy), the number of employees ranges from 36480.00 (Malta) to 6513411.00 (Germany), employee expenses range from 594.70 (Malta) to 205616.50 (Germany), turnover ranges from 8603.80 (Malta), and value added ranges from 993.60 (Malta) to 330287.80 (Germany). In Serbia and Bosnia and Herzegovina, all observed statistical variables are below the average. These differences in the size of statistical variables are maintained in their own way on the performance and positioning of individual countries of the European Union, Serbia and Bosnia and Herzegovina. Data from the correlation analysis show that there is a strong correlation between the observed statistical variables, at the level of statistical significance. The null hypothesis is rejected. There is a significant difference between the observed statistical variables. Based on the results obtained by applying the LMAW-DNMA method in measuring and analyzing the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina, the following can be concluded: According to the results of the LMAW-DNMA method, the top five countries of the European Union in terms of trade performance include : France, Germany, Spain, Poland and Italy. In terms of trade performance, the leading countries of the European Union (Germany, France and Italy) are well positioned. Malata is positioned in the last place. In terms of trade performance, Croatia is better positioned than Slovenia (21st and 23rd place, respectively). In terms of trade performance, Serbia took twenty-second place, and is positioned worse than Croatia, but better than Slovenia. Bosnia and Herzegovina's trade in terms of performance took twenty-sixth place, and is worse positioned compared to the performance of Croatia, Slovenia and Serbia. In order to improve the trade performance of the countries of the European Union, Serbia and Bosnia and Herzegovina, it is necessary to more effectively manage the number and size of companies, human resources, personal expenses, turnover and added value. Numerous factors influenced the performance positioning of the trade of the countries of the European Union, Serbia and Bosnia and Herzegovina. These are: global political and economic climate, foreign direct investments, asset management, new business models (multichannel sales, private label, sales of organic products , etc.), new concepts of cost, sales and profit management (calculation of costs by activity, management customers, product category management, etc.), the Covid-19 pandemic, the energy crisis, etc. A key factor is the digitization of the entire business. The target trade profit of the countries of the European Union, Serbia and Bosnia and Herzegovina can be achieved by effective control of the critical factors of business success.