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ECONOMIC PERFORMANCE OF THE ECONOMY OF BOSNIA AND HERZEGOVINA

ABSTRACT.

The issue of analyzing factors of the dynamics of the economic performance of every economy, which means Bosnia and Herzegovina as well, is continuously very current, challenging, significant, and complex. Adequate control of key factors can significantly influence the achievement of the target economic performance of the economy of Bosnia and Herzegovina. The application of multi-criteria decision-making methods enables adequate control of the key factors of the economic performance of the economy of Bosnia and Herzegovina. Bearing that in mind, this paper analyzes the dynamics of the economic performance of the economy of Bosnia and Herzegovina in the period 2013 - 2022 based on the LMAW-DNMA method. The top five years according to the economic performance of the economy of Bosnia and Herzegovina according to the LMAW-DNMA method are in order: 2018, 2019, 2017, 2016, and 2015. The worst economic performance of the economy of Bosnia and Herzegovina was achieved in 2020. Lately, in general, it has significantly improved the economic performance of the economy of Bosnia and Herzegovina. This was influenced by adequate management of the analyzed statistical variables (gross domestic product, inflation, agriculture, industry, export, import, capital, income, taxes, time required to start business - days, and domestic loans provided by the financial sector). Likewise, the geopolitical situation, the economic climate, foreign direct investments, the COVID-19 pandemic, the energy crisis, the digitalization of the company's entire operations, and other factors. In any case, their adequate control can greatly influence the achievement of the target economic performance of the economy of Bosnia and Herzegovina.

Keywords*: performance, economy, Bosnia and Herzegovina, LMAW-DNMA method*

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1. INTRODUCTION

Research into the factors of the dynamics of the economic performance of every economy, which means Bosnia and Herzegovina as well, is very challenging, significant, complex, and continuously current. It indicates the critical factors and what measures should be taken to achieve the target economic performance of the economy of Bosnia and Herzegovina. Bearing that in mind, this paper analyzes the dynamic factors of the economic performance of the economy of Bosnia and Herzegovina using the LMAW-DNMA method. LMAW-DNMA is a newer multi-criteria decision-making method. Based on a complex analysis using the given methodology, the real situation in terms of the achieved economic performance of the economy of Bosnia and Herzegovina can be viewed and, in the context of this, relevant measures for improvement in the future can be proposed, such as effective management of the growth of the gross domestic product, inflation, industry, agriculture, import, export, income, taxes, time required to start a business - days and domestic loans provided by the financial sector, etc.

There is no doubt that permanent control of key factors is a basic assumption for improving the economic performance of the economy of Bosnia and Herzegovina. In addition to the application of ratio analysis, statistical analysis, DEA analysis, and the use of multi-criteria decision-making methods, including the LMAW-DNMA method, a significant role is played in this. About the classic analysis, the integrated application of multi-criteria decision-making methods, in the specific case of the LMAW and DNMA methods, gives more accurate results of the achieved economic performance of the economy of Bosnia and Herzegovina as a basis for improvement in the future by applying adequate measures. In this paper, considering that the analysis of factors of the dynamics of the economic performance of the economy of Bosnia and Herzegovina is based on ratio analysis, statistical analysis, and, in particular, on the use of the LMAW-DNMA method, which enables the ranking of alternatives (in this particular case, the alternatives are the observed years) based on the simultaneous use of several selected relevant economic criteria. Knowing the positioning of the observed alternatives - year is a prerequisite for improvement in the future by applying relevant economic and other measures.

The literature devoted to the analysis of the economic performance of each economy is very rich. In classical literature, the analysis of the economic performance of the economy is mainly based on financial analysis, ratio analysis, and statistical analysis. In modern literature, DEA (Data Envelopment Analysis) models are increasingly used in the world when analyzing the efficiency of companies (Park, & Kim, 2022; Zohreh Moghaddas et al., 2022; Amirteimoori et al., 2022; Alam et al., 2022; Fotova Čiković & Lozić, 2022; Sala-Garrido, 2023; Andersen, & Petersen, 1993; Banker et al., 1984; Chen et al., 2021, Chang et al., 2020; Guo, & Cai, 2020; Lee et al., 2011;

Lin et al., 2020; Pendharkar et al., 2021; Tone, 2002; Dobrović et al., 2021; Podinovski et al., 2021; Rostamzadeh et al., 2021; Fenyves, & Tarnóczi, 2020; Amini et al., 2019; Tsai et al., 2021; Cooper et al., 1999; Amin, & Hajjami, 2021; Chen et al., 2018, 2020, 2021a,b; Stević et al., 2022; Rasoulzadeh et al., 2021). The same is the case with the analysis of the efficiency of companies in Serbia (Đurić et al., 2020; Mandić et al., 2017; Martić, & Savić, 2001; Radonjić, 2020; Lukic et al., 2017, 2020; Lukic, 2018, 2022a, b,c, 2023c; Lukic & Kozarevic, 2019; Lukic & Hadrovic Zekic, 2019; Vojteški Kljenak & Lukić, 2022). DEA models give a realistic picture of which companies are efficient and which are not, and what measures should be taken to increase efficiency.

As far as we know, there are no works in the literature that analyze the performance of individual countries using the LMAW-DNMA method. This study can be an incentive to apply these methods of multi-criteria decision-making in the evaluation of the performance of individual countries in their ranking.

As far as we know, there are no works in the literature that use these multi-criteria decision-making methods for companies in the region. This study can serve as an incentive to apply the given methods of multi-criteria decision-making to companies in the region.

In recent times, in the world literature, in addition to the DEA model, multi-criteria decision-making methods (ARAS, MARCOS, PROMETHEE, TOPSIS, WASPAS, etc.) are increasingly being applied when analyzing company performance (Ayçin & Arsu, 2021; Popović et al., 2022; Ecer & Aycin, 2022; Mishra et al., 2022; Nguyen et al., 2022; Rani et al., 2022; Toslak et al., 2022). The situation is the same with literature in Serbia (Stojanović et al., 2022; Lukic, 2021, 2023a,b,e,f,g,h, j,k). Because multi-criteria decision-making methods lead to more realistic results compared to classic methods (such as financial analysis, and ratio analysis) as a basis for improvement in the future by applying relevant eco-friendly and other measures. Based on that, this paper analyzes the factors of economic performance dynamics of the economy of Bosnia and Herzegovina by using, in addition to ratio analysis and statistical analysis, the LMAW-DNMA method. LMAW-DNMA is a newer method of multi-criteria decision-making, and compared to the classical method, for example, ratio analysis, it gives more accurate results considering that it simultaneously integrates several indicators. This enables the selection of adequate economic and other measures to improve the economic performance of the economy of Bosnia and Herzegovina in the future.

2. RESEARCH METHODOLOGY

By applying the LMAW and DNMA methods, we will evaluate the dynamic factors of the economic performance of the economy of Bosnia and Herzegovina based on statistical data from the World Bank. In the following, we will present the basic characteristics of the given methods.

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

Step 1: Determination of weight coefficients of criteria Experts $E = \{E_1, E_2, \dots, E_k\}$ set priorities with criteria $C = \{C_1, C_2, \dots, C_n\}$ about 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. The label γ_{cn}^{e} represents the value of the linguistic scale that the expert $e(1 \le e \le k)$ assigns to the criterion $C_t(1 \le t \le n)$.

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. It is calculated according to the equation:

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

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

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 $R^e = (n_{C1}^{e}, n_{C2}^{e}, \dots, n_{Cn}^{e})$ is obtained. Where n_{Cn}^{e} represents the value of the relation vector derived from the previous equation, and R e represents the relational vector $e(1 \le e \le k)$.

Step 1.3: Determination of the vector of weight coefficients

The vector of weight coefficients $w = (w_1, w_2, \dots, w_n)^T$ 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 represents the weighting coefficients obtained according to expert evaluations e^{th} and the n_{Cn}^eelements of the realization 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 $w = (w_1, w_2, \dots, w_n)^T$:

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

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

The **DNMA** (Double Normalization-based Multiple Aggregation *)* method is a newer method for showing alternatives (Demir, 2022). Two different normalized (linear and vector) techniques are used, as well as three different coupling functions (Complete Compensatory Model - CCM, Uncompensatory Model - UCM, and Incomplete Compensatory Model - ICM). The steps for 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 $\left(\hat{x}_{ij}^{1N}\right)$ normalization using the following equation:

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

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

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

The value r_j is the target value for c_j the criterion and is considered $\max_i x^{ij}$ for both utility and $\min_i x^{ij}$ cost criteria.

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:

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

Step 2.2: Values of the standard deviation calculated for the criteria se 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:

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

Step 3: Calculating the aggregation model

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

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

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

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

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

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

$$u_3(a_i) = \prod_{j=1}^{n}\left(\frac{\hat{x}_{ij}^{2N}}{\max\limits_i \hat{x}_{ij}^{2N}}\right)^{\widehat{w}_j} \quad (11)$$

Step 4: Integration of utility values

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

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

In this case, the means $r_1(a_i)$ and $r_3(a_i)$ represent the ordinal number of the alternative a_i sorted by CCM and ICM functions in descending value (higher value first). On the other hand, $r_2(a_i)$ 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 to $w_1 + w_2 + w_3 = 1$. When determining the weights, if the decision maker attaches importance to a wider range of performance alternatives, he can set a higher value for w_1. In case the decision maker is not willing 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 may assign a greater weight to w_3 if he simultaneously considers overall performance and risk. Finally, the DN values are sorted in descending order, with the higher-value alternatives being the best.

3. RESULTS AND DISCUSSION

The key issue in the application of the LMAW-DNMA method in the evaluation of the economic performance of the economy of Bosnia and Herzegovina is the selection of appropriate criteria and the determination of their weight coefficients, as well as alternatives. In this paper, the selection of criteria was made according to the nature of the research of the treated problem. Table 1 shows the descriptive statistics of the initial data. Figure 1 shows a ratio analysis of the observed economic performance indicators of the economy of Bosnia and Herzegovina for the period 2013-2022.

Table 1. *Descriptive statistics*

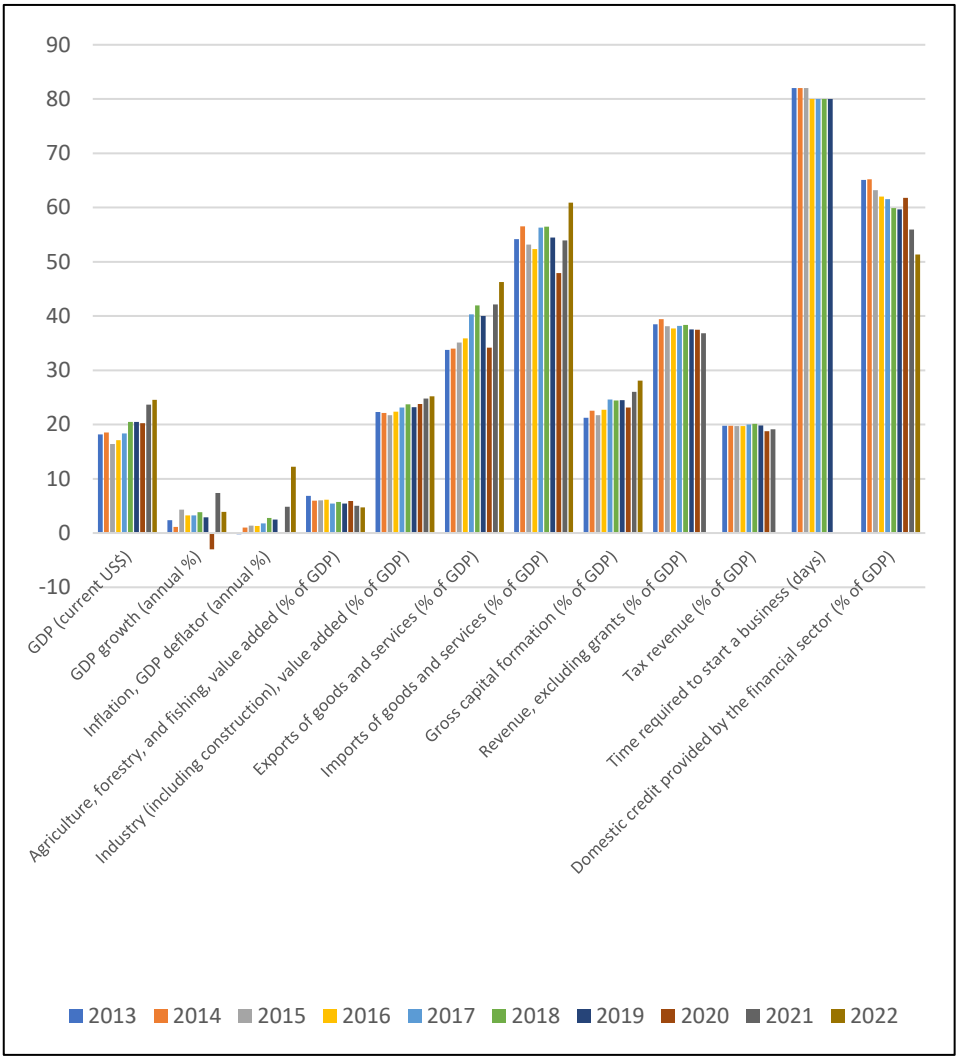
Statistics												
	GDP (current US$)	**GDP growth (annual %)**	**Inflation, GDP deflator (annual %)**	**Agriculture, forestry, and fishing, value added (% of GDP)**	**Industry (including construction), value added (% of GDP)**	**Exports of goods and services (% of GDP)**	**Imports of goods and services (% of GDP)**	**Gross capital formation (% of GDP)**	**Revenue, excluding grants (% of GDP)**	**Tax revenue (% of GDP)**	**Time required to start a business (days)**	**Domestic credit provided by the financial sector (% of GDP)**
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Mean	19.79	2.92	2.76	5.72	23.23	38.36	54.62	23.89	34.20	17.67	56.60	60.56
Std. Deviation	2.65	2.63	3.63	.60	1.14	4.35	3.36	2.09	12.03	6.22	39.06	4.22
Minimum	16.40	-3.02	-.22	4.71	21.73	33.74	47.93	21.23	.00	.00	.00	51.36
Maximum	24.53	7.39	12.24	6.84	25.21	46.25	60.89	28.12	39.42	20.14	82.00	65.20
CAGR Calculator (Compound Annual Growth Rate)	3.04 %	5.20 %	49.46 %	-3.64 %	1.23 %	3.20 %	1.17 %	2.85 %	-0.48 %	-0.36	-0.35	-2.34 %

Source: *The World Bank, World Development Indicators*. https://databank.worldbank.org/reports.aspx?source=2&country=SRB#

Note: *Author's statistics*

According to the analysis of the indicators, in 2021 the values of most indicators of the economic performance of the economy of Bosnia and Herzegovina are higher compared to 2020. In 2022, the values of most indicators of the economic performance of the economy of Bosnia and Herzegovina are also higher compared to 2021. They are also higher in statistical average. This leads to the conclusion that the economic performance of the economy of Bosnia and Herzegovina has improved to some extent recently.

Figure 1. *Economic performance indicators of the economy of Bosnia and Herzegovina*



Source: *Author's picture*

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Table 2 shows the correlation matrix of the initial data.

Table 2. *Correlations*

Correlations													
		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
C1	Pearson Correlation	1	.269	.792 **	-.795 **	.959 **	.782 **	.398	.885 **	-.651 *	-.647 *	-.787 **	-.884 **
	Sig. (2-tailed)		.453	.006	.006	.000	.008	.254	.001	.041	.043	.007	.001
C2	Pearson Correlation	.269	1	.428	-.402	.220	.564	.487	.393	-.145	-.107	.042	-.437
	Sig. (2-tailed)	.453		.218	.249	.541	.089	.153	.262	.690	.769	.909	.206
C3	Pearson Correlation	.792 **	.428	1	-.809 **	.763 *	.852 **	.705 *	.891 **	-.927 **	-.914 **	-.565	-.930 **
	Sig. (2-tailed)	.006	.218		.005	.010	.002	.023	.001	.000	.000	.089	.000
C4	Pearson Correlation	-.795 **	-.402	-.809 **	1	-.810 **	-.872 **	-.493	-.947 **	.609	.593	.590	.882 **
	Sig. (2-tailed)	.006	.249	.005		.005	.001	.147	.000	.061	.071	.073	.001
C5	Pearson Correlation	.959 **	.220	.763 *	-.810 **	1	.813 **	.312	.908 **	-.635 *	-.627	-.822 **	-.902 **
	Sig. (2-tailed)	.000	.541	.010	.005		.004	.380	.000	.049	.052	.004	.000
C6	Pearson Correlation	.782 **	.564	.852 **	-.872 **	.813 **	1	.668 *	.943 **	-.654 *	-.622	-.407	-.908 **
	Sig. (2-tailed)	.008	.089	.002	.001	.004		.035	.000	.040	.055	.244	.000
C7	Pearson Correlation	.398	.487	.705 *	-.493	.312	.668 *	1	.579	-.629	-.611	.077	-.486
	Sig. (2-tailed)	.254	.153	.023	.147	.380	.035		.079	.051	.061	.832	.155
C8	Pearson Correlation	.885 **	.393	.891 **	-.947 **	.908 **	.943 **	.579	1	-.731 *	-.712 *	-.623	-.952 **
	Sig. (2-tailed)	.001	.262	.001	.000	.000	.000	.079		.016	.021	.054	.000
C9	Pearson Correlation	-.651 *	-.145	-.927 **	.609	-.635 *	-.654 *	-.629	-.731 *	1	.998 **	.542	.795 **
	Sig. (2-tailed)	.041	.690	.000	.061	.049	.040	.051	.016		.000	.105	.006
C10	Pearson Correlation	-.647 *	-.107	-.914 **	.593	-.627	-.622	-.611	-.712 *	.998 **	1	.560	.775 **
	Sig. (2-tailed)	.043	.769	.000	.071	.052	.055	.061	.021	.000		.092	.008
C11	Pearson Correlation	-.787 **	.042	-.565	.590	-.822 **	-.407	.077	-.623	.542	.560	1	.695 *
	Sig. (2-tailed)	.007	.909	.089	.073	.004	.244	.832	.054	.105	.092		.026
C12	Pearson Correlation	-.884 **	-.437	-.930 **	.882 **	-.902 **	-.908 **	-.486	-.952 **	.795 **	.775 **	.695 *	1
	Sig. (2-tailed)	.001	.206	.000	.001	.000	.000	.155	.000	.006	.008	.026	
**. Correlation is significant at the 0.01 level (2-tailed).													
*. Correlation is significant at the 0.05 level (2-tailed).													

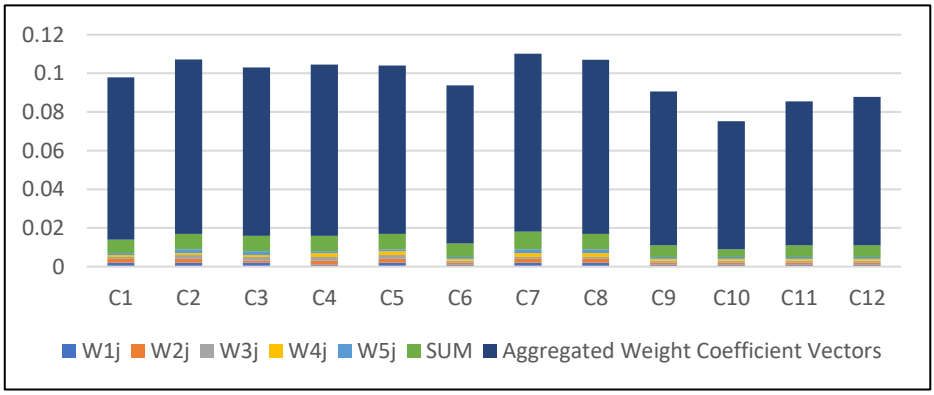
Source: *Author's statistics*

The correlation matrix shows that inflation is a significant factor in the economic performance of the economy of Bosnia and Herzegovina. Adequate control of inflation can influence the achievement of the target economic performance of the economy of Bosnia and Herzegovina.

In the annex, Tables 1 and 2 show the linguistic terms and the calculation of the weighting coefficients of the criteria using the LMAW method.

Figure 2 shows the evaluation and weighting coefficients of the criteria determined by applying the LMAW method. (All calculations and results are the author's.)

Figure 2. *Weight coefficients of criteria*



Source: *Author's picture*

So, in this particular case, the most important criterion is C7 - Imports of goods and services (% of GDP). This means, in other words, that the economic performance of the economy of Bosnia and Herzegovina can be improved to a certain extent with adequate control of the import of goods and services.

In the annex, Tables 3-8 show the calculation using the LMAW-DNMA method. Table 3 shows the results of the LMAW and DNMA methods. (All calculations and results are by the authors.)

In the specific case, therefore, the top five years in terms of the economic performance of the economy of Bosnia and Herzegovina according to the LMAW-DNMA method are in order: 2018, 2019, 2017, 2016, and 2015. In the period 2013 - 2022, the worst economic performances of the economy of Bosnia and Herzegovina were achieved in 2020. Among other things, this was influenced by the Covid-19 pandemic. Taken as a whole, it can be concluded based on the results of the given empirical analysis that the economic performance of the economy of Bosnia and Herzegovina has improved to a certain extent recently. The factors that influenced it were: adequate management of the analyzed statistical variables (gross domestic product, inflation, agriculture, industry, import, export, capital, income, taxes, time

required to start business - days, and domestic loans provided by the financial sector). Likewise, the geopolitical situation, the economic climate, foreign direct investments, the energy crisis, the digitalization of the company's entire operation, etc. The target economic performance of the economy of Bosnia and Herzegovina can be achieved by adequate control of these and other critical factors of business success (price, costs, time, quality, innovation, and growth).

Table 3. *Rank Order*

											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				
2013	**A1**	0.5169	7	0.6378	0.0752	1	0.4098	0.0000	7	0.2828	0.5085	0.5085		**9**
2014	**A2**	0.5140	8	0.6068	0.1218	9	0.9120	0.8000	6	0.7476	0.6796	0.6796		**6**
2015	**A3**	0.5004	9	0.5712	0.1179	8	0.8485	0.8338	4	0.8464	0.6815	0.6815		**5**
2016	**A4**	0.5221	6	0.6770	0.1178	7	0.8029	0.8301	5	0.8045	0.7278	0.7278		**4**
2017	**A5**	0.5831	4	0.8129	0.1131	6	0.7407	0.8373	3	0.8918	0.8294	0.8294		**3**
2018	**A6**	0.6394	1	1.0000	0.1024	4	0.6178	0.8588	1	1.0000	0.9618	0.9618		**1**
2019	**A7**	0.5928	2	0.9137	0.1054	5	0.6669	0.8458	2	0.9434	0.8979	0.8979		**2**
2020	**A8**	0.3370	10	0.3793	0.1318	10	1.0000	0.0000	7	0.2828	0.4125	0.4125		**10**
2021	**A9**	0.5922	3	0.8654	0.0799	3	0.4785	0.0000	7	0.2828	0.6519	0.6519		**7**
2022	**A10**	0.5580	5	0.7489	0.0759	2	0.4313	0.0000	7	0.2828	0.5773	0.5773		**8**
	MAX	0.6394			0.1318			0.8588						

Source: *Author's statistics*

In the specific case, therefore, the top five years in terms of the economic performance of the economy of Bosnia and Herzegovina according to the LMAW-DNMA method are in order: 2018, 2019, 2017, 2016, and 2015. In the period 2013 - 2022, the worst economic performances of the economy of Bosnia and Herzegovina were achieved in 2020. Among other things, this was influenced by the Covid-19 pandemic. Taken as a whole, it can be concluded based on the results of the given empirical analysis that the economic performance of the economy of Bosnia and Herzegovina has improved to a certain extent recently. The factors that influenced it were: adequate management of the analyzed statistical variables (gross domestic product, inflation, agriculture, industry, import, export, capital, income, taxes, time required to start business - days, and domestic loans provided by the financial sector).

Likewise, the geopolitical situation, the economic climate, foreign direct investments, the energy crisis, the digitalization of the company's entire operation, etc. The target economic performance of the economy of Bosnia and Herzegovina can be achieved by adequate control of these and other critical factors of business success (price, costs, time, quality, innovation, and growth).

The research in this paper, using the example of the LMAW-DNMA method, demonstrated the justification of applying, in addition to the classical methodology, the method of multi-criteria decision-making in the evaluation of the economic performance of the economy of Bosnia and Herzegovina, as well as the DEA model. Because they give more accurate results. Therefore, it is recommended that they be used as much as possible in the analysis of the economic performance of the economy of Bosnia and Herzegovina.

4. CONCLUSION

Empirical research of the problem treated in this paper using the LMAW-DNMA method showed that the top five years in terms of the economic performance of the economy of Bosnia and Herzegovina are in order: 2018, 2019, 2017, 2016, and 2015. In the period 2013 - 2022, the worst economic performance of the economy in Bosnia and Herzegovina was achieved in 2020, partly due to the negative impact of the COVID-19 pandemic. Overall, recently the economic performance of the economy of Bosnia and Herzegovina has improved to a certain extent. Adequate management of analyzed statistical variables as factors (gross domestic product, inflation, agriculture, industry, import, export, capital, income, taxes, time required to start business - days, and domestic loans provided by the financial sector) contributed to this.).

Significant determinants of the economic performance of the economy of Bosnia and Herzegovina also include geopolitical situation, economic climate, foreign direct investments, digitization of the entire business of companies, energy crisis, and so on. To a certain extent, the negative effects of the COVID-19 coronavirus pandemic on the economic performance of the economy of Bosnia and Herzegovina have been mitigated by the application of digitization. The economy of Bosnia and Herzegovina can, all in all, achieve the target economic performance by adequately controlling the critical factors of business success (price, costs, time, quality, innovation, and growth).

There are no works in the literature, as far as we know, that analyze the performance of the economy of individual countries using the LMAW-DNMA method. This study can serve as an incentive to apply these multi-criteria decision-making methods in the evaluation of the performance of individual countries in their ranking to improve in the future. The performance ranking of individual countries can be done according

to different criteria depending on the purpose and goal of the research. At the same time, different methods of multi-criteria decision-making can be used in an integrated manner to obtain the best possible representation of the performance position of the observed countries.

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Radojko Lukić

EKONOMSKE PERFORMANSE EKONOMIJE BOSNE I HERCEGOVINE

SAŽETAK

Pitanje analize faktora dinamike ekonomskih performansi svake privrede, a to znači i Bosne i Hercegovine, kontinuirano je veoma aktuelno, izazovno, značajno i kompleksno. Adekvatna kontrola ključnih faktora može značajno uticati na postizanje ciljanog ekonomskog učinka privrede Bosne i Hercegovine. Primjena višekriterijumskih metoda odlučivanja omogućava adekvatnu kontrolu ključnih faktora ekonomskog učinka privrede Bosne i Hercegovine. Imajući to u vidu, ovaj rad analizira dinamiku ekonomskih performansi privrede Bosne i Hercegovine u periodu 2013. - 2022. godine na osnovu LMAW-DNMA metode. Prvih pet godina prema ekonomskom učinku privrede Bosne i Hercegovine prema LMAW-DNMA metodi su: 2018., 2019., 2017., 2016. i 2015. Najlošije ekonomske performanse privrede Bosne i Hercegovine su bile postignute u 2020. U posljednje vrijeme, generalno gledano, značajno su se poboljšale ekonomske performanse Bosne i Hercegovine. Na to je uticalo adekvatno upravljanje analiziranim statističkim varijablama (bruto domaći proizvod, inflacija, poljoprivreda, industrija, izvoz, uvoz, kapital, prihod, porezi, vrijeme potrebno za početak rada – dani i domaći krediti koje daje finansijski sektor). Isto tako, geopolitička situacija, ekonomska klima, strane direktne investicije, pandemija COVID-19, energetska kriza, digitalizacija cjelokupnog poslovanja kompanije i drugi faktori. U svakom slučaju, njihova adekvatna kontrola može u velikoj mjeri uticati na postizanje ciljanih ekonomskih performansi privrede Bosne i Hercegovine.

U literaturi nema radova, koliko nam je poznato, koji analiziraju performanse privrede pojedinih zemalja metodom LMAW-DNMA. Ova studija može poslužiti kao poticaj da se primjenjuju ove višekriterijumske metode odlučivanja u evaluaciji učinka pojedinih zemalja u njihovom rangiranju u cilju poboljšanja u budućnosti. Rangiranje učinka pojedinih zemalja može se vršiti prema različitim kriterijumima u zavisnosti od svrhe i cilja istraživanja. Istovremeno, različite metode višekriterijumskog odlučivanja mogu se koristiti na integrisan način kako bi se dobila najbolja moguća zastupljenost pozicije učinka posmatranih zemalja.

Ključne riječi: *ekonomija, performanse, Bosna i Hercegovina, LMAW-DNMA metoda*

JEL: *C61, L32*