Radojko LUKIĆ, PhD

Comparative Analysis Of The Efficiency Of The Insurance Market Of Serbia And Countries In The Region Using The Mabac Method

DOI: https://doi.org/10.55707/eb.v12i1.141

Original scientific article

UDC 368:005.336.1(497.11)

KEYWORDS: efficiency, insurance market, international position, MABAC method

ABSTRACT - In recent times, as is known, various methods of multi-criteria analysis have been used more and more to evaluate the efficiency of financial institutions as accurately as possible. One is the MABAC (Multi-Attributive Border Approximation area Comparison) method. Bearing this in mind, this paper analyzes the effectiveness of the insurance in the selected countries (Croatia and Slovenia) and Serbia, based on this method, to assess their international positioning. According to the results of the empirical research on the efficiency of the insurance markets in the selected countries and Serbia based on the MABAC method, the insurance markets of Croatia are ranked best. Serbia's insurance market is ranked second and Slovenia's third. In terms of performance, Serbian insurance market is less good than the Croatian and better than Slovenian. To improve the international position of insurance in Serbia in the future, it is necessary to develop an awareness of the general importance of insurance, especially life insurance, given that it is at a lower development level than in the countries with developed market economies, especially the European Union. In this context, it is necessary to encourage an accelerated growth of life insurance in Serbia by applying appropriate measures. JEL classification: C2, C6, G1, G2, G22.

Izvirni znanstveni članek

UDK 368:005.336.1(497.11)

KLJUČNE BESEDE: učinkovitost, zavarovalniški trg, mednarodni položaj, metoda MABAC

POVZETEK - Kot je znano, se v zadnjem času vse pogosteje uporablja različne metode večkriterijske analize za čim natančnejšo oceno učinkovitosti finančnih institucij. Ena izmed njih je metoda MABAC (Multi-Attributive Border Approximation Area Comparison). Ob upoštevanju tega v prispevku analiziramo učinkovitost zavarovanja v izbranih državah (Hrvaška in Slovenija) in Srbiji na podlagi te metode za oceno njihovega mednarodnega položaja. Po rezultatih empirične raziskave učinkovitosti zavarovalniških trgov izbranih držav in Srbije po metodi MABAC je najbolje uvrščen zavarovalniški trg Hrvaške. Srbski zavarovalniški trg je na drugem, slovenski pa na tretjem mestu. Po uspešnosti je slabši od hrvaškega zavarovalniškega trga in boljši od slovenskega. Za izboljšanje mednarodnega položaja zavarovalništva v Srbiji v prihodnosti je potrebno razviti zavest o splošnem pomenu zavarovalništva, še posebej življenjskega, saj je na nižji stopnji po razvitosti v primerjavi z državami z razvitim tržnim gospodarstvom, zlasti državami Evropske unije. V tem kontekstu je treba z ustreznimi ukrepi spodbuditi pospešeno rast življenjskih zavarovanj v Srbiji. Klasifikacija JEL: C2, C6, G1, G2, G22.

1 Introduction

Recently, to evaluate the efficiency of companies/financial institutions as realistically as possible, various methods of multi-criteria analysis have been developed (Mathew, 2018; Timiryanova, 2020; Okwu, 2020; Singh, 2020; Pachar, 2021; Brezović, 2021; Tsai, 2021). One of them is the MABAC method (Pamučar, 2015; Bo-

Prejeto/Received: 26. 6. 2024
Sprejeto/Accepted: 16. 9. 2024

žanić, 2016, 2019, 2020; Božanić et al., 2019, Božanić et al., 2020; Işik et al., 2020; Nedeljković et al., 2021). In this paper, the analysis of the insurance efficiency of the selected countries and Serbia is carried out, as a research subject, based on the MABAC method to assess their international position. Its aim and purpose is to determine the most realistic situation possible as a basis and assumption for taking appropriate measures to improve the international position regarding the efficiency of insurance in Serbia in the future.

In the world, there is an increasingly rich literature dedicated to the analysis of the efficiency of companies, that is, financial institutions based on various methods of the multi-criteria analysis (Ersoy, 2017). This is also the case with literature in Serbia (Kočović, 2010; Mandić, 2017; Rakonjac-Antić, 2018; Lukic, 2010, 2011a, b, 2017, 2018a, b, c, 2019, 2020a, b, c, d, e, 2021a, b, c, d, e,f, 2022; Vojteški Kljenak & Lukić, R. 2022a,b,c, 2023a,b,c,d,e,f). However, in the relevant literature, as far as we know, there is not a single comprehensive work devoted to the evaluation of the efficiency of insurance in Serbia using the MABAC method. This work fills that gap to some extent. This, among other things, reflects its scientific and professional contribution.

The starting point of the research in this paper is the fact that the continuous evaluation of the efficiency of a certain insurance market (in this case the insurance market of Serbia) is a prerequisite for improving its international position in the future through better control of critical factors and the application of appropriate measures. The basic research hypothesis is that the efficiency of the Serbian insurance market is low, compared to the insurance markets in the countries with a developed market economy.

The application of the MABAC method plays a significant role in this. It ensures a defining of a more realistic situation regarding the efficiency of insurance in Serbia and its position in the world. Based on this, appropriate measures can be taken to improve the efficiency of insurance in Serbia in the future.

2 MABAC method

Different methods of multi-criteria decision-making can be used in the analysis of the treated problem in this study. In this particular case, the new MABAC method is used due to the simplicity and accuracy of the obtained results.

MABAC (Multi-Attributive Border Approximation area Comparison) is a newer multi-criteria decision-making method developed by Pamučar and Čirović (2015). The basic feature of this method is defining the distance of the criterion function of each observed alternative from the limit approximate value. The mathematical formulation of the MABAC method consists of the following steps (Pamučar, 2015):

Step 1: Formation of the initial decision matrix (X).

Where *m* alternatives are evaluated according to *n* criteria. Alternatives are represented by vectors $A_i = (x_{i1} , x_{i2} , ..., x_{in})$, where x_{ij} is the value of the i-th alternative according to the j-th criterion ($i = 1, 2, ..., m ; j = 1, 2, ..., n$).

$$X = \begin{matrix} A_1 \\ A_2 \\ \cdots \\ A_m \end{matrix} \begin{matrix} \begin{matrix} C_1 & C_2 & \cdots & C_n \end{matrix} \\ \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \end{matrix} \quad (1)$$

where m is the total number of alternatives, n is the total number of criteria.

Step 2: Normalization of the elements of the initial matrix (X).

$$N = \begin{matrix} A_1 \\ A_2 \\ \cdots \\ A_m \end{matrix} \begin{matrix} \begin{matrix} C_1 & C_2 & \cdots & C_n \end{matrix} \\ \begin{bmatrix} n_{11} & n_{12} & \cdots & n_{1n} \\ n_{21} & n_{22} & \cdots & n_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ n_{m1} & n_{m2} & \cdots & n_{mn} \end{bmatrix} \end{matrix} \quad (2)$$

The elements of the normalized matrix (N) are obtained using the following equations:

a) For benefit (income) types of criteria (a high value of the criteria is preferred)

$$n_{ij} = \frac{x_{ij} - x_i^-}{x_i^+ - x_i^-} \quad (3)$$

b) For non-finite (cost) types of criteria (a lower value of the criteria is preferable)

$$n_{ij} = \frac{x_{ij} - x_i^+}{x_i^- - x_i^+} \quad (4)$$

where x_{ij}, x_i^+ and are x_i^- are the elements of the initial decision matrix (X), and are x_i^+ defined x_i^- as:

$x_i^+ = max(x_1, x_2, \ldots, x_m)$ and represent the maximum values of the observed criterion by alternatives.

$x_i^- = \min(x_1, x_2, \ldots, x_m)$ and represents the minimum values of the observed criterion by alternatives.

Step 3: Calculation of elements of the weight matrix (V):

The elements of the weight matrix (V) are calculated as follows:

$$V_{ij} = w_i g(n_{ij} + 1) \quad (5)$$

where n_{ij} the elements of the normalized matrix (N) are w_i the weighting coefficients of the criteria.

Based on the previous equation, the following weight matrix V is obtained

$$V = \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1n} \\ v_{21} & v_{22} & \cdots & v_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ v_{m1} & v_{m2} & \cdots & v_{mn} \end{bmatrix} = \begin{bmatrix} w_1 g(n_{11} + 1) & w_2 g(n_{12} + 1) & \cdots & w_n g(n_{1n} + 1) \\ w_1 g(n_{21} + 1) & w_2 g(n_{22} + 1) & \cdots & w_n g(n_{2n} + 1) \\ \cdots & \cdots & \cdots & \cdots \\ w_1 g(n_{m1} + 1) & w_2 g(n_{m2} + 1) & \cdots & w_n g(n_{mn} + 1) \end{bmatrix} \quad (6)$$

where *n* is the total number of criteria, and *m* is the total number of alternatives.

Step 4: Determining the matrix of boundary approximate regions (G).

The boundary approximate area (BAA) for each criterion is determined according to the following expression:

$$g_i = \left(\prod_{j=1}^{m} v_{ij} \right)^{1/m} \quad (7)$$

where the elements of the weight matrix (V), and m is the total number of alternatives.

After calculating the value of g and for each criterion, a matrix of borderline approximate areas (G) of the format *n x 1* is formed (*n* represents the total number of criteria by which the choice of offered alternatives is made):

$$G = \begin{matrix} C_1 & C_2 & \dots & C_n \\ [g_1 & g_2 & \dots & g_n] \end{matrix} \quad (8)$$

Step 5: Calculation of the elements of the distance matrix of alternatives from the border approximate area (Q):

$$Q = \begin{bmatrix} q_{11} & q_{12} & \cdots & q_{1n} \\ q_{21} & q_{22} & \cdots & q_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ q_{m1} & q_{m2} & \dots & q_{mn} \end{bmatrix} \quad (9)$$

The distance of the alternatives from the border approximate area (*q ij*) is determined as the difference between the elements of the weight matrix (V) and the values of the border approximate area (G).

$$Q = V - G = \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1n} \\ v_{21} & v_{22} & \cdots & v_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ v_{m1} & v_{m2} & \dots & v_{mn} \end{bmatrix} - \begin{bmatrix} q_1 & q_2 & \cdots & q_n \\ q_1 & q_2 & \cdots & q_n \\ \cdots & \cdots & \cdots & \cdots \\ q_1 & q_2 & \dots & q_n \end{bmatrix} \quad (10)$$

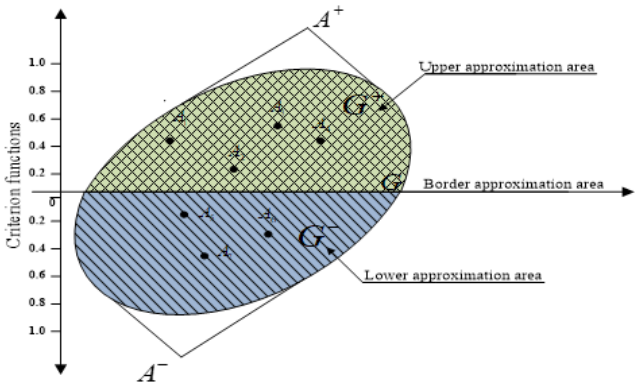
$$Q \begin{bmatrix} v_{11} - g_1 & v_{12} - g_2 & \cdots & v_{1n} - g_n \\ v_{21} - g_1 & v_{22} - g_2 & \cdots & v_{2n} - g_n \\ \cdots & \cdots & \cdots & \cdots \\ v_{m1} - g_1 & v_{m2} - g_2 & \dots & v_{mn} - g_n \end{bmatrix} - \begin{bmatrix} q_{11} & q_{12} & \cdots & q_{1n} \\ q_{21} & q_{22} & \cdots & q_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ q_{m1} & q_{m2} & \dots & q_{mn} \end{bmatrix} \quad (11)$$

where g_i is the border approximate area for criterion C_i , v_{ij} the elements of the weighting matrix (V), *n* is the number of criteria, and *m* is the number of alternatives.

Alternative A_i can belong to the border approximate area (G), the upper approximate area (G^+), or the lower approximate area (G^-), i.e. $A_i \in \{G \quad \vee \quad G^+ \quad \vee \quad G^-\}$ The upper approximate area (G^+) is the area where the ideal alternative (A +) is located, and the lower approximate area is the area where the anti-ideal alternative (A -) is located (Figure 1).

Figure 1

Displays the upper (G $^+$), lower (G $^-$), and approximate regions



Source: Pamučar, 2015

Belonging to the alternative Ai the approximate area (G, G $^+$ or G $^-$) is determined based on the following equation:

$$A_i \in \begin{cases} G^+ & if \quad q_{ij} > 0 \\ G & if \quad q_{ij} = 0 \\ G^- & if \quad q_{ij} < 0 \end{cases} \qquad (12)$$

Therefore, "for alternative A to be chosen as the best from the set, it is necessary that it belongs to the upper approximate area (G^+) according to as many criteria as possible. If, for example, alternative A_i according to 5 criteria (out of a total of 6 criteria) belongs to the upper approximate area, and according to one criterion it belongs to the lower approximate area (G $^-$), this means, in other words, that according to 5 criteria, the alternative is close to or equal to the ideal alternative, while according to one criterion close to or equal to the anti-ideal alternative. If the value of $q_{ij} > 0$, i.e. $q_{ij} \in G^+$, then the alternative A_i is close to or equal to the ideal alternative. However, if $q_{ij} < 0$, i.e. $q_{ij} \in G^-$, then alternative Ai is close to or equal to the anti-ideal alternative." (Pamučar, 2015; Božanić, 2016).

Step 6: Ranking of alternatives.

The calculation of the value of the criteria functions according to the alternatives (13) is obtained as the sum of the distances of the alternatives from the boundary approximate areas (q). By summing the elements of the matrix Q by row, the final values of the criterion functions of the alternatives are obtained:

$$S_i = \sum_{j=1}^{n} q_{ij} \quad j = 1, 2, \dots, n \quad i = 1, 2, \dots, m \qquad (13)$$

where *n* is the number of criteria, and m is the number of alternatives.

3 Analytical Hierarchy Process (AHP) method

Given that the weighting coefficient of the criteria when applying the MABAC method is determined using the AHP method, we will briefly refer to its theoretical and methodological characteristics.

The Analytical Hierarchy Process (AHP) method takes place through the following steps (Saaty, 2008):

Step 1: Formation of the matrix of comparison pairs

$$A = [a_{ij}] = \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ 1/a_{12} & 1 & \cdots & a_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ 1/a_{1n} & 1/a_{2n} & \cdots & 1 \end{bmatrix} \quad (14)$$

Step 2: Normalization of the matrix of comparison pairs

$$a_{ij}^{*} = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}}, i, j = 1, \dots, n \quad (15)$$

Step 3: Determination of relative importance, i.e. a vector of weights

$$w_i = \frac{\sum_{i=1}^{n} a_{ij}^{*}}{n}, i, j = 1, \dots, n \quad (16)$$

Consistency index - CI (consistency index) is a measure of the deviation of n from λ max and can be represented by the following formula:

$$CI = \frac{\lambda_{max} - n}{n} \quad (17)$$

If CI < 0.1 of the estimated value of the coefficients a n ij are consistent, and the deviation of λ_{max} from n is negligible. This means, in other words, that the AHP method accepts an inconsistency of less than 10%.

The consistency index can be used to calculate the consistency ratio CR = CI/RI, where RI is a random index.

4 Measuring the efficiency of the insurance market in the selected countries and Serbia based on the MABAC method: Results and discussion

To measure the insurance efficiency of the selected countries (Croatia and Slovenia) and Serbia, the following criteria were chosen: C1 – Population, C2 – Gros domestic product, C3 – Inflation rate, C4 - Exchange rate local currency per USD, C5 - Insurance premium in % of the total insurance premium in the world, C6 - Insurance premium in % of GDP, C7 - Insurance premium per inhabitant in USA and C8 - Life insurance premium in % of the total premium. The selection of the countries was made according to the criteria of countries with a developed insurance market and countries in the region of Serbia. The alternatives are: A1 - Slovenia, A2 - Croatia and A3 - Serbia. Table 1 shows the initial data for the analysis of insurance efficiency of

the selected countries and Serbia based on the MABAC method for 2022. Figure 2 shows the position of Serbia in international insurance.

Table 1

Initial data for the analysis of the insurance efficiency of selected countries and Serbia

	Population (millions)	Gross domestic product, USD bn	Inflation rate (in %)	Exchange rate local currency per USD	Insurance premium in % of the total insurance premium in the world	Insurance premium in % of GDP	Insurance premium per inhabitant in the USA	Life insurance premium in % of the total premium
	C1	C2	C3	C4	C5	C6	C7	C8
Slovenia	2	62	8.8	0.9	0.0	4.7	1396	27.5
Croatia	7	69	10.8	7.2	0.0	2.6	456	22.4
Serbia	4	64	12.0	111.7	0.0	1.9	177	19.7

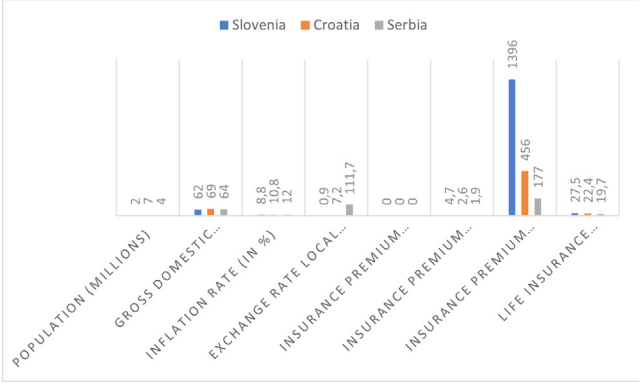
Note: GDP - gross domestic product USD - US dollar

Source: World insurance: the recovery gains pace. Swiss Re sigma No 3 / 2023, 1-49.

Figure 2 shows the performance indicators of Serbia of the selected countries.

Figure 2

Performance indicators of Serbia and selected countries



Source: Author's report

Table 2 shows the descriptive statistics of the initial data.

Table 2

Descriptive statistics

Statistics									
		C1	C2	C3	C4	C5	C6	C7	C8
N	Valid	3	3	3	3	3	3	3	3
	Missing	0	0	0	0	0	0	0	0
Mean	4.3333	65.0000	10.5333	39.9333	.0000	3.0667	676.3333	23.2000	
Std. Error of Mean	1.45297	2.08167	.93333	35.92939	.00000	.84130	368.73673	2.28692	
Median	4.0000	64.0000	10.8000	7.2000	.0000	2.6000	456.0000	22.4000	

Std. Deviation	2.51661	3.60555	1.61658	62.23153	.00000	1.45717	638.67076	3.96106	
Skewness	.586	1.152	-.722	1.712		1.293	1.368	.872	
Std. Error of Skewness	1.225	1.225	1.225	1.225	1.225	1.225	1.225	1.225	
Minimum	2.00	62.00	8.80	.90	.00	1.90	177.00	19.70	
Maximum	7.00	69.00	12.00	111.70	.00	4.70	1396.00	27.50	

Note: Author's calculation using SPSS software

The percentage share of the insurance premium of Slovenia, Croatia and Serbia in the total world insurance premium is equal to zero. In the specific case, therefore, the insurance premium as a percentage of gross domestic product is above average in Slovenia and below average in Croatia and Serbia. The highest insurance premium per inhabitant is in Slovenia and is above the average. The percentage share of the life insurance premium in the total insurance premium is the highest in Slovenia and is above the average. Such insurance flows in Slovenia, Croatia and Serbia were influenced, among other things, by the analyzed macroeconomic indicators (population, gross domestic product, inflation and exchange rate). The target performances of the insurance of Slovenia, Croatia and Serbia can be achieved by adequate control of the analyzed statistical variables. They are nothing but insurance performance factors.

Table 3 shows the weighting coefficients of the criteria. They were calculated using the AHP (Analytical Hierarchical Process) method (Saaty, 2008). (The calculation was performed using Excel AHPSoftware).

Table 3

Weight coefficients of the criteria

		1	2	3	4	5	6	7	8	WEIGHTS	
		C1	C2	C3	C4	C5	C6	C7	C8		
1	C1	1.00	1.00	1.50	2.00	1.00	1.00	1.00	1.00	0.1405	
2	C2	1.00	1.00	2.00	2.50	2.00	2.00	2.00	2.00	0.2030	
3	C3	0.67	0.50	1.00	2.00	1.00	1.00	1.00	1.00	0.1162	
4	C4	0.50	0.40	0.50	1.00	2.00	2.00	2.00	2.00	0.1359	
5	C5	1.00	0.50	1.00	0.50	1.00	2.00	2.00	2.00	0.1301	
6	C6	1.00	0.50	1.00	0.50	0.50	1.00	2.00	1.00	0.1000	
7	C7	1.00	0.50	1.00	0.50	0.50	0.50	1.00	1.00	0.0842	
8	C8	1.00	0.50	1.00	0.50	0.50	1.00	1.00	1.00	0.0901	
										1.0000	
										Consistency Ratio	0.0503

Note: Author's calculation using the software program AHPSoftware-Excel

In this particular case, since the consistency ratio is 0.0503 < 0.1, the estimated values of the coefficients aij are consistent, and the deviation λ_{max} from n is negligible. This means, in other words, that the AHP method accepts an inconsistency of less than 10%.

In this case, the most important criterion is C2. Adequate control of the annual growth rate of the gross domestic product can influence the achievement of the target performance of insurance in Slovenia, Croatia and Serbia. Of course, this is also based

on adequate management with other analyzed criteria treated as insurance performance factors.

The obtained results of the analysis of the insurance efficiency of the selected countries and Serbia using the MABAC method are shown in the tables below (Table 4, 5, 6,7, 8), as well as graphically (Figure 3). (Calculations were performed using Excel MABACSoftware.) Table 4 shows the calculated weight coefficients of the criteria, the original empirical data of the criteria, and the maximum and minimum. In the specific case, for example, the highest insurance premium as a percentage of the gross domestic product is in the Slovenia and the lowest in Serbia. The data analysis in this table is similar for other countries about the presented criteria. The original empirical data for each country and each criterion are normalized in Table 5. In Table 6, they are weighted. Table 7 shows the distance of the alternatives from the BAA matrix (Q). The ranking of alternatives is shown in Table 8.

Table 4

Initial

weights of criteria	0.1405	0.203	0.1162	0.1359	0.1301	0.1	0.0842	0.0901
kind of criteria	1	1	1	1	1	1	1	1
	C1	C2	C3	C4	C5	C6	C7	C8
A1	2	62	8.8	0.9	0	4.7	1396	27.5
A2	7	69	10.8	7.2	0	2.6	456	22.4
A3	4	64	12	111.7	0	1.9	177	19.7
MAX	7	69	12	111.7	0	4.7	1396	27.5
MIN	2	62	8.8	0.9	0	1.9	177	19.7

Note: Author's calculation using MABACSoftware-Excel software

Table 5

Normalized Matrix

weights of criteria	0.1405	0.203	0.1162	0.1359	0.1301	0.1	0.0842	0.0901
kind of criteria	1	1	1	1	1	1	1	1
	C1	C2	C3	C4	C5	C6	C7	C8
A1	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000
A2	1.0000	1.0000	0.6250	0.0569	0.0000	0.2500	0.2289	0.3462
A3	0.4000	0.2857	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000

Note: Author's calculation using MABACSoftware-Excel software

Table 6

Normalized Weighted Matrix (V)

	C1	C2	C3	C4	C5	C6	C7	C8
A1	0.1405	0.2030	0.1162	0.1359	0.1301	0.2000	0.1684	0.1802
A2	0.2810	0.4060	0.1888	0.1436	0.1301	0.1250	0.1035	0.1213
A3	0.1967	0.2610	0.2324	0.2718	0.1301	0.1000	0.0842	0.0901

Border Approximation Area Matrix (G)	0.1980	0.2781	0.1721	0.1744	0.1301	0.1357	0.1136	0.1253

Note: Author's calculation using MABACSoftware-Excel software

Table 7

Distance of Alternatives from BAA matrix (Q)

	C1	C2	C3	C4	C5	C6	C7	C8
A1	-0.0575	-0.0751	-0.0559	-0.0385	0.0000	0.0643	0.0548	0.0549
A2	0.0830	0.1279	0.0167	-0.0308	0.0000	-0.0107	-0.0102	-0.0041
A3	-0.0013	-0.0171	0.0603	0.0974	0.0000	-0.0357	-0.0294	-0.0352

Note: Author's calculation using MABACSoftware-Excel software

Table 8

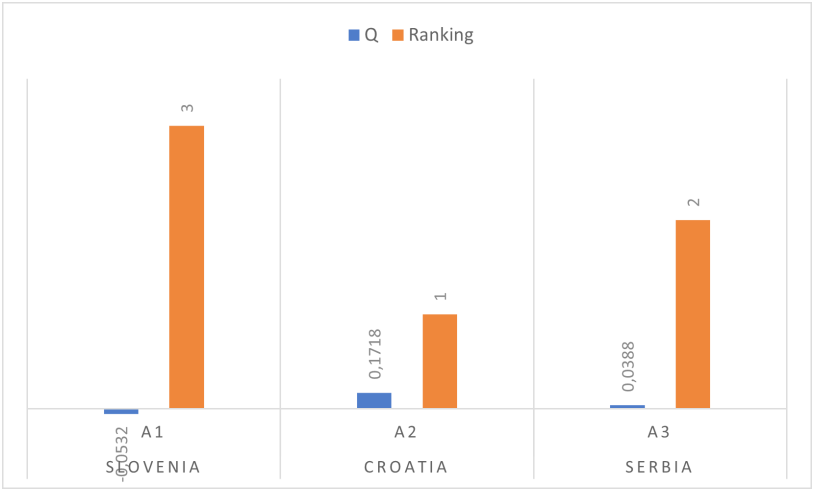
Ranking of alternatives

	Alternatives	Q	Q	Ranking
Slovenia	A1	-0.0532	-0.0532	3
Croatia	A2	0.1718	0.1718	1
Serbia	A3	0.0388	0.0388	2

Note: Author's calculation using MABACSoftware-Excel software

Figure 3

Ranking of alternatives



Source: Author's report

In the specific case, therefore, in terms of insurance performance, Croatia is in first place. Insurance of Serbia is in second place. The third place was taken by insurance in Slovenia. Serbia's insurance performance is less compared to Croatia, but better compared to Slovenia.

This international positioning of the insurance market in Serbia has been influenced by numerous factors, such as population growth, gross domestic product growth rate, inflation, exchange rate, interest rates, understanding of the importance of insurance, political situation, behaviour of insurance companies when an insured event occurs (risk) in terms of realistic assessment and payment of damages, and digitization of the entire business. Their adequate control can influence the achievement of the

target level of insurance development in Serbia in the context of international positioning.

5 Conclusion

The paper evaluates the efficiency of the insurance market in Serbia and other selected countries using the MABAC method as one of the modern methods of multi-criteria analysis. Basic indicators of the development of the insurance market were used as criteria: C1 – Population, C2 – Gros domestic product, C3 – Inflation rate, C4 - Exchange rate local currency per USD, C5 - Insurance premium in % of the total insurance premium in the world, C6 - Insurance premium in % of GDP, C7 - Insurance premium per inhabitant in USA and C8 - Life insurance premium in % of the total premium. The analysis includes three national insurance markets. These are Slovenia, Croatia and Serbia. Based on the obtained empirical results, it can be concluded that in terms of performance, Croatia is in first place, Serbia is in second place and Slovenia is in third place. Serbia's insurance performance is less compared to Croatia, but better compared to Slovenia.

To improve the international position of the insurance market in Serbia in the future, it is necessary to develop an awareness of the general importance of insurance as much as possible. Life insurance in particular is at an unsatisfactory level, compared to the observed countries of the developed market economy, i.e. the European Union. In this context, it is necessary to apply appropriate measures to encourage an accelerated development of life insurance in Serbia.

Dr. Radojko Lukić

Primerjalna analiza učinkovitosti zavarovalniškega trga Srbije in držav v regiji z metodo MABAC

V zadnjem času so bile za čim bolj realno oceno učinkovitosti podjetij/finančnih institucij razvite različne metode večkriterijske analize (Mathew, 2018; Timiryanova, 2020; Okwu, 2020; Singh, 2020; Pachar, 2021; Brezović, 2021; Tsai, 2021). Ena izmed njih je metoda MABAC (Pamučar, 2015; Božanić, 2016, 2019, 2020; Božanić idr., 2019; Božanić idr., 2020; Işik idr., 2020; Nedeljković idr., 2021). V prispevku je kot predmet raziskave izvedena analiza zavarovalniške učinkovitosti v izbranih državah in Srbiji na podlagi metode MABAC za oceno njihovega mednarodnega položaja. Cilj in namen tega je ugotoviti čim bolj realno stanje kot osnovo in predpostavko za sprejetje ustreznih ukrepov za izboljšanje mednarodnega položaja glede učinkovitosti zavarovalništva v Srbiji v prihodnosti.

V svetu je vedno bolj bogata literatura, ki se posveča analizi učinkovitosti podjetij in finančnih institucij na podlagi različnih metod večkriterijske analize (Ersoy, 2017). Tako je tudi z literaturo v Srbiji (Kočović, 2010; Mandić, 2017; Rakonjac-Antić, 2018; Lukic, 2010, 2011a, b, 2017, 2018a, b, c, 2019, 2020a, b, c, d, e, 2021a, b, c, d, e, f, 2022; Vojteški Kljenak in Lukić, 2022a, b, c, 2023a, b, c, d, e, f). Vendar pa v relevantni literaturi, kolikor nam je znano, ni niti enega obsežnega dela, ki bi bilo posvečeno oceni učinkovitosti zavarovalništva v Srbiji po metodi MABAC. To delo do neke mere zapolnjuje to vrzel. V tem se med drugim odraža njegov znanstveni in strokovni prispevek.

Izhodišče raziskave v tem prispevku je dejstvo, da je nenehno ocenjevanje učinkovitosti določenega zavarovalniškega trga (v tem primeru zavarovalniškega trga Srbije) predpogoj za izboljšanje njegovega mednarodnega položaja v prihodnosti z boljšim nadzorom nad kritičnimi dejavniki in uporabo ustreznih ukrepov. Osnovna hipoteza raziskave je, da je učinkovitost srbskega zavarovalniškega trga nizka v primerjavi z zavarovalniškimi trgi držav z razvitim tržnim gospodarstvom.

Pri tem igra pomembno vlogo uporaba metode MABAC. Zagotavlja ugotavljanje realnejše slike glede učinkovitosti zavarovalništva v Srbiji in njenega položaja v svetu. Na podlagi tega se lahko sprejmejo ustrezni ukrepi za izboljšanje učinkovitosti zavarovalništva v Srbiji v prihodnosti.

Za merjenje zavarovalne učinkovitosti v izbranih državah (Hrvaški in Sloveniji) in Srbiji so bili izbrani naslednji kriteriji: C1 – prebivalstvo, C2 – bruto domači proizvod, C3 – stopnja inflacije, C4 – tečaj lokalne valute na USD, C5 – zavarovalna premija v % celotne zavarovalne premije v svetu, C6 – zavarovalna premija v % BDP, C7 – zavarovalna premija na prebivalca v ZDA in C8 – premija življenjskega zavarovanja v % celotne premije. Izbor držav je bil narejen po sledečih kriterijih: države z razvitim zavarovalniškim trgom in države v regiji, katere del je Srbija. Alternative so: A1 – Slovenija, A2 – Hrvaška in A3 – Srbija. Tabela 1 prikazuje izhodiščne podatke za analizo učinkovitosti zavarovanja v izbranih državah in Srbiji po metodi MABAC za leto 2022.

Odstotni delež zavarovalne premije v Sloveniji, Hrvaški in Srbiji v celotni svetovni zavarovalni premiji je enak nič. V konkretnem primeru je torej zavarovalna premija v odstotku bruto domačega proizvoda nadpovprečna v Sloveniji ter podpovprečna na Hrvaškem in v Srbiji. Najvišjo zavarovalno premijo na prebivalca ima Slovenija in je nadpovprečna. Odstotni delež premije življenjskih zavarovanj v skupni zavarovalni premiji je najvišji v Sloveniji in je nadpovprečen. Na takšne zavarovalne tokove v Sloveniji, na Hrvaškem in v Srbiji so med drugim vplivali analizirani makroekonomski kazalniki (prebivalstvo, bruto domači proizvod, inflacija in tečaj). Ciljno uspešnost zavarovanj v Sloveniji, na Hrvaškem in v Srbiji je mogoče doseči z ustreznim nadzorom analiziranih statističnih spremenljivk. Niso nič drugega kot dejavniki uspešnosti zavarovanja.

V tem primeru je najpomembnejši kriterij C2. Ustrezno obvladovanje letne stopnje rasti bruto domačega proizvoda lahko vpliva na doseganje ciljne uspešnosti zavarovalništva v Sloveniji, na Hrvaškem in v Srbiji. Seveda tudi to temelji na ustreznem

upravljanju z drugimi analiziranimi kriteriji, ki so obravnavani kot dejavniki uspešnosti zavarovanja.

V konkretnem primeru je torej po uspešnosti zavarovalništvo na Hrvaškem na prvem mestu. Na drugem mestu je zavarovalništvo v Srbiji. Tretje mesto je zasedlo zavarovalništvo v Sloveniji. Srbsko zavarovalništvo je v primerjavi s Hrvaško slabše, v primerjavi s Slovenijo pa boljše.

Na to mednarodno pozicioniranost zavarovalniškega trga v Srbiji so vplivali številni dejavniki, kot so rast prebivalstva, stopnja rasti bruto domačega proizvoda, inflacija, menjalni tečaj, obrestne mere, razumevanje pomena zavarovanja, politična situacija, obnašanje zavarovalnic, ko nastopi zavarovalni dogodek (riziko), v smislu realne ocene in izplačila škode ter digitalizacija celotnega poslovanja. Ustrezen nadzor nad njimi lahko vpliva na doseganje ciljne ravni razvoja zavarovalništva v Srbiji v okviru mednarodnega pozicioniranja.

LITERATURE

1. Božanić, D. I., Pamučar, D. S. and Karović, S. M. (2016). Primene metode MABAC u podršci odlučivanju upotrebe snaga u odbrambenoj operaciji. Tehnika, 71(1), 129–136.
2. Božanić, D., Tešić, D. and Kočić, J. (2019). Multi-criteria FUCOM–Fuzzy MABAC model for the selection of location for construction of single-span bailey bridge. Decision Making: Applications in Management and Engineering, 2(1), 132–146. https://doi.org/10.31181/dmame1901132b
3. Božanić, D., Tešić, D. and Milić, A. (2020). Multicriteria decision-making model with Z-numbers based on FUCOM and MABAC model. Decision Making: Applications in Management and Engineering, 3(2), 19–36. https://doi.org/10.31181/dmame2003019d
4. Brezović, K., Stanković, R., Šafran, M. and Kolarić, G. (2021). Applying multi-criteria analysis in evaluation of distribution channels. In M. Petrović and L. Novačko (Eds.), Transformation of transportation (pp. 125–141). Springer. https://doi.org/10.1007/978-3-030-66464-0_8
5. Ersoy, N. (2017). Performance measurement in the retail industry by using multi-criteria decision-making methods. Ege Academic Review, 17(4), 539–551. https://doi.org/10.21121/eab.2017431302
6. Işik, Ö., Aydın, Y. and Koşaroğlu, Ş. (2020). The assessment of the logistics performance index of CEE countries with the new combination of SV and MABAC methods. LogForum, 16(4), 549–559. https://doi.org/10.17270/J.LOG.2020.504
7. Kočović, J., Šulejić, P. and Rakonjac-Antić, T. (2010). Osiguranje. Ekonomski fakultet.
8. Lukić, R. (2010). Revizija u bankama. Ekonomski fakultet.
9. Lukić, R. (2011a). Evaluacija poslovnih performansi u maloprodaji. Ekonomski fakultet.
10. Lukić, R. (2011b). Estimates of economic performance of organic food retail trade. Economic Research – Ekonomska Istraživanja, 24(3), 157–169. https://doi.org/10.1080/1331677X.2011.11517474
11. Lukić, R., Sokić, M. and Kljenak, D. V. (2017). Efficiency analysis of the banking sector in the Republic of Serbia. Business Excellence and Management, 7, 5–17.
12. Lukić, R. (2018a). Bankarsko računovodstvo. Ekonomski fakultet.
13. Lukić, R. (2018b). Analysis of the efficiency of insurance companies. In Insurance in the post-crisis era (pp. 122–136). Faculty of Economics, University of Belgrade.
14. Lukić, R., Lalić, S., Suceska, A., Hanić, A. and Bugarčić, M. (2018c). Carbon dioxide emissions in retail food. Economics of Agriculture, 65(2), 859–874. https://doi.org/10.5937/ekoPolj1802859L

15. Lukić, R. and Hadrović Zekić, B. (2019). Evaluation of the efficiency of trade companies in Serbia using the DEA approach. In Proceedings of the 19th International Scientific Conference Business Logistics in Modern Management (pp. 145–165). Josip Juraj Strossmayer University of Osijek, Faculty of Economics in Osijek.
16. Lukić, R., Hadrović Zekić, B. and Crnjac Milić, D. (2020a). Financial performance evaluation of trading companies in Serbia using the integrated fuzzy AHP–TOPSIS approach. In 9th International Scientific Symposium: Region, Entrepreneurship, Development (pp. 690–703).
17. Lukić, R. (2020b). Analysis of the efficiency of trade in oil derivatives in Serbia by applying the fuzzy AHP–TOPSIS method. Business Excellence and Management, 10(3), 80–98. https://doi.org/10.24818/beman/2020.10.3-06
18. Lukić, R., Vojteski Kljenak, D. and Anđelić, S. (2020c). Analyzing financial performances and efficiency of the retail food in Serbia by using the AHP–TOPSIS method. Economics of Agriculture, 67(1), 55–68. https://doi.org/10.5937/ekoPolj2001055L
19. Lukić, R. (2020d). Računovodstvo trgovinskih preduzeća. Ekonomski fakultet.
20. Lukić, R., Hanić, H. and Bugarčić, M. (2020e). Analysis of profitability and efficiency of trade in Serbia. Economic Analysis, 53(2), 39–50.
21. Lukić, R., Vojteski Kljenak, D., Anđelić, S. and Gavrilović, M. (2021a). Application of WASPAS method in the evaluation of efficiency of agricultural enterprises in Serbia. Economics of Agriculture, 68(2), 375–388.
22. Lukić, R. (2021b). Analysis of the efficiency of insurance companies by lines of insurance in Serbia using the COCOSO method. Insurance Trends, 2, 24–38. https://doi.org/10.5937/TokOsig2102009L
23. Lukić, R. (2021c). Application of MABAC method in evaluation of sector efficiency in Serbia. Review of International Comparative Management, 22(3), 400–417. https://doi.org/10.24818/RMCI.2021.3.400
24. Lukić, R. (2021d). Analysis of trade efficiency in Serbia based on the MABAC method. Ekonomski pogledi – Economic Outlook, 23(2), 1–18.
25. Lukić, R. (2021e). Analiza efikasnosti finansijskih institucija na bazi OCRA metode. Tehnika, 76(1), 103–111. https://doi.org/10.5937/tehnika2101103LLukic, R. (2021f). Application of ARAS method in assessing the efficiency of insurance companies in Serbia. Insurance Trends, 3, 23–36. 10.5937/tokosig2103009F
26. Lukić, R. (2022a). Evaluation of the efficiency of banks in Serbia using the MABAC method. Bankarstvo - Banking, 2, 35–60. https://doi.org/10.5937/bankarstvo2202010L
27. Lukić, R. (2022b). Analysis of financial performance and efficiency of banks in Serbia using fuzzy LMAW and MARCOS methods. Bankarstvo – Banking, 4, 130–169. https://doi.org/10.5937/bankarstvo2204130L
28. Lukić, R. (2022c). 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. https://doi.org/10.24818/issn14531305/26.3.2022.05
29. Lukić, R. (2023a). Analysis of the performance of companies in Serbia listed on the Belgrade stock exchange. In Zbornik radova – Računovodstvo i revizija u teoriji i praksi (Vol. 5, No. 5, pp. 69–80). Banja Luka College / Besjeda Banja Luka. https://doi.org/10.7251/ZRRRTP2301069L
30. Lukić, R. (2023b). Measurement and analysis of the information performance of companies in the European Union and Serbia based on the fuzzy LMAW and MARCOS methods. Informatica Economică, 27(1), 17–31. https://doi.org/10.24818/issn14531305/27.1.2023.02
31. Lukić, R. (2023c). Influence of net working capital on trade profitability in Serbia. European Journal of Interdisciplinary Studies, 15(1), 48–67. https://doi.org/10.24818/ejis.2023.04
32. Lukić, R. (2023d). Application of PROMETHEE method in evaluation of insurance efficiency in Serbia. Revija za ekonomske in poslovne vede – Journal of Economic and Business Sciences, 10(1), 3–19. https://doi.org/10.55707/eb.v10i1.121
33. Lukić, R. (2023e). Analysis of the efficiency of insurance companies in Serbia. Revija za ekonomske in poslovne vede, 10(2), 47–64. https://doi.org/10.55707/eb.v10i2.128

34. Lukić, R. (2023f). Analysis of the performance of insurance companies in Serbia based on the AHP-TOPSIS method. Marsonia: Časopis za društvena i humanistička istraživanja, 2(2), 21–35.
35. Mandić, K., Delibašić, B., Knežević, S. and Benković, S. (2017). Analysis of the efficiency of insurance companies in Serbia using the fuzzy AHP and TOPSIS methods. Economic Research – Ekonomska Istraživanja, 30(1), 550–565. https://doi.org/10.1080/1331677X.2017.1305780
36. Mathew, M. and Sahu, S. (2018). Comparison of new multi-criteria decision-making methods for material handling equipment selection. Management Science Letters, 8(3), 139–150. https://doi.org/10.5267/j.msl.2018.1.004
37. Nedeljković, M., Puška, A., Doljanica, S., Virijević Jovanović, S., Brzaković, P. and Stević, Ž. (2021). Evaluation of rapeseed varieties using novel integrated fuzzy PIPRECIA–Fuzzy MABAC model. PLOS ONE, 16(2), e0246857. https://doi.org/10.1371/journal.pone.0246857
38. Okwu, M. O. and Tartibu, L. K. (2020). Sustainable supplier selection in the retail industry: A TOPSIS- and ANFIS-based evaluating methodology. International Journal of Engineering Business Management, 12, 1–14. https://doi.org/10.1177/1847979019899542
39. Pachar, N., Darbari, J. D. and Govindan, K. (2021). Sustainable performance measurement of Indian retail chain using two-stage network DEA. Annals of Operations Research. https://doi.org/10.1007/s10479-021-04088-y
40. Pamučar, D. and Ćirović, G. (2015). The selection of transport and handling resources in logistics centers using Multi-Attributive Border Approximation Area Comparison (MABAC). Expert Systems with Applications, 42(6), 3016–3028. https://doi.org/10.1016/j.eswa.2014.11.057
41. Rakonjac-Antić, T. (2018). Penzijsko i zdrastveno osiguranje. Beograd: Ekonomski fakultet.
42. Saaty, T. L. (2008). Decision making with the analytic hierarchy process. International Journal of Services Sciences, 1(1), 83–98. https://doi.org/10.1504/IJSSCI.2008.017590
43. Singh, J., Tyagi, P., Kumar, G. and Agrawal, S. (2020). Convenience store locations prioritization: A fuzzy TOPSIS-GRA hybrid approach. Modern Supply Chain Research and Applications, 2(4), 281–302. https://doi.org/10.1108/MSCRA-01-2020-0001
44. Tsai, C.-M., Lee, H.-S. and Gan, G.-Y. (2021). A new fuzzy DEA model for solving the MCDM problems in supplier selection. Journal of Marine Science and Technology, 29(1), Article 7. https://doi.org/10.51400/2709-6998.1006
45. Timiryanova, V. (2020). Analyzing the production-distribution-consumption cycle using hierarchical modeling methods. Accounting, 6(7), 1313–1322.
46. Vojteški Kljenak, D. and Lukić, R. (2022). Evaluacija efikasnosti davalaca finansijskog lizinga u Srbiji. Glasnik društvenih nauka – Journal of Social Sciences, 14(XIV), 113–144.

Radojko Lukić, PhD, full profesor at the Faculty of Economics, University of Belgrade, Serbia
E-mail: radojko.lukic@ekof.bg.ac.rs