Radojko Lukić
Faculty of Economics, University of Belgrade
Kamenicka 6, 11000 Belgrade
radojko.lukic @ekof.bg.ac.rs
ORCID ID (https://orcid.org/0000-0001-6529-0297)

Izvorni znanstveni rad

ANALYSIS OF THE PERFORMANCE OF INSURANCE COMPANIES IN SERBIA BASED ON THE AHP-TOPSIS METHOD

Abstract

Evaluation of the performance of insurance companies based on multi-criteria analysis methods represents a kind of research challenge. With this in mind, the paper investigates the efficiency of insurance companies in Serbia using the AHP-TOPSIS method. According to the results of empirical research on the performance of insurance companies in Serbia using the TOPSIS method, the top five are in order: ĐENERALI OSIGURANJE SRBIJA, DUNAV OSIGURANJE, GRAWE, DDOR NOVI SAD and WINER STADTISCHE. The company TRIGLAV is in the worst position. Such a ranking of the observed insurance companies in Serbia according to the AHP-TOPSIS method was influenced by numerous macro and micro factors. Their effective control can certainly significantly influence the achievement of the target performance of insurance companies in Serbia.

Keywords : efficiency, insurance, Serbia, AHP-TOPSIS method

JEL classification : C2, C6, G1, G2, G22

1. INTRODUCTION

Recently, various methods of multi-criteria analysis (AHP, TOPSIS, ARIS and others), as well as DEA (Data Envelopment Analysis) models have been used to a significant extent in the evaluation of the performance of insurance companies. With that in mind, the evaluation of the performance of insurance companies in Serbia using the AHP-TOPSIS method is the subject of research in this paper. The aim and purpose of this is to investigate the given problem as fully as possible quantitatively and qualitatively in order to improve the performance of insurance companies in Serbia in the future by more efficient control of critical factors and in connection with this the implementation of relevant measures (Lukic, 2022, 2023).

In the world, there is a very rich literature dedicated to the analysis of the performance of companies from all sectors, which means the insurance sector as well, based on various methods of multi-criteria analysis, as well as DEA models (Mathew & Sahu, 2018 ; Timiryanova, 2020; Okwu & Tartibu, 2020; Singh et al. al., 2020; Pachar et al., 2021; Brezović et al., 2021; Tsai et al., 2021; Pamučar et al., 2015; Božanić et al., 2016; Božanic et al., 2019, 2020; Işik et al., 2020; Nedeljković et al., 2021; Kolagar, 2019; Kutlu & Kahraman, 2019 ; Turskis et al., 2015; Urosevic et al., 2017; Zavadskas et al., 2012, 2013a, b; Ersoy, 2017; Wang et al., 2021; Amini et al., 2019; Hwang & Yoon, 1981; Hwang & Yoon, 1995 ; Young et al., 1994; Üçüncü et al., 2018; Kropivšek et al., 2021). This has recently been the case with literature in Serbia (Kočović et al., 2010; Mandić et al., 2017; Rakonjac-Antić, 2018; Lukić, 2010, 2016, 2018a,b, 2022, 2023a,b ; Lukić et al., 2017 ; Lukić & Hadrovic Zekic, 2019; Lukić et al., 2020a,b,c; Lukić et al., 2021). Research through the literature in this paper serves as a theoretical-methodological and empirical basis for the needs of evaluating the

performance of insurance companies in Serbia using the TOPSIS method.

The basic hypothesis of the research is that knowledge of critical factors is a basic assumption for improving the performance of insurance companies in the future, in the specific case in Serbia, their more efficient control, as well as the application of relevant measures for these purposes. The AHP-TOPSIS method certainly plays a significant role in this.

The research of the treated problem in this paper, as a result of the given hypothesis and the applied methodology, is based on empirical data collected from the National Bank of Serbia, "produced" according to relevant international standards, so that there are no limitations regarding comparability at the domestic and international level (i.e. with the results of other methods).

2. RESEARCH METHODOLOGY

The research of the treated problem in this paper is based on the application of AHP-TOPSIS methods.

The **TOPSIS** method (Technique for Order Preference by Similarity to Ideal Solution) is very successfully used in evaluating the financial performance of companies. It is a multi-criteria decision-making technique that was first developed and applied by Hwang and Yoon (1981) (Hwang, 1981, 1995; Amin, 2019). According to this method, alternatives are defined by their distances from the ideal solution. The goal is to choose the optimal alternative that is closer to the optimal solution, that is, the farthest from the negative ideal solution (Young et al., 1994). A positive ideal solution maximizes utility, i.e. minimizes costs (relative to the given problem). In contrast, the negative ideal solution maximizes costs, that is, minimizes utility.

The TOPSIS method consists of 6 steps (Üçüncü et al., 2018):

Step 1 : Creating the initial matrix

In the displayed initial matrix A_{ij} the number of the alternative is marked with "*m*" and the number of criteria with "*n*":

$$A_{ij} = \begin{vmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{vmatrix} \quad (1)$$

Step 2 : Formation of the weighted normalized decision matrix

The normalized decision matrix (R_{ij}; *i=1,…,m; j=1,…,n*) is determined by equation (2) with matrix elements A_{ij}:

$$r_{ij} = \frac{ij}{\sqrt{\sum_{i=1}^{m} a_{ij}^2}} \quad (2)$$

$$t = 1,2,3,\dots,m \qquad j = 1,2,3,\dots,n$$

$$R_{ij} = \begin{vmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{vmatrix}$$

In equation (3), the weight measure "*j*" is represented by W_{ij}. The weight-normalized decision matrix (V_{ij}; *i=1,…,m; j=1,…,n*) was determined using equation (3) with the elements of the normalized matrix:

$$V_{ij} = W_{ij} * r_{ij} \quad (3)$$

$$i = 1,2,3,\dots,m \qquad j = 1,2,3,\dots,n$$

Step 3 : Determination of positive and negative-ideal solutions

The value of the positive-ideal solution (A^+) and the negative-ideal solution (A^-) is determined from the value of the weight-normalized matrix (V_{ij}). A^+ is better, and A^- worse performance score.

The value of the positive-ideal solution (A^+) and the negative-ideal solution (A^-) is determined as follows (equation (4) (5) respectively):

$$A^+ = \{v_i^+, \dots, v_n^+\} = \left\{\left(\max_i v_{ij}, j \in j\right) \left(\min_i v_{ij}, j \in j'\right)\right\} \; i = 1,2,\dots,m \quad (4)$$

$$A^- = \{v_i^-, \dots, v_n^-\} = \left\{\left(\min_i v_{ij}, j \in j\right) \left(\max_i v_{ij}, j \in j'\right)\right\} \; i = 1,2,\dots,m \quad (5)$$

where *j is* related to the benefit criterion, and *j'* is related to the cost criterion.

Step 4 : Determination of special measures (i.e. the distance of alternatives from the ideal and negative-ideal solution)

The distance from the positive-ideal solution (S_i^+) and the negative-ideal solution (S_i^-) for each alternative according to the given criterion is determined using equations (6) (7):

$$S_i^+ = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^+)^2} \quad (6)$$

$$S_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2} \quad (7)$$

$$i = 1,2,3, \dots, m \qquad j = 1,2,3, \dots, n$$

Step 5 : Determination of the coefficient of relative closeness to the ideal solution

Special measures of positive-ideal solution (S_i^+) and negative-ideal solution (S_i^-) were used to determine the relative closeness to the ideal solution (C_i^+) for each decision point. C_i^+ represents the relative closeness to the ideal solution and takes a value in the range $0 \leq C_i + \leq 1$. "C_i^+" = 1 shows the relative closeness to the positive-ideal solution. "C_i^+" = 0 shows relative closeness to the negative-ideal solution.

The relative closeness to the ideal solution (C_i^+; i=1,…,m; *j=1,…,n*) was determined using equation (8):

$$C_i^+ = \frac{S_i^-}{S_i^- + S_i^+} \quad (8)$$

$$i = 1,2,3, \dots, m$$

Step 6 : Sorting alternatives according to relative superiority

Determining the relative superiority of the results (*score)* represents the achieved company performance. High scores correspond to better performance. The results can be used to determine the rank of the company within the industry (Üçüncü et al., 2018).

Considering that in this paper the weighting coefficients of the criteria when applying the TOPSIS method are determined using the **AHP** (Analytical Hierarchical Process) method, we will briefly refer to its theoretical and methodological characteristics.

Analytical Hierarchical Process (AHP) method consists of the following steps (Saaty, 2008):

Step 1 : Defining the matrix of comparison pairs

$$A = [a_{ij}] = \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ 1/a_{12} & 1 & \cdots & a_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ 1/a_{1n} & 1/a_{2n} & \cdots & 1 \end{bmatrix} \quad (9)$$

Step 2 : Normalization of the matrix of comparison pairs

$$a_{ij}^* = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}}, i, j = 1, \dots, n \quad (10)$$

Step 3 : Determining the relative importance, i.e. the weight vector

$$w_i = \frac{\sum_{i=1}^{n} a_{ij}^*}{n}, i, j = 1, \dots, n \quad (11)$$

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

$$CI = \frac{\lambda_{max} - n}{n} \quad (12)$$

If CI < 0.1 of the estimated values of the coefficients a_{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%.

Based on the consistency index, the consistency ratio CR = CI/RI can be calculated, where RI is a random index.

3. RESULTS

In this paper, performance measurement of insurance companies in Serbia is performed using the TOPSIS method. In doing so, the following criteria are used: C1 – assets, C2 – capital, C3 – salary expenses, salary compensation and other personal expenses, C4 – business (functional)

income and C5 – net profit. Alternatives were observed insurance companies that operated in Serbia in 2021. For the purposes of measuring the performance of insurance companies in Serbia based on the AHP-TOPSIS method, the initial data for 2021 are shown in Table 1.

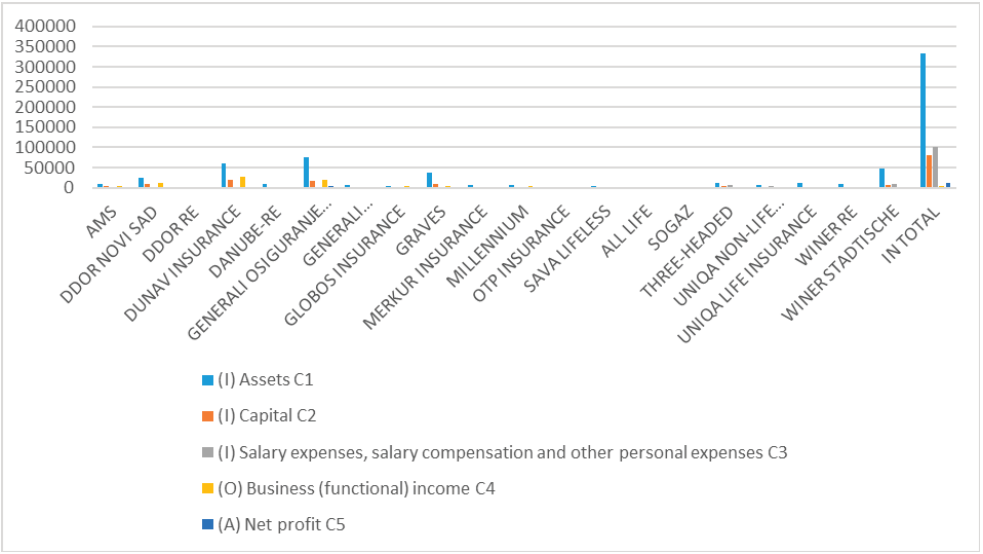
Table 1. Initial data

	DMU	(I) Assets	(I) Capital	(I) Salary expenses, salary compensation and other personal expenses	(O) Business (functional) income	(A) Net profit
		C1	C2	C3	C4	C5
A1	AMS	8164	2921	105	4255	522
A2	DDOR NOVI SAD	23713	7825	269	12376	703
A3	DDOR RE	1293	667	16	14	3
A4	DUNAV INSURANCE	60772	18501	1017	27833	2519
A5	DANUBE-RE	10053	2520	77	2325	351
A6	GENERALI OSIGURANJE SERBIA	74708	17243	493	19495	3393
A7	GENERALI REOSIGURANJE SERBIA	5167	773	32	187	132
A8	GLOBOS INSURANCE	4750	1165	53	3077	382
A9	GRAVES	37212	10171	143	4447	751
A10	MERKUR INSURANCE	5340	686	43	773	48
A11	MILLENNIUM	6740	2048	66	3310	284
A12	OTP INSURANCE	1860	677	684	100	99
A13	SAVA LIFELESS	4617	1435	1664	155	65
A14	ALL LIFE	1545	535	545	31	3
A15	SOGAZ	1679	947	169	61	43
A16	THREE-HEADED	11642	3106	5276	271	481
A17	UNIQA NON-LIFE INSURANCE	6754	1368	2725	254	19
A18	UNIQA LIFE INSURANCE	11643	1024	1823	95	59
A19	WINER RE	8041	880	1021	55	62
A20	WINER STADTISCHE	48338	6580	9401	322	1178
	IN TOTAL	334043	81084	101409	3669	11108
	Statistics					
	N	20	20	20	20	20
	Mean	16701.5500	4053.6000	1281.1000	3971.8000	554.8500
	Median	7397.5000	1401.5000	381.0000	296.5000	208.0000
	Std. Deviation	21377.83981	5418.97381	2295.78288	7458.75665	889.80975
	Minimum	1293.00	535.00	16.00	14.00	3.00
	Maximum	74708.00	18501.00	9401.00	27833.00	3393.00

Source. National Bank of Serbia. Data are expressed in thousands of dinars. I – input. O – output. Author's statistics.

Figure 1 shows the performance indicators of insurance companies in Serbia.

Figure 1. Performance indicators of insurance companies in Serbia



Source: Author's picture

In the specific case, according to the performance indicator net profit, the best insurance company in Serbia is GENERALI OSIGURANJE SERBIA. According to the same indicator, the worst insurance company is ALL LIFE. Table 2 shows the correlation matrix of the initial data.

Table 2. Correlations

Correlations						
		C1	C2	C3	C4	C5
C1	Pearson Correlation	1	.951**	.278	.793**	.948**
	Sig. (2-tailed)		.000	.236	.000	.000
	N	20	20	20	20	20
C2	Pearson Correlation	.951**	1	.067	.917**	.943**
	Sig. (2-tailed)	.000		.779	.000	.000
	N	20	20	20	20	20
C3	Pearson Correlation	.278	.067	1	-.163	.115
	Sig. (2-tailed)	.236	.779		.492	.629
	N	20	20	20	20	20
C4	Pearson Correlation	.793**	.917**	-.163	1	.872**
	Sig. (2-tailed)	.000	.000	.492		.000
	N	20	20	20	20	20
C5	Pearson Correlation	.948**	.943**	.115	.872**	1
	Sig. (2-tailed)	.000	.000	.629	.000	
	N	20	20	20	20	20
**. Correlation is significant at the 0.01 level (2-tailed).						

Source: Author's correlation matrix

The correlation analysis shows that in this particular case there is a strong correlation between the analyzed criteria at the level of statistical significance, except for criterion C3.

Table 3 shows the non-parametric test of the initial data.

Table 3. Npar Tests

NPar Tests	
Friedman Test	
Ranks	
	Mean Rank
C1	5.00
C2	3.25
C3	2.40
C4	2.70
C5	1.65
Test Statistics[a]	
N	20
Chi-Square	50.680
df	4
Asymp. Sig.	.000
a. Friedman Test	

Source: Author's non-parametric test

The non-parametric test shows that there is a significant difference between the analyzed statistical variables (Asymp. Sig. .000). This, in other words, means that the null hypothesis that there are no significant statistical differences between them is rejected.

The weighting coefficients of the criteria were determined using the AHP method (Saaty, 2008; Table 4).

Table 4. Weight coefficients of the criteria

AHP With Arithmetic Mean Method					
Initial Comparisons Matrix					
	Assets C1	**Capital C2**	**Salary expenses, salary compensation and other personal expenses C3**	**Business (functional) income C4**	**Net profit C5**
Assets **C1**	1	2	1	2	1
Capital **C2**	0.5	1	2	1	2
Salary expenses, salary compensation and other personal expenses **C3**	1	0.5	1	0.5	1
Business (functional) income **C4**	0.5	1	2	1	1
Net profit **C5**	1	0.5	1	1	1
NOISE	4	5	7	5.5	6

Normalized Matrix						
	Assets C1	**Capital C2**	**Salary expenses, salary compensation and other personal expenses C3**	**Business (functional) income C4**	**Net profit C5**	**Weights of Criteria**
Assets **C1**	0.2500	0.4000	0.1429	0.3636	0.1667	0.2646
Capital **C2**	0.1250	0.2000	0.2857	0.1818	0.3333	0.2252
Salary expenses, salary compensation and other personal expenses **C3**	0.2500	0.1000	0.1429	0.0909	0.1667	0.1501
Business (functional) income **C4**	0.1250	0.2000	0.2857	0.1818	0.1667	0.1918
Net profit **C5**	0.2500	0.1000	0.1429	0.1818	0.1667	0.1683
					NOISE	1
Consistency Ratio	0.0658		COMPARE WITH 0.1; IT SHOULD BE LESS THAN 0.1.			

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

Therefore, according to the AHP method, the asset criterion is the most important. Next: capital, business (functional) income, profit and business (functional) expenses. In other words, more efficient asset management can significantly influence the achievement of the target performance of insurance companies in Serbia.

Tables 5-8 and Figure 2 show the obtained empirical results of the research on the effectiveness of insurance companies in Serbia based on the AHP-TOPSIS method.

Table 5. Initial Matrix

weights of criteria	0.2646	0.2252	0.1501	0.1918	0.1683
kind of criteria	1	1	-1	1	1
INITIAL MATRIX	**C1**	**C2**	**C3**	**C4**	**C5**
A1	8164	2921	105	4255	522
A2	23713	7825	269	12376	703
A3	1293	667	16	14	3
A4	60772	18501	1017	27833	2519
A5	10053	2520	77	2325	351
A6	74708	17243	493	19495	3393
A7	5167	773	32	187	132
A8	4750	1165	53	3077	382
A9	37212	10171	143	4447	751
A10	5340	686	43	773	48
A11	6740	2048	66	3310	284
A12	1860	677	684	100	99

A13	4617	1435	1664	155	65
A14	1545	535	545	31	3
A15	1679	947	169	61	43
A16	11642	3106	5276	271	481
A17	6754	1368	2725	254	19
A18	11643	1024	in 1823	95	59
A19	8041	880	1021	55	62
A20	48338	6580	9401	322	1178

Information For Normalization					
Sum of Square	1.4262E+10	886573724	132966106	1372531870	21200637
SQRT	119423.8842	29775.3879	11531.0930	37047.6972	4604.4149

Source: Author's calculation using the software program SoftwareofTOPSIS-Excel

Table 6. Normalized Matrix

weights of criteria	0.2646	0.2252	0.1501	0.1918	0.1683
kind of criteria	1	1	-1	1	1
NORMALIZED MATRIX	**C1**	**C2**	**C3**	**C4**	**C5**
A1	0.0684	0.0981	0.0091	0.1149	0.1134
A2	0.1986	0.2628	0.0233	0.3341	0.1527
A3	0.0108	0.0224	0.0014	0.0004	0.0007
A4	0.5089	0.6214	0.0882	0.7513	0.5471
A5	0.0842	0.0846	0.0067	0.0628	0.0762
A6	0.6256	0.5791	0.0428	0.5262	0.7369
A7	0.0433	0.0260	0.0028	0.0050	0.0287
A8	0.0398	0.0391	0.0046	0.0831	0.0830
A9	0.3116	0.3416	0.0124	0.1200	0.1631
A10	0.0447	0.0230	0.0037	0.0209	0.0104
A11	0.0564	0.0688	0.0057	0.0893	0.0617
A12	0.0156	0.0227	0.0593	0.0027	0.0215
A13	0.0387	0.0482	0.1443	0.0042	0.0141
A14	0.0129	0.0180	0.0473	0.0008	0.0007
A15	0.0141	0.0318	0.0147	0.0016	0.0093
A16	0.0975	0.1043	0.4575	0.0073	0.1045
A17	0.0566	0.0459	0.2363	0.0069	0.0041
A18	0.0975	0.0344	0.1581	0.0026	0.0128
A19	0.0673	0.0296	0.0885	0.0015	0.0135
A20	0.4048	0.2210	0.8153	0.0087	0.2558

Source: Author's calculation using the software program SoftwareofTOPSIS-Excel

Table 7. Normalized Weighted Matrix

NORMALIZED WEIGHTED MATRIX					
	C1	C2	C3	C4	C5
A1	0.0181	0.0221	0.0014	0.0220	0.0191
A2	0.0525	0.0592	0.0035	0.0641	0.0257
A3	0.0029	0.0050	0.0002	0.0001	0.0001
A4	0.1346	0.1399	0.0132	0.1441	0.0921
A5	0.0223	0.0191	0.0010	0.0120	0.0128
A6	0.1655	0.1304	0.0064	0.1009	0.1240
A7	0.0114	0.0058	0.0004	0.0010	0.0048
A8	0.0105	0.0088	0.0007	0.0159	0.0140
A9	0.0824	0.0769	0.0019	0.0230	0.0275
A10	0.0118	0.0052	0.0006	0.0040	0.0018
A11	0.0149	0.0155	0.0009	0.0171	0.0104
A12	0.0041	0.0051	0.0089	0.0005	0.0036
A13	0.0102	0.0109	0.0217	0.0008	0.0024
A14	0.0034	0.0040	0.0071	0.0002	0.0001
A15	0.0037	0.0072	0.0022	0.0003	0.0016
A16	0.0258	0.0235	0.0687	0.0014	0.0176
A17	0.0150	0.0103	0.0355	0.0013	0.0007
A18	0.0258	0.0077	0.0237	0.0005	0.0022
A19	0.0178	0.0067	0.0133	0.0003	0.0023
A20	0.1071	0.0498	0.1224	0.0017	0.0431
MIN	0.0029	0.0040	0.0002	0.0001	0.0001
MAX	0.1655	0.1399	0.1224	0.1441	0.1240
A+	0.1655	0.1399	0.0002	0.1441	0.1240
AND-	0.0029	0.0040	0.1224	0.0001	0.0001

Source: Author's calculation using the software program SoftwareofTOPSIS-Excel

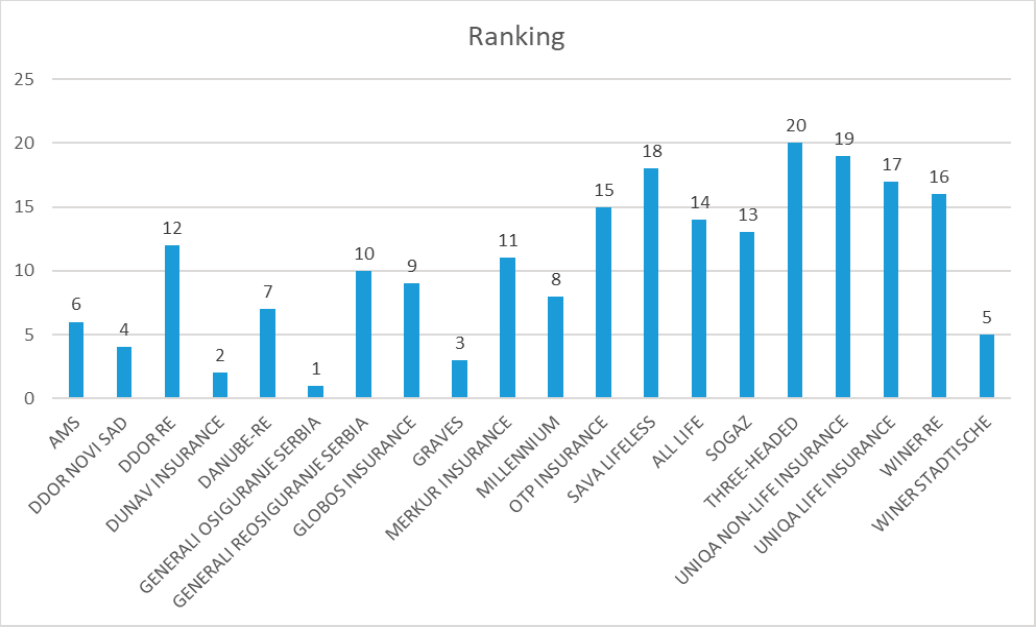
Table 8. Ranking of alternatives

	Alternatives	Si+	You-	Ci	Ci	Ranking
AMS	**A1**	0.2481	0.1267	0.3380	0.338	**6**
DDOR NOVI SAD	**A2**	0.1881	0.1562	0.4537	0.454	**4**
DDOR RE	**A3**	0.2842	0.1222	0.3007	0.301	**12**
DUNAV INSURANCE	**A4**	0.0463	0.2774	0.8570	0.857	**2**
DANUBE-RE	**A5**	0.2548	0.1251	0.3292	0.329	**7**
GENERALI OSIGURANJE SERBIA	**A6**	0.0446	0.2853	0.8647	0.865	**1**
GENERALI REOSIGURANJE SERBIA	**A7**	0.2764	0.1224	0.3068	0.307	**10**
GLOBOS INSURANCE	**A8**	0.2641	0.1238	0.3192	0.319	**9**
GRAVES	**A9**	0.1867	0.1657	0.4701	0.470	**3**

	Alternatives	Si+	You-	Ci	Ci	Ranking
MERKUR INSURANCE	**A10**	0.2763	0.1222	0.3067	0.307	**11**
MILLENNIUM	**A11**	0.2592	0.1243	0.3240	0.324	**8**
OTP INSURANCE	**A12**	0.2818	0.1135	0.2872	0.287	**15**
SAVA LIFELESS	**A13**	0.2767	0.1012	0.2679	0.268	**18**
ALL LIFE	**A14**	0.2844	0.1153	0.2885	0.288	**14**
SOGAZ	**A15**	0.2819	0.1202	0.2990	0.299	**13**
THREE-HEADED	**A16**	0.2636	0.0640	0.1954	0.195	**20**
UNIQA NON-LIFE INSURANCE	**A17**	0.2762	0.0880	0.2416	0.242	**19**
UNIQA LIFE INSURANCE	**A18**	0.2702	0.1014	0.2728	0.273	**17**
WINER RE	**A19**	0.2743	0.1102	0.2865	0.286	**16**
WINER STADTISCHE	**A20**	0.2309	0.1217	0.3451	0.345	**5**

Source: Author's calculation using the software program SoftwareofTOPSIS-Excel

Figure 2. Ranking of alternatives



Source: Author's picture

Table 5 shows the weight coefficients of the criteria determined by applying the AHP method, the types of criteria and the original empirical data of the criteria by alternatives. Table 6 shows the normalized criteria values by alternatives. Table 7 shows the weighted normalized values of the criteria by alternatives. And finally, Table 8 shows the ranking of the alternatives.

In this case, according to the AHP-TOPSIS method, the best ranked insurance company is GENERALI OSIGURANJE SERBIA in Serbia.

On the other hand, the worst ranked insurance company is THREE-HEADED in Serbia.

The presented ranking of insurance companies in Serbia was influenced by asset management, capital, human resources, business (functional) income and profit. In order to achieve the target positioning of a given insurance company on the insurance market in Serbia, it is necessary to manage the given statistical variables as efficiently as possible. The economic climate, the understanding of the importance of insurance against all kinds of potential risks, as well as the digitization of the entire insurance business play a significant role in this.

4. DISCUSSION

According to the results of empirical research on the performance of insurance companies in Serbia using the AHP-TOPSIS method, the top five are in order: ĐENERALI OSIGURANJE SRBIJA, DUNAV OSIGURANJE, GRAWE, DDOR NOVI SAD and WINER STADTISCHE. The company TRIGLAV is in the worst position.

Numerous macro and micro factors influenced the presented ranking of insurance companies in Serbia according to the AHP-TOPSIS method. These are: general economic conditions of the economy, employment, standard of living of the population, interest, inflation, understanding of the importance of insurance, the behavior of insurance companies with regard to the realistic assessment and compensation of the insured event (incurred damages), digitization of the entire business, etc. Through their effective control, it is possible to significantly influence the achievement of the target performance of insurance companies in Serbia.

5. CONCLUSION

According to the results of empirical research on the performance of insurance companies in Serbia using the AHP-TOPSIS method, the top five are in order: ĐENERALI OSIGURANJE SRBIJA, DUNAV OSIGURANJE, GRAWE, DDOR NOVI SAD and WINER STADTISCHE. The company TRIGLAV is in the worst position.

A number of macro and micro factors influenced the presented ranking of insurance companies in Serbia according to the AHP-TOPSIS method, such as: general economic conditions of the economy, employment, living standards of the population, interest, inflation, understanding of the importance of insurance, behavior of insurance companies in terms of realistic assessment and surplus of the insured case (incurred damage), digitization of the entire business, etc. Their effective control can significantly influence the achievement of the target performance of insurance companies in Serbia.

The application of the AHP-TOPSIS method enables, compared to ratio analysis, a more realistic assessment of the insurance company's position in terms of performance. Therefore, it is recommended, especially in combination with other methods of multi-criteria analysis (MABAC, WASPAS, VIKOR, etc.) when analyzing the performance of insurance companies in Serbia.

6. LITERATURE

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ANALIZA POSLOVANJA OSIGURAVAJUĆIH DRUŠTAVA U SRBIJI NA OSNOVU AHP-TOPSIS METODE

Sažetak

Vrednovanje poslovanja osiguravajućih društava na temelju metoda višekriterijskih analiza predstavlja svojevrstan istraživački izazov. Imajući to u vidu, u radu se AHP-TOPSIS metodom istražuje učinkovitost osiguravajućih društava u Srbiji. Prema rezultatima empirijskih istraživanja poslovanja osiguravajućih društava u Srbiji metodom AHP-TOPSIS, prvih pet su redom: ĐENERALI OSIGURANJE SRBIJA, DUNAV OSIGURANJE, GRAWE, DDOR NOVI SAD i WINER STADTISCHE. U najgorem položaju je tvrtka TRIGLAV. Na ovakav poredak promatranih osiguravajućih društava u Srbiji prema TOPSIS metodi utjecali su brojni makro i mikro čimbenici. Njihova učinkovita kontrola svakako može značajno utjecati na postizanje ciljnih rezultata osiguravajućih društava u Srbiji.

Ključne riječi : učinkovitost, osiguranje, Srbija, AHP-TOPSIS metoda

JEL klasifikacija: C2, C6, G1, G2, G22