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ANALIZA EFIKASNOSTI OSIGURAVAJUĆIH KOMANIJA PO VRSTAMA OSIGURANJA U SRBIJI NA BAZI COCOSO METODE

ORIGINALNI NAUČNI RAD

Apstrakt

U poslednje vreme, kao što je poznato, sve se više ocenjuje efikasnost (performanse) osiguravajućih kompanija na bazi višekriterijumske analize. Imajući to u vidu, u ovom radu analiziramo efikasnost osiguravajućih kompanija po vrstama osiguranja u Srbiji na bazi COCOSO metode (engl. *Combined Compromise Solution*). U kontekstu toga predložene su adekvatne mere za unapređenje efikasnosti osiguravajućih kompanija u Srbiji u budućnosti. Dobijeni rezultati istraživanja efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji na bazi COCOSO metode pokazuju da je ona najbolja kod imovinskog osiguranja. Zatim, po redosledu, dolaze: osiguranje od posledica nezgode i dobrovoljno zdravstveno osiguranje, osiguranje vozila, neživotna osiguranja koja nisu svrstana u podgrupe, životna osiguranja osim osiguranja života, osiguranje od odgovornosti, osiguranje života, osiguranje plov-
nih objekata i transporta, osiguranje kredita i jemstva, i osiguranje vazduhoplova. Na takvo rangiranje efikasnosti osiguravajućih kompanija po vrstama osiguranja uticali su brojni makro i mikro faktori (životni standard, ekonomska klima, politička situacija i drugi).

Ključne reči: *efikasnost, vrste osiguranja, Srbija, determinante, COCOSO metoda.*

Jel klasifikacija: *C2, C6, G1, G2, G22*

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I. Uvod

Problematika ocene efikasnosti osiguravajućih kompanija na bazi višekriterijske analize (Isseveroglu, 2015; Mandić, 2015; Tsvetkova, 2021) vrlo je aktuelna, kompleksna i značajna. S obzirom na to, predmet istraživanja u ovom radu je analiza efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji na bazi COCOSO metode. Cilj i svrha toga je da se data problematika što kompleksnije obradi i da se predlože adekvatne mere za poboljšanje efikasnosti osiguravajućih kompanija u Srbiji u budućnosti. U tome se, pored ostaloga, ogleda naučno-stručni doprinos ovog rada.

U poslednje vreme, sve je bogatija literatura posvećena analizi efikasnosti preduzeća iz različitih privrednih sektora na bazi COCOSO metode. Vrlo je malo, međutim, radova te vrste iz oblasti sektora pružanja finansijskih usluga (Ersoy, 2017; Lukić, 2019, 2020; Gaur, 2020), odnosno osiguranja, pogotovo u Srbiji (Kočović, 2010; Lukić, 2016; Rakonjac-Antić, 2018). Drugim rečima, u domaćoj literaturi ne postoji, koliko je nama poznato, nijedan celoviti rad posvećen analizi efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji na bazi COCOSO metode.

Osnovna hipoteza istraživanja u ovom radu jeste da je kontinuirano praćenje efikasnosti osiguravajućih kompanija po vrstama osiguranja pretpostavka za njeno unapređenje u budućnosti: u našem slučaju u Srbiji. Pored primene COCOSO metode, u izvesnoj meri u radu je korišćena statistička analiza, kao i racio analiza u cilju što kompleksnije obrade tretirane problematike.

Potrebni empirijski podaci prikupljeni su od Agencije za privredne registre Republike Srbije. Oni su izvedeni u skladu s relevantnim međunarodnim standardima. U pogledu međunarodne uporedivosti ne postoje, s obzirom na to, nikakva ograničenja.

II. COCOSO metoda

COCOSO (engl. *Combined Compromise Solution*) metoda zasnovana je na integrisanju jednostavnih težinskih aditiva i modela eksponencijalno težinskih produkata. Ona pruža sažet pregled kompromisnih rešenja i ima široku primenu. Da bi se rešio COCOSO problem odlučivanja, posle definisanja alternativa i srodnih kriterijuma, dolaze sledeći koraci (Yazdani, 2019):

(1) Determinisanje inicijalne matrice odlučivanja X , za m alternativa i n kriterijuma na način kako je niže prikazano:

$$x_{ij} = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}; i = 1, 2, \dots, m; j = 1, 2, \dots, n. \quad (1)$$

(2) Normalizacija elemenata inicijalne matrice odlučivanja, korišćenjem sledećih jednačina (Zeleny, 1973):

$$r_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}; \text{ za benefitni kriterijum,} \quad (2)$$

$$r_{ij} = \frac{\max_i x_{ij} - x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}; \text{ za troškovni kriterijum,} \quad (3)$$

(3) Primenom jednačina (4) i (5) dobija se suma težinskih uporedivih sekvenci (nizova) S_i i snaga težinskih uporedivih sekvenci P_i za svaku alternativu, respektivno:

$$S_i = \sum_{j=1}^n (w_j r_{ij}), \quad (4)$$

gde je: S_i vrednost dobijena na bazi sivog relacionog generacijskog pristupa (engl. *grey relational generation approach*):

$$P_i = \sum_{j=1}^n (r_{ij})^{w_j}, \quad (5)$$

gde je: P_i vrednost takođe dobijena prema WASPAS (engl. *Weighted Aggregated Sum Product Assessment*) multiplikativnom stavu; w_j označava težinu j-toj kriterijuma, i $\sum_{j=1}^n w_j$.

(4) Izračunavanje relativnih težina alternativa sa agregiranjem strategija, bazirano na ideji MULTIMOORA (engl. *Multi-Objective Optimization on the basis of a Ratio Analysis plus the full MULTiplicative form*) metode (Brauers & Zavadskas, 2006), korišćenjem jednačina (6) – (8):

$$k_{ia} = \frac{P_i + S_i}{\sum_{i=1}^m (P_i + S_i)}, \quad (6)$$

$$k_{ib} = \frac{S_i}{\min_i S_i} + \frac{P_i}{\min_i P_i}, \quad (7)$$

$$k_{ic} = \frac{\lambda(S_i) + (1 - \lambda)(P_i)}{\left(\lambda \max_i S_i + (1 - \lambda) \max_i P_i\right)}, \quad (8)$$

Jednačina (6) izražava aritmetičku sredinu suma WSM (engl. *weighted product method*) i WPM (engl. *weighted sum method*) rezultat (engl. *scores*).

Jednačina (7) izražava relativni rezultat WSM i WPM komparirano sa najgorim slučajem.

Jednačina (8) izračunava uravnoteženi rezultat WSM i WPM modela.

U jednačini (8) vrednost λ (obično $\lambda=0.5$) određuje donosioca odluke i $0 \leq \lambda \leq 1$.

(6) Rangiranje alternativa na osnovu k_i vrednosti (što je značajnija, utoliko je bolje):

$$k_i = (k_{ia}k_{ib}k_{ic})^{\frac{1}{3}} + \frac{1}{3}(k_{ia}k_{ib}k_{ic}). \quad (9)$$

III. Merenje efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji na bazi COCOSO metode

Prilikom merjenja efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji primenom COCOSO metode kao kriterijumi su uzeti: C1 – broj kompanija, C2 – poslovni (funkcionalni) rashodi, C3 – troškovi sprovođenja osiguranja, C4 – poslovni (funkcionalni) prihodi, C5 – dobitak iz investicionih aktivnosti i C6 – poslovni dobitak. Alternative su posmatrane vrste osiguranja: A1 – osiguranje života, A2 – životna osiguranja osim osiguranja života, A3 – osiguranje od posledica nezgode i dobrovoljno zdravstveno osiguranje, A4 – osiguranje vozila, A5 – osiguranje plovih objekata i transporta, A6 – osiguranje vazduhoplova, A7 – imovinska osiguranja, A8 – osiguranje od odgovornosti, A9 – osiguranje kredita i jemstva i A10 – neživotna osiguranja koja nisu svrstana u podgrupe. Kalkulisanje efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji izvršeno je pomoću COCOSO Software-Excel. Dobijeni rezultati prikazani su u niže priloženim tabelama, kao i grafički.

U Tabeli 1. prikazani su inicijalni podaci za merenje efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji za 2019.

Tabela 1. Inicijalni podaci za merenje efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji, 2019.

	Broj kompanija	Poslovni (funkcionalni) rashodi	Troškovi sprovođenja osiguranja	Poslovni (funkcionalni) prihodi	Dobitak iz investicionih aktivnosti	Poslovni dobitak
Osiguranje života	10	19432	5696	22166	4689	2734
Životna osig. osim osig. života	10	1180	688	2255	308	1074
Osig. od posl. nezgode i dobrov. zdrav. osig.	11	4010	2800	5848	574	1837
Osiguranje vozila	11	6201	3059	8089	381	1916
Osig. plovni objekata i transporta	9	269	356	656	126	389
Osiguranje vazduhoplova	6	21	131	25	56	13
Imovinska osiguranja	11	7814	4527	11894	848	3980
Osiguranje od odgovornosti	10	15198	8786	33407	1339	18208
Osiguranje kred. i jemstva	8	329	591	1084	206	754
Neživ. osigur. koja nisu svrstana u podgrupe	11	1138	2095	2825	207	1686
Ukupno	19	56608	29273	89965	8890	33567

Napomena: Podaci su iskazani u milionima dinara. Broj kompanija je iskazan u celom broju.

Izvor: Agencija za privredni registar Republike Srbije

U Tabeli 2. prikazana je statistika inicijalnih podataka korišćenih za analizu efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji.

Tabela 2. Statistika

Statistics							
		1 Broj kompanija	2 Poslovni (funkcionalni) rashodi	3 Troškovi sprovođenja osiguranja	4 Poslovni (funkcionalni) prihodi	5 Dobitak iz investicionih aktivnosti	6 Poslovni dobitak
N	Valid	10	10	10	10	10	10
	Missing	0	0	0	0	0	0
Median		10.0000	2595.0000	2447.5000	4336.5000	344.5000	1761.5000
Std. Deviation		1.63639	6814.97017	2791.84178	10976.44211	1396.19596	5378.87633
Minimum		6.00	21.00	131.00	25.00	56.00	13.00

Maximum	11.00	19432.00	8786.00	33407.00	4689.00	18208.00
Test Statistics ^a						
N	10					
Chi-Square	38.514					
df	5					
Asymp. Sig.	.000					
a. Friedman Test						

Napomena: Obračuni su izvršeni pomoću softverskog programa SPSS

Poslovni dobitak je iznad proseka kod osiguranja života, osiguranja od posledica nezgode i dobrovoljnog zdravstvenog osiguranja, kod osiguranja motornih vozila, imovinskog osiguranja i osiguranja od odgovornosti. On je kod ostalih vrsta osiguranja ispod proseka. *Friedman Test* pokazuje da između posmatranih varijabli postoje značajne razlike, tako da se odbacuje nulta hipoteza.

U Tabeli 3. prikazana je korelaciona matrica inicijalnih podataka korišćenih za evaluaciju efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji.

Tabela 3. Korelaciona matrica

Correlations		1	2	3	4	5	6
1 Broj kompanija	Pearson Correlation	1	.347	.463	.323	.188	.218
	Sig. (2-tailed)		.326	.178	.363	.603	.546
	N	10	10	10	10	10	10
2 Poslovni (funktionalni) rashodi	Pearson Correlation	.347	1	.897**	.922**	.875**	.614
	Sig. (2-tailed)	.326		.000	.000	.001	.059
	N	10	10	10	10	10	10
3 Troškovi sprovođenja osiguranja	Pearson Correlation	.463	.897**	1	.977**	.593	.857**
	Sig. (2-tailed)	.178	.000		.000	.071	.002
	N	10	10	10	10	10	10
4 Poslovni (funktionalni) prihodi	Pearson Correlation	.323	.922**	.977**	1	.650*	.872**
	Sig. (2-tailed)	.363	.000	.000		.042	.001
	N	10	10	10	10	10	10
5 Dobitak iz investicionih aktivnosti	Pearson Correlation	.188	.875**	.593	.650*	1	.219
	Sig. (2-tailed)	.603	.001	.071	.042		.544
	N	10	10	10	10	10	10
6 Poslovni dobitak	Pearson Correlation	.218	.614	.857**	.872**	.219	1
	Sig. (2-tailed)	.546	.059	.002	.001	.544	
	N	10	10	10	10	10	10
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Napomena: Autorovo kalkulisane pomoću softverskog programa SPSS

Korelaciona matrica pokazuje da postoji značajna korelaciona veza između poslovnog dobitka i troškova sprovođenja osiguranja i poslovnih (funkcionalnih) prihoda na nivou statističke značajnosti. Isto tako, i između dobitka iz investicionih aktivnosti i poslovnih (funkcionalnih) rashoda i poslovnih (funkcionalnih) prihoda. U cilju povećanja poslovnog dobitka neophodno je, dakle, što efikasnije upravljati troškovima sprovođenja osiguranja i poslovnim (funkcionalnim) prihodima.

U Tabeli 4. je, u cilju što kompleksnije obrade date problematika, ukratko prikazana racio analiza osiguravajućih kompanija po vrstama osiguranja u Srbiji za 2019.

Tabela 4. Racio analiza

	Odnos poslovnih (funkcionalnih) prihoda i poslovnih (funkcionalnih) rashoda	Odnos poslovnih (funkcionalnih) prihoda i troškova sprovođenja osiguranja	Poslovni dobitak po kompaniji	Odnos poslovnog dobitka i poslovnih (funkcionalnih) prihoda	Učešće poslovnih (funkcionalnih) prihoda u ukupnim
Osiguranje života	1.1406958	3.891503	273.4	12.33%	24.64%
Životna osigur. osim osiguranja života	1.9110169	3.277616	107.4	47.63%	2.51%
Osiguranje od posled. nezgode i dobrovoljno zdravstveno osiguranje	1.4583541	2.088571	167	31.41%	6.50%
Osiguranje vozila	1.304467	2.644328	174.1818	23.69%	8.99%
Osiguranje plovnih objekata i transporta	2.4386617	1.842697	43.22222	59.30%	0.73%
Osiguranje vazduhoplova	1.1904762	0.19084	2.166667	52.00%	0.03%
Imovinska osiguranja	1.5221397	2.627347	361.8182	33.46%	13.22%
Osiguranje od odgovornosti	2.1981182	3.802299	1820.8	54.50%	37.13%
Osiguranje kredita i jemstva	3.2948328	1.834179	94.25	69.56%	1.20%
Neživotna osiguranja koja nisu svrstana u podgrupe	2.4824253	1.348449	153.2727	59.68%	3.14%
Ukupno	1.589263	3.07331	1766.684	37.31%	100.00%

Podaci u datoj tabeli pokazuju da je u Srbiji, s obzirom na rizičnost, poslovni dobitak iskazan u procentima od poslovnih (funkcionalnih) prihoda najveći kod osiguranja kredita i jemstva, a najmanji je kod osiguranja života. Osiguravajuće kompanije u Srbiji na 100 dinara poslovnih (funkcionalnih) rashoda ostvaruju 158 dinara poslovnih (funkcionalnih) prihoda, odnosno na 100 dinara troškova sprovođenja osiguranja ostvaruju 307 dinara poslovnih (funkcionalnih) prihoda. Poslovni prihod po kompaniji najveći je kod osiguranja od odgovornosti, a najmanji je kod osiguranja kredita i jemstva. Učešće poslovnih (funkcionalnih) prihoda osiguranja života u ukupnim prihodima je 24,64%. Ono je dakle na nižem nivou u odnosu na zemlje zapadne Evrope i Amerike (gde je preko 60%).

Težinski koeficijenti kriterijuma utvrđeni su pomoću AHP metode (Saaty, 2008). Oni su prikazani u Tabeli 5. i na Slici 1.

Tabela 5. Težinski koeficijenti kriterijuma

Table	Criterion	Comment	Weights	+/-
1	Broj kompanija		19.4%	3.4%
2	Poslovni (funkcionalni) rashodi		13.7%	9.2%
3	Troškovi sprovođenja osiguranja		18.0%	5.7%
4	Poslovni (funkcionalni) prihodi		11.2%	4.1%
5	Dobitak iz investicionih aktivnosti		20.3%	7.6%
6	Poslovni dobitak		17.4%	9.6%

Result	Eigenvalue		Lambda: 6.458		MRE: 44.0%	
	Consistency Ratio	0.37	GCI: 0.26	Psi: 18.3%	CR: 7.3%	MRE est 42.8%

Matrix		Broj kompanija	Poslovni (funkcionalni) rashodi	Troškovi sprovođenja osiguranja	Poslovni (funkcionalni) prihodi	Dobitak iz investicionih aktivnosti	Poslovni dobitak	Normalized principal Eigenvector
		1	2	3	4	5	6	
Broj kompanija	1	1	2	1	2	1	1	19.35%
Poslovni (funkcionalni) rashodi	2	1/2	1	1/2	1	1/2	2	13.71%
Troškovi sprovođenja osiguranja	3	1	2	1	2	1	1/2	18.01%
Poslovni (funkcionalni) prihodi	4	1/2	1	1/2	1	1	1/2	11.25%

Dobitak iz investicionih aktivnosti	5	1	2	1	1	1	2	20.30%
Poslovni dobitak	6	1	1/2	2	2	1/2	1	17.38%

Napomena: Obračuni su izvršeni pomoću AHPSoftware-Excel

Slika 1. Težinski koeficijenti kriterijuma

Po značaju kriterijuma na prvom mestu je dobitak iz investicionih aktivnosti. Zatim slede: broj kompanija, troškovi sprovođenja osiguranja, poslovni dobitak, poslovni (funkcionalni) rashodi, i poslovni (funkcionalni) prihodi. Efikasnijim upravljanjem dobitkom iz investicionih aktivnosti može se značajno uticati na poboljšanje efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji.

U Tabeli 6. prikazana je inicijalna matrica odlučivanja.

Tabela 6. Inicijalna matrica

Initial Matrix						
weights of criteria	0.194	0.137	0.18	0.112	0.203	0.174
kind of criteria	1	-1	-1	1	1	1
	C1	C2	C3	C4	C5	C6
A1	10	19432	5696	22166	4689	2734
A2	10	1180	688	2255	308	1074
A3	11	4010	2800	5848	574	1837

A4	11	6201	3059	8089	381	1916
A5	9	269	356	656	126	389
A6	6	21	131	25	56	13
A7	11	7814	4527	11894	848	3980
A8	10	15198	8786	33407	1339	18208
A9	8	329	591	1084	206	754
A10	11	1138	2095	2825	207	1686
MAX	11	19432	8786	33407	4689	18208
MIN	6	21	131	25	56	13

U Tabeli 7. prikazana je normalizovana matrica odlučivanja.

Tabela 7. Normalizovana matrica

Normalized Matrix						
weights of criteria	0.194	0.137	0.18	0.112	0.203	0.174
kind of criteria	1	-1	-1	1	1	1
	C1	C2	C3	C4	C5	C6
A1	0.8000	0.0000	0.3570	0.6633	1.0000	0.1495
A2	0.8000	0.9403	0.9356	0.0668	0.0544	0.0583
A3	1.0000	0.7945	0.6916	0.1744	0.1118	0.1002
A4	1.0000	0.6816	0.6617	0.2416	0.0701	0.1046
A5	0.6000	0.9872	0.9740	0.0189	0.0151	0.0207
A6	0.0000	1.0000	1.0000	0.0000	0.0000	0.0000
A7	1.0000	0.5985	0.4921	0.3556	0.1709	0.2180
A8	0.8000	0.2181	0.0000	1.0000	0.2769	1.0000
A9	0.4000	0.9841	0.9469	0.0317	0.0324	0.0407
A10	1.0000	0.9425	0.7731	0.0839	0.0326	0.0919

U Tabeli 8. prikazana je težinska uporedivost sekvenci i S_i .

Tabela 8. Težinska uporedivost sekvenci i S_i

Weighted comparability sequence and S_i							
	C1	C2	C3	C4	C5	C6	S_i
A1	0.1552	0.0000	0.0643	0.0743	0.2030	0.0260	0.5228
A2	0.1552	0.1288	0.1684	0.0075	0.0110	0.0101	0.4811
A3	0.1940	0.1088	0.1245	0.0195	0.0227	0.0174	0.4870
A4	0.1940	0.0934	0.1191	0.0271	0.0142	0.0182	0.4660
A5	0.1164	0.1352	0.1753	0.0021	0.0031	0.0036	0.4358
A6	0.0000	0.1370	0.1800	0.0000	0.0000	0.0000	0.3170
A7	0.1940	0.0820	0.0886	0.0398	0.0347	0.0379	0.4770
A8	0.1552	0.0299	0.0000	0.1120	0.0562	0.1740	0.5273
A9	0.0776	0.1348	0.1704	0.0036	0.0066	0.0071	0.4001
A10	0.1940	0.1291	0.1392	0.0094	0.0066	0.0160	0.4943
						SUM	4.6083
						MAX	0.5273
						MIN	0.3170

U Tabeli 9. prikazana je eksponencijalna uporedivost sekvenci i P_i .

Tabela 9. Eksponencijalna uporedivost sekvenci i P_i

Exponentially weighted comparability sequence and P_i							
	C1	C2	C3	C4	C5	C6	P_i
A1	0.9576	0.0000	0.8308	0.9551	1.0000	0.7185	4.4619
A2	0.9576	0.9916	0.9881	0.7385	0.5538	0.6099	4.8395
A3	1.0000	0.9690	0.9358	0.8224	0.6410	0.6702	5.0383
A4	1.0000	0.9488	0.9284	0.8529	0.5831	0.6751	4.9883
A5	0.9057	0.9982	0.9953	0.6412	0.4270	0.5092	4.4764
A6	0.0000	1.0000	1.0000	0.0000	0.0000	0.0000	2.0000
A7	1.0000	0.9321	0.8802	0.8906	0.6987	0.7672	5.1688
A8	0.9576	0.8117	0.0000	1.0000	0.7705	1.0000	4.5399
A9	0.8371	0.9978	0.9902	0.6794	0.4984	0.5729	4.5760
A10	1.0000	0.9919	0.9547	0.7576	0.4991	0.6602	4.8635
						SUM	44.9526
						MAX	5.1688
						MIN	2.0000

U Tabeli 10. i na Slici 2. prikazana je konačna agregacija i rangiranje.

Tabela 10. Konačna agregacija i rangiranje

						λ	0.5			
	Final Aggregation and Ranking									
	Alternatives	Ka	Ranking	Kb	Ranking	Kc	Ranking	K	K	Final Ranking
Osiguranje života	A1	0.1006	7	3.8801	7	0.8751	7	2.3176	2.3176	7
Životna osigur. osim osiguranja života	A2	0.1074	5	3.9374	5	0.9341	5	2.3933	2.3933	5
Osig. od posl. nezgode i dobrovoljno zdrav. osigur.	A3	0.1115	2	4.0555	2	0.9700	2	2.4721	2.4721	2
Osiguranje vozila	A4	0.1101	3	3.9642	4	0.9576	3	2.4248	2.4248	3
Osiguranje plovniha objekata i transporta	A5	0.0991	9	3.6128	8	0.8624	9	2.2007	2.2007	8
Osiguranje vazduhoplova	A6	0.0468	10	2.0000	10	0.4068	10	1.1541	1.1541	10
Imovinska osiguranja	A7	0.1139	1	4.0892	1	0.9912	1	2.5043	2.5043	1
Osiguranje od odgovornosti	A8	0.1022	6	3.9334	6	0.8896	6	2.3516	2.3516	6
Osiguranje kredita i jemstva	A9	0.1004	8	3.5500	9	0.8736	8	2.1858	2.1858	9
Neživotna osig. koja nisu svrstana u podgrupe	A10	0.1081	4	3.9910	3	0.9406	4	2.4203	2.4203	4

Slika 2. Rangiranje alternativa

Na osnovu dobijenih rezultata istraživanja efikasnosti (performansi) osiguravajućih kompanija po vrstama osiguranja u Srbiji na bazi COCOSO metode može se zaključiti da je ona najbolja kod imovinskog osiguranja. Zatim slede: osiguranje od posledica nezgode i dobrovoljno zdravstveno osiguranje, osiguranje vozila, neživotna osiguranja koja nisu svrstana u podgrupe, životna osiguranja osim osiguranja života, osiguranje od odgovornosti, osiguranje života, osiguranje plovniha objekata i transporta, osiguranje kredita i jemstva, i osiguranje vazduhoplova.

Na ovakvo rangiranje efikasnosti (performansi) osiguravajućih kompanija po vrstama osiguranja u Srbiji uticali su brojni makro i mikro faktori (životni standard, ekonomska klima, politička situacija i drugi). Shvatanje značaja osiguranja je još uvek, po našem mišljenju, na nezadovoljavajućem nivou. To se pogotovo odnosi na osiguranje života, koje je na nižem nivou u Srbiji u odnosu na zemlje razvijene tržišne ekonomije (zapadne Evrope i Amerike, gde učešće premije životnog osiguranja u ukupnoj premiji prelazi 60%). Ohrabruje okolnost da se u Srbiji polako budi svest građana, koji shvataju svu bitnost i povoljnost osiguranja života.

Kao i sa osiguranjem života, ista je situacija i sa osiguranjem poljoprivrede u Srbiji. Ono je na niskom nivou razvijenosti. U poslednje vreme u Srbiji sve se više uviđa značaj osiguranja poljoprivrede od katastrofalnih vremenskih nepogoda.

IV. Zaključak

Na osnovu dobijenih rezultata istraživanja efikasnosti (performansi) osiguravajućih kompanija po vrstama osiguranja u Srbiji na bazi COCOSO metode, može se zaključiti da je ona najbolja kod imovinskog osiguranja, a slede: osiguranje od posledica nezgode i dobrovoljno zdravstveno osiguranje, osiguranje motornih vozila, neživotna osiguranja koja nisu svrstana u podgrupe, životna osiguranja osim osiguranja života, osiguranje od odgovornosti, osiguranje života, osiguranje plovniha objekata i transporta, osiguranje kredita i jemstva i osiguranje vazduhoplova.

Brojni faktori su uticali na takvo rangiranje efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji: životni standard, ekonomska klima, politička situacija, nedovoljno shvatanje značaja osiguranja i drugi.

U cilju povećanja efikasnosti osiguravajućih kompanija po vrstama osiguranja u Srbiji u budućnosti neophodno je što efikasnije upravljati poslovnim (funkcionalnim) rashodima, troškovima sprovođenja osiguranja, poslovnim (funkcionalnim) prihodima, dobitkom iz investicionih aktivnosti i poslovnim dobitkom. Značajnu ulogu u tome svakako ima digitalizacija celokupnog poslovanja.

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ANALYSIS OF THE EFFICIENCY OF INSURANCE COMPANIES BY LINES OF INSURANCE IN SERBIA USING THE COCOSO METHOD

SCIENTIFIC PAPER

Abstract

Lately, as known, the efficiency (performance) of insurance companies has been increasingly assessed through the multiple criteria analysis. Having this in mind, this paper analyses the efficiency of insurance companies by lines of insurance in Serbia using the COCOSO method (*Combined Compromise Solution*). We have proposed adequate measures, within this context, to upgrade the future efficiency of insurance companies in Serbia. The results of efficiency survey of insurance companies by lines of business in Serbia using the COCOSO method has revealed that the method is best applied in property insurance, followed by the accident insurance and voluntary health insurance, motor vehicle insurance, non-life insurance not classified in subgroups, life insurance other than pure life, liability insurance, pure life insurance, insurance of vessels and transport, credit and guarantee insurance and aircrafts insurance. Such efficiency ranking of the insurance companies by insurance lines was impacted by numerous macro and micro factors (living standard, economic climate, political situation and the like).

Key words: *efficiency, lines of business, Serbia, determinants, COCOSO method.*

Jel classification: *C2, C6, G1, G2, G22*

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I. Introduction

The assessment of the efficiency of insurance companies based on multiple criteria analyses (Isseveroglu, 2015; Mandic, 2015; Tsvetkova, 2021) is a very current, complex and significant topic. Bearing this in mind, we made the subject of research in this paper to comprise the efficiency analysis of insurance companies by lines of business in Serbia using the COCOSO method. Our aim and objective was to treat this matter as complexly as possible and propose adequate measures to improve the efficiency of insurance companies in Serbia in the future which among other things, reflects the scientific and professional contribution of this paper.

The abundant literature has recently been dedicated to analysing the efficiency of companies in different economic sectors based on the COCOSO method. However, there are few papers of this kind in the financial services sector (Ersoy, 2017; Lukić, 2019, 2020; Gaur, 2020), i.e. in the insurance sector, especially in Serbia (Kočović, 2010; Lukić, 2016; Rakonjac-Antić, 2018). In other words, as far as we are aware, the literature in Serbia offers no complete paper dedicated to analysing the efficiency of insurance companies by insurance lines in the Serbian market on the basis of COCOSO method.

The baseline research hypothesis of this paper is that continuous monitoring of the efficiency of insurance companies by insurance lines is a presumption for the future improvement thereof - in our case, in Serbia. In addition to the COCOSO method, we also used the statistical analysis to some extent and/or the ratio analysis so as to treat the observed matter as complexly as possible.

The necessary empirical data was collected from the Serbian Business Registers Agency. The data was developed in accordance with relevant international standards. There are no restrictions to any international comparison in this field.

II. COCOSO Method

COCOSO (*Combined Compromise Solution*) method is based on the integration of simple weight additives and models of exponentially weight products. It provides a brief overview of compromise solutions and is broadly applied. To solve the COCOSO decision-making problem, after defining alternatives and related criteria, the following steps are implemented (Yazdani, 2019):

(1) Determining the initial decision matrix X , for m alternatives, and n criteria as shown below:

$$x_{ij} = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}; i = 1, 2, \dots, m; j = 1, 2, \dots, n. \quad (1)$$

(2) Normalization of elements of the initial decision-making matrix, using the following equations (Zeleny, 1973):

$$r_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}} ; \text{ for the benefit criterion,} \quad (2)$$

$$r_{ij} = \frac{\max_i x_{ij} - x_{ij}}{\max_i x_{ij} - \min_i x_{ij}} ; \text{ for the cost criterion,} \quad (3)$$

(3) By applying the equations (4) and (5) we reach the sum of weight comparable sequences (series) S_i and the power of weight comparable sequences P_i for each alternative, respectively:

$$S_i = \sum_{j=1}^n (w_j r_{ij}), \quad (4)$$

Where: S_i is the value obtained based on grey relational generation approach:

$$P_i = \sum_{j=1}^n (r_{ij})^{w_j}, \quad (5)$$

Where: P_i is the value also obtained as per WASPAS (*Weighted Aggregated Sum Product Assessment*) multiplicative item; w_j marks the weight of the j criterion, and $\sum_{j=1}^n w_j$.

(4) Calculation of relative weights alternative to aggregation of strategies based on the idea of MULTIMOORA (*Multi-Objective Optimization on the basis of a Ratio Analysis plus the full Multiplicative form*) method (Brauers & Zavadskas, 2006), using the equations (6) – (8):

$$k_{ia} = \frac{P_i + S_i}{\sum_{i=1}^m (P_i + S_i)}, \quad (6)$$

$$k_{ib} = \frac{S_i}{\min_i S_i} + \frac{P_i}{\min_i P_i}, \quad (7)$$

$$k_{ic} = \frac{\lambda(S_i) + (1 - \lambda)(P_i)}{\left(\lambda \max_i S_i + (1 - \lambda) \max_i P_i\right)}, \quad (8)$$

The equation (6) expresses the arithmetic mean of the WSM sums (*weighted product method*) and WPM (*weighted sum method*) result (*scores*).

The equation (7) expresses the relative result WSM and WPM compared with the worst case.

The equation (8) calculates the balanced result of the WSM and WPM model.

In the equation (8) the value λ (usually $\lambda=0.5$) defines the decision-maker and $0 \leq \lambda \leq 1$.

(6) Ranging alternatives on the basis of k_i value (the more important, the better):

$$k_i = (k_{ia}k_{ib}k_{ic})^{\frac{1}{3}} + \frac{1}{3}(k_{ia}k_{ib}k_{ic}). \quad (9)$$

III. Efficiency Measurement of Insurance Companies by Lines of Insurance in Serbia Based on the COCOSO Method

When measuring the efficiency of insurance companies by insurance lines in Serbia, applying the COCOSO method, we took the following criteria: C1 – number of companies, C2 – operating (functional) expenditures, C3 – costs of providing the insurance services C4 – operating (functional) income, C5 – profit from investment activities and C6 – operating profit. The observed lines of insurance represent the alternatives: A1 – pure life insurance, A2 – life insurance other than pure life, A3 – accident insurance and voluntary health insurance, A4 – motor vehicle insurance, A5 – insurance of vessels and transportation, A6 – aircrafts insurance A7 – property insurance A8 – liability insurance A9 – credit and guarantee insurance, and A10 – non-life insurance not classified in subgroups. Calculating the efficiency of insurance companies by insurance lines in Serbia was done using the COCOSO Software-Excel. The results obtained are shown both in the tables below and graphically.

The Table 1 presents the initial data for the efficiency measurement of the insurance companies by lines of insurance in Serbia in 2019.

Table 1 Initial Data for Efficiency Measurement of Insurance Companies by Lines of Insurance in Serbia in 2019

	Number of companies	Operating (functional) expenditures	Costs of providing the insurance services	Operating (functional) income	Profit from investment activities	Operating profit
Pure life insurance	10	19432	5696	22166	4689	2734
Life insurance other than pure life	10	1180	688	2255	308	1074
Accident insurance and voluntary health insurance	11	4010	2800	5848	574	1837
Motor vehicle insurance	11	6201	3059	8089	381	1916
Insurance of vessels and transportation	9	269	356	656	126	389
Aircrafts insurance	6	21	131	25	56	13
Property insurance	11	7814	4527	11894	848	3980
Liability insurance	10	15198	8786	33407	1339	18208
Credit and guarantee insurance	8	329	591	1084	206	754
Non-life insurance not classified in subgroups	11	1138	2095	2825	207	1686
Total	19	56608	29273	89965	8890	33567

Note: Data are shown in RSD million. The number of companies is shown as a full number.

Source: Agency for Business Register of the Republic of Serbia

Table 2 shows statistics of initial data used to analyse the efficiency of insurance companies by insurance lines in Serbia.

Table 2 Statistics

Statistics							
		1. Number of companies	2. Operating (functional) expenditures	3. Costs of providing the insurance services	4. Operating (functional) income	5. Profit from investment activities	6. Operating profit
N	Valid	10	10	10	10	10	10
	Missing	0	0	0	0	0	0
Median		10.0000	2595.0000	2447.5000	4336.5000	344.5000	1761.5000
Std. Deviation		1.63639	6814.97017	2791.84178	10976.44211	1396.19596	5378.87633
Minimum		6.00	21.00	131.00	25.00	56.00	13.00

Maximum	11.00	19432.00	8786.00	33407.00	4689.00	18208.00
Test Statistics ^a						
N	10					
Chi-Square	38.514					
df	5					
Asymp. Sig.	.000					
a. Friedman Test						

Note: The above calculations were made using the SPSS software program.

The operating profit is above average for life insurance, accident insurance and voluntary health insurance, motor vehicle insurance, property insurance and liability insurance. This profit is below average with other lines of insurance. The *Friedman Test* shows significant differences between the observed variables so that the zero hypothesis is denied.

The Table below shows the correlation matrix of initial data used to evaluate the efficiency of insurance companies by insurance lines in Serbia.

Table 3 Correlation Matrix

Correlations		1	2	3	4	5	6
1 Number of companies	Pearson Correlation	1	.347	.463	.323	.188	.218
	Sig. (2-tailed)		.326	.178	.363	.603	.546
	N	10	10	10	10	10	10
2 Operating (functional) expenditures	Pearson Correlation	.347	1	.897**	.922**	.875**	.614
	Sig. (2-tailed)	.326		.000	.000	.001	.059
	N	10	10	10	10	10	10
3 Costs of providing the insurance services	Pearson Correlation	.463	.897**	1	.977**	.593	.857**
	Sig. (2-tailed)	.178	.000		.000	.071	.002
	N	10	10	10	10	10	10
4 Operating (functional) income	Pearson Correlation	.323	.922**	.977**	1	.650*	.872**
	Sig. (2-tailed)	.363	.000	.000		.042	.001
	N	10	10	10	10	10	10
5 Profit from investment activities	Pearson Correlation	.188	.875**	.593	.650*	1	.219
	Sig. (2-tailed)	.603	.001	.071	.042		.544
	N	10	10	10	10	10	10
6 Operating profit	Pearson Correlation	.218	.614	.857**	.872**	.219	1
	Sig. (2-tailed)	.546	.059	.002	.001	.544	
	N	10	10	10	10	10	10
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Note: Author's calculations by using the SPSS software programme.

The correlation matrix shows that there is a significant correlation between the operating profit and costs of providing the insurance services and operating (functional) income at the level of statistical significance. Likewise, the correlation exists between the profit from investment activities and operating (functional) expenditures and operating (functional) income. In order to increase the operating profit, it is therefore necessary to manage as efficiently as possible the costs of providing the insurance services and operating (functional) income.

To approach the given topic as comprehensively as possible, we have briefly presented, in the Table 4, a ratio analysis of insurance companies by lines of insurance in Serbia 2019.

Table 4 Ratio Analysis

	Ratio between the operating (functional) income and operating (functional) expenditures	Ratio between the operating (functional) income and costs of providing insurance services	Operating profit by companies	Ratio between the operating profit and operating (functional) income	Share of operating (functional) income in the total
Pure life insurance	1.1406958	3.891503	273.4	12.33%	24.64%
Life insurance other than pure life	1.9110169	3.277616	107.4	47.63%	2.51%
Accident insurance and voluntary health insurance	1.4583541	2.088571	167	31.41%	6.50%
Motor vehicle insurance	1.304467	2.644328	174.1818	23.69%	8.99%
Insurance of vessels and transportation	2.4386617	1.842697	43.22222	59.30%	0.73%
Aircrafts insurance	1.1904762	0.19084	2.166667	52.00%	0.03%
Property insurance	1.5221397	2.627347	361.8182	33.46%	13.22%
Liability insurance	2.1981182	3.802299	1820.8	54.50%	37.13%
Credit and guarantee insurance	3.2948328	1.834179	94.25	69.56%	1.20%
Non-life insurance not classified in subgroups	2.4824253	1.348449	153.2727	59.68%	3.14%
Total	1.589263	3.07331	1766.684	37.31%	100.00%

The data in the table show that in Serbia, given the risk exposures, the operating profit declared as a percentage of operating (functional) income is the highest with the credit and guarantee insurance and the lowest with the pure life insurance. The insurance companies in Serbia realize 158 dinars of operating (functional) income by every 100 dinars of operating (functional) expenditures i.e. 307 dinars of operating (functional) income by every 100 dinars of the costs of providing insurance services. Operating profit by companies is the highest with liability insurance and the lowest with credit and guarantee insurance. The share of operating (functional) income of pure life insurance in the total income amounts to 24.64%. It is therefore at a lower level than the countries of the Western Europe and America (where it is over 60%).

The weight coefficients of the criterion were determined using the AHP method (Saaty, 2008). They are presented in the Table 5 and Figure 1.

Table 5 The weight coefficients of the criterion

Table	Criterion	Comment	Weights	+/-
1	Number of companies		19.4%	3.4%
2	Operating (functional) expenditures		13.7%	9.2%
3	Costs of providing the insurance services		18.0%	5.7%
4	Operating (functional) income		11.2%	4.1%
5	Profit from investment activities		20.3%	7.6%
6	Operating profit		17.4%	9.6%

Result	Eigenvalue	Lambda: 6.458		MRE:	44.0%
	Consistency Ratio	0.37	GCI: 0.26	Psi: 18.3%	CR: 7.3%
				MRE est	42.8%

Matrix		Number of companies	Operating (functional) expenditures	Costs of providing the insurance services	Operating (functional) income	Profit from investment activities	Operating profit	Normalized Principal Eigenvector
		1	2	3	4	5	6	
Number of companies	1	1	2	1	2	1	1	19.35%
Operating (functional) expenditures	2	1/2	1	1/2	1	1/2	2	13.71%

Costs of providing the insurance services	3	1	2	1	2	1	1/2	18.01%
Operating (functional) income	4	1/2	1	1/2	1	1	1/2	11.25%
Profit from investment activities	5	1	2	1	1	1	2	20.30%
Operating profit	6	1	1/2	2	2	1/2	1	17.38%

Note: The calculations were made using the AHP Software-Excel

Figure 1 Weight Coefficient of Criterion

According to the importance of the criteria, profit from investment activities comes first. It is followed by the: number of companies, costs of providing insurance services, operating profit, operating (functional) expenditures and operating (functional) income. A more efficient management of profit from investment activities can have a significant impact on improving the efficiency of insurance companies by insurance lines in Serbia.

Table 6 shows the initial decision-making matrix.

Table 6 Initial Matrix

Initial Matrix						
Weights of Criteria	0.194	0.137	0.18	0.112	0.203	0.174
Kind of Criteria	1	-1	-1	1	1	1
	C1	C2	C3	C4	C5	C6
A1	10	19432	5696	22166	4689	2734
A2	10	1180	688	2255	308	1074
A3	11	4010	2800	5848	574	1837
A4	11	6201	3059	8089	381	1916
A5	9	269	356	656	126	389
A6	6	21	131	25	56	13
A7	11	7814	4527	11894	848	3980
A8	10	15198	8786	33407	1339	18208
A9	8	329	591	1084	206	754
A10	11	1138	2095	2825	207	1686
MAX	11	19432	8786	33407	4689	18208
MIN	6	21	131	25	56	13

Table 7 shows the normalized decision-making matrix.

Table 7 Normalized Matrix

Normalized Matrix						
Weights of Criteria	0.194	0.137	0.18	0.112	0.203	0.174
Kind of Criteria	1	-1	-1	1	1	1
	C1	C2	C3	C4	C5	C6
A1	0.8000	0.0000	0.3570	0.6633	1.0000	0.1495
A2	0.8000	0.9403	0.9356	0.0668	0.0544	0.0583
A3	1.0000	0.7945	0.6916	0.1744	0.1118	0.1002
A4	1.0000	0.6816	0.6617	0.2416	0.0701	0.1046
A5	0.6000	0.9872	0.9740	0.0189	0.0151	0.0207
A6	0.0000	1.0000	1.0000	0.0000	0.0000	0.0000
A7	1.0000	0.5985	0.4921	0.3556	0.1709	0.2180
A8	0.8000	0.2181	0.0000	1.0000	0.2769	1.0000
A9	0.4000	0.9841	0.9469	0.0317	0.0324	0.0407
A10	1.0000	0.9425	0.7731	0.0839	0.0326	0.0919

Table 8 shows the weighted comparability of sequence and S_j .

Table 8 Weighted Comparability of Sequence and S_i

Weighted Comparability Sequence and S_i							
	C1	C2	C3	C4	C5	C6	S_i
A1	0.1552	0.0000	0.0643	0.0743	0.2030	0.0260	0.5228
A2	0.1552	0.1288	0.1684	0.0075	0.0110	0.0101	0.4811
A3	0.1940	0.1088	0.1245	0.0195	0.0227	0.0174	0.4870
A4	0.1940	0.0934	0.1191	0.0271	0.0142	0.0182	0.4660
A5	0.1164	0.1352	0.1753	0.0021	0.0031	0.0036	0.4358
A6	0.0000	0.1370	0.1800	0.0000	0.0000	0.0000	0.3170
A7	0.1940	0.0820	0.0886	0.0398	0.0347	0.0379	0.4770
A8	0.1552	0.0299	0.0000	0.1120	0.0562	0.1740	0.5273
A9	0.0776	0.1348	0.1704	0.0036	0.0066	0.0071	0.4001
A10	0.1940	0.1291	0.1392	0.0094	0.0066	0.0160	0.4943
						SUM	4.6083
						MAX	0.5273
						MIN	0.3170

Table 9 shows the exponentially weighted comparability sequence and P_i

Table 9 Exponentially Weighted Comparability Sequence and P_i

Exponentially Weighted Comparability Sequence and P_i							
	C1	C2	C3	C4	C5	C6	P_i
A1	0.9576	0.0000	0.8308	0.9551	1.0000	0.7185	4.4619
A2	0.9576	0.9916	0.9881	0.7385	0.5538	0.6099	4.8395
A3	1.0000	0.9690	0.9358	0.8224	0.6410	0.6702	5.0383
A4	1.0000	0.9488	0.9284	0.8529	0.5831	0.6751	4.9883
A5	0.9057	0.9982	0.9953	0.6412	0.4270	0.5092	4.4764
A6	0.0000	1.0000	1.0000	0.0000	0.0000	0.0000	2.0000
A7	1.0000	0.9321	0.8802	0.8906	0.6987	0.7672	5.1688
A8	0.9576	0.8117	0.0000	1.0000	0.7705	1.0000	4.5399
A9	0.8371	0.9978	0.9902	0.6794	0.4984	0.5729	4.5760
A10	1.0000	0.9919	0.9547	0.7576	0.4991	0.6602	4.8635
						SUM	44.9526
						MAX	5.1688
						MIN	2.0000

Table 10 and Figure 2 show the final aggregation and ranking.

Table 10 Final Aggregation and Ranking

						λ	0.5			
	Final Aggregation and Ranking									
	Alternatives	Ka	Ranking	Kb	Ranking	Kc	Ranking	K	K	Final Ranking
Pure life insurance	A1	0.1006	7	3.8801	7	0.8751	7	2.3176	2.3176	7
Life insurance other than pure life	A2	0.1074	5	3.9374	5	0.9341	5	2.3933	2.3933	5
Accident insur. and voluntary health insur.	A3	0.1115	2	4.0555	2	0.9700	2	2.4721	2.4721	2
Motor vehicle insurance	A4	0.1101	3	3.9642	4	0.9576	3	2.4248	2.4248	3
Insurance of vessels and transportation	A5	0.0991	9	3.6128	8	0.8624	9	2.2007	2.2007	8
Aircrafts insurance	A6	0.0468	10	2.0000	10	0.4068	10	1.1541	1.1541	10
Property insurance	A7	0.1139	1	4.0892	1	0.9912	1	2.5043	2.5043	1
Liability insurance	A8	0.1022	6	3.9334	6	0.8896	6	2.3516	2.3516	6
Credit and guarantee insurance	A9	0.1004	8	3.5500	9	0.8736	8	2.1858	2.1858	9
Non-life insurance not classified in subgroups	A10	0.1081	4	3.9910	3	0.9406	4	2.4203	2.4203	4

Figure 2 Ranking of Alternatives

Based on the results of the efficiency (performance) research of insurance companies by insurance lines in Serbia by the COCOSO method, it can be concluded that the best results are obtained in property insurance, followed by accident insurance and voluntary health insurance, motor vehicle insurance, non-life insurance not classified in subgroups, life insurance other than pure life, liability insurance, pure life insurance, insurance of vessels and transportation, credit and guarantee insurance and aircraft insurance.

Such efficiency (performance) ranking of insurance companies by insurance lines in Serbia was driven by a number of macro and micro factors (living standards, economic environment, political situation and others). According to our opinion, the awareness of the importance of insurance coverage is still at an unsatisfactory level. This is especially true for pure life insurance, which is at a lower level in Serbia than in the countries of developed market economies (the Western Europe and America, where the share of life insurance premium in premium total exceeds 60%). It is encouraging, however, that the awareness in Serbia is slowly awakened with the citizens who understand the importance and benefits maintaining the life insurance cover.

The standing of the agricultural insurance in Serbia is the same as that of the life insurance - at a low stage of development. The awareness of the importance of maintaining the agricultural insurance cover against the catastrophic events, nevertheless, has somewhat increased in Serbia.

IV. Conclusion

Based on the results of the efficiency (performance) research of insurance companies by insurance lines in Serbia using the COCOSO method, we can conclude that the best results were obtained in property insurance, followed by the accident insurance and voluntary health insurance, motor vehicle insurance, non-life insurance not classified in subgroups, life insurance other than pure life, liability insurance, pure life insurance, insurance of vessels and transportation credit and guarantee insurance and aircraft insurance.

A number of factors has driven such efficiency rankings of insurance companies by insurance lines in Serbia, including the living standards, economic climate, political situation, lack of awareness of the importance of insurance and the like.

In order to increase the future efficiency of insurance companies by insurance lines in Serbia, it is necessary to manage the operating (functional) expenditures, costs of providing the insurance services, operating (functional) income, profit from investment activities and operating profit in the future. The digitalisation of the entire business certainly plays a significant role in this respect.

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