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RANKING BANKS BY APPLYING THE MULTILEVEL I–DISTANCE METHODOLOGY

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Research paper

Abstract: *Banks in the Republic of Srpska are one of the most important drivers of the economy and household savings. The activity of the financial market of the Republic of Srpska is low and banks are still the main source of funding. The question of the objective ranking of banks based on business results is an important element in the business decisions made by companies and the population. A bank's position and quality would depend on the criteria to be included in the analysis. The professional literature recommends that banks' liquidity, profitability, efficiency and solvency should be monitored. In most cases, whether to rank banks based on liquidity or adequacy or on another indicator is doubtful. The best picture of the state of the banks is obtained when all indicators are involved in such ranking. The aim of this study is to define and rank the banks headquartered in the Republic of Srpska by following a total of four indicators. In this paper, the calculation of banks' liquidity, efficiency, profitability and solvency based upon the publicly presented audit reports for the years 2013 and 2014 is given. Then, the statistical model that absorbs information and generates the final ranking of banks in the RS is defined. The subject of the study is the banks that operate and are headquartered in the RS. The hypothesis is to determine their rankings based on their business performance.*

Keywords: *bank, ranking list, I-distance, criteria.*

1. Introduction

The quality evaluation of banks' success includes monitoring a bank from different perspectives and measuring its quality from different aspects. Successful

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banks are those banks that do not have a problem with liquidity and solvency, thereby achieving the optimal amount of the profit. These aspects are the main principles of banking operations, well-known as the "golden rules" of banking. Performance analysis is closely related to liquidity, efficiency, profitability, and solvency (capital adequacy).

1.1. Liquidity

The ***liquidity*** of a bank is a complex concept, usually interpreted as a bank's ability to meet its obligations upon maturity. A bank's management are required to continuously monitor its liquidity from the static and dynamic aspects. By disrupting the liquidity of only one bank, the survival of the entire financial system may be brought into question. If a bank is unable to service its obligations, general confidence in the financial system is lost, which leads to the erosion of the monetary assets of all banks. The following indicators are used both in theory and in practice to assess liquidity:

- L1 = Cash and pledged marketable securities / Business assets,
- L2 = Total deposits / Borrowings,
- L3 = Variable funds / Liquid assets,
- L4 = Total loans / Total deposits,
- L5 = Liquid assets / Operating assets (Ćurčić, 1995).

During the management of a bank's liquidity, the indicators L1, L2 and L5 need to be maximized, i.e. a higher value of these ratios shows the presence of better liquidity. The indicators L3 and L4 have a completely opposite meaning, i.e. a low value of these indicators implicates high liquidity, and *vice versa*. When analyzing a bank, it should not be forgotten that too high liquidity causes low profitability.

1.2. Efficiency

Efficiency is defined by the phrase "do things right" and, in a specific case, it is indicative of the fact that banks must manage their assets by implementing the best possible strategy. A bank's efficiency is achieved when the bank produces bigger effects with as-low-as-possible costs, increasing its productive assets by placing liabilities in the best way under current circumstances (Ćurčić, 1995). Productive assets bring interest income, after which banks increase capital, provided that they have achieved a positive financial result. The indicators providing information about effectiveness are as follows:

- E1 = Interest expense / Interest income
- E2 = Provisions / Net interest income,
- E3 = Interest income / Total number of employees (Sinkey, 1989).

The data for this calculation are taken from the income statement, and banks tend to minimize the indicators E1 and E2 – a lower value rejects greater efficiency, and *vice versa*. The indicator E3 has an alternative explanation, i.e. the maximum value increases efficiency.

1.3. Profitability

Profitability indicators are crucial for business analysis and are defined as a bank's earning ability, i.e. its ability to receive income from invested assets and increase them during business cycles. They are used to evaluate a bank's profitability in a given time, usually at the end of the accounting period (Roman et al., 2015):

- P1 = Profit before tax / Equity,
- P2 = Profit before tax / Business assets
- P3 = Profit before tax / Interest income.

Higher values of the profitability indicators signal a greater earning power, and thus there is a possibility of increasing share capital. Caution should be exercised when interpreting the profitability indicators, because numbers may distort the true picture. The profitability indicators are maximized as a result of an increase in a net profit before tax, not under the influence of a reduction in capital, assets or income from interest and the like.

1.4. Solvency

The ***solvency***, or ***capital adequacy***, of a bank is an indicator which should be paid more attention to in the banking practice. To support this indicator, there is the statutory rate of the minimum capital adequacy ratio of 12%, which represents a bank's ability to eventually fulfill all of its obligations, even from its bankruptcy estate. "A bank is considered insolvent when its liabilities exceed the value of its assets, or when realized losses exceed its equity capital." In that case, the bank does not have enough capital to cover the incurred losses, and a part of the assets are non-performing loans, receivables and loans, and there is no possibility for the bank to fulfill all of its obligations (Ćurčić, 1995; Garcia et al., 2010). The criteria used to test the solvency (capital adequacy) of the bank are:

- S1 = Total Liabilities / Equity;
- S2 = Total deposits / Equity;
- S3 = Venture capital / Total risk-weighted assets;
- S4 = Shareholders' equity / Business assets;
- S5 = Shareholders' equity / Risk-weighted assets;
- S6 = Shareholders' equity / Total deposits;
- S7 = Shareholders' equity / Loans (Dragašević, 2010).

When managing solvency, a bank should tend to minimize the indicators S1 and S2 and have the values of the other indicators as high as possible. Instead of total assets and total resources, operating assets and business assets are included in the calculation of these indicators. Banks are for-profit organizations and business assets, which represent the funds arising from operations, participate directly in making a profit and are fully justifiably included in the calculation. The confirmation for this is the fact that total assets represent a sum of operating assets and off-balance assets, where the off-balance sheet positions are sureties, guarantees, acceptances, bills of exchange and other forms of guarantees, uncovered letters of

credit, irrevocable, approved but undrawn loans and so forth. It is characteristic of the off-balance sheet positions that they are potential liabilities or claims, and that there is an amount of uncertainty regarding whether and when those contingent liabilities and receivables would be implemented. Banks often use off-balance sheet transactions in order to earn additional income, accomplished through commission fees. To conclude, off-balance sheet (assets) are excluded from the calculation, because the research is aimed at showing the real rank and position of the banks operating in the Republic of Srpska's banking sector based on their core business.

2. Methods

There are numerous methods and ways for ranking certain units within a set or a sample. In particular, it is possible to use various multicriteria ranking methods for banks, such as ELECTRE, PROMETHEE, CAMELS, and so on. In this paper, however, we decided to apply the I-distance method. The I-distance method was originally introduced and defined in professor Branislav Ivanović's publications in the 1960s and the 1970s. Professor Ivanović designed this method so as to rank countries by the development level, which he described by means of various socio-economic indicators (Jeremić et al., 2013). The relative position of a unit in relation to another within the units of a dataset can be determined by using this method. The linear (clustered and non-clustered) and quadratic distances were worked out in the method, and further research in this field has led to the development of a multistage I-distance, which will be used in this paper (Ivanović, 1977; Jeremić et al., 2013; Jovanović–Milenković et al., 2015).

The process of the construction of the I-distance is iterative (Jeremić et al., 2013), the number of iterations depending on the number of the indicators to be included in the analysis. If observing a set of indicators $C^T = (C_1, C_2, \dots C_k)$, which in this case describe the quality of a certain field of operations, the I-distance between the two observed units (i.e. banks in this case) $e_{r=(c_1, c_2, \dots c_{k,r})}$ and $e_{s=(c_1, c_2, \dots c_{k,s})}$ is calculated by applying the following equation:

$$D(r,s) = \sum_{i=1}^{k} \frac{|d_i(r,s)|}{\sigma_i} \prod_{j=1}^{i-1} (1 - r_{ji.12\dots j-1}) \tag{1}$$

where:

$d_i(r,s)$ is the distance between the units e_r and e_s for the indicator C_i;

σ_i is the standard deviation for the value of all the units as per indicator C_i;

$r_{ji.12\dots j-1}$ represents a partial correlation coefficient between the indicators C_i and C_j (Marković et al., 2020; Radojičić et al., 2012).

It was pointed out that the calculation of the I-distance is a procedure consisting of several iterations. The process, first, involves the entire discriminatory effect of the indicator X1, i.e. the indicator with the most information about the level of the "quality" of the unit. After that, the part of the discriminatory effect of the second indicator not involved in the discriminatory effect of the first indicator is added. In a fashion similar to the previous one, the part of the information provided by the third

indicator not involved in the discriminatory effect of the first two is added. The whole process continues, so that the level of the "quality" of the unit ej, defined by a set of the indicator X, might finally be as follows:

$$D_j = \sum_{i=1}^{n} D_{ji} \tag{2}$$

If the variables have a different (either positive or negative) sign resulting in the occurrence of a negative correlation coefficient between the variables, it is necessary to use the square I-distance (Jeremić et al., 2013) in the analysis. The inclusion of the indicators with less information is greater in the square distance than in the plain distance, which is another reason why the square I-distance should be used when there is a large number of indicators. The square I-distance is calculated as follows:

$$D^2(r,s) = \sum_{i=1}^{k} \frac{|d_i^2(r,s)|}{\sigma_i^2} \prod_{j=1}^{i-1} (1 - r^2_{ji.12\ldots j-1}) \tag{3}$$

In this paper, the ranking of the banks will be performed by means of the square I-distance, because of the occurrence of the negative partial correlation coefficients between the observed indicators for the ranking. It is, however, necessary to say that, due to the specific problem being solved, the two-stage method of the I-distance will be applied. This method involves the calculation of the I-distance for units in the set in several stages, i.e. in two stages in this particular case. The results of the I–distance will be obtained within each segment and the measurement of the banks' performances (liquidity, profitability, efficiency, solvency), after which the same method will be applied again to the obtained results in order to obtain the final ranking of the banks in the RS. This method will allow us to determine the best-performing banks for each of these segments, and the most successful one among them (Marković et al., 2020; Jovanović – Milenković et al., 2015).

Apart from the final ranking, this method also allows the determination of weight coefficients for each indicator individually, also establishing the relative importance of bank performance indicators (liquidity, profitability, efficiency, solvency) and giving a picture of the quality assessment of each bank individually (Dobrota et al., 2015).

3. Research Results

The research study includes all the banks headquartered in the RS. It is aimed at forming the final ranking, which realistically reflects the quality of the operations of the banks by the observed indicators. The years the survey was conducted for are 2013 and 2014, the data having been taken from the official financial and audit reports of the included banks. Table 1 shows the quantitative indicator values expressed for the observed banks in 2013.

Table 1. The indicators of the banks' performance in 2013

Ind.	*Nova bank*	*NLB*	*Uni-credit*	*Hypo*	*Sberbank*	*Komercijalna*	*Banka Srpske*	*Pavlov. banka*	*MF*	*Bobar*
I Liq.										
L1	*0.059*	*0.103*	*0.030*	*0.052*	*0.062*	*0.046*	*0.082*	*0.104*	*0.052*	*0.066*
L2	*0.834*	*0.863*	*0.844*	*0.902*	*0.881*	*0.878*	*0.712*	*0.948*	*0.657*	*1.001*
L3	*5.695*	*2.451*	*6.534*	*4.242*	*4.287*	*6.236*	*4.339*	*3.594*	*12.64*	*4.634*
L4	*0.950*	*0.861*	*1.161*	*1.055*	*1.158*	*1.096*	*1.108*	*0.822*	*1.330*	*0.901*
L5	*0.170*	*0.396*	*0.150*	*0.225*	*0.229*	*0.158*	*0.208*	*0.261*	*0.078*	*0.209*
II Effic.										
E1	*0.492*	*0.385*	*0.203*	*0.445*	*0.348*	*0.307*	*0.487*	*0.353*	*0.398*	*0.456*
E2	*0.031*	*0.038*	*0.013*	*2.241*	*0.020*	*0.118*	*1.564*	*0.177*	*0.055*	*0.751*
E3	*124714*	*102893*	*128527*	*104789*	*116425*	*100021*	*58208*	*55980*	*77257*	*97697*
III Prof.										
P1	*0.103*	*0.113*	*0.128*	*0.000*	*0.039*	*0.006*	*0.000*	*0.024*	*0.016*	*0.043*
P2	*0.008*	*0.011*	*0.020*	*0.000*	*0.006*	*0.001*	*0.000*	*0.003*	*0.002*	*0.006*
P3	*0.009*	*0.013*	*0.023*	*0.000*	*0.007*	*0.002*	*0.000*	*0.004*	*0.002*	*0.007*
IV Sol.										
S1	*11.80*	*8.89*	*5.54*	*4.82*	*5.76*	*3.07*	*7.80*	*6.17*	*6.36*	*6.18*
S2	*9.42*	*7.32*	*4.60*	*3.71*	*4.95*	*2.64*	*5.19*	*5.79*	*3.97*	*5.26*
S3	*0.130*	*0.186*	*0.226*	*0.202*	*0.128*	*0.255*	*0.142*	*0.133*	*0.186*	*0.143*
S4	*0.064*	*0.052*	*0.103*	*0.134*	*0.093*	*0.228*	*0.156*	*0.092*	*0.171*	*0.124*
S5	*0.082*	*0.039*	*0.171*	*0.190*	*0.099*	*0.317*	*0.202*	*0.117*	*0.225*	*0.151*
S6	*0.087*	*0.071*	*0.147*	*0.210*	*0.128*	*0.351*	*0.265*	*0.114*	*0.316*	*0.169*
S7	*0.092*	*0.054*	*0.126*	*0.199*	*0.110*	*0.320*	*0.239*	*0.159*	*0.238*	*0.187*

All indicators were calculated as stated in the introductory part, the example of the calculation being the method for the calculation of the criteria L1 and L2 for *Nova banka*.

L1 = Cash and pledged marketable securities / Business assets

L1 = 103,560,819/ 1,737,567,592 = 0.059

L2 = Total deposits / Borrowings

L2 = 1,074,122,000/1,288,604,269=0.834

The results show the performance of the ten banks, only one of which (Banka Srpske) is a bank in the majority ownership of the state. The following is the final ranking combining all the aspects of the banking operations of the analyzed banks in 2013.

Table 2. The ranking of the banks according to performance indicators in the RS in 2013

Number	Bank	I-distance (TOTAL)
1	UniCredit	14.2327838
2	Komercijalna Bank	11.610584
3	NLB	3.56011666
4	Sberbanka	2.13446858
5	Pavlović	1.78470972
6	MF	1.70531188
7	Hypo	1.3461246
8	Nova banka	1.30309752
9	Banka Srpske	0.96692585
10	Bobar	0.83768652

According to the performance results in 2013, the most successful bank was *UniCredit Bank Inc. Banja Luka*, only to be followed by *Komercijalna Bank*, while *Bobar Bank Inc. Bijeljina* ranked the last. The market verification and justification of the use of the method was confirmed by the data analysis. In 2014, *Bobar Bank* lost its banking license, which confirmed the results obtained by the ranking method, because it is exactly that bank that was identified as the worst.

Also, an additional analysis was performed, which included the ranking of the banks by each individual criterion, and the results are presented below. The first to have been analyzed is the liquidity criterion, the ranking results being presented in Table 3. The above-described indicators (L1 to L5) were used for the ranking.

Table 3. The ranking of the banks by the liquidity criterion (2013)

Number	Bank	I-distance (TOTAL)
1	NLB	16.8738237
2	Pavlović	15.0160139
3	Bobar	8.5174958
4	Nova Banka	5.6421245
5	Hypo	4.05662494
6	Banka Srpske	3.75091339
7	Sberbank	3.054496
8	Komercijalna	1.86807697
9	UniCredit	1.33231758
10	MF banka	0

The results indicate that *NLB Bank* had the best liquidity in 2013, only to be followed by *Pavlović Bank* and *Bobar Bank*. On the other hand, *MF Bank* and *UniCredit Bank* had the lowest liquidity. Given the fact that UniCredit Bank was previously seen to be the best-ranked in general, this indicates that they had no problem with the placement of their funds, and the following criteria will show that they are doing it the right way.

After liquidity, the banks were also analyzed according to the profitability criterion, which included the three aforementioned and explained indicators. The ranking results for this criterion are given in the following table.

Table 4. The ranking of the banks by the profitability criterion (2013)

Number	Bank	I-distance (TOTAL)
1	UniCredit	17.23932
2	NLB	6.275044
3	Nova Banka	4.048731
4	Bobar	1.651467
5	Sberbank	1.455483
6	Pavlović	0.523299
7	MF banka	0.188562
8	Komercijalna	0.089404
9	Hypo	0
10	Banka Srpske	0

By far, the most profitable bank is UniCredit, only to be followed by *NLB Bank*, and *Nova banka* being in the 3rd place. *Hypo* and *Banka Srpske* are the banks ranked the worst, with the lowest values in all the observed indicators.

The next ranking criterion was efficiency, which included a total of three indicators. The results are given in the following table.

Table 5. The ranking of the banks by the efficiency criterion (2013)

Number	Bank	I-distance (TOTAL)
1	UniCredit	25.381683
2	Sberbank	6.9713765
3	Nova Banka	6.6322243
4	Komercijalna	4.4184533
5	NLB	3.2628914
6	Hypo	3.2233851
7	Bobar	2.8586987
8	MF banka	1.2178958
9	Pavlović	0.6498732
10	Banka Srpske	0.0025168

UniCredit Bank, which has shown a dramatically better score than the second-ranked *Sberbank*, ranked the highest. The three worst banks were *Bobar*, *MF Bank* and *Pavlović Bank*.

The last criterion observed was solvency, including a total of seven individual indicators.

Table 6. The ranking of the banks by the solvency criterion (2013)

Number	Bank	I-distance (TOTAL)
1	Komercijalna	32.93711
2	Banka Srpske	15.234933
3	MF banka	14.380753
4	Hypo	12.070788
5	Bobar	8.7877177
6	UniCredit	6.5899765
7	Pavlović	4.1813884
8	Sberbank	2.4290309
9	Nova Banka	0.8491772
10	NLB	0.2067228

It can be noticed here that the most solvent were *Komercijalna* and *Banka Srpske*, whereas the lowest solvency was that of *Nova* and *NLB* banks.

The same complete analysis for the year 2014 was also performed. In addition to the final rankings, the individual rankings of the banks in all the selected performance criteria were also given. The quantitative indicators of the banks' business success for the year 2014 are given in the following table.

Table 7. The banks' performance indicators in 2014

Ind.	*Nova banka*	*NLB*	*UniCredit*	*Hypo*	*Sberbank*	*Komercijalna*	*Banka Srpske*	*Pavlović*	*MF*
I Liq.									
L1	*0.053*	*0.176*	*0.087*	*0.078*	*0.108*	*0.039*	*0.083*	*0.102*	*0.032*
L2	*0.861*	*0.884*	*0.872*	*0.916*	*0.907*	*0.857*	*0.743*	*0.929*	*0.754*
L3	*6.201*	*2.077*	*4.307*	*4.149*	*3.859*	*6.332*	*2.889*	*3.230*	*15.383*
L4	*0.935*	*0.932*	*1.032*	*0.964*	*0.930*	*1.141*	*1.054*	*0.886*	*1.167*
L5	*0.155*	*0.468*	*0.228*	*0.228*	*0.256*	*0.156*	*0.326*	*0.287*	*0.064*
II Effic.									
E1	*0.465*	*0.369*	*0.240*	*0.455*	*0.352*	*0.282*	*0.577*	*0.359*	*0.435*
E2	*0.060*	*0.043*	*0.014*	*0.948*	*0.015*	*0.246*	*0.141*	*0.155*	*0.165*
E3	*139110*	*103618*	*131912*	*79899*	*122774*	*96497*	*44440*	*65204*	*88029*
III Prof.									
P1	*0.107*	*0.133*	*0.121*	*0.000*	*0.038*	*0.002*	*0.012*	*0.027*	*0.032*
P2	*0.008*	*0.014*	*0.018*	*0.000*	*0.005*	*0.001*	*0.001*	*0.004*	*0.004*
P3	*0.009*	*0.016*	*0.021*	*0.000*	*0.006*	*0.001*	*0.001*	*0.005*	*0.004*
IV Sol.									
S1	*11.823*	*8.338*	*5.761*	*4.256*	*6.585*	*3.142*	*8.614*	*5.121*	*7.609*
S2	*9.703*	*7.034*	*4.928*	*3.262*	*5.834*	*2.644*	*6.138*	*4.707*	*5.461*
S3	*0.1250*	*0.1710*	*0.1990*	*0.255*	*0.1421*	*0.2590*	*0.1220*	*0.13*	*0.1388*
S4	*0.064*	*0.052*	*0.089*	*0.131*	*0.091*	*0.224*	*0.142*	*0.108*	*0.139*
S5	*0.084*	*0.036*	*0.152*	*0.252*	*0.118*	*0.320*	*0.149*	*0.130*	*0.178*
S6	*0.085*	*0.070*	*0.122*	*0.210*	*0.118*	*0.351*	*0.222*	*0.140*	*0.219*
S7	*0.091*	*0.075*	*0.118*	*0.218*	*0.127*	*0.308*	*0.210*	*0.158*	*0.188*

In 2014, there were nine banks headquartered in the RS, of which only *Banka Srpske* was in the majority ownership of the state. When speaking about the banks' liquidity, the following table provides an overview of the performance of the banks' liquidity criterion.

Table 8. The ranking of the banks by the liquidity criterion (2014)

Number	Bank	I-distance (liquidity)
1	NLB	23.0679518
2	Pavlović	12.2169568
3	Sberbank	10.1900486
4	Hypo	7.50696812
5	UniCredit	5.50971948
6	Banka Srpske	4.53137136
7	Nova banka	4.09852271
8	Komercijalna	2.11820058
9	MF Bank	0.01845142

The bank with the best liquidity was *NLB Bank*, only to be followed by *Pavlović* Bank and *Sberbank*, while the last place was occupied by *MF Bank*, which had significantly poorer liquidity than the other banks included in the survey.

The next criterion according to which the banks were ranked was profitability, which included three individual indicators. According to this criterion, the success achieved by the banks is given in the following table.

Table 9. The ranking of the banks by the profitability criterion (2014)

Number	Bank	I-distance (profitability)
1	UniCredit	9.646974
2	NLB	5.556958
3	Nova banka	1.802034
4	Sberbank	0.742712
5	Pavlović	0.598086
6	MF Bank	0.384051
7	Banka Srpske	0.039267
8	Komercijalna Bank	0.013401
9	Hypo	0

Based on the data, the best-ranked is UniCredit Bank, only to be followed by *NLB Bank* and *Nova Bank*. The three banks with very poor profitability are *Banka Srpske*, *Komercijalna Bank* and *Hypo Bank*.

The third criterion is efficiency, which includes three individual indicators.

Table 10. The ranking of the banks by the efficiency criterion (2014)

Number	Bank	I-distance (efficiency)
1	UniCredit	23.528331
2	Sberbank	13.591869
3	Nova Bank	7.9688431
4	Komercijalna Bank	7.6410548
5	NLB	5.1772631
6	Pavlović Bank	2.242352
7	MF Bank	2.1212785
8	Hypo	1.3832248
9	Banka Srpske	0.0561461

According to the previous criterion, the best-ranked bank is *UniCredit Bank*, only to be followed by *Sberbank* and *Nova Bank*, whereas *Banka Srpske* is ranked the last again, being far behind the other banks in terms of efficiency.

The final performance criterion to be analyzed was capital adequacy (solvency), which included a total of seven single indicators, and the classification of the banks according to this criterion is as follows:

Table 11. The ranking of the banks by solvency criterion (2014)

Number	Bank	I-distance (solvency)
1	Komercijalna Bank	27.191051
2	Hypo	13.274755
3	MF Bank	6.067496
4	Banka Srpske	5.90802
5	Pavlović Bank	3.3239149
6	UniCredit	2.9352242
7	Sberbank	1.8211099
8	Nova Bank	0.4040932
9	NLB	0.0739856

The best bank is *Komercijalna Bank*, only to be followed by *Hypo Bank* and *MF Bank*. The worst banks in terms of solvency are *Nova Bank* and *NLB Bank*.

Finally, the survey included all the criteria in the joint ranking list and all the aspects of the business performance of the banks in the final ranking of the banks headquartered in the RS for the year 2014.

Table 12. The ranking of the banks by the performance indicators in the RS in 2014

Number	Bank	I-distance (TOTAL)
1	UniCredit	13.82901
2	NLB	11.99673
3	Komercijalna Bank	10.09697
4	Hypo	3.149554
5	Sberbank	3.100193
6	Pavlović Bank	2.499681
7	Nova Bank	1.170214
8	Banka Srpske	0.757758
9	MF Bank	0.517659

According to the results given in the tables (above), it can be concluded that *UniCredit Bank* was the best-ranked, only to be followed by *NLB Bank*, whereas *Komercijalna Bank* was the third. *Banka Srpske* and *MF Bank* ranked the last, significantly lagging behind the leading banks. Before the discussion of the obtained results, it is important to note that the application of this method allows for the calculation of the importance of individual criteria and indicators. Based on the correlation coefficients, the weight coefficients were determined not only for each individual indicator, but also for the criteria, and these data are clearly specified in the figure below (Maričić et al., 2014). The calculation was performed in such a manner that the correlation coefficients between each of the indicators and the values of the I-distance for the corresponding criterion were first determined. Subsequently, the correlation coefficients of the individual indicators were put into relation to the total sum of the correlation coefficients, thus the relative importance of each indicator being obtained individually. The identical calculation method was applied to all the main criteria, as well as the corresponding sub-criteria. The following is an example of the calculation of the weighting coefficients for the individual indicators within the profitability criteria (2014):

r_{31}=0.977; r_{32}=0.953; r_{33}=0.869; sum (r)=2.797

w_{31*}=0,977/2,797=0.348; w_{32*}=0.953/2,797=0.341; w_{33*}=0,869/2,797=0.311

After this round of the calculation, the values obtained were multiplied by the weighting factor of the profitability criterion, which was calculated in the identical manner, but with the correlation coefficients obtained from the values of all the main criteria and the final value of the I-distance. In this case, the value of the weight coefficient w_3 was 0.4; therefore, w_{31} = 0.14; w_{32} = 0.14; w_{33} = 0.12 (rounded to two decimal places), exactly as is shown in Figure 1.

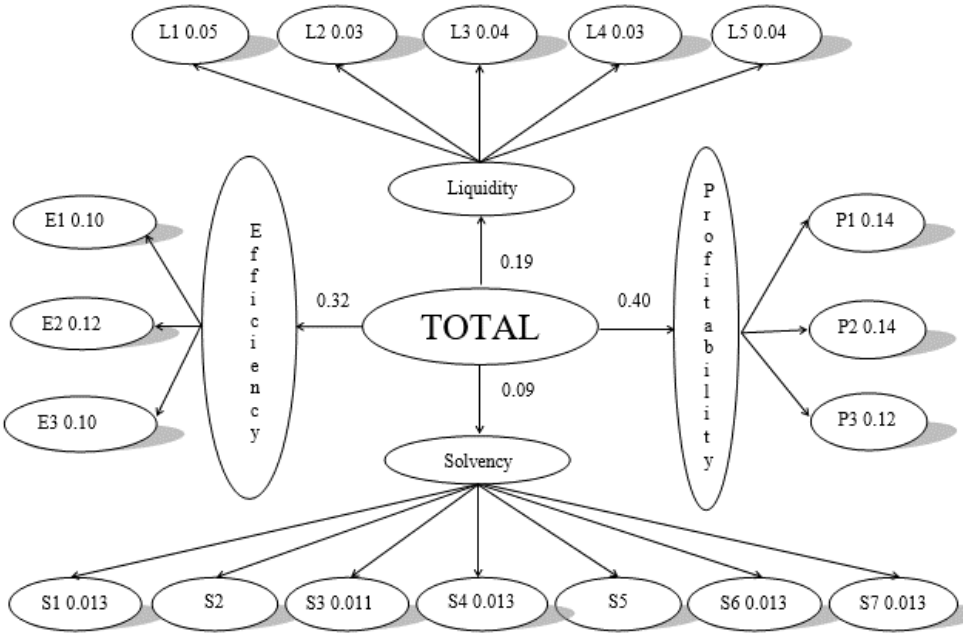

Figure 1. *The relative importance of the criteria and the individual indicators*

In the literature and in practice, throughout the territory of the Republic of Srpska and a wider environment, capital adequacy (solvency) was taken as the primary indicator of the ranking of the banks. Applying the described model, completely different data were obtained. As can be seen in Figure 1, the most important criterion in the analysis was profitability, whose significance is 0.40, which is only followed by efficiency, with the importance of 0.32, then liquidity, with 0.19, and ultimately solvency (capital adequacy), with 0.09. Such an order is justified in terms of successful business, so that the banks may increase assets effectively and also service their obligations on a regular basis. The main goal for the banks is to be solvent and fulfill their obligations, even from their bankruptcy estate.

4. Discussion

It should be taken into consideration that banks are supposed to operate indefinitely, for which reason a conclusion can be drawn that the importance of individual the indicators was fairly evenly distributed within the criteria and the distances of the individual indicators had a very short range, namely: liquidity (0.03:0.05), profitability (0.12:0.14), efficiency (0.10:0.12) and solvency (0.011:0.014). The model also included the arithmetic mean of all the parameters individually. The arithmetic mean presents the average, the minimum value of the banking sector in the RS. All the banks headquartered in the RS that had not reached the minimum value were classified into the group of the banks with risky business.

The ranking of the banks according to the liquidity criterion in 2014 is shown in Table 4 of the previous section, according to which the most liquid was *NLB*

Development Bank, whereas the worst-ranked was *MF Bank*. It is important to note that the average value of the liquidity criterion in the banking sector in the RS was 5.403 for the year 2014. *Banka Srpske*, *Nova Bank*, *Komercijalna Bank* and *MF Bank* were in the so-called gray, alarming business zone.

The average value of profitability was 1.084, and only three banks achieved profitability above the minimum required value, the first being *UniCredit Bank*, only to be followed by *NLB Development Bank* and *Nova Bank*, whereas the other four banks (*Pavlović Bank*, *MF Bank*, *Banka Srpske*, *Komercijalna Bank* and *Hypo Bank*) had the profitability value below the average. The final ranking list of the banks' profitability indicator is shown in Table 5.

Table 6 accounts for the order of the banks starting from the most efficient to the least efficient bank in the RS. The average value for the efficiency indicator of the banks in the RS was 4.533. In 2014, *Pavlović Bank*, *MF Bank*, *Hypo Bank* and *Banka Srpske* failed to reach the minimum threshold of the average value. The ranking of the banks according to the last indicator, i.e. solvency, with the least significance for the ranking of the banks is presented in Table 7. The average value of the solvency for the banks in the RS was 4.49. *Pavlović International Bank*, *UniCredit Bank*, *Sberbank*, *Nova Bank* and *NLB Development Bank* were in the gray business zone when solvency is concerned.

The list of the final ranking of the banks in the RS according to all the tested indicators is given in Table 8 of the previous section. The average value of all the indicators, here used as the landmark when companies enter into the gray business area, was 2.34. According to that criterion, *Nova Bank*, *Banka Srpske* and *MF Bank* were the banks with "problematic" business in 2014. According to the criterion with the greatest significance for the ranking, i.e. the profitability criterion, and also based on the efficiency and solvency criteria, *Banka Srpske* ranked the worst. If the fact that these three indicators account for 79% of the overall significance of the model is taken into account, then it is can be concluded that *Banka Srpske* had a worse ranking than *MF Bank*, regardless of the final ranking. *Banka Srpske* was better-ranked than *MF Bank* only according to the liquidity criterion, which means that it had not used resources at its disposal as it should have.

Attention should be paid to the worst-ranked banks in 2013. *Banka Srpske* was slightly better than *Bobar Bank* in 2014. *Banka Srpske* still holds the same position (the penultimate place). If *MF Bank*, which is quite a young and small bank in relation to the other banks, were omitted, then *Banka Srpske* could be said to have ranked the worst in 2014. This is supported by the abstained audit opinions for *Banka Srpske* in the year 2013, and a negative audit opinion for the year 2014. *MF Bank* received an unqualified audit opinion for both periods.

5. Conclusion

The model for ranking the banks is based on the official data obtained from the financial statements and the annually valorized indicators. The results show that *Bobar Bank* was the worst and had the lowest business indicators of all the banks in the overall ranking in the RS in 2013. The audit report in which the auditors refrained from expressing an opinion was a confirmation of this. In the model for

ranking the banks in 2013, the worst-ranked bank confirmed its low indicators and risky business by the loss of the banking license in 2014. The indicators in the statistical model pointed out the weakening market position and were a signal for change in the bank's business policy. According to the criteria of the established model, *MF Bank* was the worst-ranked in 2014, although it must be noted that *MF Bank* has been operating for eight years now, that it is a small bank, and that it has not been firmly established on the financial market. Also, the results obtained by using the I-distance method in relation to the data obtained by analyzing the financial and audit reports indicate that *MF Bank* was the worst-ranked, but there was a high business risk for *Banka Srpske*. It can be expected that *MF Bank* and *Banka Srpske* will change positions in the forthcoming period and that the indicators of the I-distance will point to the fact that *Banka Srpske* is the least reliable.

In a time period shorter than a fiscal year, high-risk businesses change indicators much faster. For that reason, it is recommended that they should be observed in shorter intervals, for example on a monthly basis. Calculations in shorter intervals provide more objective indicator values than average values do annually. Monthly performance results indicate reliable positioning through the ranking indicator of business performance, thereby enabling high-quality information for the immediate effect on business indicators, both internally and externally.

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