Emina Resić [1]

Edita Hebibović - Čagalj [2]

CLUSTERIZATION OF BANKS IN THE FEDERATION OF B&H BASED ON DIFFERENT CRITERIA

ABSTRACT

The evaluation of customers of banking services should be seen as an additional tool for analyzing the performance of banks in addition to the analysis of financial indicators. Considering the impact that customer satisfaction and trust can have on the stability of the banking system, it is desirable to include them in reports on the banking sector. The evaluation of customer satisfaction can also anticipate certain market trends and is a useful tool for the management of banking institutions to take corrective measures before the negative expectations of customers reflect on the financial statements. The evaluation of customers of banking services and the analysis of financial indicators must be placed in the context of the size of the banks so that the results can be properly interpreted. Cluster analysis is a method that can be used to perform clustering based on these three criteria. The results of the research for the Federation of B&H banks show the importance of bank clusters based on customer evaluation, financial indicators and the size of banks.

Keywords*: cluster, bank, indicators, customer evaluation.*

JEL: *G2, C3*

[1] Full professor, Faculty of Economics University of Sarajevo, email: emina.resic@efsa.unsa.ba

[2] MA, Bosna Bank International DD Sarajevo, email: editah87@hotmail.com

1. INTRODUCTION

The environment in which banks operate has always been one of the most dynamic ones, and as we can see from the example of the past few years, where due to external influences (of which we single out technological changes, the impact of the Covid 19 pandemic and the current crisis caused by the war in Ukraine) the way of which banks meet the needs of users has changed significantly. It is clear that the biggest challenges are, on the one hand, how to manage to maintain balance between quality risk management in a period of crisis and at the same time maintain competitiveness, and, on the other hand, how to respond to the growing needs of the bank's clients. Timely reaction, timely recognition of user needs and timely response to them are extremely important for preserving the market position. Bearing in mind the above-mentioned, as well as the fact that banking companies are one of the largest financial institutions, the focus of attention of the shareholders of banking companies is the reputation that arises from the opinions of service users, which is basically based on some kind of evaluation, regardless of whether it is a legal or natural persons. The above-mentioned becomes more important if we take into account that the evaluation of the user is determined to the greatest extent by the service provided by the banks, then by the behavior of the user, trust and finally the online service (Ansari, 2019).

Cluster analysis enables banks to make data-driven decisions by uncovering meaningful patterns and relationships within complex datasets. It provides a holistic view of customer behavior, risk profiles, and market dynamics, empowering banks to develop targeted strategies and respond swiftly to changing market conditions (Galante, 2023).

The success of banking companies' operations is most often observed through the prism of the main financial indicators of operations at the level of one bank or through comparison with other banks that have similar characteristics (Pavković, 2004). The analysis of the above-mentioned indicators serves as a basis for making decisions on future strategic issues. However, as one of the most important tasks of banks is to ensure the safety and the satisfaction of their users, we believe that the opinion of users or the evaluation of banks by users of banking services should have a significant place next to other indicators of the success of banking companies, which is also the main reason to study of this issue.

The research of the literature dealing with the financial market, and banks as the largest participants in it, has shown that only a few studies directly treat the issue of ranking banking companies in Bosnia and Herzegovina, mostly taking into account only the most significant financial indicators published in the regular reports of the Banking Agency of the Federation of Bosnia and Herzegovina and the report of the Banking Agency of the RS. Therefore, the existing groupings and rankings of banks are basically based on official financial performance indicators. In this way, ranking

lists were created in terms of profitability, number of employees, amount of assets, market share, and the like.

The aim of this research is to compare the results of bank clustering in the Federation of Bosnia and Herzegovina based on different criteria, with a special focus on custumer evaluation. In the context of all of the above, the following hypotheses were defined:

- Banking companies with the largest market share are not necessarily the ones which service users are most satisfied with.
- Monitoring global trends, primarily from the aspect of technological development, has a significant role in satisfying and providing a timely response to the needs of consumers/users of services.

2. THEORETICAL FRAMEWORK

Developing a model for bank clustering has its own purpose and significance, moreover, the selection of appropriate clusters for commercial banks represents valuable information for investors, regulators from the aspect of security evaluation, and managers from the aspect of performance observation or mergers. Ultimately, clusters have greater power to explain influences in regression models (Cyree, Davidson and Stowe, 2020). On the other hand, by clustering banks on the basis of user evaluation, service users themselves will benefit the most.

Hnatiienko et al (2021) propose to use an analysis based on the construction of clusters from the main indicators that characterize the activities of banks instead of analyzing the risks of banks, based on the calculation of economic standards.

The relationship towards the user of banking services can be observed in the context of the quality of the service provided, the price that the service users pay for the specified service and the satisfaction of the service user. According to one of the studies that examined the significance of the relationship between service quality, service price, customer satisfaction and loyalty, using the example of the domestic banking market, it was found that there was a statistically significant relationship between the aforementioned variables (Činjarević, Tatić and Avdić, 2010). If users of banking services are dissatisfied with the service, it is possible for them to turn to other options that represent an alternative to keeping deposits and lending. For example, in cases of negative or low interest rates on savings deposits, service users may decide to keep cash with them or to invest it in real estate or shares. On the other hand, in cases of high interest rates on loans, service users may turn to other sources of financing such as microcredit organizations, leasing companies, in some countries to savings and credit cooperatives, while legal entities, among other things, can obtain funds by issuing shares. The decision of the user of the bank's services whether to be loyal in the future depends mostly on their satisfaction, while other

variables such as the cost of switching to another bank, time and effort do not have a significant impact on his decision (Ozer and Zuhal, 2018). The above-mentioned implies that the banking sector must follow market trends and maintain competitiveness in terms of the cost of financing in order to retain service users and that it is necessary to adapt to the needs of customers when it comes to technological innovations and new trends in the field of internet and mobile banking, without which the dynamics of payments would practically slow down significantly. Continuous monitoring and improvement of mobile and Internet applications for payment transactions, review of balances and spending on user accounts, as well as other options offered by these applications ultimately determine customer satisfaction with this segment of banking services, which records daily growth. Monitoring technological innovations is something that contributes to the quality of service and is one of its determinants. The objective of the study Kolodiziev et al (2022) was to find a new tool for clustering banks according to the level of digitalization, i.e. to develop a model for clustering banks according to the level of digitalization in the context of the COVID-19 pandemic. They applied factor analysis and dendogram. A clear differentiation of all indicators into activators/deactivators will enable banks to develop a long-term strategy and short-term measures to increase their level of responsibility in terms of digitalization to all stakeholder categories.

Small amount of research deals with the grouping of banks based on evaluation by users of banking services. There are only annual reports on the work of the Ombudsman for the banking system of the Federation of Bosnia and Herzegovina, which represent a certain type of evaluation of banks by users, but only from the aspect of complaints regarding the work of banks and banking services. With the SERVQUAL method, one of the studies measured the level of service quality based on user perception of the example of domestic financial market, and the cluster method was also used in the study, but the results were intended for group users and not for financial institutions based on user perception. The result of the research established the division of users into traditionalists and visualists, that is, those who formed their opinion based on the friendliness of employees and the number of branches, and those whose opinion stemmed from the appearance, quality of equipment, position and reputation of the financial institution (Bevanda, 2008).

The second study grouped banking institutions using cluster analysis and the example of the domestic banking market, but only on the basis of financial indicators. The result is four clusters of banks based on profitability (Puška and Beganović, 2016).

Abdić (2013) applied multivariate statistics with the aim of determining the key determinants for the ranking of insurance companies in Bosnia and Herzegovina.

3. DATA

With the aim of carrying out the clustering of banks in FB&H based on different criteria (performance indicators, on the one hand, and evaluation of users of banking services, on the other), secondary data from the Banking Agency (FBA) report and the Ombudsman's report for banking operations are used, as well as primary data related to for evaluation by the user, which was carried out in the form of a survey questionnaire. Performance indicators considered in this research are balance sheet positions, ROA and ROE. The survey questionnaire for the evaluation of banks by users contained 27 questions with a Likert scale of 1-5.

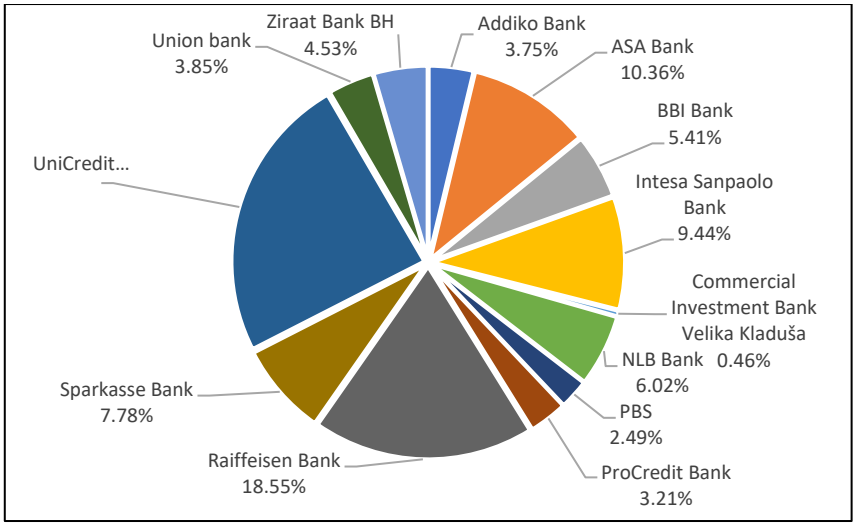
4. RESEARCH METODOLOGY

The statistical program SPSS, descriptive statistics and k means clustering methods were used to test the hypotheses. The ANOVA test was used to test the significance of the cluster analysis results. "ANOVA aims to test whether there is a difference between the arithmetic means of more than two populations and to compare their variances" (Resić et al., 2010).

5. RESULTS

According to the Report of the Banking Agency of the Federation of Bosnia and Herzegovina, 13 commercial banks have a banking license in FB&H and all banks are members of the Deposit Insurance Agency of Bosnia and Herzegovina.

Graph 1. *Market share by asset size in 2022*.



Source: *Author's calculation based on FBA data*

Compared to the year 2021, the number of banks is lower by one bank due to the case of Sberbank, where we had to implement a status change of merger with another bank. According to the ownership structure in the FB&H, as of December 31, 2022, we have 12 banks in private and predominantly private ownership, and one bank in state and predominantly state ownership. The largest participation is held by shareholders from Austria (39.4% of foreign capital), followed by Turkey (21.8%), Croatia (15%) and Germany (8.9%), while other countries do not have significant participation. Total capital of the banking sector in the FB&H as of 12/31/2022 increased by 129.2 million BAM or 4.2% compared to 2021 (FBA, 2023). Graph 1 shows market share of individual banks by asset size in 2022.

In 2022, according to the size of assets, the leading banks are Raiffeisen Bank d.d. and Unicredit Bank d.d., which make up almost half of the banking market. Given that loans are the largest item of assets, it is clear that these two banks have the largest share in loans given to households and the economy. Application of the k means clustering method resulted in three clusters of banks according to balance sheet positions (table 1).

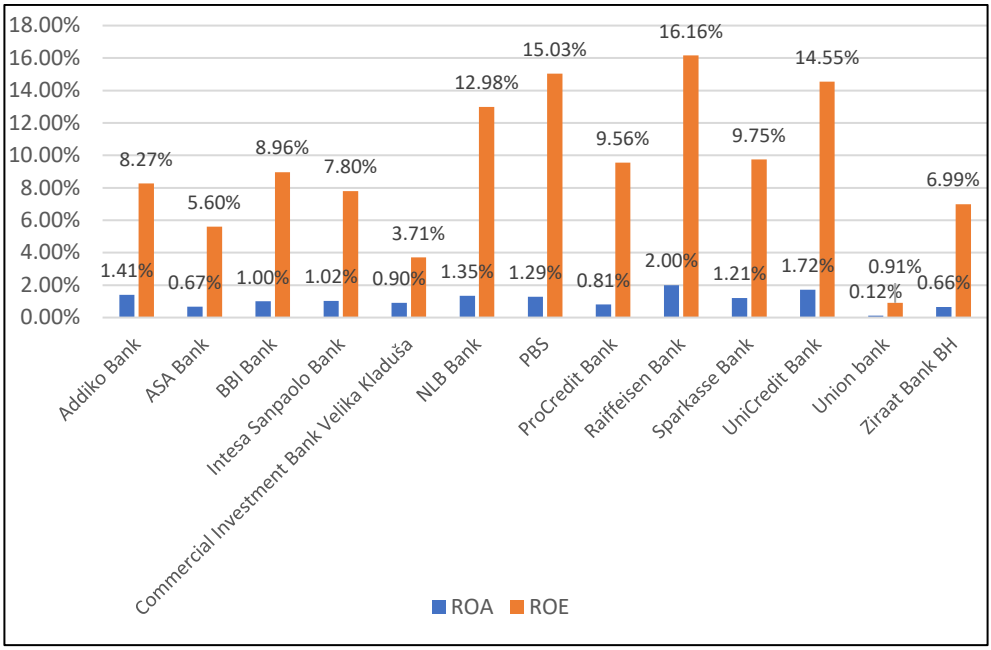
Table 1. *Clusters of banks according to the balance sheet position*

Cluster 1	Cluster 2	Cluster 3
Addiko Bank	ASA Bank	Raiffesien Bank
BBI Bank	Intesa Sanpaolo Bank	Unicredit Bank
NLB Bank	Sparkasse Bank	
PBS		
Procredit Bank		
Union Bank		
ZiraatBank		

Source: *Calculation in SPSS (2023)*

According to the ANOVA test, the clusters have significance ($p<.005$). The first cluster contains the largest number of banks, it is the cluster of banks with the smallest assets, loans and deposits and the weakest financial result. The second cluster is the medium-performing banks, and the third cluster is the banks that are the most successful in terms of financial position and performance. Also, the two banks that are the most successful in terms of financial position and performance had a leading role in 2022 in terms of the ROA and ROE profitability indicators (graph 2).

Graph 2. *Overview of ROA and ROE indicators for 2022*



Source: *Author's calculation based on FBA data*

ROA averaged 0.95% in 2021, and 1.09% in 2022, which implies growth for the entire sector. In 2021, NLB Bank played a leading role when it comes to the ROA and ROE indicators. Right behind it was PBS, followed by Unicredit Bank d.d. and Raiffeisen Bank d.d., leading by all other parameters. Given that there were no responses for Commercial Investment Bank d.d. Velika Kladuša in the user survey, it was not considered in the clustering models.

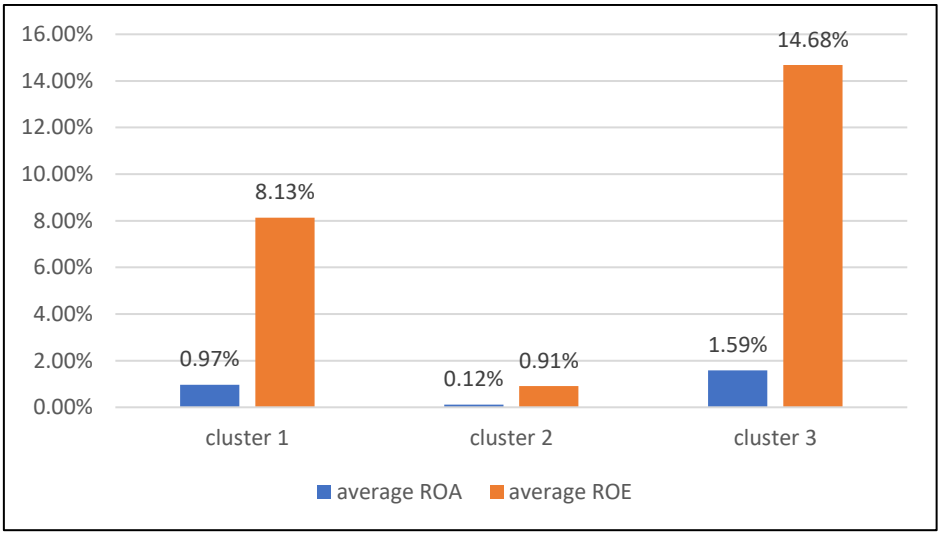
Table 2. *Clusters of banks according to ROA and ROE*

Cluster 1	Cluster 2	Cluster 3
Addiko Bank	Union bank	NLB Bank
ASA Bank		NLB Bank
BBI		PBS
Intesa Sanpaolo Bank		Raiffeisen Bank
Procredit Bank		Unicredit Bank
Sparkasse Bank		
Ziraat Bank		

Source: *Calculation in SPSS (2023)*

Application of the k means clustering method resulted in three clusters of banks according to the ROA and ROE indicators. According to the ANOVA test, the clusters had significance (p<.005), which is enough to determine that ROA and ROE indicators, viewed together, are significant for distinguishing these three clusters (table 2).

Graph 3. *Average values for ROA and ROE per clusters*



Source: *Author's calculation based on FBA data*

According to the above-mentioned results, we can say that there are clusters of banks that are highly profitable (cluster number 3), medium profitable (cluster number 1) and low profitable (cluster number 2). The cluster of highly profitable banks (graph 3) includes NLB Bank, PBS, Unicredit Bank and Raiffeisen Bank. The low-profit cluster consists of only one bank, i.e. Union bank. Other banks are in the medium-profitable cluster.

In the survey for the evaluation of banks by users of banking services, we received 306 answers to the 27 questions. A total of 12 banks were analysed. The majority of answers were expectedly related to Unicredit Bank and Raiffeisen Bank. More precisely, the participation of these two banks in the sample was 62.74%, and their market share was 42.7%. The ratings of all responses at the bank level were used as a variable in the cluster analysis. Overall rate is 3.87, which is a sign that there is room for improvements (table 3).

Table 3. *Number of responses and average rating score according to banks*

Bank	N	Participation of banks in user responses	Descriptive statisics for overall customer evaluation			
			Min.	Max.	Average	Standard deviation
Addiko Bank	4	1.31%	4.0	4.5	4.28	0.28
ASA Bank	16	5.23%	2.7	4.8	3.68	0.48
BBI Bank	18	5.88%	2.5	5.0	3.76	0.71
Intesa Sanpaolo Bank	19	6.21%	3.0	4.8	3.89	0.45
NLB Bank	12	3.92%	3.1	4.9	4.05	0.49
PBS	3	0.98%	3.3	4.3	3.80	0.48
ProCredit Bank	1	0.33%	4.0	4.0	4.00	/
Raiffeisen Bank	74	24.18%	2.1	5.0	3.58	0.62
Sparkasse Bank	16	5.23%	2.1	4.7	3.81	0.68
UniCredit Bank	118	38.56%	2.6	5.0	3.94	0.58
Union bank	8	2.61%	3.7	5.0	4.23	0.48
Ziraat Bank BH	17	5.56%	2.4	4.2	3.45	0.54
Total	**306**	**100**			**3.87**	

Source*: Survey (2023)*

The average score for the statement from the evaluation questionnaire "The bank follows modern trends" is 4. We can conclude that users are well aware of the role and importance of technological development and its application in banking business, since it significantly facilitates the use of banking services. Also, customers rate the usability and availability of ATMs as one of the main reasons for choosing a particular bank. Out of 304 responses, 105 respondents (34.5%) stated "Availability of the network of ATMs and branches" as the reason for choosing a bank. Therefore, we confirm the hypothesis of the paper: "Monitoring global trends, primarily from the aspect of technological development, has a significant role in satisfying and providing a timely response to the needs of consumers/users of services."

According to the survey for evaluation by users, the ANOVA test for clusters showed a significant difference between the three clusters (table 4). Clusters were formed using the k means method.

Table 4. *Clusters of banks according to evaluation by users*

Cluster 1	Cluster 2	Cluster 3
Addiko Bank	ASA Bank	BBI
Union Bank	Raiffeisen Bank	Intesa Sanpaolo Banka
	Ziraat Bank	NLB Bank
		PBS
		Procredit Bank d
		Sparkasse Bank
		Unicredit Bank

Source: *Calculation in SPSS (2023)*

It is possible to assign the following names to clusters: cluster 1, i.e. the cluster of banks which service users are satisfied with, cluster 2, i.e. the cluster of banks which users are least satisfied with, and cluster 3, the cluster of banks which users are moderately satisfied with.

6. COMPARISON BETWEEN CLUSTERS

In accordance with the principle that banks should be compared with their closest competitors, an overview was formed based on the criteria of size, indicators and, finally, user evaluation. Within this review, it is possible to make a comparison between large, medium and small banks. The positions of banks in clusters are different if different criteria according to which the clusterization was carried out are observed. Cluster number 3, formed according to the positions of the balance sheet and income statement, represents the most represented banks in the market and includes Unicredit Bank and Raiffeisen Bank (table 5). According to the second criterion, the financial indicators of ROA and ROE, these two banks also belong to the same cluster, that is, to the cluster of banks with the best performance indicators, however, from the aspect of user evaluation, Unicredit Bank belongs to the cluster of banks which users are moderately satisfied with, while Raiffeisen Bank is in the cluster of banks which service users are least satisfied with. Therefore, Unicredit Bank is more successful than Raiffeisen Bank. If we do not use the mentioned criteria when interpreting the cluster analysis, we can very easily draw wrong conclusions, therefore a comprehensive approach to clustering is important in interpreting the results of this analysis.

Table 5. *Clusters of banks with the largest market share*

	CLUSTERING ACCORDING TO:		
BANK	**Balance sheet position**	**ROA/ROE**	**Evaluation by users**
Raiffeisen Bank	3	3	2
UniCredit Bank	3	3	3

Table 6 presents banks with medium market share, i.e. cluster number 2 according to the positions of the balance sheet and profit and loss. Also, according to the ROA and ROE indicators, the banks are in the same cluster, however, from the aspect of user evaluation, ASA Bank is the bank which users are least satisfied with and belongs to the specified cluster of banks.

Table 6. *Clusters of banks with the middle market share*

	CLUSTERING ACCORDING TO:		
BANK	**Balance sheet position**	**ROA/ROE**	**Evaluation by users**
ASA Bank	2	1	2
Intesa Sanpaolo Bank	2	1	3
Sparkasse Bank	2	1	3

Table 7 shows the most banks and those are the banks with the smallest market share, that is, the smallest amount of assets, given loans, deposits and the weakest financial result. In case of these banks, there is a variation in terms of belonging to the cluster based on ROA and ROE, given that some banks belong to the cluster with the best indicators, others to the middle and the third cluster is the banks with the weakest indicators. In case of user evaluation, Ziraat Bank belongs to the lowest ranked cluster and therefore we can rate it as the least successful. But considering the small number of responses for some other banks such as ProCredit Bank, PBS and Union Bank, we should interpret the results with caution.

Table 7. *Clusters of banks with the lowest market share*

	CLUSTERING ACCORDING TO:		
BANK	**Balance sheet position**	**ROA/ROE**	**Evaluation by users**
Addiko Bank	1	1	1
BBI Bank	1	1	3
NLB Bank	1	3	3
PBS	1	3	3
ProCredit Bank	1	1	3
Union Bank	1	2	1
Ziraat Bank BH	1	1	2

All of the above confirms the hypothesis "Banking companies with the largest market share are not necessarily the ones which service users are most satisfied with." It is important to note that clusters formed on the basis of user evaluation and clusters formed on the basis of financial indicators are not comparable, but they are complementary and it is possible to draw certain conclusions about the market position of banks. Of course, the sample size for the observed bank should also be taken into account. Considering the number of user responses and the representativeness of the sample, Raiffeisen Bank is a good example of the aforementioned complementarity, namely because it belongs to the cluster of highly profitable banks and at the same time to the cluster of those banks which service users are least satisfied with. The above implies that the bank is not able to respond in the best way to the growing needs of its clients, even though it has a significant market share and good financial indicators. In a certain way, the high market representation of this bank represents pressure on its operations, because judging by the evaluation in the selected sample, it is not able to respond to the needs of all clients on time. Therefore, bank management can use information about the expectations and opinion of users and react on time before the opinion of users is more significantly reflected on financial results and indicators. This example shows the importance of clusterization in the business and regulatory environment. Also, similar conclusions can be drawn if we take other banks as an example, of course, first of all, it is necessary to take into account the size of the bank and the number of respondents' answers, because they affect the representativeness of the sample. Business indicators and user evaluation must also be placed in the context of market representation and the size of the bank, as shown by the example of one of the studies presented earlier, where the importance of evaluating managerial effectiveness from the aspect of comparison with competitors belonging to the same group or cluster was highlighted so that by comparing banks with different characteristics, the performance of the management is masked in relation to the comparison with the respective competitors, i.e. those with similar characteristics.

7. RECOMMENDATIONS AND CONCLUSIONS

The clustering of banks based on indicators or on the basis of evaluation by users, in principle, is done in order for banks to identify their position on the market and to improve it over a certain period of time. In the end, the greatest benefit from clusterization will be service users themselves, because the only way banks can improve their financial position is by improving the services which they offer to service users and thereby influence the increase in user satisfaction.

Clusterization provides opportunities for banks to evaluate the performance and perception of service users within the cluster to which they belong, as presented in the research. It is sometimes necessary to create input clusters according to a certain

main criterion in order to compare banks with similar characteristics. The above-mentioned results in a clear ranking of banks according to their performance in terms of financial indicators and user evaluation.

By identifying which banking companies belong to which cluster, it is possible to anticipate the direction in which the market is moving, as well as to minimize the possible losses that come with the aforementioned changes. The agencies responsible for the operation and supervision of banks can, by looking at the clusters, see which banks are stable, both from the financial point of view and from the aspect of bank evaluation by service users, because, essentially, service users are the first to feel changes in the operations of a bank and thus their "feedback" can be a certain indicator for the authorities to act on time, as well as for investors who are looking for quality investment opportunities.

The recommendation for future research is to conduct a survey on a larger number of respondents for banks with a smaller market share, so that the sample is more representative and an unambiguous conclusion can be drawn regarding the opinions of users about the mentioned banks. Also, it is recommended that subsequent research should also cluster banks for a larger number of years in order to determine the movement of banks from one cluster to another. Given that this is one of the limitations of this research, one of the recommendations is that in future research, banks from the entire territory of B&H, not only FB&H, be included in the analysis. In addition to the above, it is also recommended to survey only legal entities regarding the satisfaction with banking services, given that the survey conducted in this research contains only a few responses from legal entities.

LITERATURE

1. Abdić, A. (2013). Multivarijaciona statistika u rangiranju osiguravajućih društava. Ekonomski fakultet u Sarajevu. Sarajevo.
2. Agencija za bankarstvo Federacije Bosne i Hercegovine (FBA), (2023). Informacija o subjektima bankarskog sistema Federacije Bosne i Hercegovine. Sarajevo.
3. Bevanda, A. (2008). "Segmentacija financijskog tržišta u Federaciji Bosne i Hercegovine na temelju čimbenika imidža", Market - Tržište, 20(2), pp. 179-193. Preuzeto s: https://hrcak.srce.hr/53068 (Datum pristupa: 20.09.2023.).
4. Centralna Banka Bosne i Hercegovine, (2023). Godišnji izvještaj 2022. Sarajevo.
5. Cyree, K. B., Davidson, R. T., i Stowe, J. D. (2020). "Forming Appropriate peer groups for bank research: a cluster analysis of bank financial statements". Journal of Economics and Finance, pp. 211-237.
6. Galante, R. (2023). "Cluster Analysis in the Financial Sector". (25) Cluster Analysis in the Financial Sector | LinkedIn
7. Hnatiienko, H., Domrachev, V., Saiko, V., Semenenko, T., Tretynyk, V. (2021). "Application of Cluster Analysis for Condition Assessment Banks in Ukraine". IT&I Workshops 2021, pp. 112-121
8. Kolodiziev, O., Shcherbak, V., Vzhytynska, K., Chernovol, O., Lozynska, O. (2022). "Clustering of banks by the level of digitalization in the context of the COVID-19 pandemic". Banks and Bank Systems, 17(1), pp. 80-93
9. Ozer, D. M., & Zuhal, D. G. (2018). "Consumer Switching Behavior In Banking Industry: Can Consumer", International Journal of Economic and Administrative Studies, pp. 163-178.
10. Pavković, A. (2004). "Instrumenti vrednovanja uspješnosti poslovnih banaka", Zbornik Ekonomskog fakulteta u Zagrebu, 2(1), pp. 179-192. Preuzeto s: https://hrcak.srce.hr/26203 (Datum pristupa: 12.09.2023.)
11. Puška, A., i I. Beganović, A. (2016). "Primjena cluster analize u ekonomskim istraživanjima", Oeconomica Jadertina, 6(1), pp. 3-19. Preuzeto s: https://hrcak.srce.hr/168460 (Datum pristupa: 20.09.2023.)
12. Resić, E., Delalić, A., Balavac, M., Abdić, A., 2010. Statistics in Economics and Management. Ekonomski fakultet u Sarajevu. Sarajevo
13. Ansari, Z.A. (2021). "Measuring Consumer Behavior in Banking: Scale Development and Validation", International Journal of Business and Management, Canadian Center of Science and Education, vol. 14(11), p. 263.

Emina Resić

Edita Hebibović-Čagalj

KLASTERIZACIJA BANAKA U FEDERACIJI BIH NA BAZI RAZLIČITIH KRITERIJA

SAŽETAK

Evaluaciju korisnika bankarskih usluga treba posmatrati kao dodatni alat za analizu uspješnosti banaka pored analize finansijskih pokazatelja. Obzirom na uticaj koji zadovoljstvo i povjerenje korisnika može imati na stabilnost bankarskog sistema, poželjno je isto uvrstiti u izvještaje o bankarskom sektoru. Evaluacija zadovoljstva korisnika također može anticipirati pojedina tržišna kretanja i predstavlja koristan alat za menadžment bankarskih institucija da donesu korektivne mjere prije nego što se negativna očekivanja korisnika reflektuju na finansijske izvještaje. Evaluaciju korisnika bankarskih usluga i analizu finansijskih pokazatelja je potrebno staviti u kontekst veličine banaka kako bi se rezultati mogli pravilno interpretirati. Klaster analiza je metoda kojom se na adekvatan način može izvršiti klasterizacija na bazi ova tri kriterija. Rezultati istraživanja za banke iz Federacije BiH pokazuju značajnost klastera banaka na bazi evaluacije korisnika, finansijskih pokazatelja i veličine banaka.

Ključne riječi:. *cluster, banka, pokazatelji, evaluacija korisnika.*

JEL: *G2, C3*