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Financial Soundness Performance in Member Countries of the Organization of Turkic States: An Application Using Multiple MCDA Methods for the Period of 2018-2022

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ABSTRACT

The growing significance of cooperation between nations has become increasingly evident in recent years, largely due to the accelerating impact of globalization. Bilateral agreements and regional partnerships have been observed more frequently. One of the recent successful examples of such efforts is the Organization of Turkic States, which includes Azerbaijan, Kazakhstan, Kyrgyzstan, Uzbekistan, and Türkiye. This study examines the financial soundness performance of Organization of Turkic States member countries with sufficient data from the period of 2018 to 2022. Using data from the International Monetary Fund database, an integrated approach of CRITIC, GRA, and SAW methods is employed. The results, consolidated using the Borda Count technique, provide a ranking of the financial soundness of these countries during the specified period. According to the analysis findings, the financial soundness performance rankings are as follows: Kazakhstan, Türkiye, Uzbekistan, and Kyrgyzstan. This study is the first to comparatively examine the financial soundness performances of member countries of the Organization of Turkic States, and as such, it contributes to the literature in this area.

Keywords: Financial Soundness, Financial Stability, Organization of Turkic States, CRITIC, GRA Method, SAW Method.

JEL Classification Codes: G01, G20, G21

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INTRODUCTION

Relations between countries have been rapidly expanding due to globalization. Growing bilateral and regional alliances have facilitated access to new trade markets, financing opportunities and information. One of the important regional alliances that has been recently organized is the Organization of Turkic States (OTS). OTS represents a collaborative effort between the Republic of Türkiye and the Central Asian Turkic Republics. It is a social, cultural, and economic community of countries that have significant energy resources, especially natural gas, and oil, have a big potential in sectors such as agriculture, tourism, and construction, and are located on the trade routes between Asia and Europe, including the historical Silk Road.

The OTS is relatively young compared to other organizations established for similar purposes, aiming at economic and cultural cooperation among Turkic-speaking countries. Organizations with similar objectives, such as the Association of Southeast Asian Nations (ASEAN) and the Black Sea Economic Cooperation (BSEC), have been often established between countries with different structures and diverse cultural and historical ties. What distinguishes the OTS from similar organizations is that it is a union based on the Turkic language, emphasizing not only economic but also cultural cooperation and solidarity among its member countries. The cultural and geographical proximity of OTS countries, along with their role as a bridge between developed European nations and large emerging Asian economies, are significant advantages for the OTS. With a population of approximately 160 million, an economic size of 1.5 trillion dollars, and a trade volume exceeding 1 trillion dollars, the OTS holds significant potential for economic development. However, the trade volume of around 42 billion dollars between OTS countries is relatively low compared to the potential of its member countries. Increased economic cooperation and solidarity between countries will contribute to the growth of low-volume trade.

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The strength and stability of a nation's financial system, along with its ability to withstand economic shocks, play a crucial role in shaping the country's risk premium. Therefore, investigating the soundness of countries' financial structures is of great importance both for financial stakeholders and for the health of economies (Okur et al., 2021: 94). Financial Soundness (FS) Indıcators (FSIs) published by the International Monetary Fund (IMF) are significant indicators in this regard. This paper undertakes an in-depth assessment of the financial stability performance of OTS member states, offering a comparative analysis across recent years. This study represents the first comprehensive evaluation aimed at investigating the comparative financial soundness performance of OTS member countries, and so marking a significant and original contribution to the body of research on the economic cooperation and stability of this organization. This study aims to analyze the financial performance of OTS countries and identify the financial strengths and weaknesses of its member states. This study aims to highlight the issues in the financial structures of the countries, identify areas for improvement, and guide the Union's future economic strategies. The next steps of the study include introducing the OTS and its members, discussing the FSIs, and reviewing the literature on these indicators. The study's final phase involves conducting the practical implementation and assessing the outcomes.

OVERWIEW OF THE OTS

In 1992, a summit meeting took place involving Azerbaijan, Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan, and Türkiye. At the summit, the attendees discussed the need to strengthen cooperation between the countries, ensure economic coordination, make arrangements for free trade, and open up the high natural resource potential of the newly established Turkic states to Europe and the world through Türkiye. After the 1992 summit, this process matured and developed further with new summits. The Turkic Council, officially known as the Cooperation Council of Turkic-speaking States (CCTS), was founded in 2009 through the Nakhchivan Agreement, which was signed by Azerbaijan, Kazakhstan, Kyrgyzstan, and Türkiye. This council serves as a platform for fostering cooperation among Turkic-speaking countries. With the 7th Summit taking place in Bakû in 2019, the Republic of Uzbekistan became a member of the CCTS. During the 8th Summit, the CCTS was officially rebranded as the *Organization of Turkic States.* The 9th, 10th, and 11th Summits of the OTS were held in Samarkand on November 11, 2022, Astana on November 3, 2023, and Bishkek on November 6, 2024, respectively. During the 9th Summit, leaders reaffirmed their commitment to Turkic integration and the Turkic World 2040 Vision. The 10th Summit, held under the motto "Turkic Era," focused on strengthening cooperation among Turkic States. The 11th Summit saw the adoption of the Turkic Green Vision and the Turkic World Charter, with Bishkek being designated as the 2025 Turkic World Digital Capital. At this summit, key agreements were signed on the digital economy, green finance, and space activities. The chairmanship was handed over to Kyrgyzstan, and it was decided that the 2025 Summit would be held in Azerbaijan, while an informal summit would take place in Hungary (Organization of Turkic States, 2024a).

Currently, OTS consists of five member countries: Azerbaijan, Kazakhstan, Kyrgyzstan, Uzbekistan, and Türkiye. In addition to its full members, the OTS has several observer states, including the Turkish Republic of Northern Cyprus, Hungary, Turkmenistan, and the Economic Cooperation Organization (ECO). The main objective of the OTS is to strengthen cooperation in social, political, economic, and cultural spheres among its member states. It aims to uphold security and stability in the region and to foster the development and growth of its member countries by leveraging the potential of the Turkic world (Organization of Turkic States, 2024b).

Table 1 presents the population statistics and some macroeconomic data for the OTS countries in 2023. Relevant data were obtained from the World Bank Data

Table 1. Statistics on OTS countries

	Population (Thousand $)	Gdp (Million $)	CPI %	Exports (Millions $)	Imports (Millions $)	EDS (Millions $)	FDI (Thousand $)
Azerbaijan	10.154	72.356	8.8	35.487	25.016	14.533	252.836
Kazakhstan	20.330	262.642	14.7	90.360	71.882	163.155	5.437.312
Kyrgyzstan	7.100	13.988	10.8	5.478	14.127	10.115	1.500
Uzbekistan	35.652	101.592	11.4*	24.067	41.335	59.184	2.156.721
Türkiye	85.326	1.118.253	53.9	356.900	384.240	499.842	10.951.000
World	8.061.876	106.171.668	5.6	31.134.686	30.247.168	-	867.176.687

Source: https://data.worldbank.org/*Uzbekistan inflation data is for 2022

Portal. OTS countries account for approximately 2% of the world's population and contribute about 1.5% of global GDP. In 2023, OTS countries' exports accounted for approximately 1.65% of global exports, while their imports represented 1.77% of the global total.

Azerbaijan gained independence in 1991 and has a population of 10,154 million with a gross domestic product (GDP) of $72,36 billion as of 2023. In 2023, Azerbaijan's exports accounted for 0.11% of global exports, while its imports made up 0.08%. In 2023, Azerbaijan attracted US$ 252,836 million in net Foreign Direct Investment (FDI), while its External Debt Stock (EDS) was US$ 14,533 million.

Oil and gas are the locomotives of the economy of Azerbaijan. After gaining independence, financial liberalization became increasingly important in Azerbaijan. During this process, various financial institutions, especially banks, were allowed to operate. As of 2024, Azerbaijan is home to a total of 23 banks, with 2 state-owned and 21 privately-owned. 9 of the privately owned banks are foreign-owned. There are also 55 credit institutions and 39 credit unions operating in the country (Central Bank of the Republıc of Azerbaijan, 2024).

Kazakhstan, Central Asian Turkic state, has a population of 20,33 million and a GDP of $ 262,6 billion as of 2023. With an inflation rate of 14.7% in 2023, Kazakhstan has the second-highest inflation rate among the OTS countries. In 2023, Kazakhstan attracted US$ 5.437 million in foreign investments, while its EDS stood at US$ 163,155 billion. Kazakhstan's exports in 2023 accounted for 0.29% of global exports, while its imports totaled 0.24%.

The service and agriculture sectors play an important role in Kazakhstan's economy. Kazakhstan boasts abundant and robust mineral reserves. The country is one of the top producers of uranium in the world (Ozer et al., 2024: 19). Additionally, oil revenues are crucial for Kazakhstan's economy. From 2010 to 2021, around 65% of Kazakhstan's merchandise exports were oil-based. During this period, oil revenues accounted for approximately 35% of Kazakhstan's budget (World Bank, 2023: 13). Although relatively small, Kazakhstan's financial sector is open to development. Banks have largely dominated the financial sector. The Unified Accumulative Pension Fund (UAPF) stands as a key pillar within the non-banking financial sector, playing a crucial role in its overall structure (IMF, 2024).

Kyrgyzstan is categorized as a low- to middle-income nation situated in Central Asia. In 2023, its GDP reached approximately US$ 14 billion, with a population of 7,1 million. Kyrgyzstan is rich in natural resources. However, there are also opportunities in terms of hydroelectricity generation, agriculture, and the tourism sector. In 2023, Kyrgyzstan's foreign trade balance showed a deficit of US$ 8,6 billion, while its external debt stock stood at US$ 10,1 billion. Kyrgyzstan has a relatively weak outlook in terms of foreign direct investment.

There are 23 commercial banks operating in Kyrgyzstan's financial sector. The country is home to 752 non-bank financial institutions. Additionally, the combined assets of banks, along with those of non-bank financial and credit institutions, account for approximately 57.3% of the nation's GDP (National Bank of the Kyrgyz Republic, 2023).

Uzbekistan is the newest member of the OTS. As of 2023, its population is 35.65 million, and its GDP is US$ 101.59 billion. In 2023, Uzbekistan exported approximately US$ 24 billion and imported US$ 41 billion, resulting in a deficit in its foreign trade balance. The stock of external debt has reached US$ 59.184 billion.

The privatization efforts and reforms implemented in recent years have had a positive impact on Uzbekistan's economy. The banking sector has a significant weight in Uzbekistan's financial sector. In 2023, the proportion of banking sector assets relative to GDP is estimated to be around 61%. In the non-bank financial sector, this ratio is approximately 1.6% (Central Bank of Uzbekistan, 2023: 26).

Türkiye, a member of the G-20 countries, is the 17th major economy globally. In 2023, its GDP is US$ 1.118 trillion, and its population is 85.32 million. In this respect, Türkiye has the highest population and GDP in the OTS. Türkiye has been experiencing inflation problems in recent years, and the inflation rate in 2023 was 53.9%. This rate is significantly higher than the global average. In 2023, Türkiye's share of global exports and imports was 1.15% and 1.27%, respectively. In 2023, Türkiye attracted US$ 10.951 million in net foreign direct investment, while its external debt stock reached US$ 499.842 million.

Geographically and in terms of economic relations, Türkiye has a key position in the opening of the OTS countries to Europe and the transportation of natural resources in these countries. Türkiye has a well-established banking sector. As of March 2024, there are 63 banks in service. Banks' assets were 90% of the GDP in 2023 (BDDK, 2024).

FS AND INDICATORS REFLECTING FS

FS denotes the capacity of the financial system and its institutions to effectively manage and withstand financial

shocks or disruptions. The likelihood of disruption of intermediation services decreases as FS improves (Noman & Isa, 2021: 241). FSIs evaluate the financial sustainability and stability of both financial institutions and their clientele (San Jose & Georgiou, 2008: 277). These indicators are generated using information from financial institutions. Therefore, it has the ability to represent financial institutions and the markets in which they trade (Sundararajan et al., 2002: 2). The FSIs enable the identification of both the strengths and weaknesses within a financial system, facilitating a thorough evaluation across various countries and institutions.

FSIs were created to provide strong indicators and a reliable data set for early identification of financial risks and vulnerabilities, especially during frequent financial crises (San Jose & Georgiou, 2008: 277). The Asian financial crisis of 1997 served as a pivotal moment in the evolution of FSIs. In response to the crisis, both the World Bank and the IMF launched initiatives to create FSIs, aligning this effort with the ongoing Financial Sector Assessment Program (FSAP) at that time. Initiated in 1999, this project received support from other international organizations. After the study, a comprehensive guide was compiled and published in 2006 (Gersl & Hemanek, 2007: 69; San Jose & Georgiou, 2008: 277-278; Navajas & Thegeya, 2013: 5).

In the 2006 Compilation Guidelines, FSIs consist of two parts, a core set, and an incentivized set, and cover a total of 39 FSIs. The core set includes 12 FSIs, with key indicators for the banking sector. The incentivized framework encompasses a diverse array of entities, including non-financial corporations, households, the non-bank financial sector, securities, and real estate markets, alongside certain data from the banking sector, amounting to a total of 27 distinct indicators (Gersl & Hemanek, 2007: 69). Understanding these indicators is crucial for assessing financial well-being and stability (Sugiyarto, 2015: 1-2).

Efforts to develop FSIs are not limited to the IMF. International organizations such as the European Union are working to establish various FSIs. Some countries are also making individual efforts. The IMF's work also carries on in line with the 2006 compilation guidelines. A new guideline on FSIs was published in 2019 and then updated in 2022. In new studies, the number of FSIs increases, and their content is renewed to meet current requirements.

LITERATURE REVIEW

Research on FSIs typically focuses on individual countries or groups of countries. Arzova and Sahin (2024) with 17 countries; Bitetto et al. (2023) with 119 countries have tried to construct a valid FS index. Studies examining a single country have generally analyzed the FS and efficiency of the banking sector in that country. Some of these studies include the analyses conducted by Almahadin et al. (2020) on Jordan, Ahmed and Dogarawa (2021) on Nigeria, Sjauš and Žaja (2022) on Croatia, Salina et al. (2021) on Kazakhstan, and Ilgın (2024) on Türkiye. These studies assess the FS of the banking system in the respective countries using various FSIs.

Some authors like Seyedi and Abdoli (2019), have analyzed the factors affecting FSIs. In contrast, some authors have used FSIs to assess banks' FS or examine their changes over time. Masud and Haq (2016) conducted an analysis of the FS of banks in Bangladesh, employing a trend analysis approach covering the years 2006 to 2014. Rahman (2017) examined the financial stability of banks in Bangladesh, while Ouma and Kirori (2019) conducted a similar analysis in Kenya. They have used the Bankometer method. The FS of institutions can be investigated both on a sectoral basis and at a micro-level as a company. Suresh et al. (2019) conducted an in-depth analysis of the FS of both the Bank of Bhutan Limited and Tashi Bank at a micro-level.

Various models are used in studies that assess FS. Multi-Criteria Decision-Making (MCDM) models are also preferred in studies on FS. Below are some examples of studies that utilized these models:

Gaganis et al. (2006), have used the Utility Additives Discriminants (UTADIS) method to study 894 banks in 79 countries. By analyzing six financial and four non-financial indicators, they found that the primary factors influencing the classification of banks are asset quality, capital adequacy, and the specific market conditions in which the banks operate.

In their study, Ioannidis et al. (2010) examined 944 banks from 78 countries and determined that the UTADIS and Artificial Neural Networks (ANN) models were the most successful methods for bank classification on average.

Ginevičius and Podviezko (2013), analysed Lithuanian banks for the period 2007-2009. In addition to methods such as SAW, TOPSIS, the COPRAS method developed in Lithuania and the PROMETHEE II technique have been used in this article. The results of the study indicate instability in the Lithuanian banking market and show significant fluctuations in banks' positions.

Doumpos et al. (2016), have examined 256 banks participating in the European Central Bank's stress tests in 2010, 2011, and 2014 using the FSIs with MCDM models. According to the study findings, capital adequacy is the

Table 2. Criteria evaluated in the study

Criteria	Definition	Explanations	References	Direction
TIER1	Tier1 Capital to risk-weighted assets	TIER1 Capital is a frequently used measure in stress tests as an indicator of the survival capacity of financial institutions. This ratio, which scales quality capital elements with risk-weighted assets, measures the sensitivity of financial institutions to risk.	Doumpos et al. (2016); Ginevičius and Podviezko (2013); Okur et al. (2021)	Benefit
PRO	Provisions for nonperforming loans	This variable refers to the collateral allocated by banks and financial institutions for non-performing loans. It can also be expressed as reserves for losses arising from non-performing loans.	Marjanović and Popović (2020)	Benefit
ROA	Return on assets	The ROA ratio, used as a measure of the return on assets for financial institutions, assesses the impact of profitability generated by asset utilization on the health of the financial system	Doumpos et al. (2016); Marjanović and Popović (2020)	Benefit
ROE	Return on equity	ROE, as a measure of financial performance, indicates the efficiency of equity capital utilization. ROE is an important indicator for assessing financial health and profitability.	Radulescu et al. (2017); Roy and Das (2018)	Benefit
IM	Interest margin to gross income	This is the ratio of net interest margin to gross income. It helps us understand the proportion of interest income in total income. As this ratio increases, it is interpreted as higher income from interest-earning products and greater sensitivity to interest rates. In this case, the financial institution's interest rate risk may increase, and its financial health may deteriorate.	Ginevičius and Podviezko (2013); Okur et al. (2021)	Benefit
LA	Liquid assets to short-term liabilities	This ratio shows the ability of liquid assets to cover short-term liabilities. A high ratio indicates that the financial institution is resilient to liquidity crises.	Radulescu et al. (2017)	Benefit
NPL	Nonperforming loans to total gross loans	This ratio, which shows the share of non-performing loans in total loans, reflects the asset quality of the financial institution. An increase in this ratio indicates that the asset quality of the financial institution has weakened and its risk has grown.	Doumpos et al. (2016); Okur et al. (2021); Radulescu et al. (2017);	Cost
OFX	Net open position in foreign exchange to capital	This ratio is calculated by scaling the difference between a financial institution's foreign currency denominated assets and liabilities by capital. A low level of this ratio, which measures a financial institution's foreign exchange risk and the extent to which this risk is covered by capital, indicates that the financial institution is more resilient to foreign exchange volatility.	Okur et al. (2021); Seyedi and Abdoli (2019)	Cost

most robust indicator. While profitability and liquidity ratios are other important indicators, management efficiency is relatively weaker when measuring FS.

Radulescu et al. (2017) performed a comparative examination of the European banking system in the aftermath of Brexit, framed within the context of Basel III regulations. Their analysis employed the PROMETHEE II method combined with the entropy method across 28 EU member states. The results indicated that the banking sectors in Central and Eastern Europe demonstrated a remarkable level of efficiency and effectiveness. In contrast, more developed countries, including Germany, Italy, Britain, and France, demonstrated less favorable results.

Roy and Das (2018), analyzed the financial performance of 19 Bangladeshi banks from 2012-2013 using the TOPSIS method. Foreign commercial banks were more successful according to the findings.

Marjanović and Popović (2020) have analyzed banks in Serbia. The study period was 2012-2017 and used CRITIC and TOPSIS models. This study suggests that the influence of liquidity indicators and FSIs on bank performance is steadily growing.

Okur et al. (2021) evaluated the financial stability of 18 countries, specifically focusing on the Fragile 5 group. The TOPSIS method was utilized in this article and, examined the period from 2016 to 2018. The study's findings show that the countries defined as Fragile Five in the relevant period were not among those with poor financial performance. Accordingly, compared to other countries, it is observed that these countries performed better.

Yılmaz (2023) has examined the financial performance of US deposit banks with PARIS-ENTROPY methods from 2018 to 2022 by bank groups. It was determined that the best-performing group of banks in the relevant period were those with assets between $100 million and $1 billion. Using 10 indicators, the study concluded that the assets/equity ratio, which carries the highest weight under the ENTROPI, is the most significant criterion.

As far as we can tell from the literature, there is no research specifically focused on FS performance within the OTS. This enhances the importance of this study.

METHODOLOGY

Data set

In this article, the FSIs have been used for the analysis of the OTS member countries in the period 2018-2022. To this end, eight evaluation criteria have been determined in light of the relevant literature. The countries studied are Kazakhstan, Kyrgyzstan, Uzbekistan, and Türkiye. Azerbaijan, which did not have sufficient data during the relevant period, has been excluded from the analysis.

The data on the variables used in the study are obtained from the Financial Soundness Indicators (FSIs) published by the IMF. Table 2 presents the variables used in the study along with explanations for each variable. Additionally, the reference studies where these variables are used are provided in Table 2.

Methods

MCDM is used to select the best choice between multiple criteria. There are numerous studies in the literature concerning these methods. One of the preliminary steps in applying these methods has been determining the importance weights of the criteria. There are three primary approaches to criterion weighting: equal weighting, subjective weighting, and objective weighting methods. In this research, the significance weights assigned to the criteria were determined using two methodologies: the equal weighting approach and the Criteria Importance through Intercriteria Correlation (CRITIC) method, which is widely acknowledged in academic literature as a premier technique for objective criterion weighting. After the importance weights of the criteria were calculated, Grey Relational Analysis (GRA) and Simple Additive Weighting (SAW) methods were utilized to determine the rankings of financial institutions in the relevant countries. The implementation steps of these methods are presented in Table 3.

Table 3 provides the implementation steps of criterion weighting and performance ranking methods. All analyses conducted on the article have been performed by following the implementation steps of the respective analysis.

EMPIRICIAL FINDINGS

This study has assessed the financial performance of Kazakhstan (A1), Kyrgyzstan (A2), Uzbekistan (A3), and Türkiye (A4) using GRA and SAW methods. Defining the significance weights of the criteria used to evaluate the FS performance of the countries examined serves as the initial. CRITIC and Equal Weighting methods were used for this purpose. Both weighting methods were separately implemented to the data of the four countries for each year from 2018 to 2022. The criteria whose importance weights were determined were analyzed by GRA and SAW methods and financial performance ranking has made among countries for each year. To avoid table pollution, only the implementation results of 2018 are shared in detail. Since the same procedure was followed in other years, only the results for these years are reported. Detailed results for the other years are presented in the appendices at the end of the study. Table 4 presents findings using the CRITIC Method for 2018.

The same procedures were used for 2019, 2020, 2021, and 2022. The final results for all years are displayed in Table 5. The significance weights of the criteria fluctuate annually, as illustrated in Table 5. However, when considering the average values for the relevant period, criteria NPL, IM, and TIER1 are the top three criteria in terms of importance weights.

Performance ranking for the year 2018 is conducted following the steps of the GRA Method as outlined in Table 3, using the importance weights obtained from the CRITIC Method. According to Table 6, the country with the best FS performance in 2018 is Kazakhstan. This is followed by Türkiye, Kyrgyzstan and Uzbekistan.

In Table 7, the GRA method, integrated with the Equal Weighting method, ranks the performance of countries for 2018. The findings reveal that the ranking of countries' performance for 2018 is as follows: Kazakhstan, Turkey, Kyrgyzstan, and Uzbekistan.

In Table 8, the SAW method is integrated with the CRITIC Weighting method for 2018.

In Table 9, the SAW method is integrated with the Equal Weighting method for 2018. In both methods, Kazakhstan is ranked first, with Kyrgyzstan following in last place. In the CRITIC Weighting - SAW method, Uzbekistan ranked second, but in the Equal Weighting - SAW method, it overtook Türkiye, taking the second spot.

Table 10 reports the results of GRA and SAW analyses according to both CRITIC Weighting and Equal Weighting methods. However, similar to some studies utilizing multiple MCDM techniques findings obtained through different methods in this study are consolidated using the Borda Count Method (Akyüz & Aka, 2017; Szymczyk et al., 2023). In this method, an alternative in the best condition among n alternatives is given n-1 points. The

Table 3. Application steps of analysis methods used in the study

CRITIC Method	GRA Method	SAW Method
Step 1: Decision Matrix (DM) $X = \begin{matrix} A_1 \\ A_2 \\ \vdots \\ A_m \end{matrix} \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}$ (1.1) **Step 2:** Normalization of the DM $R_{ij}=\frac{x_{ij}-x_j^{min}}{x_j^{max}-x_j^{min}}$.... j= 1, 2, . . , n (1.2) $R_{ij}=\frac{x_j^{max}-x_{ij}}{x_j^{max}-x_j^{min}}$.... j = 1, 2, . . , n (1.3) Benefit-type criteria are normalized through Equation 1.2, while cost-type criteria are normalized using Equation 1.3. **Step 3:** Formation of the Correlation Coefficient Matrix $P_{jk}=\frac{\sum_{i=1}^{m}(r_{ij}-\bar{r_j}).(r_{ik}-\bar{r_k})}{\sqrt{\sum_{i=1}^{m}(r_{ij}-\bar{r_j})^2.(r_{ik}-\bar{r_k})^2}}$ (1.4) **Step 4:** Computation of Cj Values $C_j=\sigma_j.\sum_{k=1}^{n}(1-p_{jk})$ (1.5) j = 1, 2, . ., n $\sigma_j=\sqrt{\frac{\sum_{i=1}^{m}(r_{ij}-\bar{r_j})^2}{m-1}}$ (1.6) **Step 5:** Computation of Criterion Weights $W_j=\frac{C_j}{\sum_{k=1}^{n}C_j}$ (1.7)	**Step 1:** Decision Matrix (DM) $X = \begin{matrix} A_1 \\ A_2 \\ \vdots \\ A_m \end{matrix} \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}$ (2.1) **Step 2:** Determination of reference values depending on the orientation of the criteria **Step 3:** Normalization of the DM $X_i^*=\frac{x_{ij}-\min x_{ij}}{\max x_{ij}-\min x_{ij}}$ (2.2) $X_i^*=\frac{\max x_{ij}-x_{ij}}{\max x_{ij}-\min x_{ij}}$ (2.3) Benefit-type criteria are normalized using Equation 2.2, while cost-type criteria follow Equation 2.3 for normalization. **Step 4:** Creating the Absolute Value (difference) Matrix $\Delta_{oi}=\left\|x_{ij}-x_{pj}\right\|$ (2.4) (i = 1, ... m and j = 1 ... n) $\Delta=\begin{bmatrix} \Delta_{11} & \Delta_{12} & \cdots & \Delta_{1n} \\ \Delta_{21} & \Delta_{22} & \cdots & \Delta_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \Delta_{m1} & \Delta_{m2} & \cdots & \Delta_{mn} \end{bmatrix}$ **Step 5:** Creating the GRA Coefficient Matrix: $y_{ij}=\frac{\Delta min+n\Delta max}{\Delta_{ij}+n\Delta max}$ (2.5) The parameter denoted by n in the formula is referred to as the weighting coefficient, which must be between 0 and 1. In the literature, this value is commonly assigned as 0.5 $y =$ $\begin{bmatrix} y_{11} & y_{12} & \cdots & y_{1n} \\ y_{21} & y_{22} & \cdots & y_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ y_{m1} & y_{m2} & \cdots & y_{mn} \end{bmatrix}$ **Step 6:** Calculation of GRA Grades $r=\sum_{k=1}^{n}w_k y_{ik}$ (2.6)	**Step 1:** Decision Matrix (DM) $X = \begin{matrix} A_1 \\ A_2 \\ \vdots \\ A_m \end{matrix} \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}$ (3.1) **Step 2:** Normalization of the DM $r_{ij}=\frac{x_{ij}}{\max x_{ij}}$ (3.2) i=1, …, m j= 1, …, n $r_{ij}=\frac{x_{ij}}{\min x_{ij}}$ (3.3) i=1, …, m j= 1, …, n Benefit-type criteria are normalized Equation 3.2, while cost-type criteria follow Equation 3.3. All values must be positive. When there are negative values, formula 3.4 should be followed to make the values positive. $r_{ij}=r_{ij}+\left\|\min r_{ij}\right\|+1$ (3.4) **Step 3:** Calculation of Alternative Preference Values $S_j=\sum_{j=1}^{m}w_j r_{ij}$ (3.5) i= 1,.., m $S_i^{\%}=\frac{S_j}{\sum_{j=1}^{n}S_j}$ (3.6)

second-best alternative takes n-2 points. The alternative in the last position takes 0 points, and these points are then added up to calculate the Borda score. The option with the maximum point is ranked first. The method is formulated as follows;

$$bi = \sum_{k=1}^{n}(M - r_{ik})$$

where r_{ik} represents the rank of alternative i under criterion k, and M indicates the total number of alternatives (Lansdowne & Woodward, 1996: 27).

Table 10 and Graph 1 presents the findings of the Borda Counting Technique. Accordingly, Kazakhstan is the optimal financial stability performance across the years. Türkiye demonstrates the most successful performance in 2022, while in the other years, it ranks second. Uzbekistan holds the third position in 2018 and 2020, second in 2019, and fourth in 2021 and 2022. Meanwhile, Kyrgyzstan ranks fourth in 2018, 2019, and 2020, and third in 2021 and 2022. When the country rankings are evaluated in general, the most financially sound country is Kazakhstan, while the weakest country is Kyrgyzstan. The decline in Uzbekistan's ranking in recent years is significant.

Table 4. Application of the CRITIC Method for 2018

Direction	B	B	B	B	B	B	C	C
Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	16,786	75,056	3,037	21,293	52,680	90,760	7,385	2,518
A2	19,627	54,640	1,612	7,988	64,608	66,927	7,297	3,582
A3	14,291	46,723	2,046	16,187	48,420	41,172	1,279	2,281
A4	13,993	68,345	1,797	13,498	68,888	64,010	3,687	1,522
Min	13,993	46,723	1,612	7,988	48,420	41,172	1,279	1,522
Max	19,627	75,056	3,037	21,293	68,888	90,760	7,385	3,582
Normalized Decision Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	0,496	1,000	1,000	1,000	0,208	1,000	0,000	0,516
A2	1,000	0,279	0,000	0,000	0,791	0,519	0,014	0,000
A3	0,053	0,000	0,305	0,616	0,000	0,000	1,000	0,632
A4	0,000	0,763	0,130	0,414	1,000	0,461	0,606	1,000
Correlation Coefficient Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	1,000	-0,025	-0,070	-0,443	0,182	0,436	-0,824	-0,941
PRO	-0,025	1,000	0,605	0,492	0,267	0,872	-0,545	0,325
ROA	-0,070	0,605	1,000	0,922	-0,600	0,640	-0,304	0,124
ROE	-0,443	0,492	0,922	1,000	-0,665	0,363	0,074	0,444
IM	0,182	0,267	-0,600	-0,665	1,000	0,155	-0,279	0,058
LA	0,436	0,872	0,640	0,363	0,155	1,000	-0,863	-0,170
NPL	-0,824	-0,545	-0,304	0,074	-0,279	-0,863	1,000	0,609
OFX	-0,941	0,325	0,124	0,444	0,058	-0,170	0,609	1,000
$(1-p_{jk})$ Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	0,000	1,025	1,070	1,443	0,818	0,564	1,824	1,941
PRO	1,025	0,000	0,395	0,508	0,733	0,128	1,545	0,675
ROA	1,070	0,395	0,000	0,078	1,600	0,360	1,304	0,876
ROE	1,443	0,508	0,078	0,000	1,665	0,637	0,926	0,556
IM	0,818	0,733	1,600	1,665	0,000	0,845	1,279	0,942
LA	0,564	0,128	0,360	0,637	0,845	0,000	1,863	1,170
NPL	1,824	1,545	1,304	0,926	1,279	1,863	0,000	0,391
OFX	1,941	0,675	0,876	0,556	0,942	1,170	0,391	0,000
σ_j	0,465	0,454	0,445	0,417	0,473	0,409	0,487	0,413
C_j	4,040	2,272	2,532	2,421	3,724	2,277	4,446	2,707
w_j	**0,165**	**0,093**	**0,104**	**0,099**	**0,153**	**0,093**	**0,182**	**0,111**

Note: B: Benefit, C: Cost.

Table 5. Importance weights of FSIs for all years according to CRITIC method

	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
2018	0,165	0,093	0,104	0,099	0,153	0,093	0,182	0,111
2019	0,152	0,094	0,102	0,088	0,193	0,085	0,176	0,110
2020	0,171	0,096	0,101	0,080	0,214	0,088	0,168	0,083
2021	0,161	0,082	0,107	0,094	0,126	0,179	0,155	0,096
2022	0,112	0,077	0,110	0,082	0,115	0,149	0,169	0,187
Average	**0,152**	**0,088**	**0,105**	**0,088**	**0,160**	**0,119**	**0,170**	**0,117**

Table 6. GRA method results for 2018 (CRITIC Weighting)

Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Weights	0,165	0,093	0,104	0,099	0,153	0,093	0,182	0,111	
Direction	B	B	B	B	B	B	C	C	
References	19,627	75,056	3,037	21,293	68,888	90,760	1,279	1,522	
A1	16,786	75,056	3,037	21,293	52,680	90,760	7,385	2,518	
A2	19,627	54,640	1,612	7,988	64,608	66,927	7,297	3,582	
A3	14,291	46,723	2,046	16,187	48,420	41,172	1,279	2,281	
A4	13,993	68,345	1,797	13,498	68,888	64,010	3,687	1,522	
Min	13,993	46,723	1,612	7,988	48,420	41,172	1,279	1,522	
Max	19,627	75,056	3,037	21,293	68,888	90,760	7,385	3,582	
Max-Min	5,634	28,333	1,425	13,305	20,468	49,589	6,107	2,061	
Normalized Decision Matrix									
Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Reference	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	0,496	1,000	1,000	1,000	0,208	1,000	0,000	0,516	
A2	1,000	0,279	0,000	0,000	0,791	0,519	0,014	0,000	
A3	0,053	0,000	0,305	0,616	0,000	0,000	1,000	0,632	
A4	0,000	0,763	0,130	0,414	1,000	0,461	0,606	1,000	
Absolute Value (difference) Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,504	0,000	0,000	0,000	0,792	0,000	1,000	0,484	
A2	0,000	0,721	1,000	1,000	0,209	0,481	0,986	1,000	
A3	0,947	1,000	0,695	0,384	1,000	1,000	0,000	0,368	
A4	1,000	0,237	0,870	0,586	0,000	0,539	0,394	0,000	
Calculation of GRA Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,498	1,000	1,000	1,000	0,387	1,000	0,333	0,508	
A2	1,000	0,410	0,333	0,333	0,705	0,510	0,337	0,333	
A3	0,346	0,333	0,418	0,566	0,333	0,333	1,000	0,576	
A4	0,333	0,679	0,365	0,460	1,000	0,481	0,559	1,000	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,50								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,498	1,000	1,000	1,000	0,387	1,000	0,333	0,508	0,716
A2	1,000	0,410	0,333	0,333	0,705	0,510	0,337	0,333	0,495
A3	0,346	0,333	0,418	0,566	0,333	0,333	1,000	0,576	0,488
A4	0,333	0,679	0,365	0,460	1,000	0,481	0,559	1,000	0,610
Ranking Considering Importance Weights									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
Weights	0,165	0,093	0,104	0,099	0,153	0,093	0,182	0,111	
A1	0,498	1,000	1,000	1,000	0,387	1,000	0,333	0,508	0,648
A2	1,000	0,410	0,333	0,333	0,705	0,510	0,337	0,333	0,524
A3	0,346	0,333	0,418	0,566	0,333	0,333	1,000	0,576	0,515
A4	0,333	0,679	0,365	0,460	1,000	0,481	0,559	1,000	0,612

Note: B: Benefit, C: Cost.

Table 7. GRA method results for 2018 (Equal Weighting)

Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Weights	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	
Direction	B	B	B	B	B	B	C	C	
References	19,627	75,056	3,037	21,293	68,888	90,760	1,279	1,522	
A1	16,786	75,056	3,037	21,293	52,680	90,760	7,385	2,518	
A2	19,627	54,640	1,612	7,988	64,608	66,927	7,297	3,582	
A3	14,291	46,723	2,046	16,187	48,420	41,172	1,279	2,281	
A4	13,993	68,345	1,797	13,498	68,888	64,010	3,687	1,522	
Min	13,993	46,723	1,612	7,988	48,420	41,172	1,279	1,522	
Max	19,627	75,056	3,037	21,293	68,888	90,760	7,385	3,582	
Max-Min	5,634	28,333	1,425	13,305	20,468	49,589	6,107	2,061	
Normalized Decision Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Reference	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	0,496	1,000	1,000	1,000	0,208	1,000	0,000	0,516	
A2	1,000	0,279	0,000	0,000	0,791	0,519	0,014	0,000	
A3	0,053	0,000	0,305	0,616	0,000	0,000	1,000	0,632	
A4	0,000	0,763	0,130	0,414	1,000	0,461	0,606	1,000	
Absolute Value (difference) Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,504	0,000	0,000	0,000	0,792	0,000	1,000	0,484	
A2	0,000	0,721	1,000	1,000	0,209	0,481	0,986	1,000	
A3	0,947	1,000	0,695	0,384	1,000	1,000	0,000	0,368	
A4	1,000	0,237	0,870	0,586	0,000	0,539	0,394	0,000	
Calculation of GRA Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,498	1,000	1,000	1,000	0,387	1,000	0,333	0,508	
A2	1,000	0,410	0,333	0,333	0,705	0,510	0,337	0,333	
A3	0,346	0,333	0,418	0,566	0,333	0,333	1,000	0,576	
A4	0,333	0,679	0,365	0,460	1,000	0,481	0,559	1,000	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,50								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,498	1,000	1,000	1,000	0,387	1,000	0,333	0,508	0.716
A2	1,000	0,410	0,333	0,333	0,705	0,510	0,337	0,333	0,495
A3	0,346	0,333	0,418	0,566	0,333	0,333	1,000	0,576	0,488
A4	0,333	0,679	0,365	0,460	1,000	0,481	0,559	1,000	0,610
Ranking Considering Importance Weights									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
Weights	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	
A1	0,498	1,000	1,000	1,000	0,387	1,000	0,333	0,508	0.716
A2	1,000	0,410	0,333	0,333	0,705	0,510	0,337	0,333	0.495
A3	0,346	0,333	0,418	0,566	0,333	0,333	1,000	0,576	0.488
A4	0,333	0,679	0,365	0,460	1,000	0,481	0,559	1,000	0.610

Note: B: Benefit, C: Cost

Table 8. SAW method results for 2018 (CRITIC Weighting)

Weights	0,165	0,093	0,104	0,099	0,153	0,093	0,182	0,111
Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
Direction	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**
A1	16,786	75,056	3,037	21,293	52,680	90,760	7,385	2,518
A2	19,627	54,640	1,612	7,988	64,609	66,927	7,297	3,582
A3	14,291	46,723	2,046	16,187	48,420	41,172	1,279	2,281
A4	13,993	68,345	1,797	13,498	68,888	64,010	3,687	1,522
Normalized Decision Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	0,855	1,000	1,000	1,000	0,765	1,000	0,173	0,604
A2	1,000	0,727	0,531	0,375	0,938	0,737	0,175	0,425
A3	0,728	0,623	0,674	0,760	0,703	0,454	1,000	0,667
A4	0,713	0,911	0,592	0,634	1,000	0,705	0,347	1,000
Weighting of Normalized Decision Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
Weights	0,165	0,093	0,104	0,099	0,153	0,093	0,182	0,111
A1	0,141	0,093	0,104	0,099	0,117	0,093	0,032	0,067
A2	0,165	0,068	0,055	0,037	0,143	0,069	0,032	0,047
A3	0,120	0,058	0,070	0,075	0,107	0,042	0,182	0,074
A4	0.118	0.085	0.061	0.063	0.153	0.066	0.063	0.111

Si	**Si%**	**Rank**
0,746	0,265	1
0,616	0,219	4
0,729	0,259	2
0,719	0,256	3

Note: B: Benefit, C: Cost

Table 9. SAW method results for 2018 (Equal Weighting)

Weights	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
Direction	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**
A1	16,786	75,056	3,037	21,293	52,680	90,760	7,385	2,518
A2	19,627	54,640	1,612	7,988	64,609	66,927	7,297	3,582
A3	14,291	46,723	2,046	16,187	48,420	41,172	1,279	2,281
A4	13,993	68,345	1,797	13,498	68,888	64,010	3,687	1,522
Normalized Decision Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	0,855	1,000	1,000	1,000	0,765	1,000	0,173	0,604
A2	1,000	0,727	0,531	0,375	0,938	0,737	0,175	0,425
A3	0,728	0,623	0,674	0,760	0,703	0,454	1,000	0,667
A4	0,713	0,911	0,592	0,634	1,000	0,705	0,347	1,000
Weighting of Normalized Decision Matrix								
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	0,107	0,125	0,125	0,125	0,096	0,125	0,022	0,076
A2	0,125	0,091	0,066	0,047	0,117	0,092	0,022	0,053
A3	0,091	0,078	0,084	0,095	0,088	0,057	0,125	0,083
A4	0,089	0,114	0,074	0,079	0,125	0,088	0,043	0,125

Si	**Si%**	**Rank**
0,800	0,280	1
0,614	0,215	4
0,701	0,246	3
0,738	0,259	2

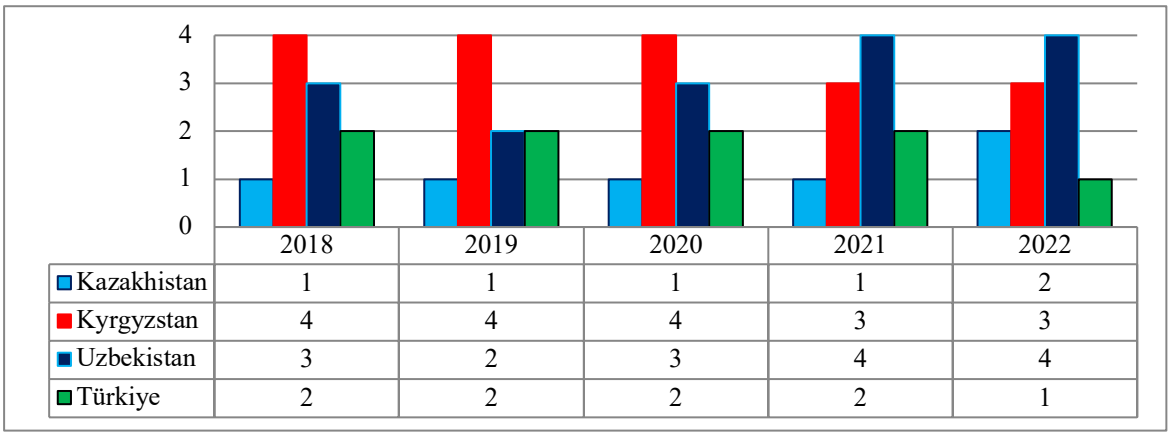
Note: B: Benefit, C: Cost

Table 10. Borda points for the 2018-2022 period

Borda Point According to GRA Method Results										
	2018		2019		2020		2021		2022	
	E.W	C.W	E.W	C.W	E.W	C.W	E.W	C.W	E.W	C.W
A1	3	3	3	3	3	3	3	3	2	2
A2	1	1	0	0	1	1	1	1	1	1
A3	0	0	1	2	0	0	0	0	0	0
A4	2	2	2	1	2	2	2	2	3	3
Borda Point According to SAW Method Results										
	2018		2019		2020		2021		2022	
	E.W	C.W	E.W	C.W	E.W	C.W	E.W	C.W	E.W	C.W
A1	3	3	3	3	3	3	3	3	2	2
A2	0	0	0	0	0	0	1	1	1	1
A3	1	2	1	2	2	2	0	0	0	0
A4	2	1	2	1	1	1	2	2	3	3
	Borda Total Point					Borda Ranking				
	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
A1	12	12	12	12	8	1st	1st	1st	1st	2nd
A2	2	0	2	4	4	4th	4th	4th	3rd	3rd
A3	3	6	4	0	0	3rd	2nd	3rd	4th	4th
A4	7	6	6	8	12	2nd	2nd	2nd	2nd	1st

E.W: Equal Weighting
C.W: Weighting According to CRITIC Method

Graph 1. Financial soundness performance in OTS member countries in the 2018-2022 period



Source: They were prepared by the authors.

EVALUATION OF FINDINGS

This study seeks to conduct a comparative assessment of the FS performance among the countries that are members of the OTS. First, in line with data availability, the four-member countries included in the sample were analyzed by MDCM methods with eight main evaluation criteria. Different weighting and ranking methods in MDCM can lead to varying results. Therefore, the Borda Counting Technique has been used, to integrate the findings and determine the final performance rankings.

According to the findings of the CRITIC Weighting method, the criteria with the highest importance weights are NPL in 2018, IM in 2019 and 2020, LA in 2021, and OFX in 2022. When evaluating the average importance weights of the research criteria over the years, it becomes evident that the criterion with the highest significance is the NPL. Criteria with the lowest importance weight according to equal mean value are PRO and ROE criteria.

When evaluating the FSIs of the countries included in the analysis, Kazakhstan is the most successful country

based on average for PRO, ROA, ROE, LA, and FX. Risk coverage capacity, asset utilization efficiency, and return on equity have increased in Kazakhstan's financial system from 2018 to 2022. IM decreased only in 2020 compared to other years. The decrease in NPL and FX are positive developments for the Kazakhstan financial system. These developments, which enhance the stability of Kazakhstan's financial system, could result in a greater interest from investors in Kazakhstan. Particularly, investments in natural resources, the energy sector, and infrastructure could present opportunities for potential investors. The ability to meet short-term obligations has decreased significantly after 2020. This is one of the most unfavorable aspects of the Kazakhstan financial system based on evaluation criteria. This must be considered for the stability of the financial system. Policymakers' measures to enhance the liquidity of financial institutions could be advantageous for the sustained stability of the financial system. Creating a reserve to guard against potential financial crises can be viewed as a measure to be taken in this context. Liquidity problems may also be regarded as a risk for investors adopting a short-term investment strategy in Kazakhstan. At this stage, a long-term investment strategy may be more suitable. Government bonds and bonds issued by strong private sector companies may be considered alternative investment options. Kazakhstan, which has ranked first in all years except 2022, has ranked second in the performance rankings in 2022. Overall, Kazakhstan's FS performance is better than other OTC countries.

An analysis of FSIs for Türkiye reveals that Türkiye's capacity to cover risks increased during the relevant period. This positive development in the financial system should be supported by policies that strengthen macroeconomic stability, such as disinflation, external debt management, and increasing reserves. The proportion of interest income in total revenues had been increasing until 2022, but there was a partial decrease in 2022 compared to the previous year. This rise in interest income is generally beneficial. However, financial diversification strategies could be promoted to boost non-interest income. Short-term debt repayment capacity has remained almost flat over time but increased significantly in 2022. The decline in both ROA and ROE and the increase in OFX are negative developments in terms of FS. Specifically, the increase in OFX poses a threat to Turkey's financial stability. Investors might choose to diversify their portfolios as a hedge against exchange rate fluctuations. To ensure the sustainability of financial stability, policymakers need to adopt measures to stabilize the FX position. Measures like enhancing foreign exchange reserves and promoting trade in domestic currency can help mitigate foreign exchange risks. Türkiye consistently ranks among the top OTC countries for the soundness of its financial performance across all analyzed years. According to the ranking to performance results, Türkiye is ranked first in 2022 and second in all other years (in 2019, it has the same score as Uzbekistan). In 2022, the ROA, ROE, and LA criteria improved, while the NPL decreased. We believe that the improvement in the criteria has a significant impact on the change in ranking.

Uzbekistan hasn't experienced a significant change in its risk-absorbing capacity from 2018 to 2022. While the ROA experiences a slight increase, the ROE experiences a decrease. IM increased in 2019 and 2020 but fell below the 2018 level in 2022. This volatility in IM increases the sensitivity of financial institutions to interest rates. Financial institutions could use derivatives to hedge against interest rate risk. Furthermore, the decrease in interest income can be balanced by diversifying revenue sources. Investors should formulate sector-specific strategies, considering the decline in ROE and the fluctuations in IM. Non-bank sectors could offer an alternative for investors looking to mitigate interest rate risk. In 2019 and 2020, short-term debt repayment capacity had increased a partial. NPL has increased in all years compared to 2018. This has an adverse effect on financial soundness. Enhanced credit monitoring and evaluation processes, along with stricter supervision of financial institutions, can help decrease non-performing loans. Regulatory actions can be implemented to restructure distressed loans. There has not been a significant change in the net open position. Uzbekistan has ranked third among the OTC states in 2018. In 2019, it moved up to second place with the same score as Türkiye, but couldn't sustain this position and dropped to third place in 2020 and fourth place in 2021 and 2022.

No significant change in risk coverage capacity has been observed in Kyrgyzstan. PRO has increased slightly in the 2018-2022 period. Both profitability indicators have shown significant increases in 2022. IM has significantly decreased in 2022. In response to this development, which could negatively impact interest income, banks should consider diversifying their revenue streams and exploring alternative sources of income. The upward trend in NPL presents a substantial threat to the stability of Kyrgyzstan's financial system. At this stage, measures such as enhancing credit assessment and monitoring processes, as well as strengthening supervisory mechanisms, can be implemented. Measures

like restructuring or removing non-performing loans from the system can be considered. Among the country's rankings, Kyrgyzstan, which ranked fourth in 2018, 2019, and 2020, moved up one place to third place in 2021 and 2022. In 2021 and 2022, there was an improvement in the ROA and ROE profitability indicators, as well as the LA criterion. The decrease in OFX also supports this improvement. We believe that this positive change in the criteria has played a key role in Kyrgyzstan's improved ranking.

CONCLUSION

The analysis findings have significant implications for policymakers and regulatory authorities in the members of the OTS. Member countries should consider increasing their risk coverage capacity and short-term debt repayment capacity, as well as maximizing profit generation potential and interest income. At the same time, efforts should be made to reduce non-performing loans and net short positions in order to enhance FS and prevent potential financial crises. Based on the findings of the CRITIC weighting method and the final performance rankings of the countries, we strongly recommend that the authorities in Uzbekistan and Kyrgyzstan implement regulations to reduce the non-performing loan ratio. Because both countries saw an increase in the NPL ratio during the years under review. This situation jeopardizes the financial health of both countries and negatively impacts their financial performance.

Recently, the OTS countries have concluded joint industrial and trade agreements to facilitate trade. Steps are being taken to establish a special economic zone between member states to promote trade, create a council of central banks, and set up an investment fund to strengthen investment activities. The development of payment systems among member countries and the mutual sharing of knowledge in banking and financial technology will enhance the financial performance of OTS countries and contribute positively to financial stability.

Azerbaijan holds significant status as a member of this organization; however, it could not be included in this analysis due to insufficient data availability. This is one of the basic limitations of the article. In subsequent studies, if observer countries are included as members and data on Azerbaijan are shared within the scope of FSIs by the IMF, the issue can be investigated more comprehensively by including these countries. Additionally, country-specific academic research can be expanded in areas such as the rise in non-performing loans, the decline in interest income, and foreign exchange needs highlighted in the study's findings. The results of new studies could provide valuable insights into identifying the sources of these issues and developing solutions.

REFERENCES

Ahmed, M. F., & Dogarawa, A. B. (2021). Financial soundness indicators and efficiency of listed deposit money banks in Nigeria, Gusau Journal of Accounting and Finance, 2(2), 17-17. https://doi:10.57233/gujaf.v2i2.67

Akyüz, G., & Aka, S. (2017). Çok kriterli karar verme teknikleriyle tedarikçi performansı değerlendirmede toplamsal bir yaklaşım, Journal of Management & Economics Research, 15(2), 28 – 46. https://doi:10.11611/yead.277893

Almahadin, H. A., Kaddumi, T., & Qais, A. K. (2020). Banking soundness-financial stability nexus: Empirical evidence from Jordan, Banks and Bank Systems, 15(3), 218, http://doi:10.21511/bbs.15(3).2020.

Arzova, S. B., & Sahin B. S. (2024). The effect of financial soundness variables on bank performance: A macro-level analysis in MSCI emerging market index countries, Kybernetes, 53(8), 2605-2623, http://doi:10.1108/K-02-2023-0237

BDDK (2024). Türk bankacılık sektörü temel göstergeleri Mart 2024, Retrived from https://www.bddk.org.tr/Veri/EkGetir/8?ekId=243, (Accessed in 10.06.2024).

Bitetto, A., Cerchiello, P., & Mertzanis, C. (2023). Measuring financial soundness around the world: A machine learning approach, International Review of Financial Analysis, 85, 102451, http://doi: 10.1016/j.irfa.2022.102451

Central Bank of the Republıc Of Azerbaijan (2024). Market actors, Retrived from https://www.cbar.az/page-195/market-actors, (Accessed in 07.07.2024).

Central Bank of Uzbekistan (2023). Financial stability report for H1 2023, Retrived from https://cbu.uz/upload/medialibrary/151/2ugv7xjycknyjtb2ex6sbzv3gwe4hcbd/FSR_H1_2023.pdf, (Accessed in 10.07.2024).

Doumpos, M., Zopounidis, C., & Fragiadakis, P. (2016). Assessing the financial performance of European banks under stress testing scenarios: A multicriteria approach, Operational Research, 16, 197-209.

Gaganis, C., Pasiouras, F., & Zopounidis, C. (2006). A multicriteria decision framework for measuring banks' soundness around the world, Journal of Multi-Criteria Decision Analysis, 14(1-3), 103-111, http://doi:10.1002/mcda.405

Geršl, A. & Heřmánek, J. (2007). Financial stability indicators: Advantages and disadvantages of their use in the assessment of financial system stability, CNB Financial Stability Report 2006, Occasional Publications-Chapters in Edited Volumes, Czech National Bank, 69-79.

Ginevičius, R., & Podviezko, A. (2013). The evaluation of financial stability and soundness of Lithuanian banks, Economic Research-Ekonomska Istraživanja, 26(2), 191-208, http://doi:10.1080/1331677X.2013.11517616

Ilgın, K. S. (2024). The effects of IMF financial soundness indicators of Turkish commercial banks on the financial development index, International Journal of Public Finance, 9(1), 105-124, http://doi:10.30927/ijpf.1428422

IMF (2024). Republıc of Kazakhstan Financial System Stability Assessment IMF Country, Report no. 24/48, Retrived from file:///C:/Users/Admin/Downloads/1KAZEA2024003.pdf, (Accessed in 17.01.2024).

Ioannidis, C., Pasiouras, F., & Zopounidis, C. (2010). Assessing bank soundness with classification techniques, Omega, 38(5), 345-357, http://doi:10.1016/j.omega.2009.10.009

Lansdowne, Z. F., & Woodward, B. S. (1996). Applying the borda ranking method, Air Force Journal of Logistics, 20(2), 27-29.

Marjanović, I., & Popović, Ž. (2020). MCDM approach for assessment of financial performance of Serbian banks. A. Horobet, P. Polychronidou and A. Karasavvoglou (eds), Business performance and financial institutions in Europe, Contributions to Economics (71-90), Springer International Publishing, https://doi.org/10.1007/978-3-030-57517-5_5

Masud, M. A. K., & Haq, M. M. (2016). Financial soundness measurement and trend analysis of commercial banks in Bangladesh: An observation of selected banks, European Journal of Business and Social Sciences, 4(10), 159-184.

National Bank of the Kyrgyz Republic (2023). The financial sector stability report of the Kyrgyz Republic, according to the results of the first half of 2023, Retrived from https://www.nbkr.kg/DOC/13032024/000000000062062.pdf, (Accessed in 13.07.2024).

Navajas, M. C., & Thegeya, A. (2013). Financial soundness indicators and banking crises, WP/13/263, International Monetary Fund.

Noman, A. H. M., & Isa, C. R. (2021). Financial soundness and macroprudential regulation of banks in ASEAN-5

countries. W. L. Filho (ed.), Reduced inequalities (241-253), Springer International Publishing, doi:10.1007/978-3-319-95882-8_8.

Okur, M., Köse, A., & Akpınar, Ö. (2021). The soundness of financial institutions in the fragile five countries, International Journal of Business Research and Management (IJBRM), 12(3), 89-102, http://www.cscjournals.org/journals/IJBRM/description.php

Ouma, M. O., & Kirori, G. N. (2019). Evaluating the financial soundness of small and medium-sized commercial banks in Kenya: An application of the bankometer model, International Journal of Economics and Finance, 11(6), 93-100, http://doi:10.5539/ijef.v11n6p93

Organization of Turkic States (2024a). History of organization, Retrived from https://www.turkicstates.org/en/organizasyon-tarihcesi, (Accessed in 21.06.2024).

Organization of Turkic States (2024b). Member states, Retrived from https://www.turkicstates.org/tr/uye-ulkeler, (Accessed in 21.06.2024).

Ozer, A., Unal, S., & Çömlekçi, İ. (2024). Küresel finansal stresin Türk devletlerinin ekonomileri üzerindeki etkisi, Selçuk Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi, 27(1), 18-30, http://doi:10.29249/selcuksbmyd.1319691

Radulescu, M., Fedajev, A., & Nikolic, D. (2017). Ranking of EU national banking systems using multi-criteria analysis in the light of Brexit, Acta Oeconomica, 67(4), 473-509, http://doi:10.1556/032.2017.67.4.1

Rahman, Z. (2017). Financial soundness evaluation of selected commercial banks in Bangladesh: An application of bankometer model, Research Journal of Finance and Accounting, 8(2), 63-70.

Roy, S., & Das, A. (2018). Application of TOPSIS method for financial performance evaluation: A study of selected scheduled banks in Bangladesh, Journal of Commerce and Accounting Research, 7(1), 24-29.

Salina, A. P., Zhang, X., & Hassan, O. A. (2021). An assessment of the financial soundness of the Kazakh banks, Asian Journal of Accounting Research, 6(1), 23-37, http://doi:10.1108/AJAR-03-2019-0022

San Jose, A., & Georgiou, A. (2008). Financial soundness indicators (FSIs): framework and implementation, IFC Bulletin, 31, 277-282.

Seyedi, S. A., & Abdoli, M. R. (2019). Modeling and rating financial soundness indicators of commercial banks using confirmatory factor analysis and TOPSIS method, Iranian Journal of Finance, 3(3), 107-136, http://doi:10.22034/ijf.2020.182468.1068

Sjauš, B. T., & Žaja, M. M. (2022, June). Analysis of the covid-19 pandemic impact on the financial soundness indicators of financial institutions: case of the republic of Croatia, Proceedings of FEB Zagreb International Odyssey Conference on Economics and Business (Vol. 4, No.1, pp. 658-670), University of Zagreb, Faculty of Economics and Business.

Sugiyarto, G. (2015). Financial soundness indicators for financial sector stability: A tale of three Asian countries, Asian Development Bank, Retrived from https://www.adb.org/sites/default/files/publication/173687/fsi-3-asian-countries.pdf, (Accessed in 30.06.2024).

Sundararajan, V., Enoch, C., San Jose, A., Hilbers, P., Krueger, R., Moretti, M., & Slack, G. (2002). Financial soundness indicators: analytical aspects and country practices, 212, Washington, DC: International Monetary Fund.

Suresh, N., Ligori, A., Khan, S., & Khan, S. A. (2019). Comparative financial performance and financial soundness of banks in Bhutan: Application of dupont and bankometer models, International Journal of Psychosocial Rehabilitation, 23(1), 441-448.

Szymczyk, K., Bağcı, H., Kaygın, C., & Şahin, D. (2023). A comparison of the entrepreneurial performance of Asian-oceanian countries via the multi-criteria decision-making techniques of critic, aras, waspas, mairca and borda count methods, Acta Polytechnica Hungarica, 20(3), 2023, 65-81, http://doi: 10.12700/aph.20.3.2023.3.5

World Bank (2023). Kazakhstan: Strengthening public finance for inclusive and resilient growth, Public Finance Review June 2023, Retrived from https://documents1.worldbank.org/curated/en/099713202282422335/pdf/IDU15c61946a1a153142771b1ff1d0f0745dcae7.pdf?_gl=1*1b5f1xf*_gcl_au*MzI5MTAwMTc1LjE3MjM4MTU0MzU, (Accessed in 05.07.2024).

World Bank (2024). DataBank World Development Indicators, Retrived from https://databank.worldbank.org/, (Accessed in 28.07.2024).

Yılmaz, N. (2023). Financial performance of the US deposit banks: The entropy based Paris method. C. Karaca and M. F. Buğan (eds), Finansal Piyasaların Evrimi-II (19-31), Özgür Yayın Dağıtım.

Appendix 1. Application of the CRITIC Method for 2019

Directions	B	B	B	B	B	B	C	C
Alternatives/ Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	19,108	75,056	3,037	21,293	52,680	95,866	8,143	1,649
A2	19,971	56,911	1,436	6,642	66,867	63,958	7,731	5,105
A3	20,368	56,651	2,126	13,046	50,715	40,322	1,479	11,280
A4	15,341	65,143	1,442	10,827	66,058	64,799	5,023	-0,997
Min	15,341	56,651	1,436	6,642	50,715	40,322	1,479	-0,997
Max	20,368	75,056	3,037	21,293	66,867	95,866	8,143	11,280
Normalized Decision Matrix								
Alternatives/ Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	0,749	1,000	1,000	1,000	0,122	1,000	0,000	0,784
A2	0,921	0,014	0,000	0,000	1,000	0,426	0,062	0,503
A3	1,000	0,000	0,431	0,437	0,000	0,000	1,000	0,000
A4	0,000	0,461	0,004	0,286	0,950	0,441	0,468	1,000
Correlation Coefficient Matrix								
Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	1,000	-0,344	0,343	0,063	-0,510	-0,186	0,056	-0,803
PRO	-0,344	1,000	0,705	0,833	-0,253	0,897	-0,532	0,668
ROA	0,343	0,705	1,000	0,958	-0,821	0,571	-0,178	-0,052
ROE	0,063	0,833	0,958	1,000	-0,746	0,623	-0,152	0,156
IM	-0,510	-0,253	-0,821	-0,746	1,000	-0,001	-0,390	0,529
LA	-0,186	0,897	0,571	0,623	-0,001	1,000	-0,848	0,700
NPL	0,056	-0,532	-0,177	-0,152	-0,390	-0,848	1,000	-0,629
OFX	-0,803	0,668	-0,052	0,156	0,529	0,700	-0,629	1,000
$(1-p_{jk})$ Matrix								
Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	0,000	1,344	0,657	0,937	1,510	1,186	0,944	1,803
PRO	1,344	0,000	0,295	0,167	1,253	0,103	1,532	0,332
ROA	0,657	0,295	0,000	0,042	1,821	0,429	1,178	1,052
ROE	0,937	0,167	0,042	0,000	1,746	0,378	1,152	0,844
IM	1,510	1,253	1,821	1,746	0,000	1,001	1,390	0,471
LA	1,186	0,103	0,429	0,378	1,001	0,000	1,848	0,301
NPL	0,944	1,532	1,178	1,152	1,390	1,848	0,000	1,629
OFX	1,803	0,332	1,052	0,844	0,471	0,301	1,629	0,000
σ_j	0,457	0,472	0,473	0,421	0,531	0,410	0,461	0,432
C_j	3,831	2,373	2,589	2,215	4,876	2,151	4,459	2,779
w_j	**0,152**	**0,094**	**0,102**	**0,088**	**0,193**	**0,085**	**0,176**	**0,110**

Note: B; Benefit, C; Cost

Appendix 2. GRA method results for 2019 (CRITIC Weighting)

Directions	B	B	B	B	B	B	C	C	
Weights	0,152	0,094	0,102	0,088	0,193	0,085	0,176	0,110	
Alternatives/Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	19,108	75,056	3,037	21,293	52,680	95,866	8,143	1,649	
A2	19,971	56,911	1,436	6,642	66,867	63,958	7,731	5,105	
A3	20,368	56,651	2,126	13,046	50,715	40,322	1,479	11,280	
A4	15,341	65,143	1,442	10,827	66,058	64,799	5,023	-0,997	
Min.	15,341	56,651	1,436	6,642	50,715	40,322	1,479	-0,997	
Max.	20,368	75,056	3,037	21,293	66,867	95,866	8,143	11,280	
Max. - Min	5,027	18,405	1,601	14,651	16,153	55,544	6,664	12,277	
Normalized Decision Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Reference	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	0,749	1,000	1,000	1,000	0.1217	1,000	0,000	0,784	
A2	0,921	0,014	0,000	0,000	1,000	0,426	0,062	0,503	
A3	1,000	0,000	0,431	0,437	0,000	0,000	1,000	0,000	
A4	0,000	0,461	0,004	0,286	0,950	0,441	0,468	1,000	
Absolute Value (difference) Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,251	0,000	0,000	0,000	0,878	0,000	1,000	0,216	
A2	0,079	0,986	1,000	1,000	0,000	0,575	0,938	0,497	
A3	0,000	1,000	0,569	0,563	1,000	1,000	0,000	1,000	
A4	1,000	0,539	0,996	0,714	0,050	0,559	0,532	0,000	
Calculation of GRA Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,666	1,000	1,000	1,000	0,363	1,000	0,333	0,699	
A2	0,864	0,337	0,333	0,333	1,000	0,465	0,348	0,502	
A3	1,000	0,333	0,468	0,470	0,333	0,333	1,000	0,333	
A4	0,333	0,481	0,334	0,412	0,909	0,472	0,485	1,000	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,500								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,666	1,000	1,000	1,000	0,363	1,000	0,333	0,699	0,758
A2	0,864	0,337	0,333	0,333	1,000	0,465	0,348	0,502	0,523
A3	1,000	0,333	0,468	0,470	0,333	0,333	1,000	0,333	0,534
A4	0,333	0,481	0,334	0,412	0,909	0,472	0,485	1,000	0,553
Ranking Considering Importance Weights									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,666	1,000	1,000	1,000	0,363	1,000	0,333	0,699	0,676
A2	0,864	0,337	0,333	0,333	1,000	0,465	0,348	0,502	0,575
A3	1,000	0,333	0,468	0,470	0,333	0,333	1,000	0,333	0,578
A4	0,333	0,481	0,334	0,412	0,909	0,472	0,485	1,000	0,577

Appendix 3. GRA method results for 2019 (Equal Weighting)

Directions	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125	
Alternatives / Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**	
A1	19,108	75,056	3,037	21,293	52,680	95,866	8,143	1,649	
A2	19,971	56,911	1,436	6,642	66,867	63,958	7,731	5,105	
A3	20,368	56,651	2,126	13,046	50,715	40,322	1,479	11,280	
A4	15,341	65,143	1,442	10,827	66,058	64,799	5,023	-0,997	
Min.	15,341	56,651	1,436	6,642	50,715	40,322	1,479	-0,997	
Max.	20,368	75,056	3,037	21,293	66,867	95,866	8,143	11,280	
Max. - Min	5,027	18,405	1,601	14,651	16,153	55,544	6,664	12,277	
Normalized Decision Matrix									
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**	
Reference	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	0,749	1,000	1,000	1,000	0.1217	1,000	0,000	0,784	
A2	0,921	0,014	0,000	0,000	1,000	0,426	0,062	0,503	
A3	1,000	0,000	0,431	0,437	0,000	0,000	1,000	0,000	
A4	0,000	0,461	0,004	0,286	0,950	0,441	0,468	1,000	
Absolute Value (difference) Matrix									
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**	
A1	0,251	0,000	0,000	0,000	0,878	0,000	1,000	0,216	
A2	0,079	0,986	1,000	1,000	0,000	0,575	0,938	0,497	
A3	0,000	1,000	0,569	0,563	1,000	1,000	0,000	1,000	
A4	1,000	0,539	0,996	0,714	0,050	0,559	0,532	0,000	
Calculation of GRA Coefficients									
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**	
A1	0,666	1,000	1,000	1,000	0,363	1,000	0,333	0,699	
A2	0,864	0,337	0,333	0,333	1,000	0,465	0,348	0,502	
A3	1,000	0,333	0,468	0,470	0,333	0,333	1,000	0,333	
A4	0,333	0,481	0,334	0,412	0,909	0,472	0,485	1,000	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,500								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**	R_{oi}
A1	0,666	1,000	1,000	1,000	0,363	1,000	0,333	0,699	0,758
A2	0,864	0,337	0,333	0,333	1,000	0,465	0,348	0,502	0,523
A3	1,000	0,333	0,468	0,470	0,333	0,333	1,000	0,333	0,534
A4	0,333	0,481	0,334	0,412	0,909	0,472	0,485	1,000	0,553
Ranking Considering Importance Weights									
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**	R_{oi}
A1	0,666	1,000	1,000	1,000	0,363	1,000	0,333	0,699	0,758
A2	0,864	0,337	0,333	0,333	1,000	0,465	0,348	0,502	0,523
A3	1,000	0,333	0,468	0,470	0,333	0,333	1,000	0,333	0,534
A4	0,333	0,481	0,334	0,412	0,909	0,472	0,485	1,000	0,553

Appendix 4. SAW method results for 2019 (CRITIC Weighting)

Directions	Max	Max	Max	Max	Max	Max	Min	Min
Weights	0,152	0,094	0,102	0,088	0,193	0,085	0,176	0,110
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	19,108	75,056	3,037	21,293	52,680	95,866	8,143	1,649
A2	19,971	56,911	1,436	6,642	66,867	63,958	7,731	5,105
A3	20,368	56,651	2,126	13,046	50,715	40,322	1,479	11,280
A4	15,341	65,143	1,442	10,827	66,058	64,799	5,023	-0,997
Normalized Decision Matrix								
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	0,938	1,000	1,000	1,000	0,788	1,000	0,182	0,274
A2	0,981	0,758	0,473	0,312	1,000	0,667	0,191	0,141
A3	1,000	0,755	0,700	0,613	0,758	0,421	1,000	0,075
A4	0,753	0,868	0,475	0,508	0,988	0,676	0,294	1,000
Weighting of Normalized Decision Matrix								
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	0,142	0,094	0,102	0,088	0,152	0,085	0,032	0,030
A2	0,149	0,071	0,048	0,027	0,193	0,057	0,034	0,015
A3	0,152	0,071	0,072	0,054	0,146	0,036	0,176	0,008
A4	0,114	0,081	0,049	0,045	0,191	0,058	0,052	0,110

Si	Si%	Rank
0,725	0,265	1
0,595	0,217	4
0,715	0,261	2
0,699	0,256	3

Appendix 5. SAW method results for 2019 (Equal Weighting)

Weighting of Normalized Decision Matrix								
Directions	Max	Max	Max	Max	Max	Max	Min	Min
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125
Alternatives /Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	0,117	0,125	0,125	0,125	0,098	0,125	0,023	0,034
A2	0,123	0,095	0,059	0,039	0,125	0,083	0,024	0,018
A3	0,125	0,094	0,087	0,077	0,095	0,053	0,125	0,009
A4	0,094	0,108	0,059	0,064	0,123	0,084	0,037	0,125

Si	Si%	Rank
0,773	0,286	1
0,565	0,209	4
0,665	0,247	3
0,695	0,258	2

Note: In the analyses performed using the Critic Weighting and Equal Weighting methods within the SAW model, the results diverge solely in the 'Weighting of Normalized Decision Matrix' step. To prevent redundancy, repeated results have not been included in Appendix 5, as they are already presented in Appendix 4.

Appendix 6. Application of the CRITIC Method for 2020

Directions	B	B	B	B	B	B	C	C
Alternatives/ Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	21,288	77,699	3,061	19,277	45,529	103,636	6,868	0,316
A2	21,650	59,149	0,995	4,607	65,483	64,866	10,094	2,805
A3	15,196	63,728	2,189	10,202	54,346	39,856	2,061	4,038
A4	15,676	74,937	1,414	10,758	71,941	58,521	3,890	2,664
Min	15,196	59,149	0,995	4,607	45,529	39,856	2,061	0,316
Max	21,650	77,699	3,061	19,277	71,941	103,636	10,094	4,038
Normalized Decision Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	0,944	1,000	1,000	1,000	0,000	1,000	0,402	1,000
A2	1,000	0,000	0,000	0,000	0,756	0,392	0,000	0,332
A3	0,000	0,247	0,578	0,381	0,334	0,000	1,000	0,000
A4	0,074	0,851	0,202	0,419	1,000	0,293	0,772	0,369
Correlation Coefficient Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	1,000	-0,066	0,085	0,099	-0,312	0,744	-0,928	0,656
PRO	-0,066	1,000	0,603	0,857	-0,255	0,607	0,263	0,705
ROA	0,085	0,603	1,000	0,924	-0,911	0,557	0,290	0,576
ROE	0,099	0,857	0,924	1,000	-0,717	0,700	0,236	0,753
IM	-0,312	-0,255	-0,911	-0,717	1,000	-0,520	-0,050	-0,483
LA	0,744	0,607	0,557	0,700	-0,520	1,000	-0,521	0,991
NPL	-0,928	0,263	0,290	0,236	-0,050	-0,521	1,000	-0,433
OFX	0,656	0,705	0,576	0,753	-0,483	0,991	-0,433	1,000
$(1-p_{jk})$ Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	0,000	1,066	0,915	0,901	1,312	0,256	1,928	0,344
PRO	1,066	0,000	0,397	0,144	1,255	0,393	0,737	0,295
ROA	0,915	0,397	0,000	0,076	1,911	0,443	0,710	0,424
ROE	0,901	0,144	0,076	0,000	1,717	0,300	0,764	0,247
IM	1,312	1,255	1,911	1,717	0,000	1,520	1,050	1,483
LA	0,256	0,393	0,443	0,300	1,520	0,000	1,521	0,009
NPL	1,928	0,737	0,710	0,764	1,050	1,521	0,000	1,433
OFX	0,344	0,295	0,424	0,247	1,483	0,009	1,433	0,000
σ_j	0,541	0,478	0,441	0,413	0,444	0,420	0,438	0,418
C_j	3,636	2,048	2,149	1,711	4,549	1,867	3,569	1,768
w_j	**0,171**	**0,096**	**0,101**	**0,080**	**0,214**	**0,088**	**0,168**	**0,083**

Note: B: Benefit, C: Cost

Appendix 7. GRA method results for 2020 (CRITIC Weighting)

Directions	B	B	B	B	B	B	C	C	
Weights	0,171	0,096	0,101	0,080	0,214	0,088	0,168	0,083	
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	21,288	77,699	3,061	19,277	45,529	103,636	6,868	0,316	
A2	21,650	59,149	0,995	4,607	65,483	64,866	10,094	2,805	
A3	15,196	63,728	2,189	10,202	54,346	39,856	2,061	4,038	
A4	15,676	74,937	1,414	10,758	71,941	58,521	3,890	2,664	
Min.	15,196	59,149	0,995	4,607	45,529	39,856	2,061	0,316	
Max.	21,650	77,699	3,061	19,277	71,941	103,636	10,094	4,038	
Max. - Min	6,453	18,550	2,066	14,669	26,412	63,780	8,033	3,722	
Normalized Decision Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Reference	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	0,944	1,000	1,000	1,000	0,000	1,000	0,402	1,000	
A2	1,000	0,000	0,000	0,000	0,756	0,392	0,000	0,332	
A3	0,000	0,247	0,578	0,381	0,334	0,000	1,000	0,000	
A4	0,074	0,851	0,202	0,419	1,000	0,293	0,772	0,369	
Absolute Value (difference) Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,056	0,000	0,000	0,000	1,000	0,000	0,599	0,000	
A2	0,000	1,000	1,000	1,000	0,245	0,608	1,000	0,669	
A3	1,000	0,753	0,422	0,619	0,666	1,000	0,000	1,000	
A4	0,926	0,149	0,798	0,581	0,000	0,707	0,228	0,631	
Calculation of GRA Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,899	1,000	1,000	1,000	0,333	1,000	0,455	1,000	
A2	1,000	0,333	0,333	0,333	0,672	0,451	0,333	0,428	
A3	0,333	0,399	0,542	0,447	0,429	0,333	1,000	0,333	
A4	0,351	0,771	0,385	0,463	1,000	0,414	0,687	0,442	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,500								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,899	1,000	1,000	1,000	0,333	1,000	0,455	1,000	0,836
A2	1,000	0,333	0,333	0,333	0,672	0,451	0,333	0,428	0,486
A3	0,333	0,399	0,542	0,447	0,429	0,333	1,000	0,333	0,477
A4	0,351	0,771	0,385	0,463	1,000	0,414	0,687	0,442	0,564
Ranking Considering Importance Weights									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,899	1,000	1,000	1,000	0,333	1,000	0,455	1,000	0,749
A2	1,000	0,333	0,333	0,333	0,672	0,451	0,333	0,428	0,538
A3	0,333	0,399	0,542	0,447	0,429	0,333	1,000	0,333	0,502
A4	0,351	0,771	0,385	0,463	1,000	0,414	0,687	0,442	0,611

Appendix 8. GRA method results for 2020 (Equal Weighting)

Directions	B	B	B	B	B	B	C	C	
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125	
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	21,288	77,699	3,061	19,277	45,529	103,636	6,868	0,316	
A2	21,650	59,149	0,995	4,607	65,483	64,866	10,094	2,805	
A3	15,196	63,728	2,189	10,202	54,346	39,856	2,061	4,038	
A4	15,676	74,937	1,414	10,758	71,941	58,521	3,890	2,664	
Min.	15,196	59,149	0,995	4,607	45,529	39,856	2,061	0,316	
Max.	21,650	77,699	3,061	19,277	71,941	103,636	10,094	4,038	
Max. - Min	6,453	18,550	2,066	14,669	26,412	63,780	8,033	3,722	
Normalized Decision Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
References	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	0,944	1,000	1,000	1,000	0,000	1,000	0,402	1,000	
A2	1,000	0,000	0,000	0,000	0,756	0,392	0,000	0,332	
A3	0,000	0,247	0,578	0,381	0,334	0,000	1,000	0,000	
A4	0,074	0,851	0,202	0,419	1,000	0,293	0,772	0,369	
Absolute Value (difference) Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,056	0,000	0,000	0,000	1,000	0,000	0,599	0,000	
A2	0,000	1,000	1,000	1,000	0,245	0,608	1,000	0,669	
A3	1,000	0,753	0,422	0,619	0,666	1,000	0,000	1,000	
A4	0,926	0,149	0,798	0,581	0,000	0,707	0,228	0,631	
Calculation of GRA Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,899	1,000	1,000	1,000	0,333	1,000	0,455	1,000	
A2	1,000	0,333	0,333	0,333	0,672	0,451	0,333	0,428	
A3	0,333	0,399	0,542	0,447	0,429	0,333	1,000	0,333	
A4	0,351	0,771	0,385	0,463	1,000	0,414	0,687	0,442	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,500								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,899	1,000	1,000	1,000	0,333	1,000	0,455	1,000	0,836
A2	1,000	0,333	0,333	0,333	0,672	0,451	0,333	0,428	0,486
A3	0,333	0,399	0,542	0,447	0,429	0,333	1,000	0,333	0,477
A4	0,351	0,771	0,385	0,463	1,000	0,414	0,687	0,442	0,564
Ranking Considering Importance Weights									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,899	1,000	1,000	1,000	0,333	1,000	0,455	1,000	0,836
A2	1,000	0,333	0,333	0,333	0,672	0,451	0,333	0,428	0,486
A3	0,333	0,399	0,542	0,447	0,429	0,333	1,000	0,333	0,477
A4	0,351	0,771	0,385	0,463	1,000	0,414	0,687	0,442	0,564

Appendix 9. SAW method results for 2020 (CRITIC Weighting)

Directions	Max	Max	Max	Max	Max	Max	Min	Min
Weights	0,171	0,096	0,101	0,080	0,214	0,088	0,168	0,083
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	21,288	77,699	3,061	19,277	45,529	103,636	6,868	0,316
A2	21,650	59,149	0,995	4,607	65,483	64,866	10,094	2,805
A3	15,196	63,728	2,189	10,202	54,346	39,856	2,061	4,038
A4	15,676	74,937	1,414	10,758	71,941	58,521	3,890	2,664
Normalized Decision Matrix								
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	0,983	1,000	1,000	1,000	0,633	1,000	0,300	1,000
A2	1,000	0,761	0,325	0,239	0,910	0,626	0,204	0,113
A3	0,702	0,820	0,715	0,529	0,755	0,385	1,000	0,078
A4	0,724	0,964	0,462	0,558	1,000	0,564	0,527	0,119
Weighting of Normalized Decision Matrix								
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	0,168	0,096	0,101	0,080	0,135	0,088	0,050	0,083
A2	0,171	0,073	0,033	0,019	0,194	0,055	0,034	0,009
A3	0,120	0,079	0,072	0,043	0,161	0,034	0,168	0,007
A4	0,124	0,093	0,047	0,045	0,214	0,049	0,089	0,010
Si	Si%	Rank						
0,801	0,292	1						
0,589	0,215	4						
0,683	0,249	2						
0,670	0,244	3						

Appendix 10. SAW method results for 2020 (Equal Weighting)

Weighting of Normalized Decision Matrix								
Directions	Max	Max	Max	Max	Max	Max	Min	Min
Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125
A1	0,123	0,125	0,125	0,125	0,079	0,125	0,038	0,125
A2	0,125	0,095	0,041	0,030	0,114	0,078	0,026	0,014
A3	0,088	0,103	0,089	0,066	0,094	0,048	0,125	0,010
A4	0,091	0,121	0,058	0,070	0,125	0,071	0,066	0,015
Si	Si%	Rank						
0,865	0,329	1						
0,522	0,199	4						
0,623	0,237	2						
0,615	0,234	3						

Note: In the analyses performed using the Critic Weighting and Equal Weighting methods within the SAW model, the results diverge solely in the 'Weighting of Normalized Decision Matrix' step. To prevent redundancy, repeated results have not been included in Appendix 10, as they are already presented in Appendix 9.

Appendix 11. Application of the CRITIC Method for 2021

Directions	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**
Alternatives/ Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	19,300	75,614	4,229	30,646	57,694	50,526	3,318	2,026
A2	19,188	63,389	1,276	6,458	63,222	71,272	10,819	5,188
A3	14,616	45,881	1,346	6,103	49,032	46,916	5,130	6,034
A4	14,999	79,520	1,665	13,337	65,643	84,647	2,976	5,461
Min	14,616	45,881	1,276	6,103	49,032	46,916	2,976	2,026
Max	19,300	79,520	4,229	30,646	65,643	84,647	10,819	6,034
Normalized Decision Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	1,000	0,884	1,000	1,000	0,522	0,096	0,956	1,000
A2	0,976	0,521	0,000	0,015	0,854	0,646	0,000	0,211
A3	0,000	0,000	0,024	0,000	0,000	0,000	0,725	0,000
A4	0,082	1,000	0,132	0,295	1,000	1,000	1,000	0,143
Correlation Coefficient Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	1,000	0,320	0,530	0,474	0,295	-0,114	-0,449	0,705
PRO	0,320	1,000	0,498	0,631	0,798	0,587	0,374	0,532
ROA	0,530	0,498	1,000	0,984	-0,052	-0,408	0,499	0,974
ROE	0,474	0,631	0,984	1,000	0,082	-0,257	0,574	0,953
IM	0,295	0,798	-0,052	0,082	1,000	0,903	-0,153	0,068
LA	-0,114	0,587	-0,408	-0,257	0,903	1,000	-0,116	-0,337
NPL	-0,449	0,374	0,499	0,574	-0,153	-0,116	1,000	0,307
OFX	0,705	0,532	0,974	0,953	0,068	-0,337	0,307	1,000
$(1-p_{jk})$ Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	0,000	0,680	0,470	0,526	0,706	1,114	1,449	0,295
PRO	0,680	0,000	0,502	0,369	0,203	0,413	0,626	0,468
ROA	0,470	0,502	0,000	0,016	1,052	1,408	0,501	0,026
ROE	0,526	0,369	0,016	0,000	0,918	1,257	0,426	0,048
IM	0,706	0,203	1,052	0,918	0,000	0,097	1,153	0,932
LA	1,114	0,413	1,408	1,257	0,097	0,000	1,116	1,337
NPL	1,449	0,626	0,501	0,426	1,153	1,116	0,000	0,693
OFX	0,295	0,468	0,026	0,048	0,932	1,337	0,693	0,000
σ_j	0,548	0,450	0,478	0,469	0,444	0,472	0,463	0,450
C_j	2,871	1,466	1,898	1,668	2,245	3,180	2,761	1,708
w_j	**0,161**	**0,082**	**0,107**	**0,094**	**0,126**	**0,179**	**0,155**	**0,096**

Note: B: Benefit, C: Cost

Appendix 12. GRA method results for 2021 (CRITIC Weighting)

Directions	B	B	B	B	B	B	C	C	
Weights	0,161	0,082	0,107	0,094	0,126	0,179	0,155	0,096	
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	19,300	75,614	4,229	30,646	57,694	50,526	3,318	2,026	
A2	19,188	63,389	1,276	6,458	63,222	71,272	10,819	5,188	
A3	14,616	45,881	1,346	6,103	49,032	46,916	5,130	6,034	
A4	14,999	79,520	1,665	13,337	65,643	84,647	2,976	5,461	
Min.	14,616	45,881	1,276	6,103	49,032	46,916	2,976	2,026	
Max.	19,300	79,520	4,229	30,646	65,643	84,647	10,819	6,034	
Max. - Min	4,685	33,639	2,953	24,543	16,611	37,731	7,843	4,008	
Normalized Decision Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Reference	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	1,000	0,884	1,000	1,000	0,522	0,096	0,956	1,000	
A2	0,976	0,521	0,000	0,015	0,854	0,646	0,000	0,211	
A3	0,000	0,000	0,024	0,000	0,000	0,000	0,725	0,000	
A4	0,082	1,000	0,132	0,295	1,000	1,000	1,000	0,143	
Absolute Value (difference) Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,000	0,116	0,000	0,000	0,479	0,904	0,044	0,000	
A2	0,024	0,480	1,000	0,986	0,146	0,355	1,000	0,789	
A3	1,000	1,000	0,976	1,000	1,000	1,000	0,275	1,000	
A4	0,918	0,000	0,868	0,705	0,000	0,000	0,000	0,857	
Calculation of GRA Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	1,000	0,812	1,000	1,000	0,511	0,356	0,920	1,000	
A2	0,954	0,510	0,333	0,337	0,774	0,585	0,333	0,388	
A3	0,333	0,333	0,339	0,333	0,333	0,333	0,645	0,333	
A4	0.3525	1,000	0,365	0,415	1,000	1,000	1,000	0,369	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,500								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	1,000	0,812	1,000	1,000	0,511	0,356	0,920	1,000	0,825
A2	0,954	0,510	0,333	0,337	0,774	0,585	0,333	0,388	0,527
A3	0,333	0,333	0,339	0,333	0,333	0,333	0,645	0,333	0,373
A4	0.3525	1,000	0,365	0,415	1,000	1,000	1,000	0,369	0,688
Ranking Considering Importance Weights									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	1,000	0,812	1,000	1,000	0,511	0,356	0,920	1,000	0,795
A2	0,954	0,510	0,333	0,337	0,774	0,585	0,333	0,388	0,554
A3	0,333	0,333	0,339	0,333	0,333	0,333	0,645	0,333	0,382
A4	0.3525	1,000	0,365	0,415	1,000	1,000	1,000	0,369	0,712

Appendix 13. GRA method results for 2021 (Equal Weighting)

Directions	B	B	B	B	B	B	C	C	
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125	
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	19,300	75,614	4,229	30,646	57,694	50,526	3,318	2,026	
A2	19,188	63,389	1,276	6,458	63,222	71,272	10,819	5,188	
A3	14,616	45,881	1,346	6,103	49,032	46,916	5,130	6,034	
A4	14,999	79,520	1,665	13,337	65,643	84,647	2,976	5,461	
Min.	14,616	45,881	1,276	6,103	49,032	46,916	2,976	2,026	
Max.	19,300	79,520	4,229	30,646	65,643	84,647	10,819	6,034	
Max. - Min	4,685	33,639	2,953	24,543	16,611	37,731	7,843	4,008	
Normalized Decision Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Reference	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	1,000	0,884	1,000	1,000	0,522	0,096	0,956	1,000	
A2	0,976	0,521	0,000	0,015	0,854	0,646	0,000	0,211	
A3	0,000	0,000	0,024	0,000	0,000	0,000	0,725	0,000	
A4	0,082	1,000	0,132	0,295	1,000	1,000	1,000	0,143	
Absolute Value (difference) Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,000	0,116	0,000	0,000	0,479	0,904	0,044	0,000	
A2	0,024	0,480	1,000	0,986	0,146	0,355	1,000	0,789	
A3	1,000	1,000	0,976	1,000	1,000	1,000	0,275	1,000	
A4	0,918	0,000	0,868	0,705	0,000	0,000	0,000	0,857	
Calculation of GRA Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	1,000	0,812	1,000	1,000	0,511	0,356	0,920	1,000	
A2	0,954	0,510	0,333	0,337	0,774	0,585	0,333	0,388	
A3	0,333	0,333	0,339	0,333	0,333	0,333	0,645	0,333	
A4	0.3525	1,000	0,365	0,415	1,000	1,000	1,000	0,369	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,500								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	1,000	0,812	1,000	1,000	0,511	0,356	0,920	1,000	0,825
A2	0,954	0,510	0,333	0,337	0,774	0,585	0,333	0,388	0,527
A3	0,333	0,333	0,339	0,333	0,333	0,333	0,645	0,333	0,373
A4	0.3525	1,000	0,365	0,415	1,000	1,000	1,000	0,369	0,688
Ranking Considering Importance Weights									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	1,000	0,812	1,000	1,000	0,511	0,356	0,920	1,000	0,825
A2	0,954	0,510	0,333	0,337	0,774	0,585	0,333	0,388	0,527
A3	0,333	0,333	0,339	0,333	0,333	0,333	0,645	0,333	0,373
A4	0.3525	1,000	0,365	0,415	1,000	1,000	1,000	0,369	0,688

Appendix 14. SAW method results for 2021 (CRITIC Weighting)

Directions	Max	Max	Max	Max	Max	Max	Min	Min
Weights	0,161	0,082	0,107	0,094	0,126	0,179	0,155	0,096
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	19,300	75,614	4,229	30,646	57,694	50,526	3,318	2,026
A2	19,188	63,389	1,276	6,458	63,222	71,272	10,819	5,188
A3	14,616	45,881	1,346	6,103	49,032	46,916	5,130	6,034
A4	14,999	79,520	1,665	13,337	65,643	84,647	2,976	5,461
Normalized Decision Matrix								
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	1,000	0,951	1,000	1,000	0,879	0,597	0,897	1,000
A2	0,994	0,797	0,302	0,211	0,963	0,842	0,275	0,391
A3	0,757	0,577	0,318	0,199	0,747	0,554	0,580	0,336
A4	0,777	1,000	0,394	0,435	1,000	1,000	1,000	0,371
Weighting of Normalized Decision Matrix								
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	0,161	0,078	0,107	0,094	0,111	0,107	0,139	0,096
A2	0,160	0,066	0,032	0,020	0,122	0,150	0,043	0,037
A3	0,122	0,048	0,034	0,019	0,094	0,099	0,090	0,032
A4	0,125	0,082	0,042	0,041	0,126	0,179	0,155	0,036

Si	Si%	Rank
0,893	0,314	1
0,630	0,221	3
0,538	0,189	4
0,786	0,276	2

Appendix 15. SAW method results for 2021 (Equal Weighting)

Weighting of Normalized Decision Matrix								
Directions	Max	Max	Max	Max	Max	Max	Min	Min
Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125
A1	0,125	0,119	0,125	0,125	0,110	0,075	0,112	0,125
A2	0,124	0,100	0,038	0,026	0,120	0,105	0,034	0,049
A3	0,095	0,072	0,040	0,025	0,093	0,069	0,073	0,042
A4	0,097	0,125	0,049	0,054	0,125	0,125	0,125	0,046

Si	Si%	Rank
0,915	0,331	1
0,597	0,216	3
0,509	0,184	4
0,747	0,270	2

Note: In the analyses performed using the Critic Weighting and Equal Weighting methods within the SAW model, the results diverge solely in the 'Weighting of Normalized Decision Matrix' step. To prevent redundancy, repeated results have not been included in Appendix 15, as they are already presented in Appendix 14.

Appendix 16. Application of the CRITIC Method for 2022

Directions	B	B	B	B	B	B	C	C
Alternatives/ Criteria	**TIER1**	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	18,556	76,898	4,197	30,723	61,520	47,034	3,365	0,514
A2	19,166	67,260	6,390	32,617	35,365	82,786	12,455	2,658
A3	14,486	46,637	2,529	13,344	42,135	47,309	3,532	1,695
A4	16,794	86,701	4,904	37,875	66,525	90,865	1,979	3,120
Min	14,486	46,637	2,529	13,344	35,365	47,034	1,979	0,514
Max	19,166	86,701	6,390	37,875	66,525	90,864	12,455	3.120
Normalized Decision Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
A1	0,870	0,755	0,432	0,708	0,839	0,000	0,868	1,000
A2	1,000	0,515	1,000	0,786	0,000	0,816	0,000	0,177
A3	0,000	0,000	0,000	0,000	0,217	0,006	0,852	0,547
A4	0,493	1,000	0,615	1,000	1,000	1,000	1,000	0,000
Correlation Coefficient Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	1,000	0,563	0,841	0,723	0,013	0,328	-0,582	0,048
PRO	0,563	1,000	0,553	0,943	0,757	0,571	0,191	-0,233
ROA	0,841	0,553	1,000	0,797	-0,125	0,758	-0,704	-0,497
ROE	0,723	0,943	0,797	1,000	0,499	0,735	-0,136	-0,395
IM	0,013	0,757	-0,125	0,499	1,000	0,085	0,779	0,113
LA	0,328	0,571	0,758	0,735	0,085	1,000	-0,322	-0,910
NPL	-0,582	0,191	-0,704	-0,136	0,779	-0,322	1,000	0,266
OFX	0,048	-0,233	-0,496	-0,395	0,113	-0,910	0,266	1,000
$(1-p_{jk})$ Matrix								
	TIER1	**PRO**	**ROA**	**ROE**	**IM**	**LA**	**NPL**	**OFX**
TIER1	0,000	0,437	0,159	0,277	0,987	0,672	1,582	0,953
PRO	0,437	0,000	0,447	0,057	0,243	0,429	0,809	1,233
ROA	0,159	0,447	0,000	0,203	1,125	0,242	1,704	1,496
ROE	0,277	0,057	0,203	0,000	0,501	0,265	1,136	1,395
IM	0,987	0,243	1,125	0,501	0,000	0,915	0,221	0,888
LA	0,672	0,429	0,242	0,265	0,915	0,000	1,322	1,910
NPL	1,582	0,809	1,704	1,136	0,221	1,322	0,000	0,735
OFX	0,953	1,233	1,496	1,395	0,888	1,910	0,735	0,000
σ_j	0,449	0,427	0,415	0,434	0,481	0,528	0,458	0,443
C_j	2,273	1,560	2,232	1,662	2,347	3,037	3,439	3,809
w_j	**0,112**	**0,077**	**0,110**	**0,082**	**0,115**	**0,149**	**0,169**	**0,187**

Note: B: Benefit, C: Cost

Appendix 17. GRA method results for 2022 (CRITIC Weighting)

Directions	B	B	B	B	B	B	C	C	
Weights	0,116	0,077	0,110	0,082	0,115	0,149	0,169	0,187	
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	18,556	76,898	4,197	30,723	61,520	47,034	3,365	0,514	
A2	19,166	67,260	6,390	32,617	35,365	82,786	12,455	2,658	
A3	14,486	46,637	2,529	13,344	42,135	47,309	3,532	1,695	
A4	16,794	86,701	4,904	37,875	66,525	90,865	1,979	3,120	
Min.	14,486	46,637	2,529	13,344	35,365	47,034	1,979	0,514	
Max.	19,166	86,701	6,390	37,875	66,525	90,864	12,455	3.120	
Max. - Min	4,680	40,064	3,861	24,531	31,160	43,831	10,476	2,606	
Normalized Decision Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Reference	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	0,870	0,755	0,432	0,708	0,839	0,000	0,868	1,000	
A2	1,000	0,515	1,000	0,786	0,000	0,816	0,000	0,177	
A3	0,000	0,000	0,000	0,000	0,217	0,006	0,852	0,547	
A4	0,493	1,000	0,615	1,000	1,000	1,000	1,000	0,000	
Absolute Value (difference) Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,130	0,245	0,568	0,292	0,161	1,000	0,132	0,000	
A2	0,000	0,485	0,000	0,214	1,000	0,184	1,000	0,823	
A3	1,000	1,000	1,000	1,000	0,783	0,994	0,148	0,453	
A4	0,507	0,000	0,385	0,000	0,000	0,000	0,000	1,000	
Calculation of GRA Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,793	0,671	0,468	0,632	0,757	0,333	0,791	1,000	
A2	1,000	0,508	1,000	0,700	0,333	0,731	0,333	0,378	
A3	0,333	0,333	0,333	0,333	0,390	0,335	0,771	0,525	
A4	0,497	1,000	0,565	1,000	1,000	1,000	1,000	0,333	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,500								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,793	0,671	0,468	0,632	0,757	0,333	0,791	1,000	0,681
A2	1,000	0,508	1,000	0,700	0,333	0,731	0,333	0,378	0,623
A3	0,333	0,333	0,333	0,333	0,390	0,335	0,771	0,525	0,419
A4	0,497	1,000	0,565	1,000	1,000	1,000	1,000	0,333	0,799
Ranking Considering Importance Weights									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,793	0,671	0,468	0,632	0,757	0,333	0,791	1,000	0,701
A2	1,000	0,508	1,000	0,700	0,333	0,731	0,333	0,378	0,592
A3	0,333	0,333	0,333	0,333	0,390	0,335	0,771	0,525	0,450
A4	0,497	1,000	0,565	1,000	1,000	1,000	1,000	0,333	0,771

Appendix 18. GRA method results for 2022 (Equal Weighting)

Directions	B	B	B	B	B	B	C	C	
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125	
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	18,556	76,898	4,197	30,723	61,520	47,034	3,365	0,514	
A2	19,166	67,260	6,390	32,617	35,365	82,786	12,455	2,658	
A3	14,486	46,637	2,529	13,344	42,135	47,309	3,532	1,695	
A4	16,794	86,701	4,904	37,875	66,525	90,865	1,979	3,120	
Min.	14,486	46,637	2,529	13,344	35,365	47,034	1,979	0,514	
Max.	19,166	86,701	6,390	37,875	66,525	90,864	12,455	3.120	
Max. - Min	4,680	40,064	3,861	24,531	31,160	43,831	10,476	2,606	
Normalized Decision Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
Reference	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
A1	0,870	0,755	0,432	0,708	0,839	0,000	0,868	1,000	
A2	1,000	0,515	1,000	0,786	0,000	0,816	0,000	0,177	
A3	0,000	0,000	0,000	0,000	0,217	0,006	0,852	0,547	
A4	0,493	1,000	0,615	1,000	1,000	1,000	1,000	0,000	
Absolute Value (difference) Matrix									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,130	0,245	0,568	0,292	0,161	1,000	0,132	0,000	
A2	0,000	0,485	0,000	0,214	1,000	0,184	1,000	0,823	
A3	1,000	1,000	1,000	1,000	0,783	0,994	0,148	0,453	
A4	0,507	0,000	0,385	0,000	0,000	0,000	0,000	1,000	
Calculation of GRA Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	
A1	0,793	0,671	0,468	0,632	0,757	0,333	0,791	1,000	
A2	1,000	0,508	1,000	0,700	0,333	0,731	0,333	0,378	
A3	0,333	0,333	0,333	0,333	0,390	0,335	0,771	0,525	
A4	0,497	1,000	0,565	1,000	1,000	1,000	1,000	0,333	
Δ max	1,000								
Δ min	0,000								
n(gc)	0,500								
GRA Coefficients and Alternative Ranking Without Consideration of Significance Coefficients									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,793	0,671	0,468	0,632	0,757	0,333	0,791	1,000	0,681
A2	1,000	0,508	1,000	0,700	0,333	0,731	0,333	0,378	0,623
A3	0,333	0,333	0,333	0,333	0,390	0,335	0,771	0,525	0,419
A4	0,497	1,000	0,565	1,000	1,000	1,000	1,000	0,333	0,799
Ranking Considering Importance Weights									
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX	R_{oi}
A1	0,793	0,671	0,468	0,632	0,757	0,333	0,791	1,000	0,681
A2	1,000	0,508	1,000	0,700	0,333	0,731	0,333	0,378	0,623
A3	0,333	0,333	0,333	0,333	0,390	0,335	0,771	0,525	0,419
A4	0,497	1,000	0,565	1,000	1,000	1,000	1,000	0,333	0,799

Appendix 19. SAW method results for 2022 (CRITIC Weighting)

Directions	Max	Max	Max	Max	Max	Max	Min	Min
Weights	0,111	0,077	0,110	0,082	0,115	0,149	0,169	0,187
Alternatives / Criteria	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	18,556	76,898	4,197	30,723	61,520	47,034	3,365	0,514
A2	19,166	67,260	6,390	32,617	35,365	82,786	12,455	2,658
A3	14,486	46,637	2,529	13,344	42,135	47,309	3,532	1,695
A4	16,794	86,701	4,904	37,875	66,525	90,865	1,979	3,120
Normalized Decision Matrix								
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	0,968	0,887	0,657	0,811	0,925	0,518	0,588	1,000
A2	1,000	0,776	1,000	0,861	0,532	0,911	0,159	0,193
A3	0,756	0,538	0,396	0,352	0,633	0,521	0,560	0,303
A4	0,876	1,000	0,767	1,000	1,000	1,000	1,000	0,165
Weighting of Normalized Decision Matrix								
	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	0,108	0,068	0,072	0,066	0,107	0,077	0,099	0,187
A2	0,112	0,059	0,110	0,070	0,061	0,136	0,027	0,036
A3	0,084	0,041	0,043	0,029	0,073	0,078	0,095	0,057
A4	0,098	0,077	0,084	0,082	0,115	0,149	0,169	0,031

Si	Si%	Rank
0,785	0,291	2
0,611	0,226	3
0,500	0,185	4
0,804	0,298	1

Appendix 20. SAW method results for 2022 (Equal Weighting)

Weighting of Normalized Decision Matrix								
Directions	Max	Max	Max	Max	Max	Max	Min	Min
Criteria	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125
Weights	TIER1	PRO	ROA	ROE	IM	LA	NPL	OFX
A1	0,121	0,111	0,082	0,101	0,116	0,065	0,074	0,125
A2	0,125	0,097	0,125	0,108	0,066	0,114	0,020	0,024
A3	0,094	0,067	0,049	0,044	0,079	0,065	0,070	0,038
A4	0,110	0,125	0,096	0,125	0,125	0,125	0,125	0,021

Si	Si%	Rank
0,794	0,280	2
0,679	0,240	3
0,507	0,179	4
0,851	0,301	1

Note: In the analyses performed using the Critic Weighting and Equal Weighting methods within the SAW model, the results diverge solely in the 'Weighting of Normalized Decision Matrix' step. To prevent redundancy, repeated results have not been included in Appendix 20, as they are already presented in Appendix 19.