Article

Not peer-reviewed version

New Horizons in Bank Mergers: A Quantum Spherical Fuzzy Decision-Making Framework for Analyzing Islamic and Conventional Banks Mergers and Enhancing Resilience

Tamy Al-Binali *, Ahmet Faruk Aysan, Hasan Dinçer, Ibrahim Musa Unal, Serhat Yüksel

Posted Date: 12 April 2023

doi: 10.20944/preprints202304.0226.v1

Keywords: resilience; bank merger; M&A; Islamic bank; conventional bank; Quantum Spherical Fuzzy Decision-Making; Balanced Scorecard

Article

New Horizons in Bank Mergers: A Quantum Spherical Fuzzy Decision-Making Framework for Analyzing Islamic and Conventional Banks Merger and Enhancing Resilience

Tamy Al-Binali [1,*], Ahmet Faruk Aysan [2], Hasan Dincer [3], Ibrahim Musa Unal [4], Serhat Yuksel [5]

[1] Hamad Bin Khalifa University, Qatar Foundation; Chief Executive Officer for Qatar Financial Markets Authority; Doha, Qatar; talbinali@hbku.edu.qa
[2] Hamad Bin Khalifa University, Qatar Foundation; Non-Resident Fellow Middle East Council for Global Affairs (MECGA); aaysan@hbku.edu.qa
[3] Istanbul Medipol University; Istanbul, Turkey; hdincer@medipol.edu.tr
[4] Hamad Bin Khalifa University, Qatar Foundation; Doha, Qatar; ibun30543@hbku.edu.qa
[5] Istanbul Medipol University; Istanbul, Turkey; serhatyuksel@medipol.edu.qa
* Correspondence: talbinali@hbku.edu.qa

Abstract: This study explores the implications of merging two fundamentally different types of banks: Islamic and conventional banks. The research aims to provide insight into the unique opportunities and challenges presented by such a merger and offer strategic guidance for future mergers. A balanced scorecard-based strategic analysis using Quantum Spherical Fuzzy Decision-Making Approach was used to develop short- and long-term strategic plans for the merged bank. The balanced scorecard included 12 key performance indicators (KPIs) in 4 groups, and the methodology also incorporated several questions to guide the analysis. The results of the study offer valuable insights into the potential opportunities and challenges of merging these two types of banks, as well as strategic recommendations for stakeholders at all levels. The study serves as a useful guideline for future mergers between similar or different types of banks. Overall, the findings suggest that a well-planned merger strategy is essential for avoiding challenges and maximizing the benefits of merging Islamic and conventional banks. By integrating the strengths of both types of banks, a merged entity could create a competitive advantage and potentially improve financial performance. However, this requires careful consideration of cultural differences, regulatory challenges, and other factors that could impact the success of the merger.

Keywords: resilience; bank merger; M&A; islamic bank; conventional bank, quantum spherical fuzzy decision-making; balanced scorecard

1. Introduction

Since the early 20th century, bank mergers have been a topic of interest for economists and financial experts for many decades. However, the frequency and significance of bank mergers have varied over time. The first recorded bank merger in the United States occurred in 1904. The National City Bank of New York merged with the Bank of the Manhattan Company (Abbot, 1929). This merger was driven by the need to increase efficiency and reduce competition in the banking industry (Carletti et al., 2007). The Great Depression of the 1930s, however, led to a decline in bank mergers as many banks failed. Eventually, the government implemented regulations to stabilize the industry. After World War II, the banking industry experienced growth and consolidation. This was driven by the economy's growth and the increasing complexity of the banking business (Reinhart & Rogoff, 2013). Additionally, technological and regulatory development made it easier for banks to merge and expand their operations. The 1960s and 1970s saw many bank mergers due to this trend (Bawani et al., 2016).

In the 1970s, the banking sector started to deregulate faster. This included the removal of restrictions on interest rates, loosening branching restrictions, and repealing the Glass-Steagall Act, which had separated commercial and investment banking (Sherman, 2009). As a result, banks could expand their operations and enter new markets. This increased competition led to a wave of bank mergers, as smaller banks could not compete with larger, more diversified banks.

The consolidation trend of the banking industry has also continued in recent years. This is driven by the need to comply with new regulations and the increasing pressure to control costs. Additionally, the ongoing digital transformation in banking has enabled banks to serve customers online and expand their reach. The advent of fintech companies and the growing use of digital payments have pressured traditional banks to modernize their offerings to stay competitive.

The impact of bank mergers on the banking industry and the economy is a long-living debate (Rezitis, 2008; Al-Sharkas et al., 2008; Piloff & Santomero, 1998). On the one hand, bank mergers can increase efficiency and cost savings for the merged entity, thus benefiting consumers. They can also lead to the formation of more diversified banks that can better weather economic downturns. On the other hand, bank mergers can decrease competition, resulting in higher consumer prices and stagnant innovation, and lead to a concentration of power in the hands of a few large banks. In many aspects, such a financial system is questionable in its health (Demirguc-Kunt & Levine, 2000). Eventually, the reasons for bank mergers, their historical development, and their impact on the banking industry and the economy have evolved and continue to be the subject of ongoing research and debate.

In today's general environment, an Islamic and a conventional bank usually do not have many reasons to merge. This is because it brings together two fundamentally different banking systems with distinct characteristics and objectives. Islamic banking is based on Sharia principles and prohibits riba, gharar, maysir, and others. Instead, Islamic banks engage in profit and loss sharing (PLS) transactions, in which the bank and the customer share the profits or losses of the venture (Lewis, 2008). On the other hand, conventional banks make most of their profit from interest payments, unlike their Islamic counterparts (Lewis, 2008).

One of the benefits of merging an Islamic and conventional bank is the opportunity to create a more diversified and resilient financial institution. By combining the strengths of both banking systems, the merged entity can mitigate the risks associated with a dependency on a single source of income, such as interest-based lending (Ullah, 2022). Furthermore, the merger allows the entity to tap into new markets and customer segments, as it can offer a broader range of financial products and services to customers.

Another benefit of the merger is the opportunity for the Islamic bank to expand its customer base and increase its market share. Islamic banks typically have a limited customer base, as their products and services mainly target Muslim customers. However, by merging with a conventional bank, the Islamic bank can reach a broader customer base and expand its market share (Purnamasari et al., 2022).

However, the merger of an Islamic and conventional bank also poses several risks. One risk is the potential for operational challenges, as the merged entity will have to integrate different systems and processes, which can be time-consuming and costly. Another risk is the potential for cultural and management conflicts, as the merged entity will have to navigate the two banking systems' different cultures, values, and management styles (Lewis, 2008).

Another risk is the potential for regulatory challenges, as the merged entity must comply with the regulatory frameworks of both the Islamic and conventional banking systems. This can be particularly challenging in countries where the regulatory framework for Islamic banking is still evolving. However, if the type of banking is set up into one of the regulatory frameworks, this dual framework problem can be solved significantly.

An example of an Islamic and conventional bank merger has been completed recently in Qatar between Masraf al-Rayan and Al Khalij Commercial Bank, completed in November 2021 (Masraf al-Rayan, 2021). This merger has many unique characteristics in the region, such as being the first merger between two publicly listed banks and the merged bank operating as an Islamic bank (Masraf al-Rayan, 2021). As this paper contributes to the literature with an analysis of Islamic and

conventional bank mergers, the Masraf al-Rayan and Al Khalij Commercial Bank merger is an appropriate case study for investigating the effects and results of such a merger. In the analysis section, the primary purpose will be to measure the potential and the performance of the merger process and the merged entity. Therefore, the balanced scorecard technique is appropriate for analyzing this specific merger.

The balanced scorecard technique is a tool used to evaluate the performance of a business, institution, or event. It considers multiple perspectives, including financial, customer, internal processes, and learning & growth. The balanced scorecard is especially effective in assessing a business's overall health and success and can be applied to various industries, including banking. One main detail about the balanced scorecard technique is that the scores could be maintained directly by industry experts for high accuracy in results. It reduces the misinformation risk as the information is obtained directly from point zero (Luo et al., 2012). The availability of experts who took a role in the Masraf al-Rayan and Al Khalij Commercial Bank merger allows the opportunity to apply a balanced scorecard rating from these experts, which is the main reason for selecting this methodology for the study.

The motivations and outcomes of the Masraf al-Rayan and Al Khalij Commercial Bank merger are aimed to be investigated through the designed scorecard. We will provide a comprehensive understanding of this merger and its context through a case study approach and the integration of multiple data sources. The findings of this study will contribute to the existing literature on bank mergers and provide insights for other Islamic and conventional banks considering a merger. Additionally, the study will offer a valuable reference for policymakers and regulators as they consider the implications of such mergers for the stability and growth of the Islamic finance industry.

Some of the key results of the paper are summarized in this part. Firstly, bank mergers are intricate procedures that call for proactive financial policies to increase the combined bank's long- and short-term resilience. Such tactics can guarantee stability and operational continuity while removing potential dangers and structural interruptions. It is crucial to have a solid financial plan that considers potential difficulties when combining two banks because stakeholders including clients, investors, and regulators actively monitor the financial stability of the merged bank. Proactive financial strategies should also anticipate potential possibilities and plan the best course for capitalizing on them, including allocating resources and generating desirable synergies between the two financial systems. Consequently, the most crucial key performance indicator (KPI) for bank mergers is resilience with proactive financial initiatives.

The continuity of the amalgamated bank depends on meeting the needs of consumers who use Islamic finance, as customer loyalty and retention are essential for long-term success. Understanding the demands of both consumer groups is crucial since Islamic banking services have distinct needs and expectations than traditional banking services. Such a plan will assist the combined company in maintaining financial products that are Shariah-compliant for clients of Islamic banks and competitive rates for consumers of conventional banks. The merged bank will have a reputation in the market, retain client loyalty and retention, and improve the likelihood of having a competitive advantage over other banks in the market if the needs of both customer groups are met. Therefore, satisfying customer needs with Islamic banking services is another critical KPI for bank mergers.

Finally, for a combined bank to successfully manage the opportunities and difficulties in the financial sector, it is essential to boost agility and human capital. High agility will guarantee the bank's responsiveness to changes in industry legislation or levels of competition. On the other side, qualified personnel will successfully manage risks, deliver top-notch customer service, and guarantee the bank's strong financial performance. Consequently, one of the most crucial KPIs for a bank merger seems to be an increase in agility and human capital. While it only affects two other KPIs—resilience with proactive financial measures and an increase in agility and human capital—continuity of profit looks to be less important in a bank merger.

The rest of the paper will continue as follows; chapter two will discuss the existing literature about bank mergers, Islamic-conventional bank mergers, and using the balanced scorecard technique for analyzing the performance of a bank merger. Chapter three will present the data and

methodology, and chapters four and five will discuss the results. Finally, chapter six will include concluding remarks.

2. Background for the Selection of the Model

Mergers and acquisitions (M&A) are familiar strategies firms adopt to achieve external expansion. According to Oh, Peter, and Johnson (2014), M&A is a measure that firms use to expand their operations and gain a competitive advantage in the market. Sheidu and Yusuf (2015) define a merger as blending two or more companies. In a broad sense, M&A encompasses companies' coming together, combining, fusion, and synergy, in which one company loses its identity and the other retains it. Anyanwu and Agwor (2015) view mergers as a "strategic alliance" in which two firms work together to pursue similar objectives. Ahmed and Ahmed (2014) also described mergers as an amalgamation involving combining two previously independent entities into a single entity. This can be achieved through "Absorption or Consolidation." Absorption is achieved when one of the entities retains its name (Anyanwu & Agwor, 2015).

The reasons for banks to merge can be classified based on four hypotheses: diversity, synergy, market share, and manager benefit maximization. The Synergy Hypothesis states that merged banks would create synergies through economies of scale, resulting in increased stock prices and profitability. The Diversity Hypothesis suggests that mergers provide banks with diversified product and service portfolios while minimizing risks with a broader geographical exposure. This risk-mitigating diversification would increase stock prices for both the target and acquirer banks. The Market Share Hypothesis states that the merger of two competitors would result in decreased price competition due to increased prices and decreased supervisory costs. The hypothesis of Manager Benefit Maximization states that bank managers would prefer the merger to increase shareholders' profitability, maintain job security, and maximize their benefits. However, this may not lead to an increase in public welfare (Palombo, 1997).

Correa (2006) studied international bank acquisitions between 1994 and 2003, using banks from the USA, Germany, France, Brazil, Argentina, and Panama. The study found that the performance of the banks improved after only two years had passed from the transaction date. Lin (2009) focused on the scale dimension as a significant factor in cross-border bank mergers and acquisitions. Using World Bank data was determined that large-scale banks with high profits have a greater tendency for acquisition compared to smaller ones and that low cost is also an essential indicator for bank selection.

Mehra (2011) evaluated mergers and acquisitions within the American banking system by analyzing a 1986-2008 quarter-based dataset using a logit model. The study found that banks that had undergone mergers and acquisitions in their history were more inclined towards consolidation and that regulations also influence banks towards consolidation. Large-scale banks strategically position mergers to increase their market share, and it was agreed that liquidity issues during the merger process negatively impact earnings.

The literature does not cover any analysis of an Islamic and a conventional bank merger analysis or a more general focus that investigates the two types of bank mergers. Therefore, to the best of our knowledge, this study fills an important gap in the existing literature by investigating such a merger.

In the existing literature, few studies utilized the balanced scorecard technique for bank M&As. Lindblom & Von Koch (2002) analyzed the cross-border bank M&As in the E.U. market by using a balanced scorecard technique. Their research suggests that the M&A strategy is a good fit as the banks complement each other well in different aspects of the model. The authors indicate that a merger's success will depend on the ability of the banks to utilize each other's strengths and characteristics effectively.

Oghuvwu & Omoye (2016) studied the relationship between the M&A of banks and their financial performance before and after the merger. The balanced scorecard is used to analyze the financial indicators of both banks during pre- and post-merger periods. Authors signify a solid positive relationship between M&A and bank performance in their datasets.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

As visible from the existing literature, Islamic and conventional bank mergers are still very undiscovered from many aspects. There are only a few papers analyzed Islamic & conventional bank mergers, and none of them uses a balanced-scorecard methodology from the other studies. Such a merger is unique from several perspectives. There is a very limited understanding about the unique characteristics of this merger, its challenges and opportunities. The main challenge is the cultural differences within the dual-banking system, which brings question marks about the success of the merged entity in the future. Academic research in this field would reduce the unexpected negative results for the future experiences significantly and help for future readiness. Therefore, this paper aims to fill such a critical gap by using a case study in the Qatar financial market.

Analysis of an Islamic & conventional bank merger with an accurate balanced scorecard method provides several contributions to the existing literature. First of all, this paper aims to enlighten the opportunities and challenges of the merger of two different types of banks, and therefore be a guideline for the future mergers. This purpose of the study is supported with a short and long-term strategic plan suggestions in the last sections. Therefore, more Islamic & conventional future mergers are encouraged with a better enlightened roadmap.

Secondly, financial performance analysis is also considered while building the scorecards and challenges related to risk management, banking products, and customer retention are also included. Therefore, the study aims to be an anchor for future studies that concerns about the financial performance of merged banks with same or different financial systems.

Furthermore, this lack of research creates a need for the optimal decision-making processes for such type of mergers, which may impact the success and continuity of the merger. A better understanding of the decision-making process, and the use of advance decision-making tools can help to improve the success of such mergers.

The balanced scorecard designed for this study includes four main categories: financial, customer satisfaction, internal business, and learning & growth. Each category has 3 KPIs which makes a total of 12. References about each KPI are given in Table 2 in the upcoming sections.

3. Data & Methodology

This paper utilizes the balanced scorecard technique for analyzing the Masraf al-Rayan and Al Khalij Commercial Bank merger. There are often four categories in a balanced scorecard: financial, customer satisfaction, internal business, and learning & growth. The below Table-2 is the scorecard designed for this analysis:

Table 1. Balanced Scorecard.

BSC Perspective	Dimensions	KPIs	#	Details
Financial	**Performance (D1)**	Continuity of Profit	C1	Profit and its consistency, Earning quality, profitability ratios
		Competitive Market Share	C2	Market Share, Rivals, Competitiveness
		Resilience with proactive financial strategies	C3	Risk Management, Capital Adequacy, Strong Financial Discipline, Clear Strategy, and Productivity.
Customer Satisfaction	**Meeting Customer Expectations (D2)**	Improvements in Service Quality	C4	Demand Customization, Meeting customer expectations, Smooth operations, Quality software & User face

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

		Satisfying customer needs with Islamic banking services	C5	Having Shariah-compliant products, Giving Trust to customers who have sensitivity to Islamic values.
		Enhancing Customer Loyalty	C6	Satisfaction, Loyalty, reducing complaints, higher positive feedback
Internal Business	**Organizational Structure (D3)**	Managerial & Organizational competencies	C7	Institutionalization, Employee Competencies, Managerial Structure of the Merged Bank, Employee Age,
		Technical requirements including technological and Organizational Infrastructure	C8	Market Data, Infrastructure, Technological competency, Databases, etc.
		Increase in Agility and Human Capital	C9	Employee Age, Experience & Other Dynamics, Islamic finance knowledge of the employee,
Learning & Growth	**Future Readiness and Prospects of the Bank (D4)**	Information Enhancements of the Customers and Doing Business	C10	Learning from Each Other, Skill Enhancement in an Islamic-Conventional Bank Merger, Skill transition, Market-based information, Innovativeness
		Future Readiness and Adaptability	C11	Competitive power, Being Ready for Future Market Place, Adaption Speed, and Flexibility.
		New generation banking services for sustainable financial development	C12	ESG approach, Integrated reporting, Sustainable Programs.

Source: Author's own contribution.

In this section, the approaches in the proposed model are explained.

3.1. Quantum Spherical Fuzzy Sets with Golden Cut

Quantum theory (Q) focuses on different probabilities in the evaluation process. This new perspective aims to increase the effectiveness of decision-making processes (Kayacık et al., 2022). This theory considers phase angle (θ^2) and amplitude items (φ^2) (Sun et al., 2022). The details are denoted in Equations (1)-(3), where u represents events and ς shows collective events (Hou et al., 2022).

$$Q(|u>) = \varphi e^{j\theta} \quad (1)$$

$$|\varsigma> = \{|u_1>, |u_2>, \dots, |u_n>\} \quad (2)$$

$$\sum_{|u>\subseteq|\varsigma>} |Q(|u>)| = 1 \quad (3)$$

These approaches can be integrated with other techniques, such as fuzzy logic, to minimize uncertainty in decision-making techniques. Thus, it is aimed at solving problems more successfully. In this context, many different fuzzy numbers have been developed in the literature. Spherical fuzzy sets ($\tilde{A}_S$) were also generated for this purpose in which membership, non-membership, and hesitation (μ, ν, π) parameters are used (Kutlu Gündoğdu and Kahraman, 2019). Considering hesitancy issues is accepted as the main benefit of these sets (Ashraf et al., 2019). They are explained in Equations (4) and (5) (Kahraman, 2021).

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

$$\tilde{A}_S = \{\langle u, (\mu_{\tilde{A}_S}(u), v_{\tilde{A}_S}(u), h_{\tilde{A}_S}(u))|u \in U\} \quad (4)$$

$$0 \le \mu_{\tilde{A}_S}^2(u) + v_{\tilde{A}_S}^2(u) + h_{\tilde{A}_S}^2(u) \le 1 \ , \ \forall_u \in U \quad (5)$$

In this proposed model, these sets are improved by integrating Quantum theory to increase problem-solving success. The details are indicated in Equations (6)-(8) in which the amplitudes of degrees are given by ς_μ, ς_v, and ς_h. Additionally, α, γ, and β refer to the set of θ.

$$|\varsigma_{\tilde{A}_S}> = \left\{\langle u, (\varsigma_{\mu_{\tilde{A}_S}}(u), \varsigma_{v_{\tilde{A}_S}}(u), \varsigma_{h_{\tilde{A}_S}}(u))|u \in 2^{|\varsigma_{\tilde{A}_S}>}\right\} \quad (6)$$

$$\varsigma = [\varsigma_\mu . e^{j2\pi.\alpha}, \varsigma_v . e^{j2\pi.\gamma}, \varsigma_h . e^{j2\pi.\beta}] \quad (7)$$

$$\varphi^2 = |\varsigma_\mu(|u_i>)| \quad (8)$$

There are different views on how to calculate degrees in spherical fuzzy sets. In this study, criteria related to golden ratio (G) are considered (Xu et al., 2022). The division of the extreme (b) and mean ratio (a) in a straight line is considered for this situation as in Equations (9) and (10) (Li et al., 2022).

$$G = \frac{a}{b} \quad (9)$$

$$G = \frac{1+\sqrt{5}}{2} = 1.618 \ldots \quad (10)$$

The amplitude of degrees are shown in Equations (11) and (12).

$$\varsigma_v = \frac{\varsigma_\mu}{G} \quad (11)$$

$$\varsigma_h = 1 - \varsigma_\mu - \varsigma_v \quad (12)$$

Moreover, phase angles are created by Equations (13)-(15).

$$\alpha = |\varsigma_\mu(|u_i>)| \quad (13)$$

$$\gamma = \frac{\alpha}{G} \quad (14)$$

$$\beta = 1 - \alpha - \gamma \quad (15)$$

In addition, Equations (16)-(19) demonstrate the mathematical operations.

$$\lambda * \tilde{A}_\varsigma = \left\{ \left(1-(1-{\varsigma_{\mu_{\tilde{A}}}}^2)^\lambda\right)^{\frac{1}{2}} e^{j2\pi.\left(1-\left(1-\left(\frac{\alpha_{\tilde{A}}}{2\pi}\right)^2\right)^\lambda\right)^{\frac{1}{2}}}, {\varsigma_{v_{\tilde{A}}}}^\lambda e^{j2\pi.\left(\frac{\gamma_{\tilde{A}}}{2\pi}\right)^\lambda}, \left((1-{\varsigma_{h_{\tilde{A}}}}^2)^\lambda - (1-{\varsigma_{\mu_{\tilde{A}}}}^2 - {\varsigma_{h_{\tilde{A}}}}^2)^\lambda\right)^{\frac{1}{2}} e^{j2\pi.\left(\left(1-\left(\frac{\beta_{\tilde{A}}}{2\pi}\right)^2\right)^\lambda - \left(1-\left(\frac{\alpha_{\tilde{A}}}{2\pi}\right)^2-\left(\frac{\beta_{\tilde{A}}}{2\pi}\right)^2\right)^\lambda\right)^{\frac{1}{2}}} \right\} \ , \ \lambda > 0 \quad (16)$$

$${\tilde{A}_\varsigma}^\lambda = \left\{ {\varsigma_{\mu_{\tilde{A}}}}^\lambda e^{j2\pi.\left(\frac{\alpha_{\tilde{A}}}{2\pi}\right)^\lambda}, \left(1-(1-{\varsigma_{v_{\tilde{A}}}}^2)^\lambda\right)^{\frac{1}{2}} e^{j2\pi.\left(1-\left(1-\left(\frac{\gamma_{\tilde{A}}}{2\pi}\right)^2\right)^\lambda\right)^{\frac{1}{2}}}, \left((1-{\varsigma_{v_{\tilde{A}}}}^2)^\lambda - (1-{\varsigma_{v_{\tilde{A}}}}^2 - {\varsigma_{h_{\tilde{A}}}}^2)^\lambda\right)^{\frac{1}{2}} e^{j2\pi.\left(\left(1-\left(\frac{\gamma_{\tilde{A}}}{2\pi}\right)^2\right)^\lambda - \left(1-\left(\frac{\gamma_{\tilde{A}}}{2\pi}\right)^2-\left(\frac{\beta_{\tilde{A}}}{2\pi}\right)^2\right)^\lambda\right)^{\frac{1}{2}}} \right\} \ , \ \lambda > 0 \quad (17)$$

$$\tilde{A}_\varsigma \oplus \tilde{B}_\varsigma = \left\{ \left({\varsigma_{\mu_{\tilde{A}}}}^2 + {\varsigma_{\mu_{\tilde{B}}}}^2 - {\varsigma_{\mu_{\tilde{A}}}}^2{\varsigma_{\mu_{\tilde{B}}}}^2\right)^{\frac{1}{2}} e^{j2\pi.\left(\left(\frac{\alpha_{\tilde{A}}}{2\pi}\right)^2+\left(\frac{\alpha_{\tilde{B}}}{2\pi}\right)^2-\left(\frac{\alpha_{\tilde{A}}}{2\pi}\right)^2\left(\frac{\alpha_{\tilde{B}}}{2\pi}\right)^2\right)^{\frac{1}{2}}}, {\varsigma_{v_{\tilde{A}}}}{\varsigma_{v_{\tilde{B}}}} e^{j2\pi.\left(\left(\frac{\gamma_{\tilde{A}}}{2\pi}\right)\left(\frac{\gamma_{\tilde{B}}}{2\pi}\right)\right)}, \left((1-{\varsigma_{\mu_{\tilde{B}}}}^2){\varsigma_{h_{\tilde{A}}}}^2 + (1-{\varsigma_{\mu_{\tilde{A}}}}^2){\varsigma_{h_{\tilde{B}}}}^2 - {\varsigma_{h_{\tilde{A}}}}^2{\varsigma_{h_{\tilde{B}}}}^2\right)^{\frac{1}{2}} e^{j2\pi.\left(\left(1-\left(\frac{\alpha_{\tilde{B}}}{2\pi}\right)^2\right)\left(\frac{\beta_{\tilde{A}}}{2\pi}\right)^2+\left(1-\left(\frac{\alpha_{\tilde{A}}}{2\pi}\right)^2\right)\left(\frac{\beta_{\tilde{B}}}{2\pi}\right)^2-\left(\frac{\beta_{\tilde{A}}}{2\pi}\right)^2\left(\frac{\beta_{\tilde{B}}}{2\pi}\right)^2\right)^{\frac{1}{2}}} \right\} \quad (18)$$

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

$$\tilde{A}_{\varsigma} \otimes \tilde{B}_{\varsigma} = \left\{ \varsigma_{\mu_{\bar{A}}} \varsigma_{\mu_{\bar{B}}} e^{j2\pi.\left(\frac{\alpha_{\bar{A}}}{2\pi}\right)\left(\frac{\alpha_{\bar{B}}}{2\pi}\right)}, \left(\varsigma_{v_{\bar{A}}}{}^2 + \varsigma_{v_{\bar{B}}}{}^2 - \varsigma_{v_{\bar{A}}}{}^2 \varsigma_{v_{\bar{B}}}{}^2\right)^{\frac{1}{2}} e^{j2\pi.\left(\left(\frac{\gamma_{\bar{A}}}{2\pi}\right)^2 + \left(\frac{\gamma_{\bar{B}}}{2\pi}\right)^2 - \left(\frac{\gamma_{\bar{A}}}{2\pi}\right)^2 \left(\frac{\gamma_{\bar{B}}}{2\pi}\right)^2\right)^{\frac{1}{2}}}, \left(\left(1 - \varsigma_{v_{\bar{B}}}{}^2\right)\varsigma_{h_{\bar{A}}}{}^2 + \left(1 - \varsigma_{v_{\bar{A}}}{}^2\right)\varsigma_{h_{\bar{B}}}{}^2 - \varsigma_{h_{\bar{A}}}{}^2 \varsigma_{h_{\bar{B}}}{}^2\right)^{\frac{1}{2}} e^{j2\pi.\left(\left(1 - \left(\frac{\gamma_{\bar{B}}}{2\pi}\right)^2\right)\left(\frac{\beta_{\bar{A}}}{2\pi}\right)^2 + \left(1 - \left(\frac{\gamma_{\bar{A}}}{2\pi}\right)^2\right)\left(\frac{\beta_{\bar{B}}}{2\pi}\right)^2 - \left(\frac{\beta_{\bar{A}}}{2\pi}\right)^2 \left(\frac{\beta_{\bar{B}}}{2\pi}\right)^2\right)^{\frac{1}{2}}} \right\} \quad (19)$$

3.2. The extension of DEMATEL

DEMATEL is used to identify those more important among different issues affecting a purpose. With this method, it is also possible to determine the causal relationship between these factors (Chang et al., 2011). DEMATEL is integrated with Spherical fuzzy numbers whose degrees are calculated with the golden ratio in this originally developed model. The steps of this generated method are shown below (Abdullah and Zulkifli, 2015).

Step 1: The evaluations are collected from the experts.

Step 2: Relation matrix is constructed by Equation (20).

$$\varsigma_k = \begin{bmatrix} 0 & \varsigma_{12} & \cdots & \cdots & \varsigma_{1n} \\ \varsigma_{21} & 0 & \cdots & \cdots & \varsigma_{2n} \\ \vdots & \vdots & \ddots & \cdots & \cdots \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \varsigma_{n1} & \varsigma_{n2} & \cdots & \cdots & 0 \end{bmatrix} \quad (20)$$

Also, Equation (21) is also used to compute aggregated values.

$$\varsigma = \left\{ \left[1 - \prod_{i=1}^{k}\left(1 - \varsigma_{\mu_i}{}^2\right)^{\frac{1}{k}}\right]^{\frac{1}{2}} e^{2\pi.\left[1 - \prod_{i=1}^{k}\left(1 - \left(\frac{\alpha_i}{2\pi}\right)^2\right)^{\frac{1}{k}}\right]^{\frac{1}{2}}}, \prod_{i=1}^{k} \varsigma_{v_i}{}^{\frac{1}{k}} e^{2\pi.\prod_{i=1}^{k}\left(\frac{\gamma_i}{2\pi}\right)^{\frac{1}{k}}}, \left[\prod_{i=1}^{k}\left(1 - \varsigma_{\mu_i}{}^2\right)^{\frac{1}{k}} - \prod_{i=1}^{k}\left(1 - \varsigma_{\mu_i}{}^2 - \varsigma_{h_i}{}^2\right)^{\frac{1}{k}}\right]^{\frac{1}{2}} e^{2\pi.\left[\prod_{i=1}^{k}\left(1 - \left(\frac{\alpha_i}{2\pi}\right)^2\right)^{\frac{1}{k}} - \prod_{i=1}^{k}\left(1 - \left(\frac{\alpha_i}{2\pi}\right)^2 - \left(\frac{\beta_i}{2\pi}\right)^2\right)^{\frac{1}{k}}\right]^{\frac{1}{2}}} \right\} \quad (21)$$

Step 3: Values are defuzzified by Equation (22)

$$Def\varsigma_i = \varsigma_{\mu_i} + \varsigma_{h_i}\left(\frac{\varsigma_{\mu_i}}{\varsigma_{\mu_i} + \varsigma_{v_i}}\right) + \left(\frac{\alpha_i}{2\pi}\right) + \left(\frac{\gamma_i}{2\pi}\right)\left(\frac{\left(\frac{\alpha_i}{2\pi}\right)}{\left(\frac{\alpha_i}{2\pi}\right) + \left(\frac{\beta_i}{2\pi}\right)}\right) \quad (22)$$

Step 4: Normalization procedure is applied with Equations (23) and (24).

$$B = \frac{\varsigma}{max_{1 \le i \le n} \sum_{j=1}^{n} \varsigma_{ij}} \quad (23)$$

$$0 \le b_{ij} \le 1 \quad (24)$$

Step 5: Total relation matrix is created by Equation (25).

$$\lim_{k \to \infty} (B + B^2 + \cdots + B^k) = B(I - B)^{-1} \quad (25)$$

Step 6: The sums of rows and columns (D, E) are computed to identify causal degrees as in Equations (26) and (27).

$$D = \left[\sum_{j=1}^{n} e_{ij}\right]_{nx1} \quad (26)$$

$$E = \left[\sum_{i=1}^{n} e_{ij}\right]_{1xn} \quad (27)$$

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

The sum/difference of these values are considered to define the weights/causal degrees of the factors. For the purpose of defining causality relationship, the differences of these values are compared with the threshold value (α) by Equation (28).

$$\alpha = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}[e_{ij}]}{N} \quad (28)$$

4. Results

This study it is aimed to determine the most influential factors in the merger process of banks. In this context, 12 different indicators are determined as a result of a comprehensive literature review. In this process, the indicators of the balanced scorecard technique are considered. The main advantage of using this approach is that financial and non-financial determinants can be considered. Within this scope, the selected 12 indicators are derived from four different balanced scorecard perspectives: finance, customer satisfaction, internal business, and learning and growth. The details of the significant criteria are indicated in Table 2.

Table 2. References for KPIs in the scorecard.

BSC Perspective	KPIs	References
Financial	Continuity of Profit	Bikker & Bos, 2008; Demirgüç-Kunt & Huizinga, 2000; Linder & Crane, 1993; Staikouras & Wood, 2004; Vong & Chan, 2009 Gur et al., 2023
	Competitive Market Share	Behn & Riley Jr, 1999; Belkhaoui et al., 2014; Berger & Bouwman, 2013; Cleverley, 1990; Rau, 2000
	Resilience with proactive financial strategies	Bakir, 2013; Corbet et al., 2022; Indupurnahayu et al., 2022; Khan et al., 2020; Maddaus, 2020; Markman & Venzin, 2014, Aysan et al., 2021, Manisaligil et al., 2023, Smola et al., 2023
Customer Satisfaction	Improvements in Service Quality	Afthanorhan et al., 2019; Coelho & Henseler, 2012; Hernon et al., 1999; Lenka et al., 2009; Oh & Kim, 2017; Succi et al., 2001; Sureshchandar et al., 2002
	Satisfying customer needs with Islamic banking services	Ahmed et al., 2021; Ali et al., 2009; Farah, 2017; Lee & Ullah, 2011; Metawa & Almossawi, 1998; Naser et al., 1999, Aysan et al., 2019
	Enhancing Customer Loyalty	Amin et al., 2011; Bilal et al., 2010; Coelho & Henseler, 2012; Ehigie, 2006; Fry et al., 1973; Lenka et al., 2009
Internal Business	Managerial & Organizational competencies	Alkhazali et al., 2020; Chen & Vashishtha, 2017; Cetin et al, 2012; Kamukana et al, 2017; Aysan et al., 2009, Mufti et al., 2016; Salman et al., 2020
	Technical requirements including technological and Organizational Infrastructure	Haleem & Kevin, 2018; Hickson et al., 1969; Khazanchi & Arora, 2016; Linder & Crane, 1993; Ringim et al., 1993
	Increase in Agility and Human Capital	Alkhazali et al., 2020; Brueller et al., 2018; Hassan & Lukman, 2020; Kjan et al., 2020; Larsson & Finkelstein, 1999
Learning & Growth	Information Enhancements of the Customers and Doing Business	Chen & Vashishtha, 2017; DeLong & DeYoung, 2007; Houston et al., 2001; Panetta et al., 2009; Piloff & Santomero, 1998; Zollo & Singh, 2004

 doi:10.20944/preprints202304.0226.v1

Future Readiness and Adaptability	Bajaj, 2009; Davis, 2000; Marshall, 1960; Smith & Walter, 1998
New generation banking services for sustainable financial development	Ahmed et al., 2015; Fauzi et al., 2010; Houston & Shan, 2022; Neffati et al., 2011; Olson & Pagano, 2005; Smith, 2010

Source: Author's own.

Banks may merge primarily to increase their profitability. The new bank, which has been formed due to the merger of the two banks, is likely to be successful in its activities in different fields. On the other hand, with the merger's help, the new bank's market share will be more significant. This will contribute to an increase in the competitive power of the bank. Banks that want to improve their financial strategies can also choose to merge. In the case of merging with a bank that is successful in different segments, it will be possible to develop more effective financial strategies. Increasing customer satisfaction is one of the critical reasons for bank mergers. As a result of the merger of two different banks in the sector, there is a higher chance of increasing service quality. For example, the number of branches and ATMs of the new bank will increase, which will help provide more comprehensive service to customers. In addition, due to the bank merger, it is possible to provide services to customers in different segments. For example, when a conventional bank is combined with an Islamic bank, it can also serve interest-sensitive customers. This situation contributes to both increase service quality and ensuring customer loyalty.

Bank mergers also help increase organizational effectiveness. Merging with another bank also means benefiting from the qualified workforce of that bank. In this context, merging with the bank, which has both successful managers and a solid corporate culture, provides many benefits. This is also very important for technological development. In case of a merger with a bank with a strong technological infrastructure, it will be possible for the new bank to have robust technology. Bank mergers can also provide some benefits in terms of agility so that it can be possible to increase the efficiency of the bank. Bank mergers also include some benefits in terms of research and development performance. In the case of merging with a bank that carries out active research activities, it will be possible to use the information more effectively. Additionally, the more substantial bank resulting from the merger is likely to adapt more successfully to technological developments. Thus, the bank will be able to develop effective new services, which will enable the bank to be more competitive.

One hundred thirty-two different questions are created from these criteria. These questions are asked of five different experts. They have the necessary sufficiency to evaluate these items. Important information about the experts is indicated in Table 3.

Table 3. Details of Experts (STXPs).

Number	Work Area	Educational Background	Work Experience (years)
1	Group Head of Audit	BC + ACAMC	33
2	Associate Director of Financial Advisory	MBA / CFA	13
3	CEO	MBA	25
4	Associate Director	MS	17
5	Asset Management	Bachelor's	13

These people make evaluations by using five different scales. The details of these scales, the degrees, and the fuzzy sets are denoted in Table 4. Additionally, the details of the evaluations are indicated in Table A1 in the appendix of the manuscript.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

Table 4. Scales, degrees and fuzzy numbers.

Scheme.	Degrees	Numerical Scales	QSFNs
NO	.40	1	$[\sqrt{.16}e^{j2\pi..4}, \sqrt{.10}e^{j2\pi..25}, \sqrt{.74}e^{j2\pi..35}]$
LOW	.45	2	$[\sqrt{.20}e^{j2\pi..45}, \sqrt{.13}e^{j2\pi..28}, \sqrt{.67}e^{j2\pi..27}]$
FAIR	.50	3	$[\sqrt{.25}e^{j2\pi..50}, \sqrt{.15}e^{j2\pi..31}, \sqrt{.60}e^{j2\pi..19}]$
STRONG	.55	4	$[\sqrt{.30}e^{j2\pi..55}, \sqrt{.19}e^{j2\pi..34}, \sqrt{.51}e^{j2\pi..11}]$
PERFECT	.60	5	$[\sqrt{.36}e^{j2\pi..6}, \sqrt{.22}e^{j2\pi..37}, \sqrt{.42}e^{j2\pi..03}]$

In the following stage, the average values of the evaluations are computed by considering Equations (20) and (21). The details of these values are demonstrated in Table 5.

Table 5. Average values.

	PBL	MKS	RFS	ISQ	SBS	CTY
PBL		$\begin{bmatrix}\sqrt{.27}e^{j2\pi..51},\\ \sqrt{.15}e^{j2\pi..31},\\ \sqrt{.60}e^{j2\pi..22}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.29}e^{j2\pi..54},\\ \sqrt{.18}e^{j2\pi..33},\\ \sqrt{.54}e^{j2\pi..15}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.33}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.49}e^{j2\pi..11}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.29}e^{j2\pi..54},\\ \sqrt{.18}e^{j2\pi..33},\\ \sqrt{.54}e^{j2\pi..15}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.26}e^{j2\pi..50},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..23}\end{bmatrix}$
MKS	$\begin{bmatrix}\sqrt{.30}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..11}\end{bmatrix}$		$\begin{bmatrix}\sqrt{.26}e^{j2\pi..50},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..23}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.32}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.48}e^{j2\pi..09}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.28}e^{j2\pi..52},\\ \sqrt{.16}e^{j2\pi..32},\\ \sqrt{.58}e^{j2\pi..19}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.29}e^{j2\pi..54},\\ \sqrt{.18}e^{j2\pi..33},\\ \sqrt{.54}e^{j2\pi..15}\end{bmatrix}$
RFS	$\begin{bmatrix}\sqrt{.30}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..11}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.26}e^{j2\pi..50},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..23}\end{bmatrix}$		$\begin{bmatrix}\sqrt{.26}e^{j2\pi..50},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..23}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.24}e^{j2\pi..48},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..22}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.26}e^{j2\pi..50},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..23}\end{bmatrix}$
ISQ	$\begin{bmatrix}\sqrt{.32}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.48}e^{j2\pi..09}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.32}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.48}e^{j2\pi..09}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.24}e^{j2\pi..48},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..22}\end{bmatrix}$		$\begin{bmatrix}\sqrt{.31}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..13}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.36}e^{j2\pi..60},\\ \sqrt{.22}e^{j2\pi..37},\\ \sqrt{.42}e^{j2\pi..03}\end{bmatrix}$
SBS	$\begin{bmatrix}\sqrt{.29}e^{j2\pi..54},\\ \sqrt{.18}e^{j2\pi..33},\\ \sqrt{.54}e^{j2\pi..15}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.30}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..11}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.24}e^{j2\pi..48},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..22}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.32}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.48}e^{j2\pi..09}\end{bmatrix}$		$\begin{bmatrix}\sqrt{.33}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.49}e^{j2\pi..11}\end{bmatrix}$
CTY	$\begin{bmatrix}\sqrt{.32}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.48}e^{j2\pi..09}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.32}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.48}e^{j2\pi..09}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.24}e^{j2\pi..48},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..22}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.33}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.49}e^{j2\pi..11}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.31}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..13}\end{bmatrix}$	
MGP	$\begin{bmatrix}\sqrt{.33}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.49}e^{j2\pi..11}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.28}e^{j2\pi..52},\\ \sqrt{.16}e^{j2\pi..32},\\ \sqrt{.58}e^{j2\pi..19}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.35}e^{j2\pi..59},\\ \sqrt{.21}e^{j2\pi..36},\\ \sqrt{.44}e^{j2\pi..05}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.34}e^{j2\pi..58},\\ \sqrt{.21}e^{j2\pi..36},\\ \sqrt{.46}e^{j2\pi..09}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.31}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..13}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.31}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..13}\end{bmatrix}$
TNF	$\begin{bmatrix}\sqrt{.30}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..11}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.28}e^{j2\pi..52},\\ \sqrt{.16}e^{j2\pi..32},\\ \sqrt{.58}e^{j2\pi..19}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.26}e^{j2\pi..50},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..23}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.33}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.49}e^{j2\pi..11}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.28}e^{j2\pi..52},\\ \sqrt{.16}e^{j2\pi..32},\\ \sqrt{.58}e^{j2\pi..19}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.30}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..11}\end{bmatrix}$
IAH	$\begin{bmatrix}\sqrt{.28}e^{j2\pi..52},\\ \sqrt{.16}e^{j2\pi..32},\\ \sqrt{.58}e^{j2\pi..19}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.27}e^{j2\pi..51},\\ \sqrt{.15}e^{j2\pi..31},\\ \sqrt{.60}e^{j2\pi..22}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.29}e^{j2\pi..54},\\ \sqrt{.18}e^{j2\pi..33},\\ \sqrt{.54}e^{j2\pi..15}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.32}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.48}e^{j2\pi..09}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.29}e^{j2\pi..54},\\ \sqrt{.18}e^{j2\pi..33},\\ \sqrt{.54}e^{j2\pi..15}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.31}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..13}\end{bmatrix}$
FDB	$\begin{bmatrix}\sqrt{.27}e^{j2\pi..52},\\ \sqrt{.16}e^{j2\pi..32},\\ \sqrt{.57}e^{j2\pi..18}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.30}e^{j2\pi..55},\\ \sqrt{.19}e^{j2\pi..34},\\ \sqrt{.51}e^{j2\pi..11}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.24}e^{j2\pi..48},\\ \sqrt{.14}e^{j2\pi..30},\\ \sqrt{.62}e^{j2\pi..22}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.32}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.48}e^{j2\pi..09}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.27}e^{j2\pi..51},\\ \sqrt{.15}e^{j2\pi..31},\\ \sqrt{.60}e^{j2\pi..22}\end{bmatrix}$	$\begin{bmatrix}\sqrt{.33}e^{j2\pi..57},\\ \sqrt{.20}e^{j2\pi..35},\\ \sqrt{.49}e^{j2\pi..11}\end{bmatrix}$

 doi:10.20944/preprints202304.0226.v1

RDP	$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$	$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$	$\left[\sqrt{.27}e^{j2\pi.51},\sqrt{.15}e^{j2\pi.31},\sqrt{.60}e^{j2\pi.22}\right]$	$\left[\sqrt{.31}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.13}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.34}e^{j2\pi.58},\sqrt{.21}e^{j2\pi.36},\sqrt{.46}e^{j2\pi.09}\right]$
NWD	$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.28}e^{j2\pi.52},\sqrt{.16}e^{j2\pi.32},\sqrt{.58}e^{j2\pi.19}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$
	MGP	**TNF**	**IAH**	**FDB**	**RDP**	**NWD**
PBL	$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$	$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$	$\left[\sqrt{.28}e^{j2\pi.52},\sqrt{.16}e^{j2\pi.32},\sqrt{.58}e^{j2\pi.19}\right]$	$\left[\sqrt{.28}e^{j2\pi.52},\sqrt{.16}e^{j2\pi.32},\sqrt{.58}e^{j2\pi.19}\right]$	$\left[\sqrt{.28}e^{j2\pi.52},\sqrt{.16}e^{j2\pi.32},\sqrt{.58}e^{j2\pi.19}\right]$	$\left[\sqrt{.28}e^{j2\pi.52},\sqrt{.16}e^{j2\pi.32},\sqrt{.58}e^{j2\pi.19}\right]$
MKS	$\left[\sqrt{.27}e^{j2\pi.51},\sqrt{.15}e^{j2\pi.31},\sqrt{.60}e^{j2\pi.22}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$	$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$
RFS	$\left[\sqrt{.29}e^{j2\pi.54},\sqrt{.18}e^{j2\pi.33},\sqrt{.54}e^{j2\pi.15}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.27}e^{j2\pi.51},\sqrt{.15}e^{j2\pi.31},\sqrt{.60}e^{j2\pi.22}\right]$	$\left[\sqrt{.28}e^{j2\pi.52},\sqrt{.16}e^{j2\pi.32},\sqrt{.58}e^{j2\pi.19}\right]$	$\left[\sqrt{.31}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.13}\right]$	$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$
ISQ	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.29}e^{j2\pi.54},\sqrt{.18}e^{j2\pi.33},\sqrt{.54}e^{j2\pi.15}\right]$	$\left[\sqrt{.25}e^{j2\pi.50},\sqrt{.15}e^{j2\pi.31},\sqrt{.60}e^{j2\pi.19}\right]$	$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$	$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$	$\left[\sqrt{.28}e^{j2\pi.52},\sqrt{.16}e^{j2\pi.32},\sqrt{.58}e^{j2\pi.19}\right]$
SBS	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.25}e^{j2\pi.50},\sqrt{.15}e^{j2\pi.31},\sqrt{.60}e^{j2\pi.19}\right]$	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$
CTY	$\left[\sqrt{.23}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.63}e^{j2\pi.23}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.33}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.49}e^{j2\pi.11}\right]$	$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$	$\left[\sqrt{.27}e^{j2\pi.51},\sqrt{.15}e^{j2\pi.31},\sqrt{.60}e^{j2\pi.22}\right]$
MGP		$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$	$\left[\sqrt{.36}e^{j2\pi.60},\sqrt{.22}e^{j2\pi.37},\sqrt{.42}e^{j2\pi.03}\right]$	$\left[\sqrt{.33}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.49}e^{j2\pi.11}\right]$	$\left[\sqrt{.35}e^{j2\pi.59},\sqrt{.21}e^{j2\pi.36},\sqrt{.44}e^{j2\pi.05}\right]$	$\left[\sqrt{.31}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.13}\right]$
TNF	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$		$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$	$\left[\sqrt{.35}e^{j2\pi.59},\sqrt{.21}e^{j2\pi.36},\sqrt{.44}e^{j2\pi.05}\right]$	$\left[\sqrt{.34}e^{j2\pi.58},\sqrt{.21}e^{j2\pi.36},\sqrt{.46}e^{j2\pi.09}\right]$
IAH	$\left[\sqrt{.34}e^{j2\pi.58},\sqrt{.21}e^{j2\pi.36},\sqrt{.46}e^{j2\pi.09}\right]$	$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$		$\left[\sqrt{.27}e^{j2\pi.51},\sqrt{.15}e^{j2\pi.31},\sqrt{.60}e^{j2\pi.22}\right]$	$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$	$\left[\sqrt{.29}e^{j2\pi.54},\sqrt{.18}e^{j2\pi.33},\sqrt{.54}e^{j2\pi.15}\right]$
FDB	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$		$\left[\sqrt{.33}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.49}e^{j2\pi.11}\right]$	$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$
RDP	$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$		$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$	$\left[\sqrt{.30}e^{j2\pi.55},\sqrt{.19}e^{j2\pi.34},\sqrt{.51}e^{j2\pi.11}\right]$		$\left[\sqrt{.32}e^{j2\pi.57},\sqrt{.20}e^{j2\pi.35},\sqrt{.48}e^{j2\pi.09}\right]$
NWD	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.24}e^{j2\pi.48},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.22}\right]$	$\left[\sqrt{.26}e^{j2\pi.50},\sqrt{.14}e^{j2\pi.30},\sqrt{.62}e^{j2\pi.23}\right]$	$\left[\sqrt{.29}e^{j2\pi.54},\sqrt{.18}e^{j2\pi.33},\sqrt{.54}e^{j2\pi.15}\right]$	

In the following section, score values are computed. These values are shown in Table 6.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

Table 6. Score values.

	PBL	MKS	RFS	ISQ	SBS	CTY	MGP	TNF	IAH	FDB	RDP	NWD
PBL	.000	1.276	1.256	1.261	1.241	1.241	1.257	1.257	1.256	1.151	1.291	1.256
MKS	1.236	.000	1.260	1.257	1.244	1.257	1.278	1.310	1.260	1.267	1.267	1.278
RFS	1.236	1.298	.000	1.298	1.290	1.298	1.282	1.260	1.316	1.244	1.304	1.293
ISQ	1.242	1.242	1.290	.000	1.264	1.236	1.241	1.269	1.276	1.257	1.242	1.269
SBS	1.241	1.236	1.290	1.257	.000	1.261	1.253	1.276	1.289	1.253	1.289	1.293
CTY	1.242	1.242	1.289	1.246	1.250	.000	1.243	1.260	1.298	1.246	1.242	1.265
MGP	1.246	1.299	1.245	1.263	1.250	1.250	.000	1.242	1.236	1.261	1.245	1.264
TNF	1.293	1.244	1.298	1.246	1.256	1.236	1.260	.000	1.298	1.236	1.245	1.247
IAH	1.280	1.316	1.269	1.242	1.269	1.250	1.247	1.242	.000	1.295	1.242	1.269
FDB	1.265	1.236	1.289	1.242	1.244	1.246	1.290	1.266	1.260	.000	1.246	1.236
RDP	1.242	1.280	1.265	1.250	1.253	1.247	1.257	1.247	1.236	1.236	.000	1.242
NWD	1.267	1.266	1.290	1.255	1.256	1.253	1.278	1.253	1.290	1.260	1.241	.000

After that, the values are normalized by applying the operations stated in Equations (23) and (24). Table 7 indicates the details of these values.

Table 7. Normalized values.

	PBL	MKS	RFS	ISQ	SBS	CTY	MGP	TNF	IAH	FDB	RDP	NWD
PBL	.000	.090	.089	.089	.088	.088	.089	.089	.089	.082	.091	.089
MKS	.088	.000	.089	.089	.088	.089	.091	.093	.089	.090	.090	.091
RFS	.088	.092	.000	.092	.091	.092	.091	.089	.093	.088	.092	.092
ISQ	.088	.088	.091	.000	.090	.088	.088	.090	.090	.089	.088	.090
SBS	.088	.088	.091	.089	.000	.089	.089	.090	.091	.089	.091	.092
CTY	.088	.088	.091	.088	.089	.000	.088	.089	.092	.088	.088	.090
MGP	.088	.092	.088	.089	.089	.089	.000	.088	.088	.089	.088	.090
TNF	.092	.088	.092	.088	.089	.088	.089	.000	.092	.088	.088	.088

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

IAH	.091	.093	.090	.088	.090	.089	.088	.088	.000	.092	.088	.090
FDB	.090	.088	.091	.088	.088	.088	.091	.090	.089	.000	.088	.088
RDP	.088	.091	.090	.089	.089	.088	.089	.088	.088	.088	.000	.088
NWD	.090	.090	.091	.089	.089	.089	.091	.089	.091	.089	.088	.000

Total relation matrix is created by Equation (25) in the next stage. Table 8 gives information about the total relation matrix.

Table 8. Total relation matrix.

	PBL	**MKS**	**RFS**	**ISQ**	**SBS**	**CTY**	**MGP**	**TNF**	**IAH**	**FDB**	**RDP**	**NWD**
PBL	4.537	4.664	4.693	4.627	4.625	4.613	4.647	4.646	4.686	4.587	4.640	4.655
MKS	4.670	4.634	4.747	4.680	4.678	4.667	4.701	4.702	4.739	4.646	4.691	4.709
RFS	4.731	4.780	4.727	4.744	4.742	4.731	4.763	4.761	4.805	4.706	4.755	4.772
ISQ	4.644	4.689	4.722	4.572	4.653	4.640	4.673	4.674	4.714	4.620	4.664	4.683
SBS	4.678	4.722	4.756	4.687	4.604	4.674	4.707	4.708	4.748	4.652	4.700	4.718
CTY	4.643	4.688	4.721	4.652	4.651	4.558	4.672	4.672	4.714	4.618	4.663	4.681
MGP	4.637	4.684	4.712	4.646	4.645	4.633	4.584	4.664	4.704	4.612	4.656	4.674
TNF	4.656	4.698	4.732	4.662	4.662	4.649	4.683	4.600	4.724	4.627	4.673	4.690
IAH	4.675	4.722	4.750	4.682	4.682	4.669	4.702	4.701	4.660	4.650	4.693	4.712
FDB	4.643	4.686	4.720	4.650	4.650	4.638	4.673	4.671	4.711	4.535	4.662	4.678
RDP	4.623	4.669	4.699	4.631	4.631	4.618	4.652	4.651	4.689	4.597	4.561	4.659
NWD	4.671	4.715	4.747	4.678	4.678	4.665	4.700	4.698	4.740	4.644	4.688	4.625

The sums of rows and columns (D, E) are calculated to create causal direction. For this purpose, Equations (26) and (27) are taken into consideration. Additionally, threshold value is also considered in this process as in Equation (28). Causality relationship between the indicators is indicated in Table 9.

Table 9. Causal Directions.

Impact directions
PBL → (RFS, IAH)
MKS → (RFS, MGP, TNF, IAH, RDP, NWD)
RFS → (PBL, MKS, ISQ, SBS, CTY, MGP, TNF, IAH, FDB, RDP, NWD)
ISQ → (MKS, RFS, IAH, NWD)

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

SBS → (MKS, RFS, ISQ, MGP, TNF, IAH, RDP, NWD)
CTY → (MKS, RFS, IAH)
MGP → (MKS, RFS, IAH)
TNF → (MKS, RFS, MGP, IAH, NWD)
IAH → (MKS, RFS, SBS, MGP, TNF, RDP, NWD)
FDB → (MKS, RFS, IAH)
RDP → (MKS, IAH)
NWD → (MKS, RFS, MGP, TNF, IAH, RDP)

Table 9 demonstrates that resilience with proactive financial strategies is the most influencing factor because it affects all other 11 criteria. This situation gives information that it is a very critical factor in the merger process of the banks. On the other hand, increase in agility and human capital is the most influenced indicator since it is affected by all other factors. This situation also plays a crucial role in the effectiveness of the merger process of the banks. Additionally, the weights of the criteria are stated in Table 10.

Table 10. Weights of the determinants.

	D	E	D+E	D-E	Weighting results	Weighting priorities
PBL	55.622	55.809	111.431	-.186	.0828	11
MKS	56.264	56.350	112.614	-.086	.0836	3
RFS	57.018	56.728	113.746	.290	.0845	1
ISQ	55.947	55.912	111.859	.035	.0831	8
SBS	56.354	55.902	112.256	.452	.0834	5
CTY	55.934	55.754	111.689	.180	.0830	10
MGP	55.851	56.158	112.009	-.307	.0832	7
TNF	56.058	56.149	112.207	-.091	.0833	6
IAH	56.299	56.635	112.934	-.336	.0839	2
FDB	55.918	55.495	111.413	.423	.0827	12
RDP	55.679	56.045	111.724	-.366	.0830	9
NWD	56.249	56.257	112.506	-.008	.0836	4

Table 9 identifies that resilience with proactive financial strategies plays the most critical role in the merger process of the banks because it has the highest weight (.0845). Increases in agility, human capital, and competitive market share also have high weights (.0839 and .0836). Nevertheless, enhancing customer loyalty, increasing profitability and information enhancements of the customers, and doing business have lower importance than the others in this process. Table 11 below sorts KPIs according to their impact factor.

Table 11. KPIs Impact Factor Ranking.

KPI	CODE	Impact Factor
Resilience with proactive financial strategies	RFS	11
Satisfying customer needs with Islamic banking services	SBS	8
Increase in Agility and Human Capital	IAH	7
Competitive market Share	MKS	6
New generation banking services for sustainable financial development	NWD	6
Technical requirements including technogical and Organizational Infrastructure	TNF	5
Improvements in Service Quality	ISQ	4

 doi:10.20944/preprints202304.0226.v1

Enhancing Customer Loyalty	CTY	3
Managerial & Organizational competencies	MGP	3
Information Enhancements of the Customers and Doing Business	FDB	3
Future Readiness and Adoptability	RDP	2
Continuity of Profit	PBL	2

5. Discussion

Resilience with proactive financial strategies is the most essential criterion for bank mergers. Bank merger is already a very complex and challenging process in most regulation systems. Taking proactive financial strategies with strong managerial instincts would help improve the resilience of the merged bank in both the short and long terms (Bakir, 2013). A robust and well-thought-out initial financial strategy merged bank can eliminate most potential risks and structural disruptions.

Moreover, a clear financial strategy will ensure the operations' stability and continuity in most scenarios. Moreover, stakeholders such as customers, investors, and regulators take an extremely close look at the financial resilience of the merged bank for the initial stages to make their decisions about plans. Having robust and precise financial strategies will ensure investor and customer retention while the spotlights are on the merged bank.

Furthermore, having a robust financial strategy means considering potential challenges when integrating two banks (Indupurnahayu et al., 2022). For example, the existing debt of the two institutions, the alignment of Islamic and conventional business systems, and the different risk management approaches of the two systems are potential challenges for such a merger. A robust financial strategy would and should include the worst- and best-case scenarios for all these potential challenges.

In addition, having proactive financial strategies would also predict possible opportunities and design the best path for making the most out of them (Khan et al., 2020). In the case of this merger, increased market share, increased economies of scale, and access to new customer segments are critical opportunities for the merged bank. Strategizing these opportunities well is critical for the future resilience of the bank. For this, the financial plan must include the allocation of resources, optimization of the operations, and achieving the desired synergies between the two financial systems (Markman & Venzin, 2014).

Therefore, the resilience that comes from a proactive financial strategy is the most essential KPI for bank mergers. It helps mitigate potential risks and enhance the chances of achieving the planned outcomes in any scenario.

Secondly, satisfying customer needs with Islamic banking services takes place with an impact on eight other KPIs. In the case of Islamic finance customers, satisfying their needs is crucial for the continuity of the merged bank (Ahmed et al., 2021). Customer loyalty and retention are critical in a merger integration process, as a loss in customer loyalty would result in a necessary amount of profit reductions (Farah, 2017). Although such a loss would be eliminated in the short term, it certainly will be vital for the bank's long-term success. As Islamic banking services differentiate from conventional, customers who prefer Islamic banking products have different needs and expectations compared to their conventional counterparts. Therefore, for a successful merger, the merged entity must clearly understand the needs of both customer groups. Such a strategy would carefully keep the financial products within their Shariah-compatible lines for Islamic bank customers and stay competitive in their rates for conventional bank customers.

Satisfying the needs of both customer groups will ensure the merged bank has a reputation in the market, maintain customer loyalty and retention, and increase the chance of having a competitive advantage over other banks in the market (Ahmed et al., 2021).

Increase in Agility and Human Capital takes the third place by impacting over seven other KPIs in the results. Certainly, agility and human capital are the primary tools for a merged bank to effectively navigate the challenges and opportunities explained in previous paragraphs. In a bank merger, an increase in agility can empower the merged bank to better respond to the changes in the finance business and the storms in today's financial volatility (Alkhazali et al., 2020). Moreover, high

agility will ensure the responsive attitude of the bank in a change of regulations or competition level in the industry. Such an attitude will increase the competitiveness of the merged entity in the banking market (Chen & Vashishtha, 2017).

In the same way, solid and skilled human capital plays a critical role in the smooth integration of the two banks. A substantial investment in human capital will ensure the inclusion of the required skills in the employees (Hassan & Lukman, 2020). In the investigated bank merger case, an employee of the merged bank should have enough knowledge and experience in Islamic finance and Shariah rulings to keep the business and products within the permissible borders. In the case of Islamic banks, the workforce should be trained in the principles of Islamic finance, such as the details and limitations of interest-based transactions and the promotion of risk-sharing. Ensuring the merged entity employee knowledge will help other strategies, such as having a proactive financial strategy or customer loyalty and retention. Moreover, a skilled workforce will effectively manage risks, provide high-quality customer service, and ensure the high financial performance of the bank (Kjan et al., 2020). Therefore, an increase in agility and human capital appears to be one of the most important KPIs for a bank merger.

On the flip side, some other KPIs appear to have less priority for a bank merger. Starting the continuity of profit, which impacts only two other KPIs, has the most negligible effect on the bank merger. Continuity of profit is unquestionably vital for the existence of the merged bank. However, analysis results show that the two KPIs it impacts are resilience with proactive financial strategies and an Increase in Agility and Human Capital, which are the most critical KPIs in the overall results. This concludes that if a proactive financial plan and strong workforce are ensured, a continuous profit stream will inevitably result in success (Bikker & Bos, 2008). In any case, focusing on the quality of the work output instead of the profit itself matters for the success of almost any kind of entity. Therefore, continuity to profit is not less important than others, but it is expected to be the result of the most critical KPIs in the merged bank.

In the same way, future readiness and adaptability have a shallow impact factor with very similar reasoning. A clear strategic plan should naturally include the agility for the changes in the future marketplace (Bajaj, 2009). All mentioned KPIs with strong impact require a future-ready entity to stay competitive in the marketplace and to ensure customer retention.

Lastly, four KPIs' competitive market share, new generation banking services for sustainable financial development, technical requirements including technological and organizational infrastructure, and improvements in service quality appears to have a mid-level impact on a bank merger. These KPIs should be included in the mid-and long-term plans of the merged entity for the business success, depending on the current level of the bank in each of them.

Considering the positioning of each criterion, the merged entity should have short-term and long-term plans to improve them. For the short term, it would be appropriate the focus on essential criteria for the business's success.

Starting from resilience with proactive financial strategies, the bank should develop and implement a comprehensive financial plan. Such a financial plan must include risk management strategies. The bank should review and improve the risk management processes and systems because Islamic and conventional banks have very different risk management approaches. The merged bank should align the risk management per the Islamic Law requirements. Furthermore, the bank may explore new ways of revenue streams such as investment banking or wealth management services. Increased human capital and economies of scale would be an excellent opportunity for expanding the business into these areas. In order to stay resilient, the bank must also monitor the financial environment closely. The bank must proactively adjust its businesses and strategies in response to the financial world's trends, volatility, and risks.

Moreover, the merged entity must focus on providing high-quality Islamic banking services to meet their needs and expectations. The bank must offer investment and financing products that are Shariah compliant while improving customer awareness about Islamic finance. Keeping the products high quality and compatible is also crucial for customer retention in the near future.

The bank must invest in its agility and human capital to achieve all these. The employee must be trained carefully about the new business style, and the organizational structure must be improved to stay flexible and responsive. Moreover, investing in technology will keep the bank competitive and ready for the future.

In longer terms, the bank is suggested to focus on profit continuity. Diversifying the revenue streams will help in this matter critically. Expansion into new markets and optimizing the cost structure are two critical factors for the profit structure of the bank. Moreover, the bank must be ready for future changes in the financial world. Long term plan of the merged bank must include the adoption strategies for fintech and digitalization tools. Investing in technology and digital solutions is critical for having the required infrastructure when needed. To ensure a competitive advantage, the bank must stay ahead of the regulatory changes and include those related to Islamic finance to ensure compliance and maintain its position in the market. Continuous development of new products and services to meet the evolving needs of modern customers should be at the center point of this strategy. Lastly, the bank must prioritize improving the information and knowledge available to the customers and improving the ease of doing business. Educating customers about Islamic financial products will increase awareness and increase the number of customers with a reason to work with Islamic banks only. Moreover, today's customers are very precise about what they want (Aysan et al., 2022). Strong and smooth software, light-speed-fast transactions, and digital solutions will ensure customer satisfaction and loyalty.

Overall, the criteria derived from the results of this study are beneficial in building short- and long-term plans for the merged bank. The impact factor of the criteria locates each of them in the short- or long-term lists. More important criteria are critical in the short term to ensure the business is compatible and in the game. Other criteria are located in the long-term plans for the perfection and enhancement of the business in the marketplace.

6. Conclusion

The findings of this study are substantial because they provide a multi-dimensional and comprehensive analysis of the merger of an Islamic and a conventional bank in the Qatari financial system. The study offers a unique and critical perspective on the opportunities and challenges of bank mergers in different markets by utilizing a balanced scorecard approach and incorporating a quantum spherical fuzzy decision-making methodology.

One of the study's key results is the importance of considering different dimensions in a bank merger process, such as financial planning, customer satisfaction and retention, operational efficiency, and human capital. Investigating the relevance of each criterion in terms of the impact on the merger process will ease the evaluation and prioritization of the strategic plans for the M&A processes in the future (Alkhazali et al., 2020). From this perspective, this study has a function of guidelines for future bank mergers, including their short- and long-term business plans.

Another critical insight is the potential of M&A strategies for expanding the Islamic finance sector. Results of the study show that mergers increase the market competitiveness and overall size of Islamic banks, giving them a more substantial hand in the future market. As a successful example of Islamic and conventional bank mergers, Masraf Al-Rayan & Al-Khalij Commercial union can set the standards for future mergers. Moreover, several policy recommendations for all stakeholders can be derived from the lessons taken from the merger and this study.

Policy recommendations for regulators would include several vital points. To start with the most important one, regulators must promote financial stability and encourage the merged bank to implement its strategies in this path. Risk management frameworks and contingency planning should be regulated for the safest levels of financial system stability.

Moreover, encouraging transparency in the merger process, including disclosing relevant documents and information related to the financial and operational aspects, will be vital to prepare guidelines for future mergers (Chen & Vashishtha, 2017). With this encouragement, more data from the merger experience could be derived so that future mergers would include fewer potential risks.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

Furthermore, since less competition in the banking sector is often perceived negatively in the current regulatory environment, regulators must promote competition and not let banks merge and excessively control a financial system, such as the examples during the 2008 sub-prime crisis in the U.S. market.

On the other side, investors must research the merger process well to decide whether to continue their investment or withdraw. The strategic rationale of the merger, the financial health of the merged bank, and the current market environment are some of the main factors that would directly affect the stock prices of the merged bank. Lastly, investors would be safer diversifying their portfolio more during the merger process and the short term after it to minimize quick losses. With the close follow-up and research, investors would safely ensure their investment in the merged bank are well-informed, diversified, and managed effectively.

Lastly, top executives of the merged bank should be well aware of the implementation details of all financial and strategic merger plans, as minor mistakes during this process would bring devastating results later. They also must push the human capital transformation to be quick and successful enough to ensure a smooth shifting of the business.

In conclusion, this study provides insightful details for practitioners, regulators, executives, and investors in the Islamic finance industry. Moreover, the paper highlights the usefulness of the balanced scorecard approach for analyzing critical processes such as M&As. The study's results demonstrate the potential benefits of utilizing quantum spherical fuzzy decision-making methodology for strategizing short-term and long-term plans for a challenging merger process and the merged entity. Ultimately, the insights and recommendations from the paper support the growth and development of the Islamic finance sector and encourage future M&As with safer guidelines for the best outcome for all stakeholders.

Appendices

Table A1. Evaluations.

STXP 1												
	PBL	**MKS**	**RFS**	**ISQ**	**SBS**	**CTY**	**MGP**	**TNF**	**IAH**	**FDB**	**RDP**	**NWD**
PBL		FAIR	STRONG	PERFECT	STRONG	FAIR	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG
MKS	STRONG		STRONG	STRONG	STRONG	FAIR	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG
RFS	STRONG	STRONG		STRONG	STRONG	STRONG	PERFECT	STRONG	STRONG	STRONG	PERFECT	PERFECT
ISQ	STRONG	STRONG	STRONG		PERFECT	PERFECT	FAIR	STRONG	STRONG	STRONG	STRONG	STRONG

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

SBS	STRONG	STRONG	STRONG	STRONG		PERFECT	STRONG	STRONG	STRONG	STRONG	STRONG	PERFECT
CTY	STRONG	STRONG	STRONG	STRONG	FAIR		FAIR	STRONG	STRONG	STRONG	STRONG	STRONG
MGP	PERFECT	STRONG	PERFECT	PERFECT	STRONG	STRONG		STRONG	PERFECT	PERFECT	PERFECT	PERFECT
TNF	PERFECT	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG		STRONG	STRONG	PERFECT	PERFECT
IAH	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG		STRONG	STRONG	STRONG
FDB	STRONG	STRONG	STRONG	STRONG	FAIR	STRONG	STRONG	FAIR	STRONG		STRONG	STRONG
RDP	STRONG	PERFECT	STRONG	STRONG	STRONG	PERFECT	STRONG	STRONG	STRONG	STRONG		STRONG
NWD	STRONG	FAIR	STRONG	FAIR	FAIR	STRONG	STRONG	FAIR	STRONG	STRONG	STRONG	

STXP 2

	PBL	**MKS**	**RFS**	**ISQ**	**SBS**	**CTY**	**MGP**	**TNF**	**IAH**	**FDB**	**RDP**	**NWD**
PBL		STRONG	STRONG	FAIR	STRONG	FAIR	FAIR	FAIR	LOW	FAIR	FAIR	FAIR
MKS	STRONG		FAIR	FAIR	FAIR	FAIR	FAIR	FAIR	FAIR	LOW	LOW	LOW
RFS	STRONG	STRONG		STRONG	LOW	STRONG	FAIR	FAIR	PERFECT	STRONG	PERFECT	STRONG

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

ISQ	STRONG	STRONG	LOW		STRONG	PERFECT	FAIR	FAIR	FAIR	FAIR	STRONG	FAIR
SBS	FAIR	STRONG	LOW	FAIR		FAIR	FAIR	FAIR	FAIR	LOW	FAIR	STRONG
CTY	STRONG	STRONG	FAIR	STRONG	STRONG		FAIR	FAIR	STRONG	STRONG	STRONG	STRONG
MGP	PERFECT	PERFECT	PERFECT	PERFECT	FAIR	PERFECT		STRONG	PERFECT	PERFECT	PERFECT	PERFECT
TNF	STRONG	STRONG	STRONG	STRONG	FAIR	STRONG	FAIR		STRONG	STRONG	PERFECT	PERFECT
IAH	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG		FAIR	STRONG	STRONG
FDB	STRONG	STRONG	FAIR	STRONG	FAIR	STRONG	LOW	FAIR	FAIR		STRONG	STRONG
RDP	STRONG	STRONG	STRONG	FAIR	FAIR	STRONG	FAIR	STRONG	STRONG	STRONG		STRONG
NWD	STRONG	FAIR	LOW	LOW	LOW	FAIR	LOW	LOW	LOW	FAIR	FAIR	

STXP 3

	PBL	**MKS**	**RFS**	**ISQ**	**SBS**	**CTY**	**MGP**	**TNF**	**IAH**	**FDB**	**RDP**	**NWD**
PBL		STRONG	STRONG	PERFECT	STRONG	FAIR	PERFECT	PERFECT	STRONG	STRONG	STRONG	STRONG
MKS	STRONG		STRONG	PERFECT	STRONG	FAIR	PERFECT	PERFECT	STRONG	STRONG	STRONG	STRONG

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

RFS	STRONG	STRONG		STRONG	STRONG	STRONG	PERFECT	STRONG	STRONG	STRONG	PERFECT	PERFECT
ISQ	STRONG	STRONG	STRONG		PERFECT	PERFECT	FAIR	PERFECT	STRONG	STRONG	STRONG	PERFECT
SBS	STRONG	STRONG	STRONG	STRONG		PERFECT	STRONG	STRONG	STRONG	STRONG	STRONG	PERFECT
CTY	STRONG	STRONG	STRONG	PERFECT	STRONG		FAIR	STRONG	STRONG	STRONG	STRONG	STRONG
MGP	STRONG	STRONG	PERFECT	PERFECT	STRONG	STRONG		STRONG	PERFECT	STRONG	STRONG	STRONG
TNF	PERFECT	STRONG	STRONG	PERFECT	STRONG	STRONG	STRONG		STRONG	STRONG	STRONG	PERFECT
IAH	PERFECT	PERFECT	PERFECT	PERFECT	PERFECT	PERFECT	PERFECT	PERFECT		PERFECT	PERFECT	PERFECT
FDB	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG		STRONG	STRONG
RDP	STRONG	PERFECT	STRONG	STRONG	STRONG	PERFECT	PERFECT	PERFECT	STRONG	STRONG		STRONG
NWD	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	STRONG	

STXP 4

	PBL	**MKS**	**RFS**	**ISQ**	**SBS**	**CTY**	**MGP**	**TNF**	**IAH**	**FDB**	**RDP**	**NWD**

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

PBL		NO	STRONG	PERFECT	STRONG	FAIR	STRONG	STRONG	FAIR	STRONG	NO	STRONG
MKS	STRONG		LOW	PERFECT	FAIR	PERFECT	LOW	NO	LOW	PERFECT	PERFECT	LOW
RFS	STRONG	NO		NO	NO	NO	FAIR	LOW	NO	FAIR	LOW	LOW
ISQ	PERFECT	PERFECT	NO		FAIR	PERFECT	FAIR	LOW	NO	PERFECT	PERFECT	FAIR
SBS	STRONG	STRONG	NO	PERFECT		PERFECT	FAIR	NO	NO	FAIR	N	LOW
CTY	PERFECT	STRONG	NO	PERFECT	PERFECT		LOW	LOW	NO	PERFECT	PERFECT	LOW
MGP	STRONG	NO	PERFECT	PERFECT	PERFECT	STRONG		PERFECT	PERFECT	PERFECT	PERFECT	FAIR
TNF	LOW	FAIR	NO	PERFECT	STRONG	STRONG	LOW		NO	STRONG	PERFECT	STRONG
IAH	LOW	NO	FAIR	STRONG	FAIR	FAIR	PERFECT	STRONG		NO	STRONG	LOW
FDB	LOW	STRONG	NO	PERFECT	STRONG	PERFECT	NO	NO	LOW		PERFECT	STRONG
RDP	PERFECT	LOW	LOW	PERFECT	FAIR	PERFECT	PERFECT	PERFECT	STRONG	STRONG		STRONG

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 April 2023 doi:10.20944/preprints202304.0226.v1

NWD	PERFECT	LOW	NO	LOW	STRONG	FAIR	NO	FAIR	NO	LOW	STRONG	
STXP 5												
	PBL	**MKS**	**RFS**	**ISQ**	**SBS**	**CTY**	**MGP**	**TNF**	**IAH**	**FDB**	**RDP**	**NWD**
PBL		STRONG	LOW	STRONG	FAIR	STRONG	PERFECT	PERFECT	STRONG	LOW	PERFECT	LOW
MKS	STRONG		LOW	STRONG	STRONG	STRONG	LOW	NO	LOW	STRONG	STRONG	NO
RFS	STRONG	NO		NO	NO	NO	LOW	LOW	NO	FAIR	LOW	LOW
ISQ	STRONG	STRONG	NO		FAIR	PERFECT	LOW	STRONG	LOW	PERFECT	STRONG	LOW
SBS	STRONG	STRONG	NO	PERFECT		STRONG	LOW	LOW	NO	FAIR	NO	LOW
CTY	STRONG	PERFECT	NO	STRONG	STRONG		LOW	LOW	NO	PERFECT	STRONG	LOW
MGP	STRONG	LOW	STRONG	FAIR	STRONG	FAIR		STRONG	PERFECT	FAIR	PERFECT	FAIR
TNF	LOW	FAIR	NO	STRONG	LOW	STRONG	LOW		NO	STRONG	PERFECT	STRONG
IAH	LOW	NO	LOW	STRONG	LOW	STRONG	PERFECT	STRONG		LOW	STRONG	FAIR

FDB	LOW	STRONG	NO	STRONG	FAIR	PERFECT	NO	LOW	LOW		PERFECT	STRONG
RDP	STRONG	FAIR	LOW	STRONG	LOW	STRONG	STRONG	PERFECT	STRONG	STRONG		PERFECT
NWD	LOW	NO	NO	LOW	STRONG	LOW	LOW	STRONG	NO	LOW	STRONG	

References

1. Abbot Jr, H. W. (1929). The Merger Movement Among New York Banks. Bankers' Magazine (1896-1943), 119(2), 307.
2. Abdullah, L., & Zulkifli, N. (2015). Integration of fuzzy AHP and interval type-2 fuzzy DEMATEL: An application to human resource management. *Expert Systems with Applications*, *42*(9), 4397-4409.
3. Afthanorhan, A., Awang, Z., Rashid, N., Foziah, H., & Ghazali, P. (2019). Assessing the effects of service quality on customer satisfaction. Management Science Letters, 9(1), 13-24.
4. Ahmed, A. D., Saleh, M.B., & Ibrahim, M. (2015). Assessment of the non-financial measures of performance in deposit money banks in Nigeria. Journal of Accounting and Taxation, 7(8), 131- 136. http://dx.doi.org/10.5897/JAT2015.0188.
5. Ahmed, M., & Ahmed, Z. (2014). Mergers and acquisitions: Effect on financial performance of manufacturing companies of Pakistan. Middle-East Journal of Scientific Research, 21(4), 689-699.
6. Ahmed, S., Mohiuddin, M., Rahman, M., Tarique, K. M., & Azim, M. (2021). The impact of Islamic Shariah compliance on customer satisfaction in Islamic banking services: mediating role of service quality. Journal of Islamic Marketing.
7. Ali, H., Zainuddin, A., Rashid, W. E. W., & Jusoff, K. (2009). Customers satisfaction in Malaysian Islamic banking. International Journal of Economics and Finance, 1(1), 197-202.
8. Alkhazali, Z., Abu-Rumman, A., Khdour, N., & Al-Daoud, K. (2020). Empowerment, HRM practices and organizational performance: a case study of Jordanian commercial banks. Entrepreneurship and Sustainability Issues, 7(4), 2991.
9. Al-Sharkas, A. A., Hassan, M. K., & Lawrence, S. (2008). The impact of mergers and acquisitions on the efficiency of the US banking industry: further evidence. Journal of Business Finance & Accounting, 35(1-2), 50-70.
10. Amin, M., Isa, Z., & Fontaine, R. (2011). The role of customer satisfaction in enhancing customer loyalty in Malaysian Islamic banks. The Service Industries Journal, 31(9), 1519-1532.
11. Anyanwu, S. A. C., & Agwor, T. C. (2015). Impact of mergers and acquisitions on the performance of manufacturing firms in Nigeria. An International Multidisciplinary Journal, 9(2), 156-165. http://dx.doi.org/10.4314/afrrev.v9i2.12.
12. Ashraf, S., Abdullah, S., Mahmood, T., Ghani, F., & Mahmood, T. (2019). Spherical fuzzy sets and their applications in multi-attribute decision making problems. *Journal of Intelligent & Fuzzy Systems*, *36*(3), 2829-2844.
13. Aysan, A. F., Belatik, A., Unal, I. M., & Ettaai, R. (2022). Fintech strategies of Islamic banks: a global empirical analysis. FinTech, 1(2), 206-215.
14. Aysan, A. F., Bergigui, F., & Disli, M. (2021). Using blockchain-enabled solutions as SDG accelerators in the international development space. Sustainability, 13(7), 4025.
15. Aysan, A. F., & Disli, M. (2019). Small business lending and credit risk: Granger causality evidence. Economic Modelling, 83, 245-255.
16. Aysan, A., Pang, G., & Véganzonès-Varoudakis, M. A. (2009). Uncertainty, economic reforms and private investment in the Middle East and North Africa. Applied Economics, 41(11), 1379-1395.
17. Bajaj, H. (2009). Organizational culture in bank mergers & acquisitions. Indian Journal of Industrial Relations, 229-242.
18. Bakir, C. (2013). Bank behavior and resilience: The effect of structures, institutions and agents. Springer.

19. Bawani, M. A., Ghias, K., & Ahmed, I. (2016). Post Merger Performance of the KsE Listed, selected Banks of Pakistan. Journal of Business Strategies, 10(2), 85.
20. Behn, B. K., & Riley Jr, R. A. (1999). Using nonfinancial information to predict financial performance: The case of the US airline industry. Journal of Accounting, Auditing & Finance, 14(1), 29-56.
21. Belkhaoui, S., Lakhal, L., Lakhal, F., & Hellara, S. (2014). Market structure, strategic choices and bank performance: a path model. Managerial Finance.
22. Berger, A. N., & Bouwman, C. H. (2013). How does capital affect bank performance during financial crises?. Journal of financial economics, 109(1), 146-176.
23. Bikker, J., & Bos, J. W. (2008). Bank Performance: A theoretical and empirical framework for the analysis of profitability, competition and efficiency. Routledge.
24. Bilal, A., Zia, U. R., leeb, Q., & Asad, S. (2010). Determinants of customer loyalty in the banking sector: The case of Pakistan. African Journal of Business Management, 4(6), 1040-1047.
25. Brueller, N. N., Carmeli, A., & Markman, G. D. (2018). Linking merger and acquisition strategies to postmerger integration: A configurational perspective of human resource management. Journal of Management, 44(5), 1793-1818.
26. Carletti, E., Hartmann, P., & Spagnolo, G. (2007). Bank mergers, competition, and liquidity. Journal of Money, Credit and Banking, 39(5), 1067-1105.
27. Çetin, M., Karabay, M. E., & Efe, M. N. (2012). The effects of leadership styles and the communication competency of bank managers on the employee's job satisfaction: the case of Turkish banks. Procedia-Social and Behavioral Sciences, 58, 227-235.
28. Chang, B., Chang, C. W., & Wu, C. H. (2011). Fuzzy DEMATEL method for developing supplier selection criteria. *Expert systems with Applications*, *38*(3), 1850-1858.
29. Chen, Q., & Vashishtha, R. (2017). The effects of bank mergers on corporate information disclosure. Journal of Accounting and Economics, 64(1), 56-77.
30. Chen, Q., & Vashishtha, R. (2017). The effects of bank mergers on corporate information disclosure. Journal of Accounting and Economics, 64(1), 56-77.
31. Cleverley, W. O. (1990). Improving financial performance: a study of 50 hospitals. Hospital & health services administration, 35(2), 173-188.
32. Coelho, P. S., & Henseler, J. (2012). Creating customer loyalty through service customization. European Journal of Marketing.
33. Coelho, P. S., & Henseler, J. (2012). Creating customer loyalty through service customization. European Journal of Marketing.
34. Corbet, S., Cumming, D. J., Hou, Y. G., Hu, Y., & Oxley, L. (2022). Have crisis-induced banking supports influenced European bank performance, resilience and price discovery?. Journal of International Financial Markets, Institutions and Money, 78, 101566.
35. Correa, R., 2006. Essays on financial integration. Ph.D. Thesis, Columbia University, the USA.
36. Davis, S. (2000). Bank mergers: lessons for the future. Springer.
37. DeLong, G., & DeYoung, R. (2007). Learning by observing: Information spillovers in the execution and valuation of commercial bank M&As. The journal of Finance, 62(1), 181-216.
38. Demirgüç-Kunt, A., & Huizinga, H. (2000). Financial structure and bank profitability. Available at SSRN 632501.
39. Demirguc-Kunt, A., & Levine, R. (2000, October). Bank concentration: cross-country evidence. In World Bank Global Policy Forum Working Paper. Piloff, S. J., & Santomero, A. M. (1998). The value effects of bank mergers and acquisitions. In Bank Mergers & Acquisitions (pp. 59-78). Springer, Boston, MA.
40. Ehigie, B. O. (2006). Correlates of customer loyalty to their bank: a case study in Nigeria. International Journal of bank marketing.
41. Farah, M. F. (2017). Consumers' switching motivations and intention in the case of bank mergers: a cross-cultural study. International Journal of Bank Marketing.
42. Fauzi, H., Svensson, G., & Rahman, A. (2010). Triple bottom line as sustainable corporate performance: A proposition for the future. Sustainability, 2(5), 1345-1360. http://dx.doi.org/10.3390/su2051345.
43. Fry, J. N., Shaw, D. C., Von Lanzenauer, C. H., & Dipchand, C. R. (1973). Customer loyalty to banks: a longitudinal study. The Journal of Business, 46(4), 517-525.
44. Gur, N., Babacan, M., Aysan, A. F., & Suleyman, S. (2023). Firm Size and Financing Behavior during COVID-19 Pandemic: Evidence from SMEs in Istanbul. Borsa Istanbul Review.
45. Haleem, A. H., & Kevin, L. L. T. (2018). Impact of user competency on accounting information system success: Banking sectors in Sri Lanka. International Journal of Economics and Financial Issues, 8(6), 167.
46. Hassan, Y., & Lukman, R. (2020). Comparative Effects of Pre and Post Bank Mergers and Acquisitions (M&A) on Employee Productivity in Selected Banks in Nigeria. Economic Insights-Trends & Challenges, (2).
47. Hernon, P., Nitecki, D. A., & Altman, E. (1999). Service quality and customer satisfaction: An assessment and future directions. The journal of academic librarianship, 25(1), 9-17.

48. Hickson, D. J., Pugh, D. S., & Pheysey, D. C. (1969). Operations technology and organization structure: An empirical reappraisal. Administrative science quarterly, 378-397.
49. Hirsch Jr, F. A., & Dowdy, J. S. (2009). Whither Wachovia-Wells Fargo Wins the Battle for the Storied North Carolina Banking Institution. NC Banking Inst., 13, 167.
50. Hou, M., Zhang, S., & Xia, J. (2022, July). Quantum fuzzy K-means algorithm based on fuzzy theory. In Artificial Intelligence and Security: 8th International Conference, ICAIS 2022, Qinghai, China, July 15–20, 2022, Proceedings, Part I (pp. 348-356). Cham: Springer International Publishing.
51. Houston, J. F., & Shan, H. (2022). Corporate ESG profiles and banking relationships. The Review of Financial Studies, 35(7), 3373-3417.
52. Houston, J. F., James, C. M., & Ryngaert, M. D. (2001). Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders. Journal of financial economics, 60(2-3), 285-331.
53. Indupurnahayu, I., Nurhayati, I., Endri, E., Marlina, A., Yudhawati, D., & Muniroh, L. (2022). Islamic Bank Merger And Economic Crisis: Event Study Analysis. Quality-Access To Success, 23(187).
54. Kahraman, C. (2021). Decision Making with Spherical Fuzzy Sets. *Studies in Fuzziness and Soft Computing*.
55. Kamukama, N., Kyomuhangi, D. S., Akisimire, R., & Orobia, L. A. (2017). Competitive advantage: Mediator of managerial competence and financial performance of commercial banks in Uganda. African Journal of Economic and Management Studies.
56. Kayacık, M., Dinçer, H., & Yüksel, S. (2022). Using quantum spherical fuzzy decision support system as a novel sustainability index approach for analyzing industries listed in the stock exchange. *Borsa Istanbul Review*, *22*(6), 1145-1157.
57. Khan, Z., Soundararajan, V., & Shoham, A. (2020). Global post-merger agility, transactive memory systems and human resource management practices. Human Resource Management Review, 30(1), 100697.
58. Khan, Z., Soundararajan, V., Wood, G., & Ahammad, M. F. (2020). Employee emotional resilience during post-merger integration across national boundaries: Rewards and the mediating role of fairness norms. Journal of World Business, 55(2), 100888.
59. Khazanchi, D., & Arora, V. (2016). Evaluating Information Technology (IT) Integration Risk Prior to Mergers and Acquisitions (M&A). ISACA journal, 1.
60. Kumar, B. R. (2019). Mergers and Acquisitions by Bank of America. In Wealth Creation in the World's Largest Mergers and Acquisitions (pp. 259-270). Springer, Cham.
61. Kutlu Gündoğdu, F., & Kahraman, C. (2019). Spherical fuzzy sets and spherical fuzzy TOPSIS method. *Journal of intelligent & fuzzy systems*, *36*(1), 337-352.
62. Larsson, R., & Finkelstein, S. (1999). Integrating strategic, organizational, and human resource perspectives on mergers and acquisitions: A case survey of synergy realization. Organization science, 10(1), 1-26.
63. Lee, K. H., & Ullah, S. (2011). Customers' attitude toward Islamic banking in Pakistan. International Journal of Islamic and Middle Eastern Finance and Management.
64. Lenka, U., Suar, D., & Mohapatra, P. K. (2009). Service quality, customer satisfaction, and customer loyalty in Indian commercial banks. The Journal of Entrepreneurship, 18(1), 47-64.
65. Lenka, U., Suar, D., & Mohapatra, P. K. (2009). Service quality, customer satisfaction, and customer loyalty in Indian commercial banks. The Journal of Entrepreneurship, 18(1), 47-64.
66. Lewis, M. K. (2008). In what ways does Islamic banking differ from conventional finance. Journal of Islamic Economics, Banking and Finance (JIEBF), 4(3), 9-24.
67. Li, J., Yüksel, S., Dınçer, H., Mikhaylov, A., & Barykin, S. E. (2022). Bipolar q-ROF hybrid decision making model with golden cut for analyzing the levelized cost of renewable energy alternatives. *IEEE Access*, *10*, 42507-42517.
68. Lin, D., 2009. Two essays in international banking and finance: Cross-border bank mergers and acquisitions, small and premium enterprise financing in transition economies. Ph.D. Thesis, Auburn University, the USA.
69. Lindblom, T., & Von Koch, C. (2002). Cross-border bank mergers and acquisitions in the EU. Service Industries Journal, 22(4), 41-72.
70. Linder, J. C., & Crane, D. B. (1993). Bank mergers: integration and profitability. Journal of Financial Services Research, 7(1), 35-55.
71. Linder, J. C., & Crane, D. B. (1993). Bank mergers: integration and profitability. Journal of Financial Services Research, 7(1), 35-55.
72. Luo, C. M. A., Chang, H. F., & Su, C. H. (2012). 'Balanced Scorecard'as an operation-level strategic planning tool for service innovation. The service industries journal, 32(12), 1937-1956.
73. Maddaus, M. (2020). The resilience bank account: skills for optimal performance. The Annals of Thoracic Surgery, 109(1), 18-25.
74. Manisaligil, A., Gölgeci, İ., Bakker, A. B., Aysan, A. F., Babacan, M., & Gür, N. (2023). Understanding change in disruptive contexts: The role of the time paradox and locus of control. Journal of Business Research, 156, 113491.
75. Markman, G. M., & Venzin, M. (2014). Resilience: Lessons from banks that have braved the economic crisis—And from those that have not. International Business Review, 23(6), 1096-1107.

76. Marshall, R. H. (1960). Bank Mergers and the Nature of Competition in Banking. The American Journal of Economics and Sociology, 20(1), 81-87.
77. Masraf al-Rayan Press News, 2021, Accessed in January 2023. Available at: https://www.alrayan.com/english/media-center/news-and-press-releases/masraf-al-rayan-and-al-khaliji-complete-merger.
78. Mehra, S., 2011. Essays on mergers and acquisitions amongst U.S. Commercial banks: Attributes of merging banks and implications of M&A on bank risk-taking. Ph.D. Thesis, University of Houston, the USA.
79. Metawa, S. A., & Almossawi, M. (1998). Banking behavior of Islamic bank customers: perspectives and implications. International journal of bank marketing.
80. Mufti, O., Parvaiz, G. S., Wahab, M., & Durrani, M. (2016). Human Resource Competencies and Organizational Performance: A Study on Banking Sector Managers in Pakistan. Journal of Managerial Sciences, 10(1).
81. Naser, K., Jamal, A., & Al-Khatib, K. (1999). Islamic banking: a study of customer satisfaction and preferences in Jordan. International journal of bank marketing.
82. Neffati, A., Fredj, I. B., & Schalck, C. (2011). Earnings management and banking performance: a Stochastic-Frontier analysis on US bank mergers. Interdisciplinary Journal of Research in Business, 1(6), 58-65.
83. Oh, H., & Kim, K. (2017). Customer satisfaction, service quality, and customer value: years 2000-2015. International Journal of Contemporary Hospitality Management.
84. Oh, J.H., Peter, L.D., & Johnston, W.J. (2014). Who's acquiring whom: Experimental evidence of firm size effect on Mergers and marketing sales tasks. Industrial Marketing Management, 43(6), 1044. http://dx.doi.org/10.1016/j.indmarman.2014.05.016.
85. Olson, G. T., & Pagano, M. S. (2005). A new application of sustainable growth: A multi-dimensional framework for evaluating the long run performance of bank mergers. Journal of Business Finance & Accounting, 32(9-10), 1995-2036.
86. Palombo, L., 1997. Bank associations and purchases. TBB. Bankacılar Dergisi, 3-4.
87. Panetta, F., Schivardi, F., & Shum, M. (2009). Do mergers improve information? Evidence from the loan market. Journal of Money, Credit and Banking, 41(4), 673-709.
88. Piloff, S. J., & Santomero, A. M. (1998). The value effects of bank mergers and acquisitions. In Bank Mergers & Acquisitions (pp. 59-78). Springer, Boston, MA.
89. Purnamasari, F., Nanda, H. I., Purnamaputra, M. Z., Susanti, M., & Palil, M. R. (2022). Merger In Islamic Banking Sector: A Snap Of Views From Their Customers And Prospective Customers. International Journal of Social Science, 2(4), 1839-1846.
90. Rau, P. R. (2000). Investment bank market share, contingent fee payments, and the performance of acquiring firms. Journal of Financial Economics, 56(2), 293-324.
91. Reinhart, C. M., & Rogoff, K. S. (2013). Banking crises: an equal opportunity menace. Journal of Banking & Finance, 37(11), 4557-4573.
92. Rezitis, A. N. (2008). Efficiency and productivity effects of bank mergers: Evidence from the Greek banking industry. Economic Modelling, 25(2), 236-254.
93. Ringim, K. J., Razalli, M. R., & Hasnan, N. (2012). The relationship between information technology capability and organizational performance of Nigerian banks. International Journal of Business Research and Development, 4(2).
94. Salman, M., Ganie, S. A., & Saleem, I. (2020). Employee competencies as predictors of organizational performance: a study of public and private sector banks. Management and Labour Studies, 45(4), 416-432.
95. Sheidu, A. D., & Yusuf, H. (2015). Bank consolidation and improvement of shareholder value: An empirical evaluation of return on capital employed following bank mergers in Nigeria. American International Journal of Contemporary Research, 5(5) 240 - 246
96. Sherman, M. (2009). A short history of financial deregulation in the United States. Center for economic and policy research, 7.
97. Smith, A. D. (2010). Managerial decisions involving bank mergers and acquisitions within the current recession: case study. International Journal of Electronic Finance, 4(1), 39.
98. Smith, R. C., & Walter, I. (1998). Global patterns of mergers and acquisition activity in the financial service industry. In Bank mergers & acquisitions (pp. 21-36). Springer, Boston, MA.
99. Smolo, E., Jahangir, R., Nagayev, R., & Aysan, A. F. (2023). Performances of leading Islamic finance markets prior to and during the COVID-19 pandemic. Heliyon, e12870.
100. Staikouras, C. K., & Wood, G. E. (2004). The determinants of European bank profitability. International Business & Economics Research Journal (IBER), 3(6).
101. Succi, G., Benedicenti, L., & Vernazza, T. (2001). Analysis of the effects of software reuse on customer satisfaction in an RPG environment. IEEE Transactions on Software Engineering, 27(5), 473-479.
102. Sun, L., Peng, J., Dinçer, H., & Yüksel, S. (2022). Coalition-oriented strategic selection of renewable energy system alternatives using q-ROF DEMATEL with golden cut. *Energy*, *256*, 124606.

103. Sureshchandar, G. S., Rajendran, C., & Anantharaman, R. N. (2002). The relationship between service quality and customer satisfaction–a factor specific approach. Journal of services marketing.
104. Ullah, N. (2022). Impact Of Mergers & Acquisitions On The Operational Performance And Stability Of Islamic And Conventional Banks.
105. Vong, P. I., & Chan, H. S. (2009). Determinants of bank profitability in Macao. Macau Monetary Research Bulletin, 12(6), 93-113.
106. Xu, X., Yüksel, S., & Dinçer, H. (2022). An integrated decision-making approach with golden cut and bipolar Q-ROFSs to renewable energy storage investments. *International Journal of Fuzzy Systems*, 1-14.
107. Zollo, M., & Singh, H. (2004). Deliberate learning in corporate acquisitions: post-acquisition strategies and integration capability in US bank mergers. Strategic management journal, 25(13), 1233-1256.