Journal of Islamic Economics Lariba
(P-ISSN 2477-4839 E-ISSN 2528-3758)
2024, Vol. 10, No. 1, 471-490
https://doi.org/10.20885/jielariba.vol10.iss1.art25

UNIVERSITAS ISLAM INDONESIA

OPEN ACCESS Check for updates

Pre- and post-merger efficiency of Islamic state-owned bank: A case study of Bank Syariah Indonesia

Fifi Hakimi[1], Faricha Maf'ula[1], & Rifyal Zuhdi Gultom[2]
[1]Program Studi Ekonomi Syariah (S1), Universitas Muhammadiyah Lamongan, Lamongan, Indonesia
[2]Program Studi Manajemen Bisnis Syariah (S1), Universitas Muhammadiyah Sumatera Utara, Medan, Indonesia

ABSTRACT

Introduction
The increased development of Islamic banks in Indonesia is one way the government promotes state financial inclusion. On January 27, 2021, the Financial Services Authority (Otoritas Jasa Keuangan) formally granted permission for corporate mergers. Subsequently, on February 1, 2021, BRI Syariah, Bank Syariah Mandiri, and BNI Syariah, three state-owned Islamic banking companies, were officially merged to form Bank Syariah Indonesia. This study evaluates the performance efficiency of these three Islamic banks before and after the merger and compares it to other state-owned conventional banks using the Data Envelopment Analysis (DEA) approach with the BCC model framework.

Objectives
This study aims to compare Bank Syariah Indonesia's efficiency levels before and after the merger and assesses its performance relative to other state-owned conventional banks.

Method
This research utilizes the DEA method with the BCC model to analyze quarterly financial data from March 2019 to March 2023. The inputs considered are total deposits, personal expenses, and fixed assets, whereas the outputs are financing (loans) and income.

Results
The results indicate that Bank Syariah Indonesia is more efficient than other conventional state-owned banks after the merger. However, pre-merger, BRI Syariah and BNI Syariah ranked first in efficiency compared to conventional state-owned banks. The post-merger analysis shows a stable and high-efficiency level for Bank Syariah Indonesia despite fluctuations.

Implications
The findings suggest that the merger improved Bank Syariah Indonesia's performance efficiency, making it a benchmark for state-owned banks. The study highlights the importance of mergers in enhancing efficiency and suggests areas for further improvement, such as risk-mitigation strategies during economic downturns.

JEL Classification:
D24, D31, L10, Z12

KAUJIE Classification:
H34, M42, I7

ARTICLE HISTORY:
Submitted: January 5, 2024
Revised: May 2, 2024
Accepted: May 17, 2024
Published: June 28, 2024

KEYWORDS:
bank efficiency; bank merger; Bank Syariah Indonesia; Islamic bank; state-owned bank

Contact: Fifi Hakimi ✉ fifi_hakimi@umla.ac.id

ABSTRACT

Originality/Novelty
This study provides additional literature on the impact of mergers on the efficiency of Islamic banks in Indonesia. It extends previous studies on Islamic bank mergers by offering insights into performance differences before and after the merger, using Bank Syariah Indonesia as a case study.

CITATION: Hakimi, F., Maf'ula, F., & Gultom, R. Z. (2024). Pre- and post-merger efficiency of Islamic state-owned bank: A case study of Bank Syariah Indonesia. *Journal of Islamic Economics Lariba*, *10*(1), 471-490. https://doi.org/10.20885/jielariba.vol10.iss1.art25

INTRODUCTION

Banking and financial institutions are the core of every country's financial system and act as intermediaries for economic activities (Dinçer & Yüksel, 2020). Banking and financial institutions in Indonesia adhere to a dual banking system, namely conventional and Islamic banks (Nahar et al., 2022). The preponderance of the Muslim population in Indonesia presents a significant opportunity for the development of a Sharia-based financial ecosystem, which is one of the key drivers behind the rise of Islamic banking and financial institutions. The realization of the idea of Islamic bank first appeared in 1991 with the establishment of Bank Muamalat Indonesia as the pioneer of Islamic bank practice in Indonesia (Tyas & Rusydiana, 2021).

The government initiated historical progress in the legality of Islamic banking and finance in Indonesia in 1998, changing Law No. 7 of 1992 to Law No. 10 of 1998, concerning the regulation of Indonesian banking operations with additional Sharia principles. Banks in Indonesia warmly welcomed the issuance of this law, and the Sharia system was used as an opportunity to develop commercial banks in Indonesia. The government issued a specific law concerning Islamic banking on July 16, 2008, based on Law No. 21 of 2008. The birth of this Sharia banking law encouraged commercial banks in Indonesia to develop Sharia business units (*Unit Usaha Syariah,* abbreviated UUS in Bahasa Indonesia). Along with the successful development, some Sharia business units separated themselves from their parent companies to become Islamic commercial banks (*Bank Umum Syariah,* abbreviated as BUS in Bahasa Indonesia). Between 2009 and 2010, as the years of this trend, there was only five Islamic commercial banks. This number improved significantly to 11 in only two years (Nofinawati, 2015).

According to State of the Global Islamic Economy Report 2018/19, Indonesia's Islamic finance industry is still ranked tenth in the world after Brunei, Kuwait, Oman, Jordan, Saudi Arabia, Pakistan, the UAE, Bahrain, and Malaysia (Thomson Reuters & DinarStandard, 2018). With this fact in mind, the government seeks to increase the growth of Islamic Banks in Indonesia with regulations regarding Islamic banking, one of which is the spin-off policy of merging three subsidiary banks of state-owned enterprises (*Badan Usaha Milik Negara* abbreviated BUMN in Bahasa Indonesia): PT

Bank Rakyat Indonesia (Persero) Tbk, PT Bank Mandiri (Persero) Tbk, and PT Bank Negara Indonesia (Persero) Tbk. On January 27, 2021, based on letter Number SR-3/PB.1/2021 and the Decision of the Board of Commissioners Number 4/KDK.03/2021, the Financial Services Authority (*Otoritas Jasa Keuangan* abbreviated OJK in Bahasa Indonesia) officially issued a permit for the merger of these three Islamic banks. The merger was officially and effectively operational on February 1, 2021 (Kusumaningrum et al., 2023; Qibtiyah & Wicaksono, 2022; Ramadhan, 2022).

Previous studies showed that the financial efficiency of Islamic banks in Indonesia had a downward trend in years before the merger of three state-owned Islamic banks (Hata et al., 2020; Rusydiana & Marlina, 2019). By merging these three banks, government policies could be a solution so that the state of Islamic finance can improve and accelerate Islamic financial inclusion in Indonesia. The merger of the three Islamic banks aims to accelerate Indonesia's economic growth and to maintain and improve performance efficiency and productivity (Putri & Ningtyas, 2022; Utari et al., 2022).

Previous studies on the efficiency of BNI Syariah, BRI Syariah, and Bank Syariah Mandiri before the merger into Bank Syariah Indonesia found that the three Islamic banks were inefficient when combined. However, it will be efficient if only two Islamic banks merge: BNI Syariah and BRI Syariah (Octrina & Mariam, 2021; Rusydiana & Marlina, 2019). Hence, this study aims to compare the performance efficiency before and after the merger of these three Islamic banks. Another objective is to compare the performance efficiency of the three state-owned Sharia banks (BNI Syariah, Bank Syariah Mandiri, and BRI Syariah) before being merged in the 2016 – 2019 period and after the merger, which is currently Bank Syariah Indonesia in the 2020 – 2022 period. Therefore, this study hypothesizes that the post-merger effect improves the performance efficiency of Bank Syariah Indonesia.

LITERATURE REVIEW

Efficiency from an Islamic Perspective

The terminology of efficiency in Islam has yet to be discussed in detail. Efficiency is a way to achieve complete optimization. Therefore, Islam teaches that making a profit must be accompanied by great effort (*ikhtiar*). The caveat that achieves this remains by maintaining balance and economic norms, which in this case are based on Islamic economic principles (Cholik, 2013).

Referring to the teachings of the Islamic religion, the Prophet Muhammad SAW taught his friends to always do all work (charity) as effectively and efficiently as possible. With various understandings from him, he and his friends understand how to put the word efficiency in its place (Cholik, 2013). An example of the high authority of the Prophet Muhammad by emphasizing *ihsan* (generosity) and *itqan* (perfection). Even the Prophet Muhammad SAW places a person's Islamic values when a Muslim can optimize his personality as efficiently as possible. In this context, efficiency refers to doing all useful work and abandoning useless work. (Cholik, 2013).

From the above article, the meaning of efficiency, according to Islam, differs from conventional efficiency. From an Islamic perspective, efficiency is not only oriented towards the life of a Muslim, not limited to the world alone, but also the integration of life in this world and the afterlife. Sharia banking also implements This concept of efficiency from an Islamic perspective in practice (Masrizal et al., 2023). This concept of efficiency avoids all forms of waste; therefore, it is highly recommended or mandatory for Islamic banking to implement this efficiency.

Bank Efficiency and Data Envelopment Analysis

Generally, efficiency in a work unit is related to producing the maximum output level with a certain amount of input (Firdaus & Hosen, 2014). Efficiency is defined as a measure of effectiveness without wasting time or energy and accompanied by minimum skills (Tyas & Rusydiana, 2021). Semantically, effectiveness is a term used to characterize an entity's performance, whereas efficiency is concerned with utilizing the least amount of input to provide the best potential result (Jaouadi & Zorgui, 2014). In microeconomics, the theories of production, consumption, and efficiency are closely connected concepts. According to the production efficiency theory, a business is considered to be in good standing when it is able to maximize profits from its production activities and serve as a gauge for its producers. Consumption efficiency theory assumes that customers are able to maximize their utility and happiness (Tyas & Rusydiana, 2021). Optimizing efficiency can also be achieved if the business can minimize inputs to attain the same output level, or in other words, maximize output with fixed inputs (Karim, 2018).

Banking must continually improve its performance as a business-based or profit-oriented financial institution. One way to measure banking business performance is to assess efficiency. In other words, efficiency provides an overview of the performance of Sharia banking. Efficient banking also means that its performance is good, and inefficient banking also does not perform well (Hidayat, 2014). Therefore, efficient banking will indirectly provide confidence that the funds invested will make a profit, as well as have an impact on other sectors related to the bank itself. Meanwhile, inefficient banking does not provide the trust or confidence that the funds invested will obtain profits or results.

The rapid development of the Sharia banking industry makes measuring efficiency in banking and financial institutions very important in its performance. By knowing the efficiency level of Sharia banks, it will be known how much ability they have to optimize all their resources, which can have a greater beneficial impact on society (Karimah et al., 2016). Several approaches can be used to analyze bank efficiency performance, one of which is the intermediation approach, which covers all bank operational actions that channel funds from surplus to deficit units. This approach analyzes Islamic banks' efficiency performance by considering inputs and outputs in their operational activities (Abdul Rahman & Rosman, 2013).

Most researchers examine the performance evaluation of Islamic banking, with the main focus on profitability, which is assisted by financial ratios (Idris et al., 2016;

Mohd Noor et al., 2020). Banking efficiency is usually measured using standard cost and profitability ratios (Nguyen & Pham, 2020). Meanwhile, research conducted by Badruzaman (2020) measured banking performance efficiency using the Total Factor Productivity approach, which measures the relationship between output and several inputs together.

Two methods can be used to measure efficiency performance: non-parametric and parametric methods. The parametric technique measures efficacy by having the model identifying specific parameters of the population or study object. However, the non-parametric technique uses a measurement whose model does not ascertain the parameters of the population that serves as the parent research sample (Hidayah, 2016). If a non-parametric approach is used, Data Envelop Analysis (DEA) and free disabled hull (FDH) methods can be used. For a parametric approach, the analysis can use the following three methods: Stochastic Frontier Approach (SFA), Distribution Free Approach (DFA), and Thick Frontier Approach (TFA) (Hidayat, 2014; Tyas & Rusydiana, 2021).

Based on the findings of Rusydiana & Marlina (2019) using the DEA method, when viewed from the social efficiency level category, Sharia banks with high financial efficiency and social efficiency scores consist of Bank Syariah Mandiri and BNI Syariah. On the other hand, BRI Syariah is situated in a quadrant with poor efficiency, but high social efficiency. According to Rusydiana & Sanrego (2018), Bank Syariah Mandiri is included in quadrant two with an average efficiency value of 65% and an MSI of 0.202 when assessed from the perspective of the *maslahah* efficiency concept. While BNI Syariah is in quadrant four with an MSI of 0.172 and an average efficiency value of 47%, BRI Syariah is in quadrant three with an average efficiency value of 65% and an MSI of 0.208.

There are many previous research relevant to this research (Anagnostopoulos et al., 2020; Badruzaman, 2020; Mohd Noor et al., 2020; Pambuko, 2016; Puteh et al., 2018; Sakti & Mohamad, 2018; Tyas & Rusydiana, 2021) that use the DEA method to analyze the performance efficiency of the Islamic Bank industry by comparing several conventional banks. According to Ben Rejeb & Arfaoui (2019), there is a difference between the efficiency levels in the conventional and Sharia financial market segments, where there is diversity in efficiency between Sharia and conventional financial institutions. This revealed that the differences between the two segments were not 100 percent convincing because, according to Ling et al. (2020), previous findings were conducted in different study periods and from different countries. Ben Rejeb & Arfaoui (2019) reveal that Islamic financial institutions perform better than conventional ones. However, this does not align with Shawtari et al.'s (2018) findings that conventional banks are relatively more stable despite being inefficient. Meanwhile, Sharia and foreign banks are becoming more efficient, while state-owned and private banks are behind in achieving performance-efficiency levels.

Research on the efficiency of Islamic banks compared to conventional banks was carried out by Tyas & Rusydiana (2021) using the period before the merger (2016–2019) of Bank Mandiri Syariah, Bank BNI Syariah, and Bank BRI Syariah, which explained that the three state-owned Sharia banks are still slightly less efficient than conventional banks, one ranking behind Bank BTN, which is ranked first, followed by Bank BNI Syariah. Bank BRI Syariah is ranked eighth and Bank Syariah Mandiri is ranked 12th. After the merger of the three Sharia Banks, which have the largest assets of all Islamic banks in Indonesia, there has been no research on the performance efficiency of Indonesian Sharia Banks. Based on the problem formulation in this research, the hypothesis is that the merger increases the efficiency of Bank Syariah Indonesia's performance.

The Effect of Mergers on Efficiency Bank

A merger is a legal activity in which two or more companies unite to form one legal entity, and companies conduct mergers to increase stability in the operating process. Mergers can change a company's efficiency (Tri & Anh, 2020). Post-merger identities combine resources that enable them to increase the variety of goods and services they offer as well as to develop their technical and human resource capacities. Consequently, many managers view the merger as a tool that can quickly increase profitability at a low point (Tri & Anh, 2020).

Several studies have shown the efficiency impact of bank mergers, Kandil & Chowdhury (2014) found significant differences in the performance of British Islamic Banks pre- and post-merger in the long term, especially in terms of controlling the financial crisis that the UK faced from 2007 to 2010. They also found that the technology industry in Islamic banks that carried out mergers and acquisitions in developed countries had a negative impact on their long-term performance. Meanwhile, the findings of Musah et al. (2020) regarding bank mergers and acquisitions in Ghana had a positive impact on increasing bank assets, but a negative impact on net profit margin and return on equity because after the merger experienced a decline, this proves that the merger and acquisitions do not necessarily improve bank performance.

Tri & Anh (2020) also researched the effect of a merger on post-merger bank performance efficiency and found that post-merger banks in Vietnam did not find significant growth in bank performance efficiency when tested using a production approach. Al-Khasawneh et al. (2020) found in the large and small US merging banks that in comparison to their peer banks, large merging banks typically have similar productivity rankings. By contrast, smaller merging banks saw poorer productivity than their counterparts.

METHOD

This type of research is quantitative in nature. The data in this research are in the form of numbers, which will be analyzed, and conclusions drawn. Quantitative research is a method of obtaining or solving problems faced. It is carried out carefully and systematically using data collected in the form of a series or collection of numbers (Nasehudin & Gozali, 2015). This research data is included in the primary data and supported by secondary data, namely the quarterly financial reports of Bank BRI, Bank BNI, Bank BTPN, and Bank Syariah Indonesia.

This study uses the Data Envelopment Analysis (DEA) method with the BCC model. The DEA method produces efficiency values on a scale of 0-1 (Sabiti et al., 2018). In the DEA approach for DMU or UKE in the banking industry, all input and output samples are marked with n and m, respectively, where n is the input and m is the output. Thus, banking efficiency can be seen by calculating the ratio between output and input using the equation. The model is formulated as follows:

$$e_s = \frac{\sum_{i=1}^{m} u_i y_{is}}{\sum_{j=1}^{n} v_j x_{js}}$$

Where:

e_s = bank efficiency *s*

m = bank *s* observed output

n = bank *s* observed input

y_{is} = The amount of output *i* produced by bank *s*

x_{js} = The amount of output *j* produced by bank *s*

u_i = output ballast

v_j = input ballast

This model was developed by Banker, Charnes, and Cooper (BCC model) in 1984 and is a development of the CCR model. This model assumes that companies must operate on an optimal scale. This model assumes that the ratio between additional input and output is not the same (variable return to scale), meaning that increasing input by x times will not cause output to increase by x times; it could be smaller or larger than x times. The equations in the VRS model are as follows.

Max $$e_s = \sum_{i=1}^{m} u_i y_{is} + U_0$$

$$\sum_{i=1}^{m} u_i y_{ir} - \sum_{j=1}^{m} v_j x_{jr} \le 0 \quad ; r = 1,.., N$$

$$\sum_{j=1}^{m} v_j x_{js} = 1$$

$$u_{i,} v_j \ge 0$$

The company, in this case the bank, will be considered efficient if it has a value of 1, while it will be inefficient if it is less than 1 (close to the value of 0). The samples used in this research are three state-owned Sharia banks that will be merged, namely Bank Syariah Mandiri, Bank BRI Syariah, and Bank BNI Syariah, and conventional state-owned banks, namely Bank Mandiri, Bank BRI, Bank BNI, and Bank BTPN, from March 2019 to March 2023. The type of research used was quantitative research, with data taken from bank financial reports for each period (quarterly).

The next section begins by explaining the inputs and outputs used in this study. The input variables are total deposits, personal expenses, and fixed assets. Financing (loans) and NII (income) were the output variables used. This study uses two models to measure performance efficiency to obtain various options for consideration in the planned merger of state-owned Sharia banks (Tyas & Rusydiana, 2021). The two models include:

1. Comparison of the performance efficiency of each of the three Islamic banks with the performance efficiency of four state-owned conventional banks
2. Comparison of the performance efficiency of state-owned Sharia banks (merger of BRI Syariah, BNI Syariah, and Bank Syariah Mandiri) with that of four state-owned conventional banks.

Several theoretical studies have been conducted on measuring performance efficiency using DEA (Abdul Rahman & Rosman, 2013; Benarda et al., 2016; Khan & Noreen, 2014; Miniaoui & Chaibi, 2014; Najib & Iskandar, 2022; Sabiti et al., 2017; Tuffahati et al., 2019). The analytical tool used in this study was the DEAP 2.1. The method presented in this research measures the performance efficiency of three Sharia banks and four BUMN banks in Indonesia.

RESULTS

Definition of Operational Variables

The financial efficiency of state-owned banks in Indonesia from March 2019 to 2023, obtained based on the DEA in Tables 2 and 3, shows that only a few BUMN banks are consistently efficient in their performance. The majority of conventional banks' financial conditions in this research period lacked efficiency in performance compared to Islamic banks. These differences can be observed in the financial performance results for the output and input variables. The following table shows the differences in the performance of the input and output variables for conventional and Islamic banks:

Table 1

Descriptive Statistics of the Inputs and Outputs, March 2019 – March 2023

Conventional Banks Variables	Average	Standard Deviation	Minimum	Maximum
Input Variables				
Total Deposits	260,702,296	156,670,325	34,159,966	521,039,799
Personal Expenses	7,977,520	6,994,524	681,682	29,960,850
Fixed Assets	16,114,163	9,364,452	2,966,991	29,910,569

Output Variables				
Financing	633,616,866	265,881,727	219,695,414	1,065,324,679
Income	28,301,608	23,290,231	2,179,243	101,004,569
Islamic Banks				
Variables	Average	Standard Deviation	Minimum	Maximum
Input Variables				
Total Deposits	95,932,446	83,823,682	13,263,996	311,061,729
Personal Expenses	2,634,904	2,809,654	168,489	14,548,779
Fixed Assets	3,873,347	3,461,856	74,594	15,373,614
Output Variables				
Financing	63,809,644	55,530,328	9,866,621	225,722,283
Income	8,771,038	9,494,054	481,914	49,303,827

Source: Author's estimations (2023).

Pre-Merger

The Pre-Merger Bank Syariah Indonesia consists of three Sharia Banks, which are subsidiaries of BUMN banks in Indonesia that have the largest assets in the Sharia Bank group in Indonesia. Bank Mandiri Syariah was born in 1999, followed by Bank BNI Syariah in 2000, and Bank BRI Syariah in 2002. The data sample period for the three Sharia Banks and the four BUMN conventional banks used in the research is the quarterly period from the first quarter of 2019 to the fourth quarter of 2020. Using the DEA method, the results show that banks that are very efficient in their performance are BNI Syariah and BRI Syariah. However, Bank Mandiri Syariah still lags third in its level of performance efficiency, with a score of 0.994 after Bank BNI. Meanwhile, Bank BTPN was declared less efficient in this study, with a score of 0.958. The pre-merger efficiency scores are as follows:

Table 2

The Value of the Efficiency Score Pre-Merger

	Mar-19	**Jun-19**	**Sep-19**	**Dec-19**	**Mar-20**	**Jun-20**	**Sep-20**	**Dec-20**	**MEAN**	**Rank**
BSM	1.000	1.000	1.000	1.000	0.970	1.000	0.978	1.000	0.994	3
BNIS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1
BRIS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1
MANDIRI	1.000	1.000	1.000	1.000	1.000	0.955	0.955	0.930	0.980	5
BNI	1.000	0.964	1.000	1.000	1.000	1.000	0.993	1.000	0.995	2
BRI	1.000	1.000	1.000	1.000	1.000	0.967	0.957	0.951	0.984	4
BTPN	1.000	1.000	1.000	0.870	1.000	1.000	0.914	0.881	0.958	6

Source: DEA Output (Data Processed) (2023)

Post-Merger

Post Merger Bank Syariah Indonesia is a merger of three Sharia Banks: Bank BRI Syariah, Bank Syariah Mandiri, and Bank BNI Syariah. The three Sharia Banks officially merged on February 1, 2021 (Bank Syariah Indonesia, 2021, 2023b). The data sample period used in this research is the quarterly period from the first quarter of 2021 to the first quarter of 2023. The data sample also consisted of several conventional BUMN banks. The results show that Bank Syariah Indonesia is an Indonesian state-owned bank with efficient performance, with a score of 0.997. This shows that there was an increase in assets, employee performance, and financing and customer deposit funds at Bank Syariah Indonesia during the merger (Utari et al., 2022), which could increase the efficiency of Sharia Bank's performance. The lowest BUMN bank in this research period was Bank Mandiri, which had a score of 0.970. The pre-merger efficiency score is as follows:

Table 3

The Value of the Efficiency Score Post-Merger

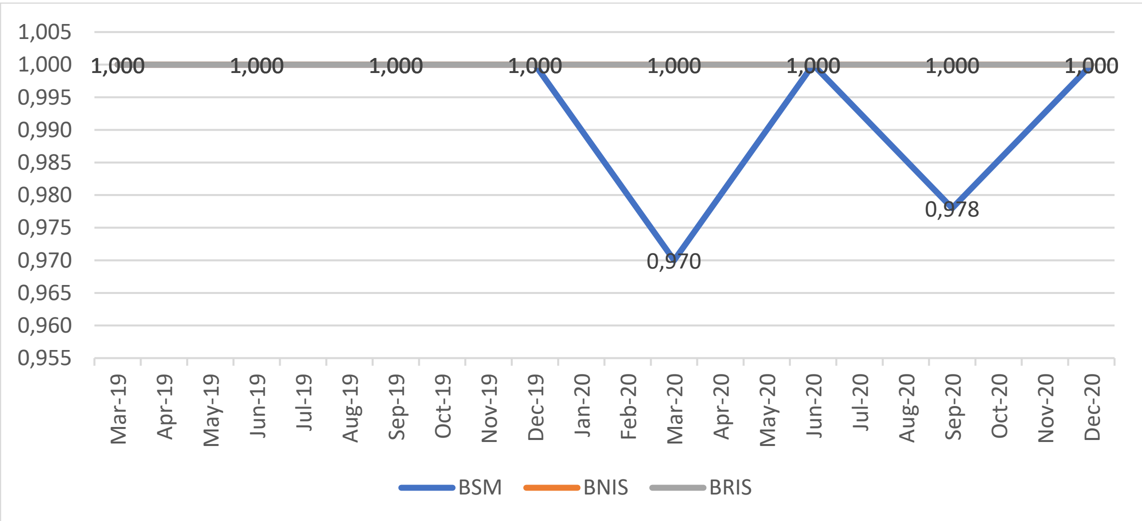
	Mar-21	Jun-21	Sep-21	Dec-21	Mar-22	Jun-22	Sep-22	Dec-22	Mar-23	Mean	Rank
BSI	1.000	1.000	1.000	1.000	0.977	1.000	1.000	1.000	1.000	0.997	1
MANDIRI	0.945	0.955	0.944	0.948	0.952	0.982	1.000	1.000	1.000	0.970	5
BNI	1.000	0.975	0.977	1.000	0.971	0.989	0.994	1.000	1.000	0.990	2
BRI	0.942	0.949	0.983	1.000	1.000	1.000	1.000	1.000	1.000	0.986	3
BTPN	0.969	0.895	0.910	0.979	1.000	1.000	0.986	1.000	1.000	0.971	4

Source: DEA Output (Data Processed) (2023)

The two results in Tables 2 and 3 prove that when the three Sharia Banks, which are subsidiaries of BUMN Bank, merge, their performance efficiency increases more than that of other BUMN Banks. However, if we look at the average value of the condition of Bank Syariah Indonesia post-merger, the results are lower than when the three Sharia Banks did not merge. The efficiency value for each quarter of Bank Syariah Indonesia before and after the merger is presented in Figure 1.

Figure 1

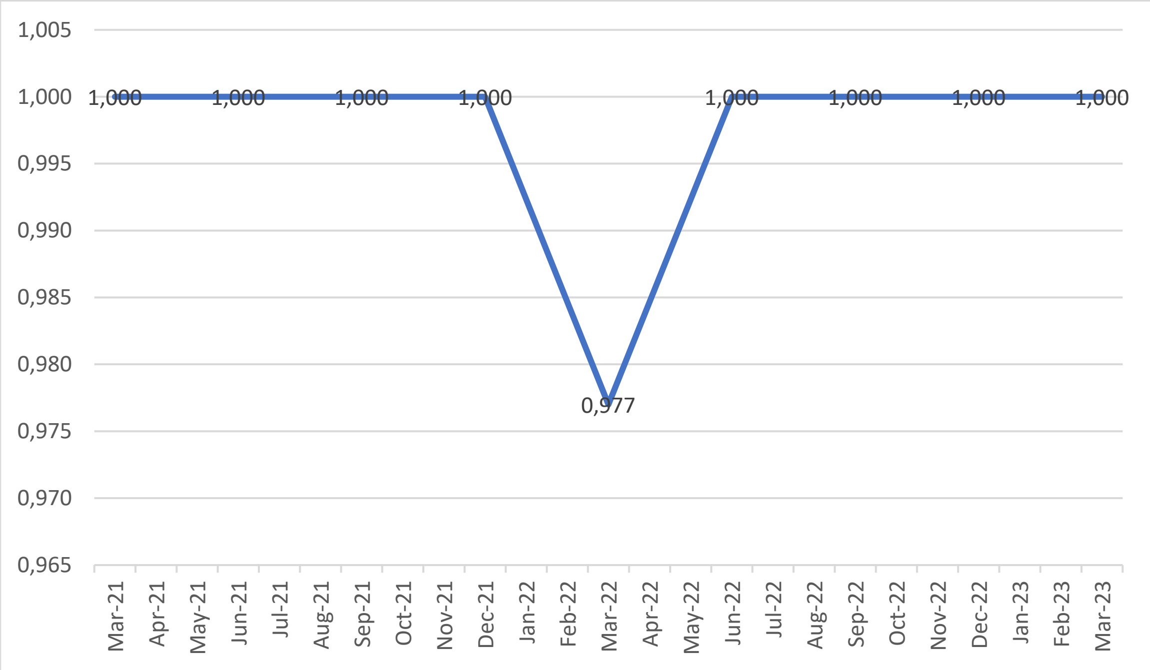
Pre-Merger Indonesian Sharia Bank Efficiency.



Source: Authors' estimation.

Figure 2

Post-Merger Indonesian Sharia Bank Efficiency.



Source: Authors' estimation.

The figures above shows that pre- and post-merger Bank Syariah Indonesia experienced fluctuating levels of efficiency every quarter. The pre-merger efficiency levels of BNI Syariah and BRI Syariah were very stable, with the efficiency level always tending to be 100 percent. Bank Syariah Mandiri also experienced a fairly stable level of efficiency, although there was a decline in the second and fourth quarters of 2020 and 2021, respectively. After the three banks merged, the results were satisfactory because they experienced stability at an efficiency level of 100 percent every quarter, with only a decline in the second quarter of 2022. This is proven by the results of the 2022 BSI report, where in the second quarter, the company's profit decreased from the previous period, amounting to only 2,125 million (Bank Syariah Indonesia, 2023a). The impact of this decline caused the post-mergers in this research period to be less efficient than the pre-merger period. Although the overall level of efficient performance of post-merger BSI was more stable and increased compared with other conventional state-owned banks, it was proven that there was an increase in company profits after the second quarter of 2022, amounting to 4,260 million (Bank Syariah Indonesia, 2023a). From these results, it is evident that there was no significant change in performance efficiency before and after the merger.

There is no significant difference in the performance of Bank Syariah Indonesia before and after the merger, as confirmed by a robustness test based on the results of the Wilcoxon Test. The results of the Wilcoxon Test were as follows:

Table 4

Wilcoxon Test Results

Method	df	Value	Probability
Wilcoxon/Mann-Whitney		1.139330	0.2546
Wilcoxon/Mann-Whitney (tie-adj.)		1.389010	0.1648
Med. Chi-square	1	0.000000	1.0000
Adj. Med. Chi-square	1	0.008433	0.9268
Kruskal-Wallis	1	1.304145	0.2535
Kruskal-Wallis (tie-adj.)	1	1.938376	0.1638
van der Waerden	1	2.238884	0.1346

Category Statistics

Code	Count	Median	> Overall Median	Mean Rank	Mean Score
0	56	1.000000	0	63.83036	0.007367
1	63	1.000000	0	56.59524	-0.140849
All	119	1.000000	0	60.00000	-0.071100

Source: Authors' estimation.

Wilcoxon test was performed for data that were not normally distributed. Table 4 shows that the probability value of the Wilcoxon Test is 0.2546. This value is > 0.05; therefore, there is no difference between the efficiency value of Bank Syariah Indonesia before and after the merger.

DISCUSSION

The test results show no difference between the efficiency values of Bank Syariah Indonesia before and after the merger. This is in line with the findings of Al-Khasawneh et al. (2020) and Tri & Anh (2020) that the merger of the banking industry did not make a significant difference in increasing performance efficiency, even though it positively impacted bank assets (Musah et al., 2020).

The efficiency level of Bank Syariah Indonesia post-merger decreased only in the second quarter of 2022 because, in this period, the number of input variables (total deposits, personal expenses, and fixed assets) was lower than the output variables (income and financing). The weakening efficiency of Bank Syariah Indonesia in this period was due to the presence of global geopolitical tensions, which caused increasing global inflationary pressures, followed by a weakening of the global economy (Goryunov et al., 2023). Therefore, this had an impact on the average Rupiah exchange rate, weakening by 1.13 percent, reaching a nominal value of IDR 14,549 per USD. This occurred because of the influence of increasing pressure on global financial markets and high inflation volatility. Meanwhile, domestic inflation also increased the 2022 inflation target which could harm the BSI's financing and income.

Bank Syariah Indonesia's efficiency level was superior to other state-owned banks, even during the economic recovery period after the COVID-19 pandemic. The BSI performed more efficiently during this testing period than other conventional state-owned banks. The BSI is still at a high efficiency level (99.7%), but only experienced a decrease in efficiency level of 0.3 percent. This does not have an impact on the BSI's performance efficiency rating, where its performance efficiency is still superior to that of other state-owned conventional banks. This finding is in line with previous findings, which stated that Islamic banks, in terms of asset quality, are more stable than conventional banks, so the performance of Sharia Banks is more efficient than that of conventional banks in Indonesia (Octrina & Mariam, 2021; Sakti & Mohamad, 2018). This is different from the efficiency of Sharia Commercial Banks in MENA countries, where the performance of Conventional Banks is more efficient than that of Sharia Commercial Banks (Anagnostopoulos et al., 2020).

The efficiency of Bank Syariah Indonesia's post-merger performance is proven in the output variable, namely financing that has been disbursed amounting to IDR 140 trillion with good financing quality (Bank Syariah Indonesia, 2022). Financing is said to be of good quality, as shown by the NPF level of Bank Syariah Indonesia, which has decreased from 3.11 percent to 2.78 percent (Bank Syariah Indonesia, 2022). Judging from one of the input variables, Bank Syariah Indonesia's assets were recorded at IDR 280 trillion, an increase of 20 percent less than two years after the merger, with records at the start of the merger amounting to IDR 234.43 trillion (Bank Syariah Indonesia, 2022). This proves that the hypotheses of this study are accepted. The merger of BNI Syariah, Bank Syariah Mandiri, and BRI Syariah can increase performance efficiency.

The findings demonstrate that while Bank Syariah Indonesia (BSI) has maintained a high level of efficiency post-merger, global and economic challenges, such as geopolitical tensions and inflationary pressures, have slightly impacted its financial performance. This aligns with the literature, which suggests that economic volatility can affect even the most stable banking institutions. The efficiency drops in the second quarter of 2022, driven by an imbalance between input variables (deposits, expenses, and fixed assets) and output variables (income and financing), highlights Islamic bank sensitivity to external economic factors. These results emphasize the importance of economic resilience for Islamic banks, especially as they navigate national and global financial disruptions.

Another noteworthy aspect of the BSI's efficiency post-merger is its robust asset growth, evidenced by a 20% increase in assets to IDR 280 trillion within two years. This growth indicates that the merger enhanced the BSI's capacity to pool resources effectively, supporting the hypothesis that merging operations can strengthen Islamic banking competitiveness. Additionally, BSI's positive performance indicators, such as the decrease in Non-Performing Financing (NPF) from 3.11% to 2.78%, underscore the merger's contribution to overall financing quality. This observation is consistent with the view that merging institutions can improve loans and financing quality by concentrating resources and expertise.

Despite the BSI's sustained efficiency post-merger, the findings suggest a limited difference in overall efficiency compared to the pre-merger period. This is consistent with studies indicating that banking mergers may not yield immediate performance efficiency improvements. The findings prompt further examination of the merger's impact on operational resilience rather than efficiency alone. These insights can aid regulatory bodies in refining merger strategies, especially for Islamic banks, where structural complexities and compliance with Sharia principles necessitate careful evaluation of the long-term effects of mergers.

CONCLUSION

Based on the results of the efficiency analysis of the five BUMN banks in the pre-merger period, it was found that BNI Syariah and BRI Syariah had an average efficiency level that ranked first compared to other state-owned conventional banks. The average efficiency obtained using the DEA method for the two Sharia banks is 100 percent, which means that it is highly efficient. In the post-merger Syariah Bank period (March 2021–March 2023), it is stated that the state-owned bank with the most efficient position is Bank Syariah Indonesia, with an average of 99.7 percent, even though the research period was in a state of economic recovery after the Covid-19 pandemic. However, the average efficiency value for the post-merger period is still low compared to the pre-merger value of the three largest banks (BNI Syariah, Bank Syariah Mandiri, and BRI Syariah).

This research answers the problem in the introduction that the three BUMN Sharia banks, namely BNI Syariah, BRI Syariah, and Bank Syariah Mandiri, in the pre-merger period, as seen from the level of performance efficiency, had slightly decreased compared to the period when they were merged into Bank Syariah Indonesia. Even so, Bank Syariah Indonesia remains highly efficient. This does not have an impact on the ranking of Bank Syariah Indonesia's performance efficiency level, where its performance efficiency is still better and superior to other BUMN conventional banks.

This research can be used as an evaluation material for Bank Syariah Indonesia to prove its performance so that it remains a BUMN bank whose performance efficiency is better than that of other BUMN conventional banks. Although the findings of this study are positive, there are still other variables or indicators that need to be tested for the efficiency level of Bank Syariah Indonesia's performance. Therefore, Bank Syariah Indonesia, as the largest Sharia bank in Indonesia, must improve its performance further, especially in mitigating the risks that will occur, such as when the country's economy experiences a decline, high inflation, and the rupiah exchange rate. Planning risk-mitigation strategies is necessary to increase transparency and resilience. The implementation requires collaboration between management and Sharia bank regulators to increase the harmonization of Sharia standards as well as the recruitment of potential resources and training programs for developing human resources that have Sharia values. In this way, Bank Syariah Indonesia's reputation will be further maintained because it is a bank that strictly adheres to Islamic Sharia values. This study can also be used as a reference for further research on similar topics. The performance of Bank Syariah Indonesia in terms of overall service is yet to be tested at the level of performance and banking performance; this can be used as a test in further research.

Limitation of the Study

A disadvantage of this study is its dependence on a particular collection of input and output variables, which may not comprehensively encompass all the aspects affecting bank efficiency. This study employs deposits, personal expenses, and fixed assets as input variables, along with income and financing as output variables; however, additional pertinent metrics, including technological investment, operational innovation, and customer satisfaction, could offer a more comprehensive assessment of BSI's efficiency following the merger. Subsequent research may enhance its findings by incorporating supplementary financial and nonfinancial variables to bridge this gap.

A further drawback is the study's singular emphasis on Bank Syariah Indonesia, which constrains the findings' applicability to other Islamic or conventional banks, both inside Indonesia and internationally. Islamic banks function within distinct structural, regulatory, and market contexts that are markedly different from regular banks. Consequently, the results may not apply to traditional or Islamic banks in areas beyond Indonesia, including the MENA region. A comparative analysis with other banks offers a wider perspective on the post-merger performance of BSIs.

This study examines a limited timeframe (2020-2022) following the merger, which may be inadequate to assess the long-term effects of the merger on BSI efficiency. Enhancements in efficiency and operational synergies resulting from mergers may require years to fully manifest. Prolonging the research period to examine efficiency trends over an extended timeframe, such as five- or ten-years post-merger, would provide a more thorough assessment of the merger's enduring effects on the BSI's performance.

Recommendations for Further Research

Subsequent studies may broaden the efficiency analysis parameters by including a more comprehensive array of input and output factors. Variables about technological adaptation, digital banking services, and customer satisfaction may be especially pertinent for evaluating banks' efficiency in a progressively digital environment. Integrating these factors would yield a more sophisticated understanding of how BSI utilizes its resources to enhance efficiency following a merger, particularly considering the digital transformation of financial services.

It is also advisable to undertake a comparative analysis of Islamic and conventional banks to establish a standard for BSI efficiency. Researchers have identified distinct strengths and limitations in Islamic banking mergers by comparing BSI's post-merger performance with those of other state-owned and private conventional banks. A comparative analysis could assist policymakers in comprehending the performance of Islamic banks with conventional banks and in refining regulatory policies according to the requirements of each sector.

Ultimately, prolonging the research duration would provide a comprehensive analysis of the BSI's long-term efficiency trajectory over the long run. Examining efficiency trends over an extended duration, such as the decade following the merger, would elucidate the evolution of operational synergies and merger advantages over time. This longitudinal method illuminates the influence of mergers on BSI's resilience to economic fluctuations, global financial pressures, and obstacles in emerging markets, providing vital insights into the sustainability of mergers in the Islamic banking sector.

Author Contributions

Conceptualization	F.H., F.M., & R.Z.G.	Resources	F.H., F.M., & R.Z.G.
Data curation	F.H., F.M., & R.Z.G.	Software	F.H., F.M., & R.Z.G.
Formal analysis	F.H., F.M., & R.Z.G.	Supervision	F.H., F.M., & R.Z.G.
Funding acquisition	F.H., F.M., & R.Z.G.	Validation	F.H., F.M., & R.Z.G.
Investigation	F.H., F.M., & R.Z.G.	Visualization	F.H., F.M., & R.Z.G.
Methodology	F.H., F.M., & R.Z.G.	Writing – original draft	F.H., F.M., & R.Z.G.
Project administration	F.H., F.M., & R.Z.G.	Writing – review & editing	F.H., F.M., & R.Z.G.

All authors have read and agreed to the published version of the manuscript.

Funding

This research was funded by the 2023 Internal Research Funding Grant of Muhammadiyah University of Lamongan.

Institutional Review Board Statement

The study was approved by Program Studi Ekonomi Syariah (S1), Universitas Muhammadiyah Lamongan, Lamongan, Indonesia.

Informed Consent Statement

Informed consent was not required for this study.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

Acknowledgments

The authors thank Lembaga Penelitian dan Pengabdian Masyarakat (LPPM), Universitas Muhammadiyah Lamongan, Lamongan, Indonesia, for administrative and financial support for the research on which this article was based.

Conflicts of Interest

The authors declare no conflicts of interest.

REFERENCES

Abdul Rahman, A. R., & Rosman, R. (2013). Efficiency of Islamic banks: A comparative analysis of MENA and Asian countries. *Journal of Economic Cooperation and Development*, *34*(1), 63–92. https://jecd.sesric.org/pdf.php?file=ART12091001-2.pdf

Al-Khasawneh, J. A., Essaddam, N., & Hussain, T. (2020). Total productivity and cost efficiency dynamics of US merging banks: A non-parametric bootstrapped analysis of the fifth merger wave. *The Quarterly Review of Economics and Finance*, *78*, 199–211. https://doi.org/10.1016/j.qref.2020.02.002

Anagnostopoulos, I., Noikokyris, E., & Giannopoulos, G. (2020). A meta-crisis banking efficiency study in the MENA region. *Journal of Islamic Accounting and Business Research*, *11*(10), 2087–2112. https://doi.org/10.1108/JIABR-12-2019-0235

Badruzaman, J. (2020). Analisis efiensi dan kinerja bank syariah di Indonesia [Analysis of efficiency and performance of Islamic banks in Indonesia]. *Jurnal Akuntansi*, *15*(1), 20–27. https://doi.org/10.37058/jak.v15i1.1812

Bank Syariah Indonesia. (2021, October 19). Sejarah perseroan [Company history] [HTML]. *Bank Syariah Indonesia*. https://ir.bankbsi.co.id/corporate_history.html

Bank Syariah Indonesia. (2022). *Laporan tahunan 2021: Energi baru untuk Indonesia [Annual report 2021: New energy for Indonesia]*. Bank Syariah Indonesia. https://ir.bankbsi.co.id/misc/AR/AR2021-IDN.pdf

Bank Syariah Indonesia. (2023a). *Laporan tahunan 2022: Kolaborasi untuk akselerasi pertumbuhan [Annual report 2022: Collaboration to accelerate growth]*. Bank Syariah Indonesia. https://ir.bankbsi.co.id/misc/AR/AR2022-ID.pdf

Bank Syariah Indonesia. (2023b, August 16). Sejarah dan perkembangan bank syariah di Indonesia [History and development of Islamic banking in Indonesia] [HTML]. *Bank Syariah Indonesia*. https://www.bankbsi.co.id/news-update/edukasi/sejarah-dan-perkembangan-bank-syariah-di-indonesia

Ben Rejeb, A., & Arfaoui, M. (2019). Do Islamic stock indexes outperform conventional stock indexes? A state space modeling approach. *European Journal of Management and Business Economics*, *28*(3), 301–322. https://doi.org/10.1108/EJMBE-08-2018-0088

Benarda, B., Sumarwan, U., & Hosen, M. N. (2016). Tingkat efisiensi industri asuransi jiwa syariah menggunakan pendekatan Two Stage Data Envelopment Analysis [The efficiency level of the sharia life insurance industry using the Two Stage Data Envelopment Analysis approach]. *Jurnal Aplikasi Bisnis Dan Manajemen (JABM)*, *2*(1), 64–64. https://doi.org/10.17358/jabm.2.1.64

Cholik, A. A. (2013). Teori efisiensi dalam ekonomi Islam [Efficiency theory in Islamic economics]. *Islamic Economics Journal*, *1*(2), 167–182. https://doi.org/10.21111/iej.v1i2.179

Dinçer, H., & Yüksel, S. (2020). Financial intermediaries. In A. Driouchi (Ed.), *Monetary policies and independence of the central banks in E7 countries*: IGI Global. https://doi.org/10.4018/978-1-7998-1643-0

Firdaus, M. F., & Hosen, M. N. (2014). Efisiensi bank umum syariah menggunakan pendekatan two-stage data envelopment analysis [Efficiency of Islamic commercial banks using a two-stage data envelopment analysis approach]. *Buletin Ekonomi Moneter Dan Perbankan*, *16*(2), 167–188. https://doi.org/10.21098/bemp.v16i2.31

Goryunov, E. L., Drobyshevsky, S. M., Kudrin, A. L., & Trunin, P. V. (2023). Factors of global inflation in 2021–2022. *Russian Journal of Economics*, *9*(3), 219–244. https://doi.org/10.32609/j.ruje.9.111967

Hata, F. Y., Suharno, S., & Alfarisy, M. F. (2020). Efficiency analysis of Islamic banking in Indonesia 2015—2018 using Stochastic Frontier Method. *Al-Amwal : Jurnal Ekonomi Dan Perbankan Syari'ah*, *12*(2), 191–200. https://doi.org/10.24235/amwal.v12i2.7016

Hidayah, N. (2016). Studi komparatif tingkat efisiensi perbankan konvensional dan perbankan syariah di Indonesia [Comparative study of the efficiency levels of conventional banking and Islamic banking in Indonesia]. *Jurnal Ekonomi & Keuangan Islam*, *2*(2), 28–37. https://doi.org/10.20885/jeki.vol2.iss2.art4

Hidayat, R. (2014). *Efisiensi perbankan syariah: Teori dan praktik [Efficiency of Islamic banking: Theory and practice]*. Gramata Publishing.

Idris, N. H., Yazid, Z. A., Faique, F. A., Daud, S., Ismail, S., Bakri, M. H., & Taib, N. M. (2016). Financial literacy and debt burden among malay youth workers in Malaysia. *Advanced Science Letters*, *22*(12), 4288–4292. https://doi.org/10.1166/asl.2016.8130

Jaouadi, S., & Zorgui, I. (2014). Exploring effectiveness and efficiency of banks in Switzerland. *International Journal of Academic Research in Business and Social Sciences*, *4*(4), 313–325. https://doi.org/10.6007/IJARBSS/v4-i4/787

Kandil, T., & Chowdhury, D. (2014). Islamic banks' mergers and acquisitions – impacts on performance and financial crisis in the United Kingdom. In F. H. Beseiso (Ed.), *Contemporary Studies in Economic and Financial Analysis* (pp. 119–140). Emerald Group Publishing Limited. https://doi.org/10.1108/S1569-3759(2014)0000095016

Karim, A. A. (2018). *Ekonomi mikro Islam [Islamic microeconomics]* (Tenth edition). Rajawali Pers.

Karimah, S., Novianti, T., & Effendi, J. (2016). Kajian efisiensi bank umum syariah di Indonesia [Study of the efficiency of Islamic commercial banks in Indonesia]. *Al-Muzara'ah*, *4*(1), 33–43. https://doi.org/10.29244/jam.4.1.33-43

Khan, A., & Noreen, U. (2014). Efficiency measure of insurance v/s takaful firms using DEA approach: A case of Pakistan. *Islamic Economic Studies*, *22*(1), 139–158. https://doi.org/10.12816/0004133

Kusumaningrum, D., Sari, P. A., Panjaitan, A. Y., & Panggiarti, E. K. (2023). Pengaruh kombinasi bisnis PT. Bank Syariah Indonesia (BSI) Tbk terhadap perkembangan ekonomi syariah di Indonesia [The influence of the business combination of PT. Bank Syariah Indonesia (BSI) Tbk on the development of the sharia economy in Indonesia]. *Cemerlang: Jurnal Manajemen Dan Ekonomi Bisnis*, *4*(1), 183–194. https://doi.org/10.55606/cemerlang.v4i1.2304

Ling, P.-S., Abdul-Rahim, R., & Said, F. F. (2020). The effectiveness of technical strategies in Malaysian Sharīʿah vs conventional stocks. *ISRA International Journal of Islamic Finance*, *12*(2), 195–215. https://doi.org/10.1108/IJIF-08-2018-0092

Masrizal, Sukmana, R., Fianto, B. A., & Gultom, R. Z. (2023). Does economic freedom fosters Islamic rural banks efficiency? Evidence from Indonesia. *International Journal of Productivity and Performance Management*, *72*(9), 2538–2558. https://doi.org/10.1108/IJPPM-11-2021-0660

Miniaoui, H., & Chaibi, A. (2014). *Technical efficiency of takaful industry: A comparative study of Malaysia and GCC countries* (IPAG Business School Working Paper Series 2014-055). IPAG Business School. https://faculty-research.ipag.edu/wp-content/uploads/recherche/WP/IPAG_WP_2014_055.pdf

Mohd Noor, N. H. H., Bakri, M. H., Wan Yusof, W. Y. R., Mohd Noor, N. R. A., & Zainal, N. (2020). The impact of the bank regulation and supervision on the efficiency of Islamic banks. *The Journal of Asian Finance, Economics and Business*, *7*(11), 747–757. https://doi.org/10.13106/JAFEB.2020.VOL7.NO11.747

Musah, A., Abdulai, M., & Baffour, H. (2020). The effect of mergers and acquisitions on bank performance in Ghana. *Asian Journal of Economics and Empirical Research*, *7*(1), 36–45. https://doi.org/10.20448/journal.501.2020.71.36.45

Nahar, F. H., Adha, M. A., & Rofiul Wahyudi. (2022). Efficiency in Islamic and conventional banking in Indonesia. *Journal of Islamic Economics Lariba*, *8*(1), 179–195. https://doi.org/10.20885/jielariba.vol8.iss1.art11

Najib, M. I. A., & Iskandar, D. D. (2022). Efficiency analysis of sharia commercial banks (BUS) in Indonesia during 2015 – 2019. *Journal of Islamic Economics Lariba*, *8*(1), 33–51. https://doi.org/10.20885/jielariba.vol8.iss1.art3

Nasehudin, T. S., & Gozali, N. (2015). *Metode penelitian kuantitatif [Quantitative research methods]*. CV Pustaka Setia.

Nguyen, P. H., & Pham, D. T. B. (2020). The cost efficiency of Vietnamese banks – the difference between DEA and SFA. *Journal of Economics and Development*, *22*(2), 209–227. https://doi.org/10.1108/JED-12-2019-0075

Nofinawati, N. (2015). Perkembangan perbankan syariah di Indonesia [The development of Islamic banking in Indonesia]. *Juris*, *14*(2), 168–183. https://doi.org/10.31958/juris.v14i2.305

Octrina, F., & Mariam, A. G. S. (2021). Islamic bank efficiency in Indonesia: Stochastic Frontier Analysis. *The Journal of Asian Finance, Economics and Business*, *8*(1), 751–758. https://www.kci.go.kr/kciportal/landing/article.kci?arti_id=ART002681771

Pambuko, Z. B. (2016). Determinan tingkat efisiensi perbankan syariah di Indonesia: Two Stages Data Envelopment Analysis [Determinants of the efficiency level of Islamic banking in Indonesia: Two Stages Data Envelopment Analysis]. *Cakrawala: Jurnal Studi Islam*, *11*(2), 178–194. https://doi.org/10.31603/cakrawala.v11i2.249

Puteh, A., Rasyidin, M., & Mawaddah, N. (2018). Islamic banks in Indonesia: Analysis of efficiency. In *Emerald Reach Proceedings Series* (pp. 331–336). Emerald Publishing Limited. https://doi.org/10.1108/978-1-78756-793-1-00062

Putri, L. W., & Ningtyas, M. N. (2022). The impact of merger on Bank Syariah Indonesia financial performance. *Imanensi: Jurnal Ekonomi, Manajemen, Dan Akuntansi Islam*, *7*(2), 1–12. https://doi.org/10.34202/imanensi.7.2.2022.1-12

Qibtiyah, M., & Wicaksono, F. (2022). Analisis merger Bank Syari'ah Indonesia (BSI) dalam perkembangan perbankan syari'ah di Indonesia [Analysis of the merger of Bank Syariah Indonesia (BSI) in the development of Islamic banking in Indonesia]. *Jurnal Justisia Ekonomika: Magister Hukum Ekonomi Syariah*, *6*(2), 581–595. https://doi.org/10.30651/justeko.v6i2.15265

Ramadhan, B. (2022). Analisis perbandingan harga saham PT. Bank Syariah Indonesia Tbk sebelum dan sesudah merger [Comparative analysis of PT. Bank Syariah Indonesia Tbk stock prices before and after the merger]. *ETNIK: Jurnal Ekonomi Dan Teknik*, *1*(12), 788–794. https://doi.org/10.54543/etnik.v1i12.124

Rusydiana, A. S., & Marlina, L. (2019). Financial and social efficiency on Indonesian Islamic banks: A non-parametric approach. *Journal of Islamic Monetary Economics and Finance*, *5*(3), 579–602. https://doi.org/10.21098/jimf.v5i3.1154

Rusydiana, A. S., & Sanrego, Y. D. (2018). Measuring the performance of Islamic banking in Indonesia: An application of maslahah-efficiency quadrant (MEQ). *Journal of Islamic Monetary Economics and Finance*, *3*(Special Issue), 103–130. https://doi.org/10.21098/jimf.v3i0.909

Sabiti, M. B., Effendi, J., & Novianti, T. (2017). Efisiensi asuransi syariah di Indonesia dengan pendekatan Data Envelopment Analysis [Efficiency of Islamic insurance in Indonesia with Data Envelopment Analysis approach]. *Al-Muzara'ah*, *5*(1), 69–87. https://doi.org/10.29244/jam.5.1.69-87

Sabiti, M. B., Effendi, J., & Novianti, T. (2018). Efisiensi Asuransi Syariah di Indonesia dengan pendekatan Data Envelopment Analysis. *Al-Muzara'ah*, *5*(1), 69–87. https://doi.org/10.29244/jam.5.1.69-87

Sakti, M. R. P., & Mohamad, A. (2018). Efficiency, stability and asset quality of Islamic vis-à-vis conventional banks: Evidence from Indonesia. *Journal of Islamic Accounting and Business Research*, *9*(3), 378–400. https://doi.org/10.1108/JIABR-07-2015-0031

Shawtari, F. A., Salem, M. A., & Bakhit, I. (2018). Decomposition of efficiency using DEA window analysis: A comparative evidence from Islamic and conventional banks. *Benchmarking: An International Journal*, *25*(6), 1681–1705. https://doi.org/10.1108/BIJ-12-2016-0183

Thomson Reuters & DinarStandard. (2018). *State of the global Islamic economy report 2018/19: An inclusive ethical economy*. Thomson Reuters, DinarStandard. https://static.zawya.com/pdf/Others/2018%20Global%20Islamic%20Economy%20Report%20.pdf

Tri, T. M., & Anh, N. P. (2020). Effect of bank merger on efficiency using stochastic frontier analysis: The case of Vietnam. *International Journal of Advanced Science and Technology*, *29*(10s), 242–253. http://sersc.org/journals/index.php/IJAST/article/view/14417

Tuffahati, H., Mardian, S., & Suprapto, E. (2019). Pengukuran efisiensi asuransi syariah dengan Data Envelopment Analysis (DEA) [Measuring the efficiency of Islamic insurance with Data Envelopment Analysis (DEA)]. *Jurnal Akuntansi Dan Keuangan Islam*, *4*(1), 1–23. https://doi.org/10.35836/jakis.v4i1.27

Tyas, A. A., & Rusydiana, A. S. (2021). The pre-merger efficiency of banks: Evidence in Indonesia state-owned Islamic banks. *Jurnal Ekonomi Dan Bisnis Islam | Journal of Islamic Economics and Business*, *7*(1), 1–13. https://doi.org/10.20473/jebis.v7i1.23319

Utari, K. K., Septiyana, Y., Asnaini, A., & Elwardah, K. (2022). Efisiensi keputusan merger tiga bank syariah di Indonesia pada masa pandemi COVID-19 (Studi di BSI KC Bengkulu Panorama) [The efficiency of the merger decision of three Islamic banks in Indonesia during the COVID-19 pandemic (Study at BSI KC Bengkulu Panorama)]. *EKOMBIS REVIEW: Jurnal Ilmiah Ekonomi Dan Bisnis*, *10*(S1), 311–324. https://doi.org/10.37676/ekombis.v10iS1.1922