Eduvest – Journal of Universal Studies
Volume 4 Number 10, October, 2024
p- ISSN 2775-3735- e-ISSN 2775-3727

EFFICIENCY OF SHARIA COMMERCIAL BANKS IN INDONESIA (TWO-STAGE ANALYSIS)

Risky Dwi Endahsari[1], Barianto Nurasri Sudarmawan[2]
Universitas Islam Negeri Maulana Malik Ibrahim Malang, Indonesia[1,2]
Email: riskysarii027@gmail.com

ABSTRACT

This research is motivated by the importance of efficiency in the banking industry, especially in the Islamic banking sector which has a vital role in the Indonesian economy. This study aims to analyze the efficiency of Islamic commercial banks in Indonesia using a two-stage analysis approach. The method used is divided into 2 stages, the first stage is to measure efficiency using the Data Envelopment Analysis (DEA) method to assess the operational performance of banks. The second stage is to analyze the factors that influence efficiency through panel regression. The results of the study indicate that although there are variations in the level of efficiency between banks, factors such as bank size, capitalization, and information technology have a significant influence on efficiency. These findings are expected to provide insight for stakeholders in improving the performance of Islamic banks in Indonesia.

KEYWORDS *Efficiency, Sharia Commercial Banks, Two-Stage Analysis, Data Envelopment Analysis, Regression Panel, Indonesia*

INTRODUCTION

Efficiency is one of the important indicators to measure the overall performance of a bank's activities. In addition to being an important indicator in banking, efficiency is also one of the important means of increasing the effectiveness of monetary policy. In addition, efficiency also plays an important role in seeing the possibility of risks that can cause bankruptcy in a bank (Marsondang et al., 2019). Islamic banking plays the role of an intermediary institution that functions to collect and distribute public funds with the aim of supporting the implementation of national economic development as an effort to increase equitable development and other results (Listri, 2021).

According to data recorded in the OJK, the market share of Islamic banking in Indonesia as of August 2023 is still at 7.26%, still far behind conventional banks

How to cite: Risky Dwi Endahsari, et.al. (2024). Efficiency Of Sharia Commercial Banks In Indonesia (Two-Stage Analysis). *Journal Eduvest. 4*(10), 9092-9111
E-ISSN: 2775-3727
Published by: https://greenpublisher.id/

which reached 92.74%. Meanwhile, the Worldometers report states that the population in Southeast Asia is dominated by Indonesia, which is 273.52 million people or 40.9% come from Indonesia. In addition, Indonesia also has the largest number of Muslim populations in the ASEAN region and globally, reaching 237.55 million people and equivalent to 86.7% of the total population in Indonesia. However, the development of Islamic banking still seems slow compared to conventional banks. This phenomenon is indicated to occur due to the lack of public understanding of the products and services offered by Islamic banking. This is evidenced by the results of the National Survey on Financial Literacy and Inclusion (SLIK) in 2022 stating that the Islamic financial literacy rate still reaches 9.14% compared to the national financial literacy which reaches 49.68%. Meanwhile, Islamic financial inclusion also still reaches 12.12%, which is far different from the inclusion rate of conventional banks which reaches 85.10%.

In general, the Indonesian people do not fully understand the characteristics of the various products and services offered by Islamic banking. So that customers prefer to transact at conventional banks that have long been known to the public. This has an impact on the low *Market Share* in Islamic Banking (Romli, 2022; Tedy & Yusuf, 2020). Market share/*Market Share* has a positive effect on bank efficiency because banks with a higher market share have the opportunity to get high profits so that the public will also be interested in companies with higher market shares. So that better Islamic banking differentiation product offerings will increase the number of new customers (Zampara et al., 2017).

Table 1. Development of the Number of Islamic Banking Offices for the 2019-2023 Period

GROUP	2019	2020	2021	2022	2023
Sharia Commercial Banks	14	14	12	13	13
Sharia Business Unit	20	20	21	20	20
Number of BUS and UUS offices	**2.300**	**2.426**	**2.479**	**2.445**	**2.393**
Shariah People's Financing Bank	164	163	164	167	173
Number of BPRS offices	**617**	**627**	**659**	**668**	**693**

Source : Data processed

Another phenomenon occurred in 2021 according to the LPPI stability research team which stated that Islamic banks again received new challenges, namely with the issuance of POJK No. 12/POJK.03/2021 regarding Commercial Banks. One of the main points of the regulation is the ease of forming or running a digital bank. This makes Islamic banks even more difficult in facing the burden of competition with conventional banks, because the competition of Islamic banks at the non-digital business level is still lagging behind. According to research (Kamarudin et al., 2017) Analyzing the technological advances owned by Islamic banks are relatively lagging behind compared to conventional banks. This new challenge can be an opportunity for Islamic banks but it can also be a threat to Islamic banks themselves if these challenges are not handled properly (LPPI, 2021).

Bank efficiency is one of the benchmarks to assess the phenomenon of competition between Islamic banks and conventional banks that is getting tighter. The higher the efficiency value of the bank, the more stable the bank's operational activities and long-term returns to customers. Efficiency measurement aims to be able to maximize the use of inputs from all available resources in achieving

maximum output so that no resources are wasted (Rahayu & Sari, 2022). In addition, banks that have a good level of efficiency are able to increase profits optimally, and are able to offer better price quality, security, and price levels, as well as being able to channel more funds so that Indonesia's economic welfare can increase overall. This means that more efficient banks certainly have a superior value compared to banks that are not efficient (Muhammad & Nawawi, 2022). Efficient banking performance can be a tool for mobilizing and allocating funds to increase investment and savings to be more effective (Anggraeni & Saputri, 2020; Nguyen, 2018).

There are three factors that cause efficiency, including: first, if the output obtained is greater than the use of the same input. Second, when the output produced is the same as using a smaller input. Third, when the output obtained is greater with a larger input (Khalifaturofi'ah, 2018). The measurement of the efficiency level begins by setting the input variable and the output variable. The input variables of this study are total assets, equity and deposits (Third Party Funds), while the output is total financing and operating profit.

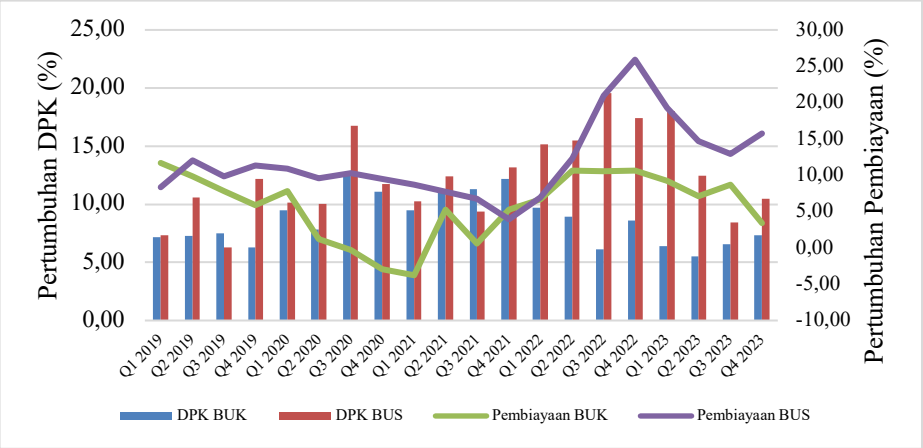


Figure 1. Growth of Deposits and Financing in Conventional Commercial Banks and Sharia Commercial Banks for the 2019-2023 Period

Source : processed data

Figure 1. above shows that there is a slowdown in deposits and financing in conventional commercial banks and Islamic commercial banks. However, Sharia Commercial Banks show higher growth in deposits and financing than conventional banks. In Sharia Commercial Banks, the lowest slowdown in deposit growth occurred in the 3rd quarter of 2019 at 6.31%, while the lowest deposit in Conventional Commercial Banks occurred in the 3rd quarter of 2022 at 6.13%. Meanwhile, in Islamic commercial bank financing, the lowest growth occurred in the 2nd quarter of 2018 at 2.21%, while the lowest conventional commercial bank financing occurred in the 1st quarter of 2021 at -3.77%.

Banking efficiency can also be measured using the BOPO (Operating Costs to Operating Income) ratio. The BOPO ratio can show a bank's ability to obtain operating cost control income on operating income. If the BOPO ratio is higher, it will affect the bank's profitability, which makes the bank's financial performance decrease so that the bank is inefficient, which is shown by the bank's competence in managing operational costs and increasing the bank's operating income.

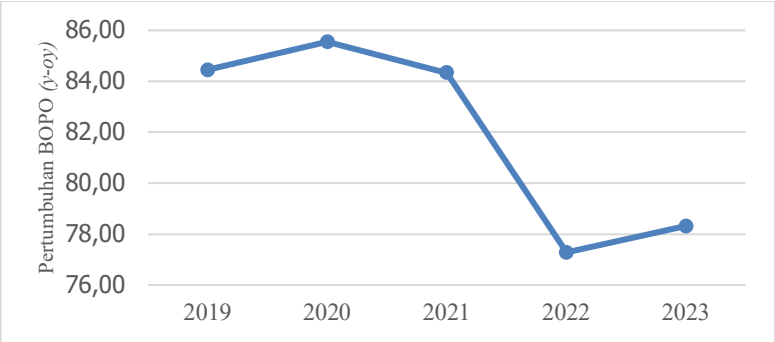


Figure 2. BOPO Growth in Sharia Commercial Banks for the 2019-2023 Period

Source : Processed Data

In figure 2 above, it shows that the BOPO ratio in Sharia Commercial Banks (BUS) has experienced volatile growth and tends to decrease every quarter. This will be a problem for Sharia Commercial Banks in catching up with the banking market share in Indonesia. If Islamic banks are not efficient, it will be difficult for banks to expand by adding new products or offices (Amalia, 2013). Indonesian Islamic banks can run efficiently if the performance capacity and competitiveness of the banking sector are improved, besides that the opportunity for Islamic banking to continue to experience growth will be greater (Fiafifah & Darwanto, 2019).

In addition to measuring bank efficiency, it is also important to assess determinant factors that can affect the level of bank efficiency. Based on empirical findings that argue that determinants of factors that can affect the level of efficiency of Islamic commercial banks can provide appropriate and good information and instructions to the bank (Ramly & Hakim, 2017). In this study, there are six variables to test the influence of Islamic bank ratios on the level of efficiency, namely the size of the bank *(Bank Size),* CAR *(Capital Adequency Ratio)* ROA *(Return On Asset)*, NPF *(Non Performing Financing)*, and FDR *(Financing to Deposit Ratio)*, while one of the external factors is GDP (Gross Domestic Product).

This efficiency measurement is important, one of which is to control the company's performance so that the results achieved are in line with expectations and Islamic banking banks are able to catch up with conventional banking (Mostafa, 2007; Othman et al., 2016; Rahayu & Sari, 2022). Banking is said to be stable if the banking condition is healthy and able to carry out its intermediation function properly. This will help banks in maintaining banking stability so that they are always efficient in their operations (Hamda & Sudarmawan, 2023).

However, measuring banking efficiency cannot be done only by reviewing financial ratios and comparisons of banking indicators. These ratios still have some weaknesses that are difficult to interpret, this is because cost reduction alone cannot determine the level of efficiency. So that efficiency measurement can be done with several other approaches that can be considered more accurate than looking at the financial ratio alone. These approaches, among others, can be measured using the *SFA (Stocastic Frountier Approach)* and methods *DFA (Distribution Free Analysis)* As for the non-parametric approach, it can be measured using the *DEA (Data Envelopment Analysis)* (Rahmawati et al., 2019).

Exist *Research Gap* from previous research that underlies this research on the efficiency of Islamic commercial banks by using *Data Envelopment Analysis.* Based on research (Adeabah et al., 2019) found that the average score of the

efficiency level of banks in Ghana is 0.709 or 70.9%. The average bank in Ghana still has the potential to increase its output by 0.291 or 29.1% while maintaining its input value to achieve technical efficiency. In the second stage, they argue that bank size has a positive effect on bank efficiency.

Research (Thi et al., 2023) found that the efficiency level of 79 Islamic banks in 16 countries has quite significant differences. They also revealed that GDP in each country has a positive effect on the level of efficiency and can improve the performance of banks in their respective countries. So that economic development must be well maintained to help the country survive various crises and pandemics. This research can help the global economic recovery process quickly and appropriately.

Research (Otero et al., 2020) stated that the average cost efficiency score in the MENA banking industry was 77%. This study also shows a negative influence on market share on the technical efficiency of banks caused by the lack of stability in the relationship between customers and banks so that customers will look for better conditions elsewhere. The size of the bank also has a positive influence on the level of efficiency which shows how important economies of scale are.

Research (Ofori-Sasu et al., 2019) revealed that technically the average bank in Ghana is less efficient where the average efficiency score is still below the limit of 1. Other results show that the average bank in Ghana finances their operations with deposit funding sources. This means that there is a positive relationship between the funding structure and technical efficiency. In addition, bank size has a significant positive relationship to technical efficiency. From the regression results, there was no significant relationship between CAR and technical efficiency. As well as GDP growth is negatively and significantly related to technical efficiency. Thus, banks in Ghana that are less efficient can improve bank efficiency by adjusting the input weight by following a more efficient target bank.

There are other literatures that discuss banking efficiency in several countries, including research conducted (Eyceyurt Batir et al., 2017) which states that the efficiency of *Particopation Bank* more efficient than conventional banks in Turkey, the level of efficiency is influenced by burdens, loans, and non-performing loans. Furthermore, the results of the research (Olohunlana et al., 2023) revealed that the majority of banks in Nigeria are not yet fully efficient. The factors that hinder the achievement of optimal efficiency are currently influenced by market conditions and bank ownership. Then the results of the research (Anagnostopoulos et al., 2020) stated that the efficiency of banks in the MENA region is influenced by various indicators of Islamic banks. One of them is capital resources. Meanwhile, the main obstacle in hindering its growth is labor costs. Furthermore, the study (Neves et al., 2020) stated that the influence of determining factors on banking efficiency in European countries varies, namely by considering macroeconomic conditions. While the research (Jiménez-Hernandez et al., 2019) stated that the level of efficiency in Latin American countries is influenced by internal variables such as bank size, non-performing loan ratio, and loan-to-total asset ratio.

This study aims to analyze the operational efficiency of Islamic commercial banks in Indonesia using a two-stage approach. The first stage uses the Data Envelopment Analysis (DEA) method to measure the efficiency of each bank. The second stage is the analysis of factors that influence this efficiency through panel regression. This study aims to provide a comprehensive picture of the efficiency

performance of Islamic banks and the most significant factors influencing it, such as bank size, capital, and information technology.

The benefits of this study are to provide insight for policy makers, Islamic bank management, and other stakeholders regarding areas that need to be improved in order to increase operational efficiency. In addition, the results of this study are expected to be a reference for Islamic banking in designing strategies to increase competitiveness in the market, as well as a consideration in efforts to increase Islamic financial literacy and inclusion in Indonesia. Therefore, this study plays an important role in supporting the development of a more efficient and competitive Islamic banking industry.

RESEARCH METHOD

The research utilizes a quantitative method with an associative approach, relying on secondary data sources. The secondary data is derived from the quarterly financial reports published by each Islamic commercial bank in Indonesia. The data collection technique employed in this study is the documentation study method.

Data Analysis Techniques

This study will be carried out with two stages of research, namely in the first stage using a non-parametric approach with the DEA method and the second stage using multiple linear regression. The software used in processing the data in this study is the stata 17 application. The data analysis carried out includes: efficiency analysis with *the Data Envelopment Analysis method*, Descriptive Statistics, panel data regression test, classical assumption test, and hypothesis test. In analyzing the efficiency performance of a bank, there are two approaches that can be used to estimate the efficiency score of an Islamic bank. The two approaches are the parametric approach and the non-parametric approach. The function of these two approaches is to estimate *the frontier* and efficiency level. The estimation results from the frontier and the efficiency level will serve as a reference for comparing a bank with other banks. The parametric approach to estimating efficiency employs the Stochastic Frontier Approach (SFA) and Thick Frontier Approach (TFA) methods. On the other hand, the non-parametric approach uses the Data Envelopment Analysis (DEA) method to assess efficiency levels.

RESULT AND DISCUSSION

Analysis of Efficiency Results in Sharia Commercial Banks in Indonesia

The first stage is to analyze the efficiency value of each BUS using a non-parametric approach with the *Data Envelopment analysis* (DEA). There are two types of efficiency calculation analysis models in this DEA method. These models include the CRS model *(Constant Return to Scale)* and VRS models *(Variable Returt to Scale)*. This research uses the VRS model in determining the efficiency value of each Islamic commercial bank. The VRS model is a development of the first model (CRS model) introduced by BCC *(Bankers-Charnes-Cooper)*. This model assumes that the addition between the input and output ratios is not the same so that if there is an increase in input by x times the output does not increase by x times as well (Rosida & Hermawan, 2020).

The results of the efficiency value of each Islamic bank per the first quarter of 2019 to the fourth quarter of 2023 that have been obtained will be analyzed. The interpretation of DMU conditions during the study period is described below:

Table 2. Obtaining Results of Sharia Bank Efficiency Values

Range Score	*Colour*	Condition	Information
100%	Green	*Efficient*	The condition where the DMU has been considered safe because it has obtained a perfect efficiency value so that the DMU is able to carry out its project on the track to be achieved. This level of efficiency has been said to be optimal.
90% - 99,99%	Amber	*Marginally Efficient*	This condition is considered inefficient. If there are obstacles but a good solution is not immediately found and is not properly considered, then the DMU may be at risk. The level of efficiency in these conditions is close to optimal.
0% - 89,9%	Red	*Innefficient*	This condition is considered inefficient and DMU is very risky so that quick and appropriate management actions and solutions are needed in making improvements. The level of efficiency in this condition is less than optimal.

If an Islamic bank has achieved an efficiency value of 100% or 1, it can be said that the Islamic commercial bank can optimize the company's performance well and is able to obtain a perfect level of efficiency. On the other hand, if the efficiency value obtained is less than 99% or even 0%, the Islamic bank is declared inefficient in carrying out its role as an intermediary institution (Mustaniroh et al., 2023; Puspita & Shofawati, 2019). The following can be seen the results of the efficiency value of each BUS during the period from the first quarter of 2019 to the fourth quarter of 2023.

Table 3. BUS Efficiency Value for the Period 2019 to 2023 Per Quarter (%)

Era		Engineering Efficiency									Average
		BANK	BCAS	BJBS	BMI	BMS	BTPS	BVIS	KBBS	PNBS	
2019	**I**	100	90,16	100	100	100	100	100	100	94,77	**98,33**
	II	100	87,96	100	100	100	100	100	100	100	**98,66**
	III	100	100	100	100	100	100	100	100	100	**100**
	IV	100	100	100	100	100	100	100	100	100	**100**
2020	**I**	100	100	100	100	100	100	100	100	96,27	**99,59**
	II	100	100	100	100	100	100	100	100	100	**100**
	III	100	100	100	100	96,17	100	100	100	100	**99,57**
	IV	100	100	100	100	100	100	100	82,74	100	**98,08**
2021	**I**	100	100	100	100	100	100	100	100	100	**100**

Era		Engineering Efficiency									Average
		BANK	BCAS	BJBS	BMI	BMS	BTPS	BVIS	KBBS	PNBS	
	II	100	100	100	100	100	100	100	100	100	**100**
	III	100	100	100	100	100	100	100	100	100	**100**
	IV	100	100	76,4	100	66,2	100	100	100	100	**93,62**
2022	I	100	93,97	75,05	100	55,38	100	100	100	49,34	**85,97**
	II	100	78,35	76,53	100	49,93	100	100	100	54,54	**84,37**
	III	100	74,45	72,85	100	49,63	100	100	78,25	44,53	**79,97**
	IV	100	71,75	81,96	100	60,54	100	100	31,52	47,53	**77,03**
2023	I	100	70,05	80,36	100	70,49	100	100	100	47,83	**85,41**
	II	100	71,05	82,86	100	71,95	100	100	100	51,74	**86,4**
	III	100	74,15	85,36	100	59,74	100	100	100	55,24	**86,05**
	IV	100	74,35	96,46	100	73,45	100	100	38,53	58,14	**82,33**
Average		**100**	**89,31**	**91,39**	**100**	**82,67**	**100**	**100**	**91,55**	**80**	**92,77**

Source : STATA 17 Output Results

Based on table 3, it can be described, among others: first, there are only four Islamic banks that have an average efficient performance of 100% *(green)* for a period of five years, namely PT Bank Aladin Syariah, PT Bank Muamalat Indonesia, PT Bank BTPN Syariah and PT Bank Victoria Syariah. condition *Green* This can explain that the four Islamic banks are in optimal condition so that the operational performance activities of Islamic banks are considered safe and in line with the goals to be achieved. These four Islamic banks are in a condition of *Constant Returns to Scale* (CRS) is a condition where the input value of Islamic banks has increased in the same way as the output value. The achievement of efficiency values in the four Islamic banks is influenced by the use of input variables (total assets, equity and deposits) in banks which are relatively lower when compared to other Islamic banks. Fourth, banks can take advantage of the use of lower input values and can produce optimal output values so that it affects efficient bank performance. The timeliness of Islamic banks in conducting the rotation between their inputs and outputs has a positive effect on the efficiency performance of Islamic banks (Mustaniroh et al., 2023).

Second, Islamic banks with an average efficiency value are in the condition of *Amber (Marginally Efficient)* are PT Bank Jabar Banten Syariah and PT Bank KB Bukopin Syariah. Condition *Amber* explained that the performance of Islamic banks is considered inefficient. The two banks are in a condition *Increasing Returns to Scale* (IRS) is a condition in which the output increases in a larger amount compared to the increase in the number of inputs. In some periods, the two banks were even in an inefficient condition, therefore the obstacles in the bank must be overcome immediately and the problems must be well considered so that the bank's performance can return to optimal. On the contrary, if these obstacles are not immediately overcome and properly considered, then Islamic banks may be at risk.

Second, Islamic banks need special attention so that the performance of banks experiencing inefficiencies does not increase (Nikmah & Atun, 2023).

Third, three other Islamic banks have an average red *efficiency value (inneficient),* namely PT Bank Central Asia Syariah, PT Bank Mega Syariah and PT Bank Panin Dubai Syariah. This *Red condition* illustrates that the risks faced by Islamic banks are quite high so that banks need good solutions and quick and appropriate management actions in making improvements. These three banks are experiencing a condition *of Decreasing Returns to Scale* (DRS), which is a condition where the output value tends to be proportionally smaller than the increase in the input value.The high use of input variables (total assets, equity and deposits) makes the bank's performance not optimal. The following graph 4.1 shows the average efficiency of each Islamic commercial bank over a five-year period.

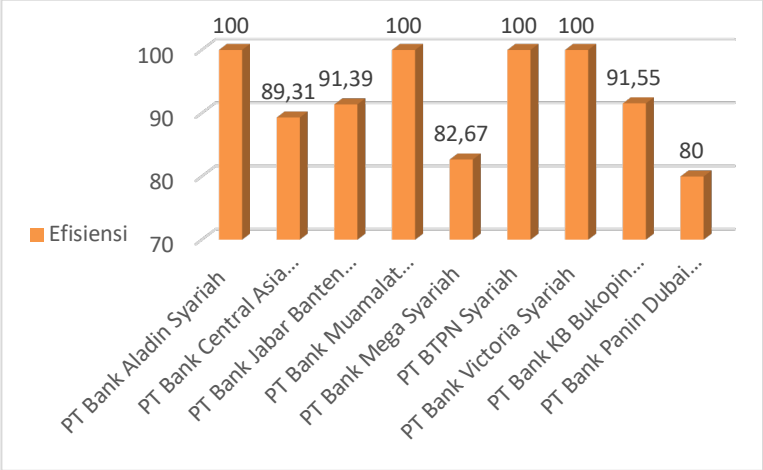


Figure 3. Average Efficiency of Each Indonesian Sharia Commercial Bank for the 2019-2023 Period

Source : STATA 17 Output Results

Figure 3 shows that the overall results of the analysis of the average efficiency value in Islamic commercial banks are experiencing a fluctuating trend. There are 4 Islamic banks, including PT Bank Aladin Syariah, PT Bank Muamalat Indonesia, PT Bank BTPN Syariah and PT Bank Victoria Syariah with an efficiency value of 100%. This means that the four banks can manage and utilize the company's resources in an optimal way and are considered to perform better than other Islamic banks. The banks with an efficiency value of less than 99% are PT Bank Central Asia Syariah at 89.31%, PT Bank Jabar Banten Syariah at 91.39%, PT Bank Mega Syariah at 82.67%, PT Bank KB Bukopin Syariah at 91.55% and PT Bank Panin Dubai Syariah at 80%. The five banks are categorized as inefficient because they are not able to optimize their resources properly. The following is a graph of the average movement of the overall efficiency value of Islamic banks per quarter during the 2019-2023 period.

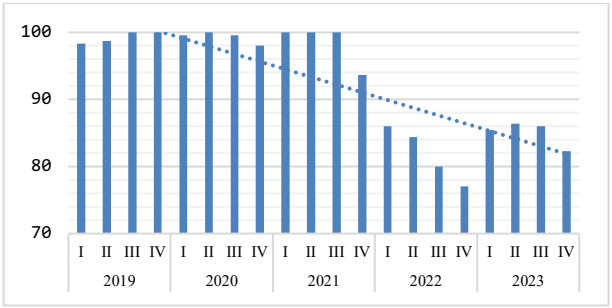


Figure 4. Average Efficiency Value of Sharia Commercial Banks Per Quarter

Source : STATA 17 Output Results

Figure 4. illustrates the trend of the average efficiency value of the nine buses which fluctuates and tends to decrease quarter-on-quarter during the period 2019 to 2023. The 100% efficiency value was obtained in the 3rd and 4th quarters of 2019, the 2nd quarter of 2020 and the 1st to 3rd quarters of 2021, while in other periods the efficiency value was quite volatile. The lowest efficiency value occurred in the fourth quarter of 2022 at 77.03%.

Overall, from the results of the above analysis, it is concluded that between the input and output variables managed by Islamic banks can affect the efficiency value. So, these two variables need to be considered continuously and Islamic banks must be able to balance the inputs used with the outputs produced so that the bank's performance continues to run efficiently.

Analysis of Multiple Linear Regression Model in Sharia Commercial Banks in Indonesia

Descriptive Statistical Analysis

The second stage is the analysis of factors from independent variables that affect the efficiency value of Islamic banks. The second stage *of analysis (Two-stage analysis)* in this study uses the STATA 17 application to process research data with a multiple linear regression model. This descriptive statistical analysis is needed to describe the existence of each research variable.

Table 4. Descriptive Statistical Data Table

Variable	Obs	Mean	Std. dev.	Min	Max
Efficiency	180	87.68411	22.69028	21.88	100
Banksize	180	6.931667	.4818743	5.41	7.83
CAR	180	39.1835	32.83187	12.01	199.9
ROA	180	1.8403	4.473109	-10.85	17.23
NPF	180	2.943667	2.200608	0	9.54
FDR	180	2900.535	37753.31	0	506600
GDP	180	3.4225	3.355939	-5.32	7.08

Source : STATA 17 Output Results

Based on the results of the descriptive statistical test above, it can provide an overview of the variables studied, as follows:

1. Efficiency: The efficiency value obtained during the research period has an average of 87.68%. The standard deviation of efficiency is 22.69% which shows that the value is lower than the average efficiency so that it indicates that the data distribution does not vary. The minimum efficiency value is 21.88% and the maximum efficiency value is 100%.

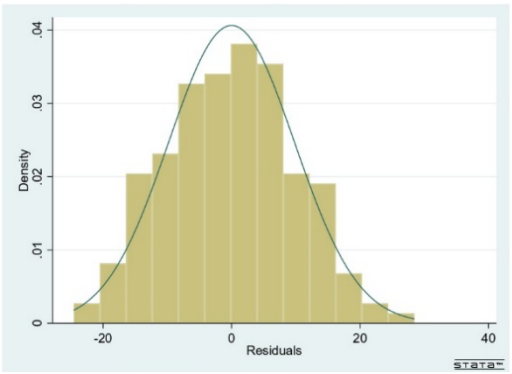
2. Banksize: The average banksize variable is 6.93% with a lower standard deviation value of 0.48% which shows that the condition of data distribution does not vary. The minimum banksize value is 5.41% and the maximum value is 7.83%.
3. CAR: The CAR variable has a standard deviation value of 32.83% lower than the variable average, which is 39.18%, this shows that the data does not vary so that the average obtained is able to explain the condition of the data. The minimum value of the CAR variable was 12.01% and the maximum value was 199.9%.
4. ROA: The standard deviation value of the ROA variable is 4.47% > 1.84% of the variable mean, indicating that the data varies so that the variable average value is less able to explain the overall data. The minimum value is -10.85% and the maximum value is 17.23%.
5. NPF: The standard deviation value obtained by the NPF variable is 2.20% lower than the average of 2.94%, meaning that the average value of NPF has been able to explain the entire data. The minimum NPF value is 0% and the maximum value is 9.54%.
6. FDR: The average value of the FDR variable is 2900.53% < 37753.31% of the FDR standard deviation, this illustrates that the average value has not been able to explain the condition of the data because the data is varied. The minimum value of FDR is 0% and the maximum value is 506600%.
7. GDP: The standard deviation value of GDP of 3.36% is lower than the average GDP value of 3.42%, which indicates that the distribution of data does not vary so that the average value is able to explain the condition of the data. The minimum value of GDP is -5.32% and the maximum value is 7.08%.

Classical Assumption Test

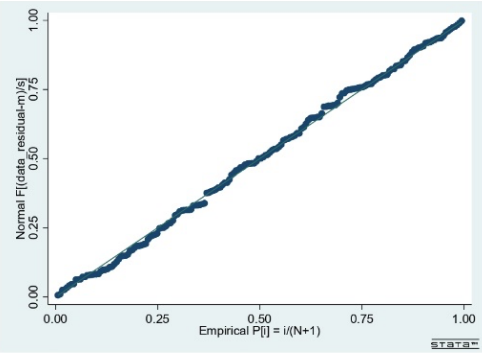
1. Normality Test

Table 5. Results of the Normality Test Skewness and kurtosis tests for normality

				------join test------	
variable	Obs	Pr(skewness)	Pr(curtosis)	Adj chi2(2)	Prob>chi2
resid	180	0,7594	0,3711	0,90	0,6363



Graph 1. Normality Test



Graph 2. Q-Q-Plot of the Normality Test

Source : STATA 17 Output Results

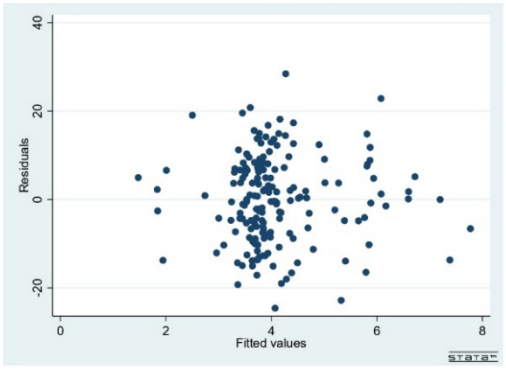
Based on the Skewness and kurtosis statistical test above, it has a probability value of more than 0.6363 (-2 < 0.6363 < 2) so that the data is normally distributed. This pattern is evidenced in graph 4.3 showing a bell-shaped curve. In addition, graph 4.4 explains that the fit line is followed by plots.

2. Heteroscedasticity Test

Table 6. Heteroscedasticity Test Results

Breusch–Pagan/Cook–Weisberg test for heteroskedasticity Assumption: Normal error terms
Variable: Fitted values of Y
H0: Constant variance chi2(1) = 0.14
Prob > chi2 = 0.7058

Source : STATA 17 Output Results



Graph 3. Heterokedasticity Test Results

According to the results of the data processing above, it is explained that the result of the probability value of 0.7058 is greater than the value of α (0.7058 > 0.05), so there is no heterokedasticity problem. The dots shown in Grefique 4.5 also spread irregularly and do not form a specific pattern.

3. Multicollinearity Test

Table 7. Multicollinearity Test Results

Variable	VIF	1/VIF
X1	**5.30**	**0.188662**
X3	**5.06**	**0.197648**
X5	**4.71**	**0.212501**
X6	**4.01**	**0.249201**
X2	**3.98**	**0.251454**
X4	**2.96**	**0.337640**
Mean VIF		**4.34**

Source : STATA 17 Output Results

Based on table 4.5, it is explained that the values of the research variables show a VIF < 10 with a value of 1/VIF > 0.1, so that it can be stated that the research regression model is free from the symptoms of multicollinearity.

4. Autocorrelation Test

Table 8 Autocorrelation Test Results

```
Wooldridge test for autocorrelation in panel data
 H0: no first-order autocorrelation
F(1, 8) = 1.409
Prob > F = 0.2693
```

Source : STATA 17 Output Results

Based on the table above, the score on the *Wooldridge Test* shows that the number 0.2693 is greater than the alpha value (0.2693 > 0.05), so there is no autocorrelation.

Multiple Linear Regression Analysis Results

Hypothesis Test

Simultaneous Test (Test F)

Table 9. Results of the Determination Coefficient Test

Number of obs	=	**180**
F(6, 173)	=	**6.08**
Prob > F	=	**0.0000**
R-squared	=	**0.1742**
Adj R-squared	=	**0.1455**
Root MSE	=	**20.975**

Source : STATA 17 Output Results

From the results of the simultaneous test in table 4.7 above, it shows that the value of the > F prob of 0.0000 is smaller than the alpha value of 0.05. The conclusion is that simultaneously independent variables have a significant effect on the dependent variables.

Partial Test (t-Test)

Table 10. Results of Partial Regression Test (t-Test)

Efficiency	Coefficient	P>|t|	Result
Banksize	1.037321	0.791	Insignificant
CAR	.2935293	0.000	Significant
ROA	.1783114	0.625	Insignificant

NPF	3.054919	0.001	Significant
FDR	.0000109	0.799	Insignificant
GDP	-1.620315	0.001	Significant

Source : STATA 17 Output Results

According to the results of the determination coefficient test, the R2 value is 0.1742 which indicates that the independent variable can explain the dependent variable (efficiency), which is 17.42% while the remaining 93.68% is influenced by other variables.

MULTIPLE LINEAR REGRESSION

Efficiency = 65.1853 + 1.037321 Banksize + 0.2935293 CAR + 0.1783114 ROA + 3.054919 NPF + 0.0000109 FDR – 1.620315 GDP + e

The constant value of Sharia Commercial Banks is 65.185, which indicates the efficiency of Sharia Commercial Banks during the period 2019 to 2023 of 65.185%. The results of the analysis indicate that the coefficient value in the value of the dependent variable (efficiency) when the independent variable consists of Banksize, CAR, ROA, NPF, FDR, and GDP has a fixed or constant value.

The Effect of Banksize Variables on the Efficiency of Sharia Banks

From the results of the partial test, the profitability value of the Banksize variable was obtained at 0.791 (0.791 > 0.05), which stated that the Banksize variable partially did not have a significant effect on the efficiency of Islamic banks. This means that any change in Banksize of 1% cannot affect the increase or decrease in the efficiency of Islamic commercial banks. Islamic commercial banks that have a higher banksize are not necessarily more efficient than Islamic commercial banks whose banksize is smaller. Large assets owned by Islamic commercial banks cannot necessarily be used to optimize the performance of a bank. These results are in line with research conducted by (Wardana & Abdani, 2022) which explains that banksize has no significant effect on the bank's efficiency level.

The Effect of CAR Variables on the Efficiency of Sharia Banks

The results of the partial hypothesis test on the CAR variable obtained a probability value of 0.000 (0.000 < 0.05) which states that the CAR variable partially has a significant positive effect on the efficiency of Sharia Banks. This means that every change in the CAR variable of 1% will affect the increase in the efficiency of Islamic banks by 0.2935%. These results are in line with research from (Marsondang et al., 2019) which shows that CAR has a positive effect on the efficiency of Islamic banks. This is due to the bank's ability to suffice its capital, thus opening up opportunities for the bank to expand credit which can affect the bank's efficiency value. In addition, if the CAR ratio in a bank has a higher value, the bank will be more able to face the possibility of the risk of bank operational losses. So that the larger the value of the CAR ratio will affect the higher the efficiency value.

CAR is considered one of the factors that can affect the efficiency value of a bank. The performance of a bank can be said to be better if the CAR ratio is higher. There is an assumption that there will be no bad loans at the bank because of optimal credit distribution so that it can increase the bank's profit which will ultimately increase the efficiency value of the bank. The CAR ratio is also very important for banks as it assesses capital parameters. The high level of capital adequacy can make public trust in the bank even better. Each bank must have a CAR of at least 15% to

ensure that the bank has sufficient cushioning to absorb the possibility of a reasonable amount of loss.

The Effect of ROA Variables on the Efficiency of Sharia Banks

The results of the partial test obtained a variable profitability value of ROA of 0.625 (0.625 > 0.05) which stated that ROA did not significantly affect the efficiency value of Islamic banks. This is due to the ROA value in the research sample which tends to fluctuate and is relatively small, so that the ROA cannot affect the efficiency value of Islamic banks. This result agrees with (Miftahurrohman, 2019) and (Fauziyah, 2022) which states that the ROA ratio partially has no effect on the efficiency value of Islamic banks.

The Effect of NPF Variables on the Efficiency of Sharia Banks

The results of the partial test on the NPF variable have a profitability value of 0.001 (0.001 > 0.05) which states that the NPF ratio significantly affects the efficiency value of Islamic banks. This means that every change in the NPF value of 1% will increase the efficiency of Islamic banks by 3.0549%. This is due to the lack of optimality of banks in managing the company's resources, so that a high NPF value can reduce the income generated by banks to be inefficient. The bank's risk resulting from the distribution of funds through financing that exceeds the reasonable limit is fully borne by the bank. This condition resulted in an increased risk of default, which allowed non-performing financing to occur, which had an impact on the increase in the NPF ratio. If the financing risk owned by the bank is greater, it can make the bank tighten the amount of financing disbursed, so that it can reduce profit opportunities and its operational efficiency will also decrease.

The increase in the NPF ratio illustrates the increasing amount of financing that borrowers cannot pay. This situation makes banks have to face difficulties in carrying out bank payment obligations to customers, such as the return of savings and deposits. As a result, banks experienced a decrease in the amount of funds in, because some of the financing could not be returned. So, the high NPF ratio is one of the causes of the decline in the efficiency value of Islamic commercial banks. In dealing with this problem, banks will usually look for additional funds from other parties, such as other financial institutions or investors. These results are in line with research conducted by (Haryanto, 2018) (Wardana & Abdani, 2022) and (Budi gautama Siregar et al., 2023) which obtained the result that the NPF ratio has a positive influence on the efficiency of Islamic banks.

The Effect of FDR Variables on the Efficiency of Sharia Banks

The results of the partial test on the FDR variable obtained a profitability value of 0.799 (0.779 > 0.05) which stated that FDR did not have a significant influence on the efficiency value of Islamic banks. This ratio does not directly affect the efficiency of Islamic commercial banks because FDR is more about financing allocation. This shows that it is likely that the bank's efficiency level is not affected by the ratio. The FDR ratio is financing collected from third parties carried out by Islamic commercial banks. The efficiency of Islamic banks is more emphasized on costs related to other operational costs as well as reserves for the elimination of collectibility from productive assets. These results are in line with research conducted by (Fathurrahman & Rahmadani, 2024) which states that the FDR ratio does not directly affect the efficiency value of Islamic commercial banks.

The Effect of GDP Variables on the Efficiency of Sharia Banks

Based on the results of the partial test of the GDP variable, a profitability value of 0.001 (0.001 > 0.05) was obtained, which stated that GDP had a significant

effect on the efficiency value of Islamic banks. This means that every 1% change in GDP will affect a decrease in the efficiency value of Islamic banks by 1.6203%. If the GDP value is higher, it will make the efficiency value of Islamic banks decrease and vice versa. GDP is a tool to measure the value of national income, the higher the income generated by the community, the more people will be able to fulfill all their desires with their own income without having to borrow funds or money from banks.

A high GDP value will be more likely to attract investors to establish new banks themselves, both local banks and new foreign banks. As a result, higher GDP growth in a country will tend to increase competition between banks so that the profit margins generated will be more competitive. The results of this study are in line with the research from (Arraniri et al., 2020) which states that GDP partially has a negative effect on the efficiency value of Islamic commercial banks.

CONCLUSION

Based on the results and discussion of the research on the Efficiency of Sharia Commercial Banks in Indonesia *(Two-Stage Analysis)* during the period from the first quarter of 2019 to the fourth quarter of 2023, it can be concluded that this study conveys several findings. In the *first-stage,* it was found that in general, nine Sharia Commercial Banks in Indonesia have *a* fluctuating trend in efficiency levels with an average efficiency of 92.77%. Individually, Islamic commercial banks that have an average perfect efficiency level of 100% are Bank Aladin Syariah, Bank Muamalat Indonesia, BTPN Syariah, and Bank Victoria Syariah. Meanwhile, the five Islamic commercial banks that are in the inefficiency category include: BCA Syariah, BJB Syariah, Bank Mega Syariah, KB Bukopin Syariah and Bank Panin Dubai Syariah. During the research period, banks that experienced *inefficiencies* were caused by the bank's inefficiency in allocating its fund inputs by producing optimal *output*.

In the second stage *(Two-stage)* Based on the results of the research that has been explained in the previous chapter, the following conclusions can be drawn:

1. *Banksize, Return On Assets* (ROA) and *Financing to Deposit Ratio* (FDR) partially do not affect the efficiency value of Sharia Commercial Banks in Indonesia.
2. The CAR *(Capital Adequacy Ratio)* ratio is partially significant positively affecting the efficiency value of Sharia Commercial Banks in Indonesia.
3. The NPF *(Non-Performing Financing) ratio* significantly affects the efficiency value of Sharia Commercial Banks in Indonesia.
4. GDP (Gross Domestic Income) partially has a negative effect on the efficiency value of Sharia Commercial Banks in Indonesia.

REFERENCES

Adeabah, D., Gyeke-Dako, A., & Andoh, C. (2019). Board Gender Diversity, Corporate Governance And Bank Efficiency In Ghana: A Two Stage Data Envelope Analysis (Dea) Approach. *Corporate Governance (Bingley)*, *19*(2), 299–320. Https://Doi.Org/10.1108/Cg-08-2017-0171

Amalia, Z. R. (2013). Perbandingan Tingkat Efisiensi Bank Umum Konvensional (Buk) Dengan Bank Umum Syariah (Bus) Menggunakan Metode Data Envelopment Analysis (Dea). *Kategori Peneliti Muda*, 1–20.

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*(9), 2087–2112. Https://Doi.Org/10.1108/Jiabr-12-2019-0235

Anggraeni, A., & Saputri, I. A. (2020). Diversifikasi Aset, Risiko Bank, Ukuran Bank, Dan Likuiditas Bank Terhadap Efisiensi Bank Syariah Dengan Metode Sfa. *Journal Of Business And Banking*, *10*(1), 129. Https://Doi.Org/10.14414/Jbb.V10i1.2182

Arraniri, I., Harjadi, D., & Fitroh, Y. (2020). Identifikasi Faktor-Faktor Yang Mempengaruhi Efisiensi Perbankan Syariah Indonesia. *Digital Economic, Management And Accounting Knowledge Development (Demand)*, *2*(1), 17–42. Https://Doi.Org/10.46757/Demand.V2i1.98

Budi Gautama Siregar, Aswadi Lubis, & Muhammad Salman. (2023). Efisiensi Operasional Bank Umum Syariah. *Jurnal Penelitian Ekonomi Akuntansi (Jensi)*, *7*(2), 264–278. Https://Doi.Org/10.33059/Jensi.V7i2.8571

Eyceyurt Batir, T., Volkman, D. A., & Gungor, B. (2017). Determinants Of Bank Efficiency In Turkey: Participation Banks Versus Conventional Banks. *Borsa Istanbul Review*, *17*(2), 86–96. Https://Doi.Org/10.1016/J.Bir.2017.02.003

Fathurrahman, A., & Rahmadani, S. (2024). Analisis Determinan Efesiensi Bank Umum Syariah. *Iqtishodiyah: Jurnal Ekonomi Dan Bisnis Islam*, *10*(1), 53–67. Https://Doi.Org/10.55210/Iqtishodiyah.V10i1.1123

Fauziyah, N. (2022). *Pengaruh Return On Assets, Bank Size Dan Inflasi Terhadap Efisiensi Bank Syariah Di Indonesia Dan Malaysia Periode 2012-2020*. *7*(30), 605–619.

Fiafifah, A. L., & Darwanto, D. (2019). Technical Efficiency Level Of Islamic Bank In Indonesia. *Al-Uqud : Journal Of Islamic Economics*, *3*(2), 114. Https://Doi.Org/10.26740/Al-Uqud.V3n2.P114-132

Hamda, I., & Sudarmawan, B. N. (2023). *The Effect Of Macroeconomics Variables On Islamic Bank Stability During Covid-19 Pandemic : Evidence From Indonesia*. *12*(April), 59–76. Https://Doi.Org/10.35878/Islamicreview.V12.I1.682

Haryanto, S. (2018). Determinan Efisiensi Bank: Analisis Bank Di Indonesia. *Afre (Accounting And Financial Review)*, *1*(1), 46–52. Https://Doi.Org/10.26905/Afr.V1i1.2230

Jiménez-Hernandez, I., Palazzo, G., & Sáez-Fernández, F. J. (2019). Determinants Of Bank Efficiency: Evidence From The Latin American Banking Industry. *Applied Economic Analysis*, *27*(81), 184–206. Https://Doi.Org/10.1108/Aea-09-2019-0027

Kamarudin, F., Hue, C. Z., Sufian, F., & Mohamad Anwar, N. A. (2017). Does Productivity Of Islamic Banks Endure Progress Or Regress?: Empirical

Evidence Using Data Envelopment Analysis Based Malmquist Productivity Index. In *Humanomics* (Vol. 33, Issue 1). Https://Doi.Org/10.1108/H-08-2016-0059

Khalifaturofi'ah, S. O. (2018). Cost Efficiency, Total Assets, And Profitability: Evidence From Islamic Bank. *Jurnal Keuangan Dan Perbankan*, *22*(4), 769–778. Https://Doi.Org/10.26905/Jkdp.V22i4.2218

Listri, H. (2021). Fungsi Bank Sebagai Lembaga Intermediasi Di Masa Pandemic Covid-19: Analisis Komparatif. *Jurnal Indonesia Membangun*, *20*(1), 28–42.

Lppi, T. Riset Stabilitas. (2021). *Perbankan Syariah Tampaknya Akan Sampai Pada Level Penting Dalam Perjalanannya Di Industri Keuangan Tanah Air . Apakah Ini Menjadi Sebuah Peluang Atau Malah Akan Menjadi Ancaman Bagi Bank Syariah ? Lembaga Pengembangan Perbankan Indonesia*.

Marsondang, A., Purwanto, B., & Mulyati, H. (2019). Pengukuran Efisiensi Serta Analisis Faktor Internal Dan Eksternal Bank Yang Memengaruhinya Measurement Of Efficiency And Analysis Of Bank Internal And External Factors That Affect It. *Jurnal Manajemen Dan Organisasi (Jmo)*, *10*(1), 48–62.

Miftahurrohman. (2019). Analisis Faktor-Faktor Yang Mempengaruhi Tingkat (Studi Pada Bank Syariah Negara-Negara Asean). *Jurnal Lentera Akuntansi*, *Issn 2339-*, 71–91.

Mostafa, M. (2007). Modeling The Efficiency Of Gcc Banks: A Data Envelopment Analysis Approach. *International Journal Of Productivity And Performance Management*, *56*(7), 623–643. Https://Doi.Org/10.1108/17410400710823651

Muhammad, R., & Nawawi, M. (2022). Kinerja Keuangan Bank Syariah Di Indonesia Sebelum Dan Selama Pandemi Covid-19. *El-Mal: Jurnal Kajian Ekonomi & Bisnis Islam*, *3*(5), 854–867. Https://Doi.Org/10.47467/Elmal.V3i5.1133

Mustaniroh, S. A., Septifani, R., Sri, D., & Pangesti, W. (2023). Analisis Kinerja Efisiensi Kelembagaan Rantai Pasok Klaster Ukm Keripik Kentang Menggunakan Pendekatan Data Envelopment Analysis Performance Analysis Of Supply Chain Institutional Efficiency For Smes Cluster Using Data Envelopment Analysis Approach. *Jurnal Teknologi Industri Pertanian*, *33*(1), 58–71.

Neves, D., Do, M., Gouveia, C., Alexandra, C., & Proença, N. (2020). *European Bank ' S Performance And E Ffi Ciency And*. *1998*, 1–17.

Nguyen, T. L. A. (2018). Diversification And Bank Efficiency In Six Asean Countries. *Global Finance Journal*, *37*(2017), 57–78. Https://Doi.Org/10.1016/J.Gfj.2018.04.004

Nikmah, & Atun, N. (2023). Analisis Tingkat Efesiensi Saluran Distribusi Pemasaran Produk Dengan Menggunakan Metode Data Envelopment Analysis (Dea) (Studi Kasus Ud.Ktm(Kateem)). *Unisulla Instutional Respository*, *2*(1), 46–53.

Ofori-Sasu, D., Abor, J. Y., & Mensah, Lord. (2019). Funding Structure And Technical Efficiency: A Data Envelopment Analysis (Dea) Approach For Banks In Ghana. *International Journal Of Managerial Finance*, *15*(4), 425–443. Https://Doi.Org/10.1108/Ijmf-01-2018-0003

Olohunlana, A. O., Odeleye, A. T., & Isola, W. A. (2023). Determinants Of The Intellectual Capital Efficiency Of Listed Banks In Nigeria: A Dea Approach. *Journal Of Business And Socio-Economic Development*, *3*(1), 86–96. Https://Doi.Org/10.1108/Jbsed-07-2021-0100

Otero, L., Razia, A., Cunill, O. M., & Mulet-Forteza, C. (2020). What Determines Efficiency In Mena Banks? *Journal Of Business Research*, *112*(November), 331–341. Https://Doi.Org/10.1016/J.Jbusres.2019.11.002

Othman, F. M., Mohd-Zamil, N. A., Rasid, S. Z. A., Vakilbashi, A., & Mokhber, M. (2016). Data Envelopment Analysis: A Tool Of Measuring Efficiency In Banking Sector. *International Journal Of Economics And Financial Issues*, *6*(3), 911–916.

Puspita, H. S., & Shofawati, A. (2019). Determinan Tingkat Efisiensi Bank Pembangunan Daerah (Bpd) Syariah Di Indonesia: Two-Stage Data Envelopment Analysis. *Jurnal Ekonomi Syariah Teori Dan Terapan*, *5*(10), 804. Https://Doi.Org/10.20473/Vol5iss201810pp804-819

Rahayu, S. K., & Sari, A. W. (2022). Efficiency Analysis Of Fixed Broadband Service Management Industry: Measurement Of The Integrated Dea Model. *European Journal Of Business And Management Research*, *7*(4), 211–216. Https://Doi.Org/10.24018/Ejbmr.2022.7.4.1539

Rahmawati, A. K., Sari, S. R. K., & Hermawan, H. (2019). Analisis Perbandingan Efisiensi Bank Umum Konvensional Dan Bank Umum Syariah Di Indonesia. *Akuntabilitas*, *12*(2), 191–200. Https://Doi.Org/10.15408/Akt.V12i2.12600

Ramly, A. R., & Hakim, A. (2017). *Pemodelan Efisiensi Bank Di Indonesia: Perbandingan Antara Bank Syariah Dan Bank Konvensional*. *7*(Oktober), 131–148. Https://Doi.Org/10.15408/Ess.V7i2.

Romli, M. (2022). *Komparasi Market Share Bank Syariah Di Indonesia Dan Malaysia*. *6*, 35–51.

Rosida, R., & Hermawan, D. (2020). Analisis Tingkat Efisiensi Bank Umum Syariah Di Indonesia Pada Era Masyarakat Ekonomi Asean (Mea). *Journal Of Applied Islamic Economics And Finance*, *1*(1), 171–185. Https://Doi.Org/10.35313/Jaief.V1i1.2401

Tedy, & Yusuf, S. (2020). Literasi Keuangan Syariah Pada Pendidikan Dasar: Tinjauan Teoritis Dan Empiris. *Eco-Iqtishodi Jurnal Ilmiah Ekonomi Dan Keuangan Syariah*, *I*(2), 116–122.

Thi, X., Mai, T., Thi, H., Nguyen, N., Ngo, T., & Le, T. D. Q. (2023). *Efficiency Of The Islamic Banking Sector : Evidence From Two-Stage Dea Double Frontiers Analysis*.

Wardana, Guntur Kusuma, & Abdani, F. (2022). *Bukti Efisiensi Bank Syariah Di Indonesia Dan Malaysia: Roa, Bank Size Dan Npf*. *17*(1), 30–41. Https://Doi.Org/10.32812/Jibeka.V17i1.1026

Zampara, K., Giannopoulos, M., & Koufopoulos, D. N. (2017). Macroeconomic And Industry-Specific Determinants Of Greek Bank Profitability. *International Journal Of Business And Economic Sciences Applied Research*, *10*(1), 13–22. Https://Doi.Org/10.25103/Ijbesar.101.02.