Analysis of the Efficiency Level of Islamic Commercial Banks in Indonesia using Data Envelopment Analysis (2019-2023 Period)

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ABSTRACT: This study aims to analyses the level of efficiency and factors that cause the inefficiency of Islamic Commercial Banks (BUS) in Indonesia in 2019-2023. The study used a purposive sampling of 11 Islamic commercial banks. The data analysis method used in this research uses the Data Envelopment Analysis method through input-oriented measurement and the VRS model, with data processing tools, namely the Win4Deap 2 application. This research shows that the efficiency level of Islamic Commercial Banks in Indonesia during 2019-2023 tends to fluctuate. Only one Islamic Commercial Bank whose efficiency level is perfect with a 100% score is BJB Syariah. As for the inefficiency analysis, the cause of inefficiency occurred in the input and output variables. The third-party fund variable became the most significant contributor that caused inefficiency in the Islamic Commercial Bank, which was 31%.

KEYWORDS: Efficiency; Data Envelopment Analysis; Islamic Commercial Bank.

I. INTRODUCTION

Financial institutions are experiencing rapid development, one of which is the Islamic financial industry, namely Islamic banking. Islamic banking is a financial institution that has a role that is no different from conventional banking; the only difference is the operational system for carrying out banking business activities. Globally, the total assets of Islamic Banking amounted to 2,765 billion USD, with a share of 70% in global Islamic finance (OJK, 2022).

Islamic banking in Indonesia is currently showing relatively rapid development, as shown by several financial indicators, namely assets, deposits, and Islamic banking financing.
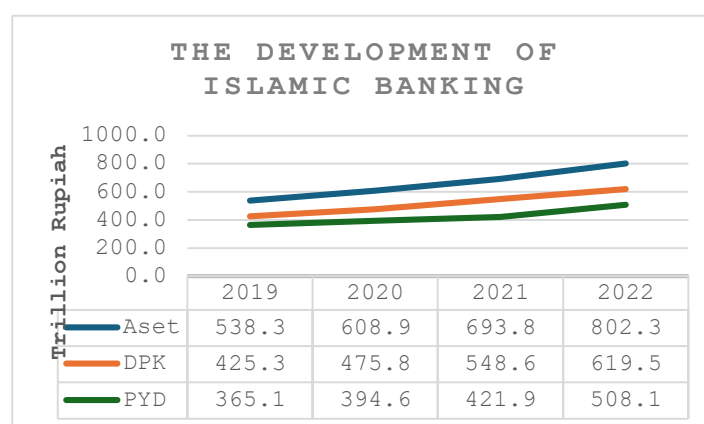

THE DEVELOPMENT OF ISLAMIC BANKING

	2019	2020	2021	2022
Aset	538.3	608.9	693.8	802.3
DPK	425.3	475.8	548.6	619.5
PYD	365.1	394.6	421.9	508.1

Figure 1. Development of Islamic Banking in Indonesia 2019-2022

Based on this graph, the growth of Islamic banking assets, deposits, and financing in Indonesia continues to increase consistently and significantly. In 2022, the growth of Islamic banking assets increased by 15.63% from 2021. Meanwhile, DPK growth also increased in 2022 by 12.93%. And the distribution of Islamic banking financing increased by 20.44% in 2022. This development makes Islamic banking an important contributor to national economic development, especially in supporting inclusive finance, creating jobs, and advancing the Islamic economy.

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Despite showing positive growth, the condition of Islamic banking in Indonesia is directly proportional to the Market Share of Islamic Banking. Indonesia's Islamic Banking Market Share globally is still low compared to other countries' Islamic Banking Market Share, as can be seen from the following graph.
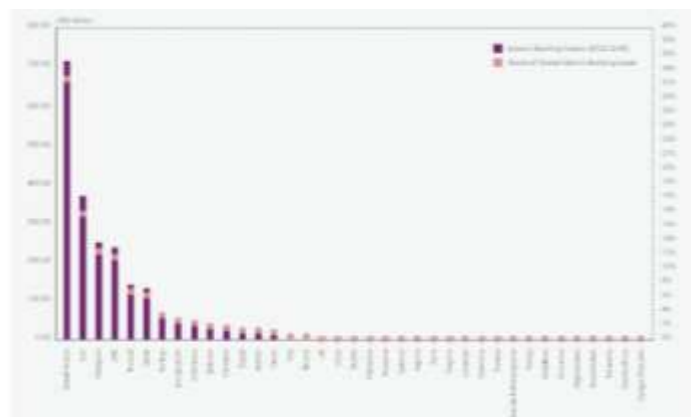

Figure 2. Market Share of Islamic Banking

The graph shows that the Market Share of Islamic Banking in Indonesia is lower than that of Saudi Arabia (32.9%), Iran (16.2%), Malaysia (11.1%), the United Arab Emirates (10.8%), Kuwait, and Qatar (6.6%). This shows that Bank Indonesia's desired target of 20% has not been achieved (Agus DW Martowardojo, 2017).

With the vast potential of the Islamic market and the majority of Indonesia's population being Muslim, Islamic Banking is unable to develop its market share. This is feared to affect Islamic Banking's performance because the better a bank's performance, the possibility of competing and controlling most of the market share can also be realized. The greater the market share of Islamic banks in Indonesia, the greater their role and function in the national economy (Ludiman & Mutmainah, 2020).

II. LITERATURE REVIEW

Efficiency measures a company's success in utilizing its resources optimally, hoping to exceed predetermined goals. The measurement of the level of efficiency in Islamic banks can be an important indicator in seeing the ability of Islamic banks to survive and face the tight competition in the Islamic banking industry as well as in the competition in the national banking industry in Indonesia. Efficient Islamic banks can achieve higher levels of Return on Assets (ROA) and Net Interest Margin (NIM), resulting in more optimal profits. He will undoubtedly contribute positively to the development of the Islamic economy.

In analyzing the efficiency of Islamic banks, it is often measured using the Data Envelopment Analysis Method, which is a calculation with input variables (such as third-party funds, labor expenses and fixed assets) against outputs (such as total financing disbursed and operating income). These variables are among the factors causing the inefficiency of Islamic commercial banks. This can happen because the use of inputs to produce outputs is not maximized (Abdul Matin & Razali, 2021). Such as Third-Party Funds to Financing, where if DPK is used or channeled to productive financing, Islamic Banks can increase profitability so that Islamic Banks can increase their efficiency, but when Islamic Banks do not channel DPK to financing, Islamic Banks do not get profitability and experience a decrease in efficiency (Titania Mukti, 2023)

So, this research uses measurement with a non-parametric approach, namely Data Envelopment Analysis. The reason for using measurement in the DEA approach is that this approach can calculate many input and output variables and is carried out simultaneously compared to the ratio and regression approaches. Desmy Riani also reinforces this research, so research on banking efficiency using the DEA approach can provide values for each input and output variable to achieve efficiency. It can help banks know the performance of banks, especially in terms of financial efficiency, and can be used as a guideline for managers to make decisions in the future. In addition, research conducted by Andri Lestari and Nurul Huda (2020) also explained that the inefficiency factor of Islamic Commercial Banks is not from the management of inputs but from the output side. It shows that the Data Envelopment Analysis approach to getting accurate results with many input and output variables can also determine the inefficiency of an Islamic Commercial Bank.

III. METHOD

The data source used is secondary data obtained in a finished form, already collected and processed by other parties, which are usually already in published and documented form the population used in the study were 11 Islamic Commercial Banks

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registered with the Financial Services Authority (OJK). The sample determination used a purposive sampling method, and based on this method, 55 samples were used in this study.

This study uses Data Envelope Analysis (DEA), a standardized method for measuring the performance of a unit activity. The processing process uses Win4Deap 2 Software and Microsoft Excel as a supporting tool. DEA is a linear programming-based efficiency analysis technique used on many inputs and outputs that are difficult to calculate by comparison or ratio methods.

If using a mathematical model, bank efficiency is calculated with the following formula:

$$\begin{aligned}
\min_{\theta, \lambda, s^+, s^-} \quad & z_0 = \theta - \varepsilon . \vec{1}\, s^+ - \varepsilon . \vec{1}\, s^- \\
s.t. \quad & Y\lambda - s^+ = Y_0 \\
& \theta X_0 - X\lambda - s^- = 0 \\
& \vec{1}\, \lambda = 1 \\
& \lambda, s^+, s^- \geq 0
\end{aligned}$$

The calculation results in a number varying from 0 to 1. The bank can be said to be efficient when it gets a number 1, and vice versa. If it gets a number close to 0, the bank is said to be relatively inefficient or inefficient. This research, using the Data Envelopment Analysis model, uses input-oriented measurement. The approach used in this study also uses the VRS (Variable Return to Scale) model developed by Banker (1984).

In this study, the intermediation approach was used to determine variables. The variables used consisted of input variables (Third Party Funds, Labor Expenses, and Fixed Assets) and output variables (Total Financing and Operating Income).

IV. RESULTS AND DISCUSSION

A. Results of the Efficiency Level of Islamic Commercial Banks for the 2019-2023 Period

Based on DEA calculation using VRS with input-oriented approach. It is known that the 11 Islamic Commercial Banks have the following efficiency levels.

Table 1. Result of efficiency level Islamic Commercial Bank Period 2019-2023

No.	Name of Bank	Efficient Value	Description
1.	Bank Aceh Syariah	92,7%	Not yet efficient
2.	BPD NTB Syariah	72,6%	Not yet efficient
3.	Bank Muamalat Indonesia	70,3%	Not yet efficient
4.	Bank Victoria Syariah	91,6%	Not yet efficient
5.	Bank Jabar Banten Syariah	100%	Efficient
6.	Bank Mega Syariah	90,1%	Not yet efficient
7.	Bank Panin Dubai Syariah	98,6%	Not yet efficient
8.	BCA Syariah	95,6%	Not yet efficient
9.	BTPN Syariah	94,5%	Not yet efficient
10	Bank Aladin Syariah	76,3%	Not yet efficient
11.	Bank Syariah Bukopin	79,9%	Not yet efficient

Based on the calculation of the efficiency level of Islamic Commercial Banks during the research period 2019-2023, it is known that only one Islamic Commercial Bank reaches the perfect efficiency level, namely Bank Jabar Banten Syariah. Based on the calculation in that year, efficiency reached 100%. Meanwhile, 10 Islamic Commercial Banks have not achieved perfect efficiency. The results of the research on the efficiency level of Islamic Commercial Banks are not in line with the research conducted by

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Lidyana Arifah (2023), where the results show that 8 Islamic Commercial Banks at the end of 2022 have reached the perfect efficiency level of 100%.

Based on Table 1, it is known that Bank Aceh Syariah has an efficiency level of 92.7% because, in the 2019-2022 period, Bank Aceh Syariah was unable to achieve the target of each variable, such as Financing in 2022, targeted at Rp. 18,797 billion, but the realization of Bank Aceh Syariah had Rp. 17,334 billion. This aligns with research conducted by Fitriningsih (2012) that the cause of inefficiency comes from the variable side, namely Financing, with a target of 614 billion, but the realization is 86 billion Rupiah.

BPD NTB Syariah has an efficiency level of 72.6%. In the 2019-2023 period, BPD NTB Syariah exceeded the target of each variable, such as the Third-Party Fund target of Rp 8,700,698, whose realization was Rp 9,780,183. This result shows inefficiency but is not in line with the research of Faqih et al. (2024) that the inefficiency of BPD NTB Syariah is due to the economic conditions of the people of West Nusa Tenggara which have not yet recovered from the impact of the earthquake natural disaster in the region identified as one of the factors affecting the decline in efficiency.

Bank Muamalat Indonesia has an efficiency level of 70.3% in the 2019-2023 period, fixed asset inputs, and several outputs that did not reach the target. So, Bank Muamalat Indonesia experienced inefficiency. This research is in line with the research of Nur Khalimah and Edy Yusuf (2022): inefficiency caused by fixed asset inputs exceeding the target along with all outputs not reaching the target and exacerbated by the existence of COVID-19 which has an impact on more selective in channeling financing.

Bank Victoria Syariah has an efficiency level of 91.6%. In terms of inputs and outputs in 2020 and 2021, it was not maximally used because it exceeded the target achieved by Bank Victoria Syariah. In line with Asyilla and Rendra's research (2023), there are still inputs and outputs that have not worked optimally, resulting in Bank Victoria Syariah's inefficiency.

Bank Mega Syariah has an efficiency level of 90.1%. Due to the period 2020-2022, the use of inputs that are not optimal for output where in terms of inputs, namely Third-Party Funds, Labor Expenses, and Fixed Assets which exceed the target of Bank Mega Syariah's achievements each year such as 2020, Third Party Funds were targeted at IDR 6,377,462 but the realization is IDR 14,098,678, -. Thus, it causes inefficiency from Bank Mega Syariah. In line with Titania Mukti's research (2024), many funds from third parties have not been optimized for financing.

BCA Syariah has an efficiency level of 95.6%. This is due to the less-than-optimal use of input by producing outputs, such as the input of Third-Party Funds in 2021 of IDR 829.3 billion, or an increase of 12.1%, which exceeds the growth target of 3-8%. Thus, BCA Syariah's inefficiency. In line with Titania Mukti's research (2024), 2023 has third-party funds, namely 234,180.71185 million, meaning that there are still many funds from third parties that have not been optimized for financing.

Bank Panin Dubai Syariah has an efficiency level of 98.6%, and BTPN Syariah has an efficiency level of 94.5%. Due to 2019-2023, the use of inputs of Third-Party Funds, Labor Expenses, and Fixed Assets to the output of financing and operating income was not optimal, resulting in inefficiency from Bank Panin Dubai Syariah and BTPN Syariah. However, Lidyana Arifah's research (2023) said that Bank Panin Dubai Syariah and BTPN Syariah in 2022 reached the perfect efficiency value, so it is not in line with the results of this study.

Bank Aladin Syariah has an efficiency level of 76.3%, and Bank Syariah Bukopin has an efficiency level of 79.9%. This is due to the use of inputs that have not been optimal in producing outputs, which causes the inefficiency of Bank Aladin Syariah and Bank Syariah Bukopin. However, Titania Mukti's research (2024) said that both banks reached the perfect efficiency value, so this research was not in line with this research.

Thus, the overall efficiency level of Islamic Commercial Banks shows that Islamic Commercial Banks in Indonesia still cannot achieve a perfect level of efficiency of 100%.

B.   *Factors Causing Inefficiency of Islamic Commercial Banks in Indonesia 2019-2023*

Based on the calculation of DEA using VRS with an input-oriented approach in terms of the efficiency reference set (ERS), the inefficiency factors in Islamic Commercial Banks are in the input variables in the form of Third Party Funds, labor expenses and fixed assets as well as outputs in the form of total financing and operating income at Islamic Commercial Banks that must be improved, follows the research of Nur and Edy (2022) that the cause of inefficiency comes from the improper allocation of input and output variables, so corrective action is needed, especially on the input variables, namely Third Party Fund, which is the leading cause of inefficiency in Islamic Commercial Banks.

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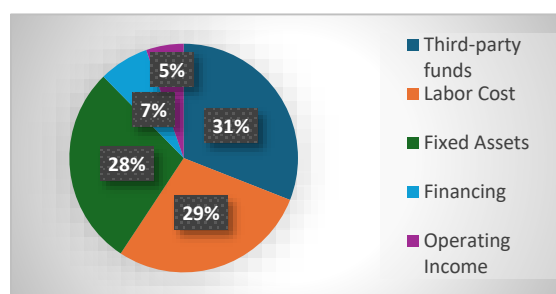

Figure 3. Variable Causes of Inefficiency of Islamic Commercial Banks in 2019-2023

Figure 3. Explains that the variables that need improvement are the input and output variables. Input variables include third-party funds, fixed assets, and labor expenses; output variables include total financing and operating income. Third-party funds are the most significant contributor to inefficiency in Islamic commercial banks, at 31%. While labor cost inefficiency was 29%, fixed asset inefficiency was 28%, and financing and operating income were 7% and 5%, respectively. The results of the contribution of each variable that causes inefficiency show that the Islamic Commercial Bank (BUS) in Indonesia has not been able to maximize the inputs generated using a specific outputs set. These results are in line with research conducted by Titania Mukti (2024) and Lidyana Arifah (2023), where the results show that the Third-Party Fund is the most significant contributor to the inefficiency of Islamic Commercial Banks, which causes Islamic Commercial Banks not to carry out their functions optimally so that they must improve efficiency in the management of Islamic Commercial Banks.

Inefficiency in third-party funds input caused by the amount of input that is more significant than the target in each table of each Islamic commercial bank, where the actual value is greater than the efficiency reference set (ERS) value or the efficiency value, shows that the input of third-party funds does not play a maximum role in producing output. So, the effort that allocating excess input of deposits through financing products such as channeling funds to productive financing (financing of small and medium enterprises (SMEs), infrastructure financing, and other projects following sharia principles) and consumptive financing (financing of vehicles, houses, and other consumer goods through murabahah, ijarah, or istisna schemes), can be done so that the community can reuse the funds through financing.

Furthermore, the input variable that needs to be improved is the labor burden variable. The increase in labor expenses caused by the costs incurred by Islamic Commercial Banks related to their employees for operational activities is still relatively large. This occurs because of ineffective human resource planning in analyzing and recruiting employees, so the labor burden is not proportional to the operating income earned by the Bank.

The fixed asset variable also experienced waste because the number of new branches of Islamic Commercial Banks increases yearly. As a result, operational vehicles and ATMs add to the long list of inefficiencies in fixed assets. Moreover, Islamic commercial banks experience a swelling of fixed assets, so efforts are needed to make them efficient, such as conducting asset inventories to identify unproductive or unused fixed assets and reducing the need for physical assets through process digitization and automation needs to be done so that Islamic Commercial Banks can achieve efficient use of existing fixed assets.

In addition to the input variables, inefficiency occurred in the output variables, namely total financing and operating income. The amount of financing is still smaller than the target set at the Islamic Commercial Bank, which has not reached the level of perfect efficiency. This is due to the prudential principle applied by the Islamic Commercial Bank, but the excess proportion of the principle's application will hamper the target amount of financing that should be channeled.

Inefficiency also occurs in operating income. Due to intense competition among banks and high operating expenses, operating income does not reach or is less than the target that should be achieved. Obtaining operating income according to the target can be achieved by developing innovative and value-added Sharia products and services, analyzing and evaluating operational expenses (salary expenses, allowance for doubtful accounts, rental expenses, etc.), and improving effective marketing strategies to reach the right target market.

So, several factors that cause Islamic Banks' inefficiency have been described. Each Islamic Bank needs to conduct an in-depth evaluation to carry out its policies or development so that it can compete with other Islamic banks and Conventional Banks. It takes the role of all parties, such as the Government, to help Islamic Banking develop more with its policies so that people can be interested in using products from Islamic Banking.

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V. CONCLUSION

The results showed that the efficiency level of Islamic Commercial Banks in Indonesia during 2019-2023 tended to fluctuate. There is only one Islamic Commercial Bank whose efficiency level was stable and perfect, with a score of 100%, namely Bank Jabar Banten Syariah. Moreover, in the inefficiency analysis, it was found that the cause of inefficiency in Islamic Commercial Banks in Indonesia occurred in the input and output variables. Input variables include Third Party Funds, fixed assets, and Labor expenses; output variables include total financing and operating income. Third-party funds became the highest variable that caused inefficiency in Islamic Commercial Banks, which amounted to 31%. Meanwhile, Labor costs amounted to 29%, fixed assets amounted to 28%, and financing and operating income amounted to 7% and 5%, respectively. The analysis shows that Islamic Commercial Banks in Indonesia have not been able to maximize the use of their inputs to achieve optimal output.

Therefore, this research is expected to provide information that will be evaluated by the management of each Islamic Commercial Bank regarding the performance that has been achieved, especially in achieving the optimal level of efficiency during the research period.

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