



FINANCING EFFICIENCY ANALYSIS USING DATA ENVELOPMENT ANALYSIS (DEA) APPROACH AT BANK ACEH SYARIAH

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Abstract

This study aims to analyze the level of Financing Efficiency Using the Data Envelopment Analysis (DEA) Approach at Bank Aceh Syariah. This type of research is descriptive quantitative research. The data collection technique uses secondary data in the form of financial statements accessed through the official website www.bankaceh.co.id. The collected data is processed using the STATA 17 program. The population used in this study is all financial reports of Bank Aceh Syariah. The sampling technique in this study uses saturated samples, namely the entire population. This study uses two variables, namely input variables consisting of Third-Party Funds and Fixed Assets and Financing output variables. The data analysis method used in this study is Data Envelopment Analysis. The results of the study show that there is variation in the level of efficiency during the entire 2020-2023 Period of Bank Aceh Syariah. Some branches show a high level of efficiency with a DEA score of 1, while others show varying levels of inefficiency with different DEA scores. Overall, Bank Aceh Syariah has achieved fairly efficient circumstances where the fluctuations observed reflect variations in bank performance from year to year. Despite these fluctuations, Bank Aceh Syariah continues to show a relatively good level of efficiency throughout the period. The theoretical implication of this study is to increase understanding of how DEA techniques can be used to evaluate and compare financing efficiency between units or branches in a Sharia bank. The managerial implication of this study is to assist management in making strategic decisions related to resource allocation, setting internal policies, and developing more effective financing strategies. By optimizing efficiency, banks can improve competitiveness, quality of service to customers, and long-term financial sustainability. Additionally, this study can be used as a tool for periodic performance evaluation and monitoring, ensuring that banks continue to operate at maximum efficiency.

Keywords: *Third-Party Funds, Fixed Assets, Financing*

Introduction

In the progress and development of the Islamic banking industry, banks play an important role in a country's economy. Banks not only manage funds profitably, but also encourage the growth of other sectors. Therefore, Islamic banking has a fairly even role and is increasingly targeted by a country and society, thus making the banking industry fertile in society. Almost all economic activities require banking services, such as national and international transactions, money distribution, and investment. Currently, the increasing number of Islamic banks in Indonesia shows that more and more people want a bank that manages finances in accordance with Islamic law. The financial sector, especially banking financial institutions, plays an important role because banking activities are a reflection of the rate of economic growth. Throughout 2019, Indonesia's economic growth grew at 5.02% (Central Statistics Agency, 2020).

Islamic banks are banks that carry out their business activities based on sharia principles (Fitroh et al., 2020). Islamic banking is one aspect of Islamic economics that prohibits the use of interest systems in the economy, especially banking, because this system is considered usury which is prohibited by religion. In carrying out the intermediary function of Islamic banks, it is important to maintain client trust. Maintaining a level of health through the efficiency of Islamic bank performance is one way to achieve this. Islamic banks can achieve this level of health by being able to optimize the use of various available resources. Therefore, it is very important to assess the level of bank health through various factors that shape the efficiency of Islamic banks (Koiri & Erdkhadifa, 2022). The main factor in the banking industry is efficiency, which is one of the important components in determining the ability of Islamic banks to survive and survive in the competition of the Indonesian banking industry.

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The development of the Islamic banking industry from the past until now continues to share good growth from the financing side of the Aceh Syariah Bank. The development of Islamic banking itself can be seen from the increase in total financing in the bank. Below is the development of the Aceh Syariah Bank Indonesia in 2020-2022.

Table 1 Bank Aceh Syariah Financing

Name	2020	2021	2022
Financing	15,279,249	16,345,845	17,334,052
DPK	6,665,390	7,479,463	8,153,590

Source: Processed data (2024)

Based on the table above, it shows that the financing performance and DPK of Bank Aceh Syariah from 2020-2022 have increased every year. This is because Bank Aceh has succeeded in distributing financing on a consolidated basis every year. Bank Aceh's main director, Muhammad Syah, said that in encouraging this growth, Bank Aceh is committed to improving services by providing financial solutions that are in accordance with the needs of the community and customers. Especially by encouraging economic growth in Aceh, especially MSMEs in each region by distributing productive financing such as KUR and micro financing of Bank Aceh (www.bankaceh.co.id).

The description above shows the increasing desire of the community to have a bank that manages finances in accordance with Islamic sharia principles. The development of the Islamic banking industry in Indonesia demands efficiency measurements, including at Bank Aceh Syariah Indonesia. The question that arises is whether Bank Aceh Syariah has been efficient in maximizing all of its resources. Because by knowing the level of efficiency of a bank, we can know how much the bank's ability is in optimizing all of its resources and providing greater benefits to the community as its customers, both as savings customers and financing customers.

Research Method

The method used in measuring efficiency is the input orientation model. The non-parametric Data Envelopment Analysis (DEA) method is one of the methods used to analyze bank efficiency. One way to find the causes and solutions to inefficient performance is to identify several units needed, and this is the core of the DEA analysis technique (Pambuko, 2016). The type of research used is quantitative and the data used is secondary data. The data in this study comes from financial reports on banking, namely Bank Aceh Syariah Indonesia for the period 2020-2023, which is a type of panel data. The data collection technique uses a literature study method, namely by reviewing, observing, studying, and analyzing literature such as books, journals and other written sources. While the documentation study was carried out using Bank Aceh Syariah financial report data published on its official website.

This study focuses on analyzing the efficiency of Aceh Syariah bank financing taken from the bank's financial statements by tracing and determining inputs (Deposits & DPK) that are linked to outputs (Financing). Through the Data Envelopment Analysis (DEA) approach method with a research period of 2020-2023. The model can calculate the reduction in inputs needed to produce efficient performance without changing the amount of output produced. While DEA has many inputs and outputs used, the efficiency is relative.

$$\begin{aligned}
 & \text{Min } \theta \lambda \theta && \theta = \text{efficiency of the DMU} \\
 & && Q1 = \text{Financing} \\
 & \text{St-qi} + Q\lambda \geq 0 && X1 = \text{DPK} \\
 & \Theta xi - X\lambda \geq 0 && X2 = \text{Fixed Assets} \\
 & L \geq 0 &&
 \end{aligned}$$

Information:

It can be explained that xi is the number of inputs of type i and qi is the number of outputs of type i. The value of θ is always less than or equal to 1. DMU with a value of $\theta < 1$ means inefficient while $\theta = 1$ means efficient. The VRS model can be written as follows:



$$\sum_{j=1}^n \lambda_j = 1$$

Additionally, the following equation can be used to represent the BBC model:

$\lambda \text{Max} \pi$ (DMU Efficiency of VRS Model)

$\sum_{j=1}^n \lambda_j = 1$ $i = 1, 2, \dots, m$

$\sum_{j=1}^n \lambda_j y_{rj} \geq 1$ $r = 1, 2, \dots, s$

$\sum_{j=1}^n \lambda_j y_{rj} \geq 1$ $j = 1, 2, \dots, n$

Data Envelopment Analysis is a linear programming technique used to assess and evaluate the performance of a decision-making unit, known as the Decision Making Unit (DMU). Measuring bank efficiency with this technique is done by calculating the ratio between the output and input used. The DEA approach measures how efficient a bank is in using a number of inputs n to produce various outputs m . (Agustin, 2019). Data Envelopment Analysis (DEA) will be used as an analysis method in this study. In this case, Data Envelopment Analysis (DEA) will be used to measure the efficiency of financing in banking, namely Bank Aceh Syariah. DEA measurement is a method for evaluating the productivity of a decision-making unit (work unit) that is responsible for using a set of inputs to obtain targeted outputs. Simply put, the measured value is expressed as the ratio of output and input. This is a measure of productivity that can be expressed in part or in whole and helps show which input factors have the greatest impact on production output. One of the advantages of DEA is that it can handle many inputs and outputs and does not require the assumption of a functional relationship between input variables and output variables (Fatimah & Mahmudah, 2017). The sampling technique in this study used saturated sampling, namely the sample taken was the entire population. All financial report data available from the official website of Bank Aceh Syariah for the period 2020 - 2023.

Table2. Research Sample

No	Financial Report of Bank Aceh Syariah
1	Year 2020
2	Year 2021
3	Year 2022
4	Year 2023

Source: Data Processing Results, 2024

In this study, the data source was obtained from Bank Aceh Syariah which publishes its financial reports directly through the website <https://www.bankaceh.co.id/> as a form of transparency and accountability in managing the company's finances.

Results and Discussion

Bank Aceh is a bank owned by the Aceh regional government, the idea of establishing it was initiated by the Aceh Provincial Transitional Government Council (Nanggroe Aceh Darussalam Provincial Government). After obtaining approval from the Aceh Provincial Transitional People's Representative Council in Kutaraja (Banda Aceh) with Decree Number 7/DPRD/5 dated September 7, 1957, the aim was to provide financing for the implementation of regional development efforts in the framework of planned national development.

Bank Aceh has a long history that initially operated in a conventional system and had a sharia business unit branch, then for various considerations and in compliance with Aceh regional regulations, it was then converted into a sharia operating system as a whole, namely on September 19, 2016 and simultaneously in all Bank Aceh office networks in Aceh province and since that date Bank Aceh has been able to serve all customers and the community with a sharia system as a whole (PBI Number 11/15 / PBI / 2009). The conversion process of Bank Aceh is basically based on three considerations, namely philosophical, sociological, and legal. The philosophical basis is that the Aceh region has long implemented Islamic law even before Indonesia's independence. Then for the sociological basis, the Aceh region in every Islamic value has already been united and integral with every activity of the Aceh community. Meanwhile, for the legal basis, there is legal force including Law Number 44 of 1999 concerning the implementation of Aceh's Special Autonomy, the Special Autonomy Law, the Aceh Government

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Law (UUPA), and various Qanuns concerning the implementation of Islamic law, including in the economic sector (Munawar, 2019).

Data Analysis

Efficiency is a measure that determines the level of production efficiency, namely the extent to which existing inputs can produce efficient production. In this study, the data used include Third Party Funds and Fixed Assets as input variables, and Financing as an output variable with a research period of 2020-2023. With the Data Envelopment Analysis (DEA) approach, this study calculates technical efficiency over a certain period of time. Efficiency criteria or metrics are compiled to identify stages of efficiency in the financing process at Bank Aceh Syariah, which are categorized into high, medium, low, and poor efficiency.

Table 1. Input Variable Value of Bank Aceh Syariah Period 2020-2023

DMU	DPK	Fixed assets
2020	21,574,036	281,362,000
2021	24,018,009	275,247,000
2022	22,976,036	283,061,000
2023	24,467,268	285,503,000

Source: Data Processing Results, 2024

Table 2. Output Variable Value of Bank Aceh Syariah Period 2020-2023

DMU	Bank Aceh Syariah Financing
2020	15,279,249
2021	16,345,845
2022	17,334,052
2023	18,687,112

Source: Data Processing Results, 2024

Results of Calculation and Discussion of Financing Efficiency Analysis of Bank Aceh Syariah 2020-2023 Using the DEA Approach with the Return to Scale (VRS) Variable Model

In this study, Financing Efficiency Analysis at Bank Aceh Syariah was conducted using the Data Envelopment Analysis (DEA) approach in the period 2020-2023. The results of the study indicate that there are variations in the level of efficiency among the entire 2020-2023 Period of Bank Aceh Syariah.

Table 3. DEA VRS Oriented Output for the 2020-2023 Period

Year	Unit Name	Output Efficiency
2020	Bank Aceh Syariah	1.113283
2021	Bank Aceh Syariah	1.025420
2022	Bank Aceh Syariah	1.014907
2023	Bank Aceh Syariah	1.068837

Source: Data Processing Results, 2024

The table above shows the level of output efficiency of Bank Aceh Syariah throughout the 2020-2023 period using the Data Envelopment Analysis (DEA) approach based on the Variable Returns to Scale (VRS) assumption. The input efficiency value reflects the extent to which Bank Aceh Syariah is able to utilize its resources to achieve optimal output. In 2020, the output efficiency level was at 1.113283, which showed very satisfactory performance. However, in the following years there was a decrease in efficiency with a value of 1.025420 in 2021 and 1.014907 in 2022. However, in 2023, output efficiency increased again to 1.068837. This fluctuation reflects variations in the bank's performance from year to year, although overall, Bank Aceh Syariah continued to show a relatively good level of efficiency throughout the period.



Table 4. Slack Input & Output Value of Bank Aceh Syariah Period 2020-2023

DMU	Slack Input		Slack Output
	DPK	AT	P
2020	247114	3,800,007	1066596
2021	389839	6996897	2.32006
2022	280346	5188754	-
2023	0	0	-

Source: Data Processing Results, 2024

In 2020, there was excess input that was not used efficiently in Third Party Funds (TPF) of 247,114 and Fixed Assets of 3,800,007. In addition, there was output that was not achieved 1,066,596. In 2021, there was excess input that was not used efficiently in Third Party Funds (TPF) of 389,839 and Fixed Assets of 699,6897. In addition, there was output that was not achieved 2,32006. In 2022, there was excess input that was not used efficiently in Third Party Funds (TPF) of 280,346 and Fixed Assets of 5,188,754. In addition, In 2023, there was no slack value recorded for either input or output.

Conclusion

Based on data processing using the Data Envelopment Analysis VRS model and the discussion that has been described previously, the following conclusions can be drawn:

1. Based on the above conditions, in 2020 Bank Aceh Syariah achieved a fairly good efficiency condition with a score of 1.113283. Furthermore, in 2021, Bank Aceh Syariah achieved a condition where the efficiency value decreased to 1.023420. Although still above 1, this decrease indicates a slight decrease in efficiency performance compared to the previous year. Efficiency in 2022, In 2022, the efficiency value fell again to 1.014907. This continued decline indicates the challenges faced by Bank Aceh Syariah in maintaining its efficiency. An in-depth evaluation may be needed to identify areas that need improvement. Efficiency in 2023, In 2023, the efficiency value rose to 1.068837. This increase indicates that Bank Aceh Syariah has succeeded in improving its performance after experiencing a decline for the previous two years.
2. Overall, for the 2020-2023 period, Bank Aceh Syariah has achieved a fairly efficient condition. The fluctuations reflect variations in the bank's performance from year to year, although overall, Bank Aceh Syariah continues to show a relatively good level of efficiency throughout the period.
3. The financial performance of Bank Aceh Syariah is quite efficient when viewed from the management of input variables (TPF & Fixed Assets), and output variables (Financing).

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