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EFFICIENCY ANALYSIS OF ISLAMIC RURAL BANK IN CENTRAL JAVA : NON PARAMETRIC APPROACH

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HIGHLIGHT
- *Islamic Rural Bank*
- *Efficiency*
- *SDGs*

ABSTRACT

This study analyzes the efficiency of Islamic Rural Banks in Central Java, Indonesia, from 2016 to 2020, using DEA (Data Envelopment Analysis). Examining 20 banks, it measures efficiency through input variables such as fixed assets, operational costs, and third-party funds, and output variables like financing quantity and operating income. The findings reveal a fluctuating efficiency trend, with a notable decline during the COVID-19 pandemic. Inefficiency is primarily found in customer financing. The study also identifies potential enhancements for less efficient programs and provides insights for various stakeholders. These results are significant for understanding the dynamics of Islamic banking, particularly in supporting sustainable development and public welfare during challenging times. The research contributes valuable insights into the potential of Islamic Rural Banks in aligning financial strategies with broader societal goals, particularly during the pandemic.

KEYWORDS

Keywords: Islamic Rural Bank, Data Envelopment Analysis, Efficiency, SDGs

INTRODUCTION

Covid-19, which initially surfaced in December 2019 in China, has rapidly spread throughout the world. The impact of the Covid-19 pandemic has been devastating not just on a health level, but also on the world economy (Zheng, C., & Zhang, 2020). The spread of this virus and the government's preventive measures to contain it are the primary reasons for the suspension of production and consuming activities (Arianto, 2021). They are also felt by one of the economic sectors, specifically the banking sector, which is at the heart of any country's economy (Adeebah, D., & Andoh, 2020).

Banks are intermediate institutions that act as a conduit for deposits and lending (Cetorelli, N., 2012). The strength and confidence of the banking system can result in banks performing efficiently in order to compete and thrive across industries (Zeitun, 2013). A well-functioning banking system can ensure the effective implementation of monetary policy and the smooth operation of the state payment system (Gulati, 2011). Then, with the promulgation of Law Number 23 of 1999 respecting Bank Indonesia, which empowered Bank Indonesia to carry out its functions in accordance with sharia principles. Since then, the Islamic banking industry has developed to unprecedented proportions. The growing number of Islamic banks has compelled the Indonesian banking sector to improve its competitiveness by outperforming and outperforming the Islamic banking market (Astiyah, 2006; Endri, Ritha, H, Hadiyati, 2010; Hadad, 2003)

The banking industry has the potential to contribute to the accomplishment of Sustainable Development Goals (SDGs), particularly in terms of ensuring community equity. The banking industry is a sharia-compliant financial institution that will contribute to the growth of the real sector, particularly in productive economic activities, but has not yet accounted for a significant amount of funding for productive activities. The banking sector's productive financing contributes to the realization of prosperity and equity. The banking industry, through productive financing, will not only provide financial services to the public, but will also create chances for the development of Indonesia's MSME sector, particularly in the province of Central Java. Financing these productive activities would boost income, the economy, and community welfare, all of which are part of the Sustainable Development Goals agenda (SDGs).

The number of Rural Banks and Islamic Rural Banks in Indonesia has decreased. There are a number of explanations for the decline in the number of BPRs and BPRS in Indonesia. First, tighter regulation might lead smaller banks to not comply, leading to mergers or closures. Second, competition from big banks and fintech has affected rural banks. Third, the impact of the COVID-19 pandemic on the economy has put pressure on liquidity and asset quality, which may lead to a downturn or consolidation. Fourth, products and services that do not meet local needs can reduce bank sustainability. Fifth, operational and management issues, such as the inability to manage risk or governance issues, may also contribute. Finally, macroeconomic fluctuations such as inflation and interest rates can affect

the stability of these banks. The combination of these factors may have contributed to the decline in the number of BPRs and BPRS, highlighting the need for adaptation and innovation within the rural banking industry to deal with these challenges and ensure future survival and growth.The Financial Services Authority (OJK) in September 2021 noted that the number of Rural Bank and Islamic Rural Bank in Indonesia reached 1,646 units, with details of Rural Bank as many as 1,481 units and Islamic Rural Bank as many as 165 units (OJK, 2021). This number shows a decrease compared to 2016. The number of Rural Bank and Islamic Rural Bank was still recorded at 1,799 units; then, in 2017, it was reduced to 1,989 units. Furthermore, in 2018 Rural Bank and Islamic Rural Bank were again recorded to have decreased to 1,764 units. Two years later, in 2019 and 2020, which was the year the COVID-19 pandemic emerged, the number of the two types of banks left was 1,709 and 1,669 units, respectively. Although the number of Rural Bank and Islamic Rural Bank has decreased in Indonesia, there are provinces in Indonesia, namely Central Java, where the development and performance of these Bank, especially Islamic Rural Bank, are quite good. The Financial Services Authority stated that the market share of Rural Bank and Islamic Rural Bank in Central Java is quite large. Currently, it is known that the number of Rural Bank in Central Java reaches 235 units and Islamic Rural Bank as many as 26 units. Compared to other provinces, the performance of Rural Bank and Islamic Rural Bank in Central Java province is relatively better.

During the Covid-19 pandemic, measuring banking efficiency was very important because it is one of the benchmarks that underlies the company's overall performance by optimally maximizing output for its input resources. Furthermore, to realize the achievement of community welfare which is the agenda of the Sustainable Development Goals (SDGs), efficiency measurements must also be carried out in the banking industry, especially in Islamic Rural Bank. Besides realizing the welfare of the community, efficiency in the banking industry can undoubtedly achieve the short-term goal of the bank, namely maximizing profits and the long-term goal of maximizing the welfare of the owner. So one of the strategies to achieve this goal is to increase operational efficiency (Rose, P.S., & Hudgins, 2013). An accurate analysis of banking efficiency can take advantage of the evaluation both parametrically and non-parametrically (Hadad, 2003). Furthermore, various input and output variables can be included in this method's analysis.

Numerous scholars have conducted studies on the effectiveness of banking, particularly the Islamic Rural Bank in Indonesia, including (Warninda, T. D., & Hosen, 2015), analyzing the efficiency and profitability of Islamic Rural Bank. Then (Jatmiko, 2017) examines whether ownership structure affects the technical efficiency of Rural Bank and Islamic Rural Bank in Indonesia. Sandono measures technical efficiency and identifies the factors causing inefficiency at Islamic Rural Bank in East Java (Sadono, 2017). Devi & Firmansyah investigated the direct and indirect effects of macroeconomic variables on financial distress by using the efficiency variable as a mediator (Devi, A., & Firmansyah, 2018). Nugrohowati measures the efficiency level of Islamic Rural Bank in Indonesia during the period 2012 to 2015 according to regional zones (Nugrohowati, 2019). Agustina, Sholihin, & Fithria measured and analyzed the technical efficiency of Indonesian Islamic

Rural Bank from the first quartile of 2011 to the fourth quartile of 2016 (Agustina, D., Sholihin, M., & Fithria, 2019).

Based on this background, this study aims to analyze the efficiency of Islamic Rural Bank in Indonesia, especially in Central Java province, during the period 2016 to 2020. Furthermore, due to the covid-19 pandemic that emerged at the end of 2019 and spread massively in 2020, this study also aims to analyze whether the pandemic affected Islamic Rural Bank in Central Java. This study will also explore potential improvements to improve the efficiency of the two types of banks in the future.

DEA has a linear programming (LP) basis that can be used to measure efficiency in an Economic Activity Unit (UKE) or also known as a Decision-Making Unit (DMU) which has a variety of inputs and outputs. This study uses a non-parametric DEA approach to determine the efficiency level of each DMU. DEA is used to calculate technical efficiency for all units, with the efficiency score of each unit being relative. Each unit sampled in the study has a non-negative efficiency level, and the value interval is between 0 (very inefficient) to 1 (perfect efficiency). This study's DEA method is output-oriented, with inputs that can still produce large outputs (Marsondang, A., Purwanto, B., & Mulyati, 2020).

LITERATURE REVIEW

Islamic Rural Bank

Islamic Rural Bank is a bank that carries out its business activities based on sharia principles and does not provide services in payment traffic in its business activities. As explained in Law number 21 of 2008, BPRS is a sharia bank that does not provide services in payment traffic in its business activities. The legal form can be a Limited Liability Company (PT) or a Cooperative or Regional Company (Article 2 PBI No. 6/17/PBI/2004).

Financial Services Authority Regulation (POJK) Number 3/POJK.03/2016 concerning Islamic Rural Bank regulates that Islamic Rural Bank is divided into four zones. (OJK, 2021) The zone division is based on the regional economic potential and the level of competition from financial institutions in the respective regions. Zone one has high and tight economic potential and competition between financial institutions, while zone four is classified as having lower economic potential and less competition between financial institutions. The performance of Islamic Rural Bank in big cities will undoubtedly be different from Islamic Rural Bank in small cities due to the ease of access to commercial banks in these areas. For example, a Islamic Rural Bank located in Eastern Indonesia is expected to perform better than the Greater Jakarta area. This is because commercial banks in Eastern Indonesia are more challenging to access with lower levels of competition than in big cities with higher levels of competition.

Although Islamic Rural Bank is statistically lower than Rural Bank and conventional commercial banks, the role of Islamic Rural Bank in the Indonesian economy is prominent because Islamic Rural Bank tends to have a social and commercial mission (Seibel, 2008). BPRS has a specific purpose, namely providing financing and providing assistance to low-income communities and Micro, Small, and Medium Enterprises (MSMEs) to reduce poverty and realize community welfare. In addition, Islamic Rural Bank can be a solution to filling the

gap in sources of financing for small and medium enterprises (SMEs) following sharia principles. Islamic Rural Bank has an essential role in the progress of SMEs in Indonesia, and it is well known that SMEs have a high contribution in Indonesia (Masyita, D., 2013).

The differences between Rural Bank and Islamic Rural Bank are: 1) Contract and Legality; 2) There is a Sharia Supervisory Board (DPS); Settlement of disputes through the Sharia Arbitration Board or the Religious Courts; 4) Prohibition of doing illegal business, doubtful and causing harm to other parties; 5) profit-sharing system in the collection and distribution of financing.

Bank Efficiency

To carry out its role optimally, especially during the COVID-19 pandemic, which harms several industries, including the banking industry, Islamic Rural Bank must operate efficiently to compete in the banking industry. Furthermore, because commercial banks are starting to expand their business to remote areas, the competition between Islamic Rural Bank and other commercial banks has become even tighter. In addition, financial support, information technology, and quality human resources encourage commercial banks to expand the market. Facing this competition, Islamic Rural Bank are required to improve competitiveness by increasing the efficiency of their companies. The Islamic Rural Bank measures its efficiency level and determines corrective actions to make it more effective. By knowing the status of company efficiency, bank leaders can determine their ability to optimize their resources (Firdaus, Muhammad Faza, & Hosen, 2013).

Assess the health of a bank can be seen from its operational performance. Performance can be measured by looking at the efficiency of bank fund management. Efficiency is one of the performance parameters, which theoretically is one of the basics of the overall performance of an organization. When measuring efficiency is carried out, banks are faced with how to get the optimal level of output with the current input level or obtain a minimum level of input with the level of output (Hadad, 2003) The ability to produce maximum output with the owned input is a form of performance measure.

Abidin and Endri, Efficiency is an essential standard in measuring the total performance of company activities (Endri, 2009). If a company can produce more output with less output, then a company can be declared to have a good level of efficiency (Prativi, Y. P., Dewi, D. M., & Lubis, 2020). The company is said to be efficient if it can use existing inputs to produce a level of output. Maximum without wasting resources (inputs) owned (Naufal, F. M., & Firdaus, 2018).

Furthermore, in financing based on sharia aspects, efficiency can be measured from two assessment elements. First is the ability of banks to produce output, in this case, funding at a cost (cost). So that this aspect is closely related to the financing ratio and the development of bank assets. The second is the bank's performance in minimizing risk in the financing, or the ability of banks to channel the funding (financing) and reduce risk (Iskandar, 2012).

Three factors, including the first, can cause inefficiency. If the same input can produce a larger output, the two smaller inputs can have the same output, and the third, with more critical information, can produce an even greater output (Iskandar, 2012) Thus, a BPRS is said to be technically efficient if it has maximum output with specific resources using minimal input.

RESEARCH METHOD

This study uses a non-parametric quantitative approach, Data Envelopment Analysis (DEA). Initially, Dea was developed by Charnes, Cooper & Rhodes (1978) and later expanded by Banker, Charnes, & Cooper (1984) to measure the productivity and efficiency of business units (Charnes, A., Cooper, W. W., & Rhodes, 1978). This allows some outputs (weighted) and some inputs (weighted) to measure productivity or efficiency, or is usually referred to as a weighted level of output resulting from a given input.

In the literature study on efficiency, DEA is widely used to measure technical efficiency, including the efficiency of financial institutions (Sharma, D., Sharma, A. K., & Barua, 2013). In addition, the DEA method can also provide information about Decision Making Units (DMU) (in this context, Islamic Commercial Banks in Indonesia) which are inefficient in the use of inputs, and what variables cause inefficiency. Finally, this method can produce information about how much input and output must be adjusted to achieve a relatively maximum efficiency value.

The process of converting inputs into outputs is known as technical efficiency. A business unit is said to be efficient if it can produce maximum output for a certain level of production (input) or if a unit can minimize costs for a certain level of output. Ozcan divides efficiency into several aspects: technical efficiency, scale efficiency, cost efficiency, and allocation efficiency (Ozcan, 2008). Because this research only applies to the internal technical relationship between inputs and outputs, a company is considered economically effective if it can reduce production costs to produce specific outputs.

DEA's two basic models are the Charnes, Chopper & Rhodes (CCR) model and the Bankers, Charnes & Rhodes (BCR) model (Charnes, A., Cooper, W. W., & Rhodes, 1978). The CCR model assumes that the change in the value of the output produced by the DMU will always be the same as the proportion of addition specific output value. This is in line with the Constant Return to Scale (CRS) assumption that
fixed production function. Meanwhile, the BCR model assumes that changes in the output value produced by the DMU are different for each proportion of differences in specific input values. This is in line with the Variable Return to Scale (VRS), which means that each input does not necessarily produce the same output. Therefore, this research on banking efficiency is calculated by comparing the CRS and VRS models with an intermediation approach to reflect the activities of Islamic banks.

The data used in this study focuses on the efficiency analysis of 20 Islamic Rural Bank in the province of Central Java. The selection of the bank as the sample of this research is determined based on the BPRS, which has the most significant assets. This study uses input and output variables that refer to the results of research (Hadad, 2003) and (Almas, 2018).

The variables used as input variables are Third Party Funds (TPF), Operational Costs, and Total Assets, while the output variables consist of credit/financing and operating income.
Input Variables:

- Operational expenses, namely the cost of providing for losses on productive assets, marketing expenses, research and development expenses, general and administrative expenses, and other operating expenses;
- Total Fixed Assets are tangible assets used for the production and supply of goods and services, rented out to other parties, or for administrative purposes, and are expected to be used for more than one period.
- Third Party Funds for Islamic Rural Bank used are with savings, mudharabah savings, and mudharabah deposits

Output Variable

- Credit/Financing. The financing components used are Murabahah, Mudharabah, and Musharakah financing, while the credits are all types of loans.
- Operating Income. In the form of total operating income from the bank concerned

RESULT AND DISCUSSION

Table 1 provides an overview of the input and output variables used in this study and shows descriptive statistics of the input and output of Islamic Rural Bank variables in Central Java province during the 2016-2020 period.

Table 1 Descriptive Statistics of Islamic Rural Banks in Central Java

Variable	Mean	Std.Dev	Max	Min
Input				
Fixed Asset	1.485.023	2.052.423	9.672.288	37.368
Operational Expense	4.154.836	3.751.044	27.297.995	1.243.529
Third Party Fund	38.900.446	38.916.598	153.519.910	5.944.671
Output				
Financing	8.024.202	9.290.284	48.109.519	550
Operating Income	6.868.776	6.211.730	31.394.874	325.434

Panel Summary of Islamic Rural Bank Score Efficiency in Central Java per Year

The efficiency of the Islamic Rural Bank in Central Java has been checked using the DEA method annually by investigating the use of common frontiers. Table 3 below is the average Technical Efficiency (TE), Pure Technical Efficiency (PTE), and Scale Efficiency (SE) from Islamic Rural Bank for 2016 (Panel A), 2017 (Panel B), 2018 (Panel C), 2019 (Panel D), 2020 (Panel E), and all years (Panel F).

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Islamic Rural Bank Efficiency Score

Table 2 Efficiency Score of Islamic Rural Bank in Central Java (CRS)

CRS					
DMU	**2016**	**2017**	**2018**	**2019**	**2020**
PT BPRS Al Mabrur Klaten	0,759	0,785	0,760	0,735	0,800
PT BPRS Arta Leksana banyumas	0,760	0,685	0,659	0,625	0,665
PT BPRS Artha Amanah Ummat semarang	0,942	0,889	0,832	0,797	0,751
PT BPRS Artha Mas Abadi pati	0,894	0,792	0,684	0,713	0,699
PT BPRS Artha Surya Barokah semarang	0,768	0,735	0,608	0,529	0,609
PT BPRS Asad Alif Kendal	0,623	0,768	0,681	0,747	0,703
PT BPRS Bina Amanah Satria banyumas	0,652	0,697	0,670	0,706	0,666
PT BPRS Bina Finansia kota semarang	0,820	0,750	0,746	0,582	0,568
PT BPRS Buana Mitra Perwira purbalingga	0,747	0,703	0,719	0,773	0,816
PT BPRS Bumi Artha Sampang cilacap	0,690	0,732	0,658	0,704	0,678
PT BPRS Central Syariah Utama surakarta	0,817	0,785	0,805	0,890	0,339
PT BPRS Dana Amanah Surakarta	0,854	1,000	0,975	1,000	0,939
PT BPRS Dharma Kuwera klaten'	0,656	0,648	0,767	0,940	0,641
PT BPRS Gala Mitra Abadi grobogan	0,757	0,742	0,661	0,770	1,000
PT BPRS Insan Madani	1,000	0,711	1,000	0,811	0,693
PT BPRS Khasanah Ummat banyumas	0,582	0,801	0,670	0,718	0,389
PT BPRS Mitra Harmoni Kota Semarang	1,000	1,000	0,882	0,826	0,757
PT BPRS Saka Dana Mulia	1,000	0,874	0,693	0,789	1,000
PT BPRS Sukowati Sragen	0,361	0,589	0,088	0,868	0,937
PT BPRS Suriyah cilacap	0,798	0,814	0,770	0,698	0,728
Average	**0,774**	**0,775**	**0,716**	**0,761**	**0,719**

Table 3 Efficiency Score of Islamic Rural Bank in Central Java (VRS)

VRS					
DMU	**2016**	**2017**	**2018**	**2019**	**2020**
PT BPRS Al Mabrur Klaten	0,801	0,900	1,000	1,000	1,000
PT BPRS Arta Leksana banyumas	0,768	0,707	0,696	0,652	0,700
PT BPRS Artha Amanah Ummat semarang	1,000	0,891	0,844	0,798	0,751
PT BPRS Artha Mas Abadi pati	0,908	0,838	0,744	0,828	0,805

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PT BPRS Artha Surya Barokah semarang	0,822	1,000	0,674	0,839	1,000
PT BPRS Asad Alif Kendal	0,696	0,772	0,744	0,768	0,744
PT BPRS Bina Amanah Satria banyumas	0,775	0,742	0,728	0,772	0,730
PT BPRS Bina Finansia kota semarang	0,822	0,772	0,771	0,688	0,586
PT BPRS Buana Mitra Perwira purbalingga	0,768	0,744	0,804	0,916	1,000
PT BPRS Bumi Artha Sampang cilacap	0,702	0,744	0,768	0,763	0,723
PT BPRS Central Syariah Utama surakarta	0,981	0,785	0,813	0,896	0,339
PT BPRS Dana Amanah Surakarta	1,000	1,000	0,976	1,000	0,983
PT BPRS Dharma Kuwera klaten'	0,766	0,662	0,768	0,950	0,662
PT BPRS Gala Mitra Abadi grobogan	1,000	0,876	0,736	0,842	1,000
PT BPRS Insan Madani	1,000	0,857	1,000	0,858	0,739
PT BPRS Khasanah Ummat banyumas	0,585	1,000	0,881	1,000	0,647
PT BPRS Mitra Harmoni Kota Semarang	1,000	1,000	0,971	0,936	0,889
PT BPRS Saka Dana Mulia	1,000	0,902	0,695	0,793	1,000
PT BPRS Sukowati Sragen	0,362	1,000	0,112	1,000	1,000
PT BPRS Suriyah cilacap	0,888	0,925	0,869	0,802	0,852
Average	**0,832**	**0,856**	**0,780**	**0,855**	**0,808**

Tabel 4 Average Efficiency Score of Islamic Rural Bank in Central Java

NO	Islamic Rural Bank	CRS	VRS
1	PT BPRS Al Mabrur Klaten	0,768	0,940
2	PT BPRS Arta Leksana banyumas	0,679	0,705
3	PT BPRS Artha Amanah Ummat semarang	0,842	0,857
4	PT BPRS Artha Mas Abadi pati	0,756	0,825
5	PT BPRS Artha Surya Barokah semarang	0,650	0,867
6	PT BPRS Asad Alif Kendal	0,704	0,745
7	PT BPRS Bina Amanah Satria banyumas	0,678	0,749
8	PT BPRS Bina Finansia kota semarang	0,693	0,728
9	PT BPRS Buana Mitra Perwira purbalingga	0,752	0,847

10	PT BPRS Bumi Artha Sampang cilacap	0,692	0,740
11	PT BPRS Central Syariah Utama surakarta	0,727	0,763
12	PT BPRS Dana Amanah Surakarta	0,954	0,992
13	PT BPRS Dharma Kuwera klaten'	0,730	0,761
14	PT BPRS Gala Mitra Abadi grobogan	0,786	0,891
15	PT BPRS Insan Madani	0,843	0,891
16	PT BPRS Khasanah Ummat banyumas	0,632	0,822
17	PT BPRS Mitra Harmoni Kota Semarang	0,893	0,959
18	PT BPRS Saka Dana Mulia	0,871	0,878
19	PT BPRS Sukowati Sragen	0,569	0,695
20	PT BPRS Suriyah cilacap	0,762	0,867

Let's look at the results of the average CRS each year at Islamic Rural Banks in Central Java. It is known that there are no Islamic Rural Banks in Central Java that have achieved maximum efficiency (1,000) during the five-year observation period. However, when viewed from the highest CRS score, PT BPRS Dana Amanah Surakarta obtained the highest average efficiency score compared to other sharia BPRs with a value of 0.954. In contrast, PT BPRS Sukowati Sragen received the lowest average efficiency score with 0.569. Furthermore, based on the VRS assumption, there are also no Islamic Rural Banks that reach the maximum efficiency level. Still, if seen from the highest VRS value, PT BPRS Al Mabrur Klaten (0.940), the lowest VRS achievement is also PT BPRS Sukowati Sragen with a value of 0.695.

Comparison of Islamic Rural Banks Efficiency Trends in Central Java

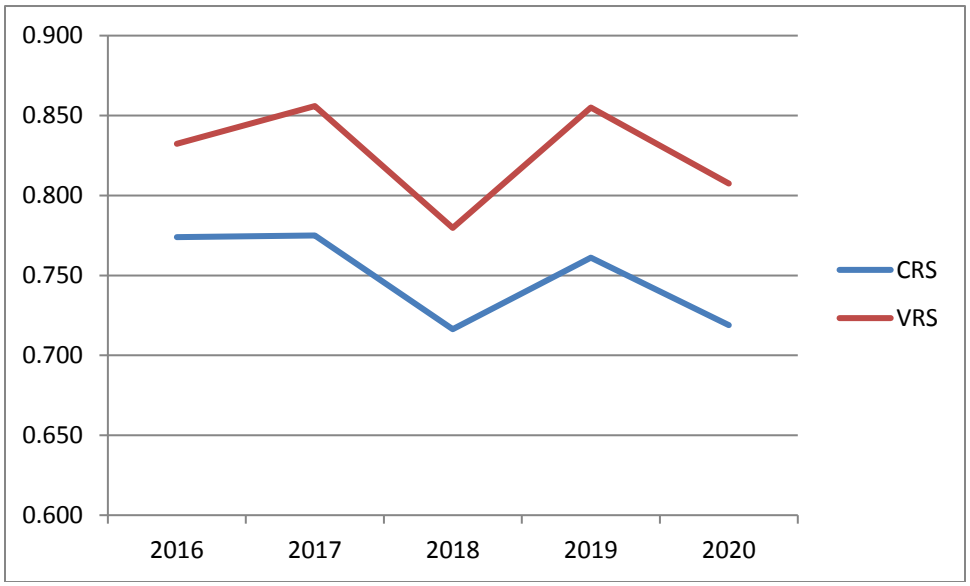

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Figure 1 Efficiency Trend of slamic Rural Bank In Central Java

Based on the efficiency graph above, it is known that Technical Efficiency (CRS) shows fluctuations from year to year. Based on observations during the research period, it is known that the average efficiency of Islamic Rural Bank in Central Java also fluctuates every year. An interesting finding from the CRS and VRS assumptions chart below is a similar pattern. Figure 1 shows the trend of Islamic Rural Bank efficiency in Central Java from 2016 to 2020. The efficiency value of Islamic Rural Bank in Central Java decreased in 2018 and then increased again until 2019, then reduced again in 2020 as it is known that at the end of 2019, there was a Covid-19 pandemic throughout the world, especially in Indonesia. The Covid-19 pandemic has affected the efficiency of Islamic Rural Bank in Central Java. The decline in efficiency of Islamic Rural Banks (BPRS) in Central Java at the end of 2019 through 2020 can be linked to the Covid-19 pandemic through several arguments. The pandemic led to widespread economic disruptions, including a decrease in consumer purchasing power and a slowdown in business activities, impacting the banks' performance. Specifically, the financing offered by BPRS may have faced reduced demand or an increase in bad loans due to customers' financial difficulties. Additionally, movement restrictions and health protocols may have hindered the banks' operations, adding cost burdens, and disrupting services. These collective factors reflect the direct impact of the pandemic on the banks' efficiency.

Comparison of Islamic Rural Bank Efficiency in Central Java During the Covid-19 Pandemic

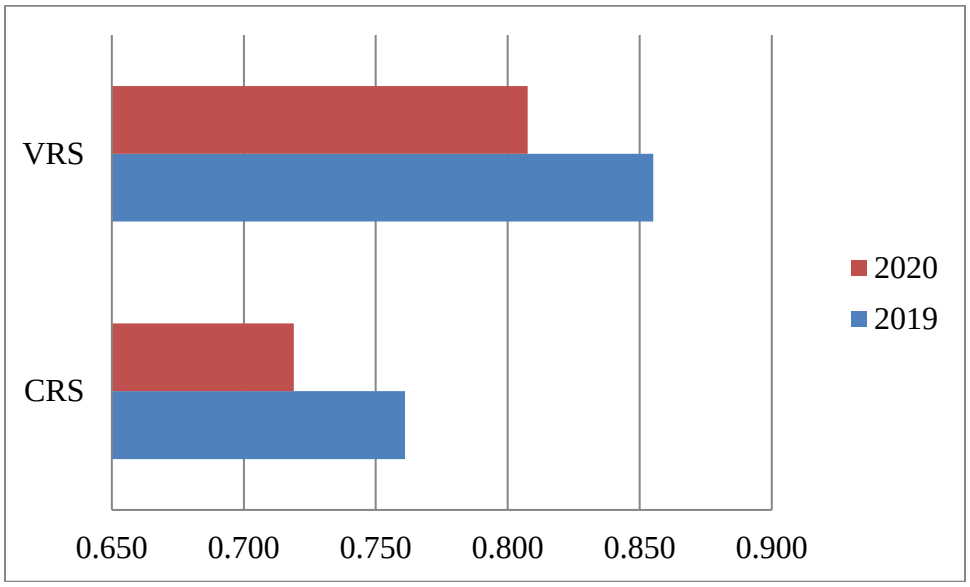

Figure 2 Efficiency of Islamic Rural Bank in the time of Covid-19

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Based on Figure 2 above, it can be seen that Islamic Rural Bank in Central Java experienced a decrease in efficiency in the Constant Return to Scale (CRS) and Variable Return to Scale (VRS) analysis during the pandemic period, namely from 2019 to 2020. At first, Islamic Rural Bank experienced increased efficiency in 2019. Due to the covid-19 pandemic that emerged at the end of 2019, the efficiency of the two types of banks experienced a decrease in efficiency in 2020.

Potential Improvement

Besides producing efficiency values, the DEA method can also produce potential improvements or the level of improvement needed to achieve optimal efficiency values. An analysis of potential improvement is carried out using the last year of observation and separately from previous years to describe the value to be achieved. Through the analysis of potential improvement, the variables that need to be optimized are known. The results of measuring the potential for improvement can be seen in the graph below:

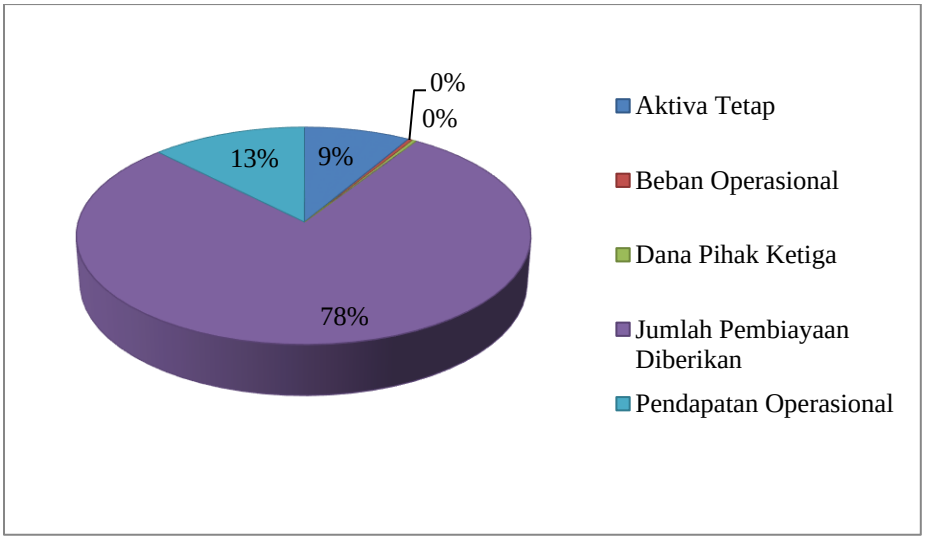

Figure 3 Potential Improvement of Islamic Rural Bank in Central Java

To find out the sources of inefficiency from Islamic Rural Bank in Central Java can be seen through potential improvements. Figure 3 above provides an overview of the input and output variables at the Islamic Rural Bank in Central Java, which are considered inefficient. The variable that causes inefficiency comes from the input variable, consisting of fixed assets, operating expenses, and third-party funds. The output variable consists of the amount of financing provided and operating income. The graph of potential improvement states that for Islamic Rural Bank in central java to achieve an optimal level of efficiency, fixed assets need to be reduced by 9%. Then the amount of financing provided needs to be increased by 78%, and operating income needs to be increased by 13%.

Findings

Based on the research results on the efficiency of Islamic Rural Banks in the 2016 to 2020 research period, several findings can be used by academics for further research and the regulator as a party-making policy. The first finding of this study is shown by graphs of CRS and VRS scores which show the average development of the efficiency of Islamic Rural Banks in the province of Central Java each year. From the graph, it can be seen that the average efficiency of the Islamic Rural Bank fluctuates from year to year. The fluctuating efficiency trend of Islamic Rural Banks in Central Java from 2016 to 2020 is significant for research and policy formulation. Researchers can analyze these patterns to understand the underlying causes, be it economic conditions, regulatory changes, or market dynamics, leading to valuable insights for future studies. Policymakers can utilize these findings to create targeted interventions to address specific inefficiencies, shaping regulations that promote financial stability and alignment with market demands. Moreover, the trend's analysis might shed light on the resilience and adaptability of the banking sector to global events, like the Covid-19 pandemic. Thus, these fluctuations are not merely statistical observations but vital indicators that guide decision-making processes, facilitate strategic planning, and contribute to the broader economic and societal well-being, particularly in the rural finance landscape.

Furthermore, the second finding of this study is based on observations in the year the COVID-19 pandemic emerged, namely in 2019 and 2020. It was found that the efficiency of Islamic Rural Banks in Central Java province has decreased. The decline in efficiency could be attributed to the pandemic's broad economic disruptions. With reduced consumer purchasing power, there might have been a decline in demand for financing or an increase in bad loans due to financial hardships. Restrictions on movement and adherence to health protocols could have also impeded bank operations, adding costs and hindering services. These collective factors might have directly contributed to the observed decrease in efficiency. Research conducted by Ningsih and Mahfuz shows that since the Covid-19 pandemic entered Indonesia, all banks in Indonesia have fallen in terms of collection and financing (Ningsih, M. R., & Mahfudz, 2020). This decline certainly affects the efficiency of the bank concerned. In the case of the Covid-19 pandemic, the average efficiency level of Islamic Rural Banks in Indonesia has decreased. This could be due to a decrease in income and disbursement of financing, while banking operational costs continued to increase to meet the daily needs of banking operations. Therefore, it is essential to improve the banking sector to achieve an optimal level of efficiency. This is following research conducted by (Sholihah, 2021) whose results show that the average level of efficiency in the banking sector, both Conventional Commercial Banks and Islamic Commercial Banks, faced a substantial decline during the COVID-19 pandemic.

The third finding of this study is related to the potential improvement of the Islamic Rural Bank in Central Java in the 2020 dataset (OJK, 2021). From the efficiency analysis results, a table shows the amount of slack (difference in the gap between the efficient projected value and the original value of the data) for each input and output for each bank. The slack variable is used to identify the source of inefficiency. If a variable tends to be below, the Islamic Rural Bank is not fully efficient because inputs can be reduced without reducing

output. The graph of potential improvement states that for the Islamic Rural Bank of Central Java to reach an optimal efficiency level, fixed assets need to be reduced by 9%. Then the amount of financing provided needs to be increased by 78%, and operating income needs to be increased by 13%. The same research was also conducted by Ningsih and Mahfuz on Islamic banking, which showed that since the Covid-19 pandemic entered Indonesia, all banks in Indonesia have experienced a decline in collection and financing (Ningsih, M. R., & Mahfudz, 2020). This decline certainly affects the efficiency of the bank concerned. The Covid-19 pandemic has affected the efficiency of Islamic Rural Banks in Central Java in multifaceted ways. Economic disruptions have led to a decline in collection and financing, as businesses and consumers faced financial hardships. Bank customers may have deferred or defaulted on loans, resulting in increased bad debt for banks. At the same time, social distancing and lockdown measures might have hindered traditional banking operations, increasing costs, and slowing down services. The general economic uncertainty could also have made banks more cautious in providing financing, impacting their growth and efficiency. Together, these factors illustrate the complex ways in which the pandemic has negatively impacted the efficiency of rural banks.

Based on the analysis of potential improvement from the Islamic Rural Bank in Central Java, the most significant cause of inefficiency of the two types of banks lies in the output variable, namely the financing provided to customers. Productive funding provided by the banking sector plays a role in realizing prosperity and equity. Through abundant financing, the banking sector will provide access to financial services to the public and provide opportunities for the development of the MSME sector in Indonesia, especially in the province of Central Java. Financing for these productive activities will increase income, economy, and community welfare, where welfare is part of the Sustainable Development Goals (SDGs) agenda.

CONCLUSION

This study on the efficiency of Islamic Rural Banks in Central Java from 2016 to 2020 using the Data Envelopment Analysis (DEA) method provides vital insights for both theoretical exploration and policy formulation. The fluctuating efficiency trend and the specific findings regarding adjustments in fixed assets, financing, and operating income have broader implications. Theoretically, this research adds to the understanding of efficiency dynamics in rural Islamic finance and illustrates how global events like the Covid-19 pandemic can impact local banking efficiency. It may spark further studies to develop new models explaining these phenomena. On the policy front, the findings can guide regulators in crafting targeted interventions, such as reducing fixed assets by 9%, increasing financing by 78%, and elevating operating income by 13%. These specific recommendations can serve as a blueprint for achieving optimal efficiency. Additionally, the study's insights on the pandemic's impact can lead to the creation of robust policies to protect rural banks during global crises, supporting not only the banks' resilience but also broader financial inclusion and rural development goals. By intertwining both theoretical knowledge and practical policy considerations, this study lays a foundation for a more resilient and thriving rural banking sector in Indonesia.

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Based on the results of the research and the conclusions that have been presented, the researchers found implications that could be useful for several parties, including the following:

- For the Management of Islamic Rural Banks, especially in the province of Central Java. Productive funding provided by the banking sector plays a role in realizing prosperity and equity, following the Sustainable Development Goals (SDGs) agenda. For efficient Banks, it is hoped that they will be able to maintain their efficiency in the following year, while those that are not yet efficient can improve their efficiency level in the next year. Then, Islamic Rural Banks in Indonesia are expected to be transparent in publishing their financial reports to increase public trust and other research purposes. Furthermore, the financing provided to customers is the leading cause of the inefficiency of Islamic Rural Banks in Central Java. Thus, it is hoped that the two types of banks can maximize the financing provided, especially for productive activities.
- Academics are expected to improve this research by multiplying data and updating the research period until 2021, and further researchers can also use other research approaches and methodologies.
- For the government/regulator, it is better to pay attention to the variables that cause the inefficiency of the Islamic Rural Bank. By evaluating the efficiency level, it is expected that Islamic Rural Banks in the province of Central Java can experience significant efficiency developments. Furthermore, as one of the authorized institutions, the Financial Services Authority (OJK) has a role to play in the success of the SDGs through sustainable finance programs. This program is carried out through the cooperation of various parties to create financial support for institutions that apply sustainable finance principles. The sustainable finance program seeks to increase the portion of the financing and increase the resilience and competitiveness of financial service institutions. In addition, human resources also certainly play a role in improving the efficiency and performance of the company. Therefore, the regulator can also enhance the quality of human resources so that the performance of the banking industry will be even better by making a rule to require a minimum budget for improving the quality of human resources. Or the regulator can provide incentives, especially in terms of HR financing. In addition, the regulator can also provide free training for Islamic Rural Bank staff, especially the Central Java provincial government.

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