Efficiency, Performance, and Potential Improvement of Indonesian Rural Banks During Covid-19 Pandemic

Aam Slamet Rusydiana[a], Mimma Maripatul Uula[b,*], Syahdatul Maulida[b], Aufa[b], & Raihan Agra Dharana Kanz[b]

[a]*Sharia Economic Applied Research and Training (SMART) Indonesia*
[b]*Institut Agama Islam Tazkia*

Abstract

The objective of this study is to examine the efficiency, performance, and scope for enhancement of Rural Banks (BPRs) and Sharia Rural Banks (BPRSs) in Indonesia, particularly in the context of the Covid-19 pandemic, in order to support national economic recovery. The research sample consisted of 77 BPRs and 52 BPRSs in Indonesia over the period of 2016-2020. The analytical approach employed was a non-parametric method called Data Envelopment Analysis (DEA), utilizing secondary data obtained from financial bank statements. The input variables encompassed fixed assets, operational costs, and third-party funds, while the output variables included the amount of financing provided and operating income. The findings of the study reveal a fluctuating trend in the performance of BPRs and BPRSs in Indonesia from year to year. According to the CRS and VRS scores, the efficiency level of BPRs remained stable during the Covid-19 pandemic, whereas BPRSs experienced a decline in efficiency. Consequently, this study concludes that BPRs exhibit superior efficiency compared to BPRSs in Indonesia. Moreover, the analysis of potential improvements indicates that the most significant source of inefficiency lies within the output variables: financing and operating income. Furthermore, benchmarking analysis reveals that the efficiency of both BPRs and BPRSs was higher during the period of 2016–2019 compared to 2020.

Keywords: BPR; BPRS; Covid-19 Pandemic; DEA; Indonesia
JEL Classification: G2; R1

*Corresponding Address: Institut Agama Islam Tazkia, Jl. Ir. H. Djuanda No. 78 Sentul City, Bogor 16810, Bogor, Indonesia. Email: mimma.uula2010@gmail.com.

1. Introduction

The global economy is being forcefully disrupted by Covid-19. The pandemic has generated both a health catastrophe and a widespread financial crisis in the world's banking system (Diana et al., 2021). Nationally and internationally, the contribution of the financial sector to actual economic expansion has garnered the majority of economic focus (Furqani & Mulyany, 2009; Abduh & Chowdhury, 2012; Abduh & Azmi Omar, 2012; Bahlous & Mohd. Yusof, 2014; Grassa & Gazdar, 2014; Masrizal et al., 2022). Consequently, a nation's finances must be carefully managed in order to support economic progress (Devi & Firmansyah, 2018). The financial sector is the primary mediator and source of finance for emerging nations, including Indonesia (Agustina et al., 2019).

Rural Banks (BPR) and Sharia Rural Banks (BPRS) are components of the banking sector that have contributed significantly to the economy (Hosen & Muhari, 2013). According to a study by Wasiaturrahma et al. (2020), BPR and BPRS serve as alternative financial providers catering to individuals who are excluded from the banking sector. These two microfinance institutions exist to provide products and services to low-income individuals and microbusinesses in both urban and rural locations. During the pandemic, the impoverished and the Covid-19 epidemic in underdeveloped nations were the most limited categories. In accordance with its poverty rate during the epidemic, the Indonesian government has established a national economic recovery strategy, a set of measures aimed at alleviating the impact of the Covid-19 pandemic on the economy. Targeting the poor and MSMEs created by the pandemic, the presence of BPRs and BPRS can stimulate the momentum of the national economic recovery.

During the pandemic, the government swiftly enacted a program of widespread social restriction. This regulation imposes limitations on the transmission of Covid-19 while also affecting the micro, small, and medium-sized enterprise sectors, which cannot operate normally. Micro, Small, and Medium Enterprises (MSMEs) form the predominant portion of businesses in Indonesia and hold a pivotal position in the nation's economic development. According to the Ministry of Cooperatives and SMEs, the total count of micro, small, and medium-sized enterprises in 2019 amounted to 65.47 million. This figure represented 61.07 percent of the nation's overall gross domestic product. Moreover, data from the Ministry of Cooperatives, Small and Medium Businesses (UMKM) for 2018 indicates that 97% of Indonesia's total workforce may be absorbed by SME's. Currently, various financial institutions such as commercial banks, BPR/BPRS (Regional Development Banks), multi-finance institutions, and informal financial organizations are actively involved in providing business financing to foster the growth of MSMEs in Indonesia (Anwar et al., 2021). However, among all financial institutions, the involvement of BPR and BPRS is considered to be very high, given the information provided by OJK, which states that there are around 1,646 banks dispersed across all provinces in Indonesia as of September 2021, consisting of 1,481 BPRs and 165 BPRS, the participation of BPR and BPRS is regarded as

remarkably extensive. Despite the fact that BPR and BPRS are categorized as banks, these entities are more profitable for low-income community groups than other banks. The given credit/financing is easy to disburse, which makes the required collateral straightforward and the registration procedures simple. It is due to the fact that microfinance organizations, like BPR or BPRS, provide financial services to individuals who lack access to conventional (bankable) banking services (2022). Therefore, BPRs and BPRSs must optimize their role in providing low-income community groups with access to finance.

As part of the banking system, BPRs and BPRS frequently compete with other financial institutions, necessitating efficient operations to withstand industrial rivalry. Due to the fact that prior research on banking efficiency has concentrated more on major banks and less on BPR and BPRS, there is currently a dearth of evidence regarding its effectiveness (Agustina et al., 2019). BPRs and BPRS must operate as efficiently and effectively as possible to compete in order to remain competitive in the banking industry, it is crucial for both BPR and BPRS to operate with optimal efficiency and effectiveness. Consequently, BPRs and BPRS must compete not just with other microfinance institutions, but also with commercial banks, which have begun to target the MSME market, which has been the focus of BPR and BPRS markets (Hosen & Muhari, 2013).

Efficiency in the banking industry is a popular and commonly utilized performance metric. In general, previous research stated that efficiency at BPRS shows a lower level of efficiency than BPR such as research conducted by Jatmiko (2017), Prayitno (2018), and Wasiaturrahma (2020), as well as the level of efficiency of BPR or BPRS during a pandemic which was not optimal. As revealed in the research by Nugrohowati (2019) and Hasbi & Apriyana (2021). Seeing the development of efficiency research related to BPR and BPRS, no research has been conducted thus far to assess the level of efficiency of BPR and BPRS across all provinces of Indonesia from 2016 to 2020. Therefore, this study aims to bridge this gap by examining the extent of efficiency within BPR and BPRS during the observed year. By employing a non-parametric efficiency measurement method and utilizing a data envelopment approach, this study evaluates the efficiency level of BPR and BPRS in Indonesia. By comparing the output outcomes to the input resources, the Data Envelopment Analysis (DEA) approach enables the calculation of an efficiency level. It is hoped that this research would influence the performance of BPRs and BPRS in all of Indonesia's provinces, which are the focus of the author's study, so that their role in fostering national economic recovery can be maximized.

This study has multiple purposes, including measuring the level of banking efficiency in Indonesia from 2016 to 2022, particularly in BPR and BPRS. Moreover, this study seeks to conduct a comparative analysis of the performance of BPR and BPRS across all provinces in Indonesia. The subsequent objective is to identify the development potentials of BPR and BPRS in Indonesia, with the aim of maximizing the national economy. This research is divided into various sections. The second section presents a comprehensive overview of the theoretical

framework and previous studies as the foundation for this research. The third section explains the approach, which comprises of research methodologies and data. In the fourth section, this study presents the findings and engages in a discussion regarding the effectiveness of BPR and BPRS in Indonesia, examines the efficacy of DMUs, and describes the scope for development. The final section of the study is the conclusion, which provides a summary of the major points and makes suggestions.

1.1. BPR and BPRS

According to Financial Services Authority Regulation Number 62/POJK.03/2020 regarding Rural Banks, Rural Banks (BPR) are banks that conduct regular commercial operations but do not offer services related to payment traffic. Rural banks (BPR) and commercial banks mostly differ in how they approach business. BPR places more of an emphasis on supplying funding for MSMEs, which are not served by large banks. The size of BPR operations is also less than that of commercial banks, enabling them to offer services that are quicker and more adaptable. However, BPR typically cover a narrow region because of their reduced working scale. Interest rates are another area where BPR and commercial banks differ from one another; BPR often provides lower interest rates than do commercial banks.

Furthermore, it is explained that Sharia Rural Banks, now abbreviated as BPRS, are Islamic banks that are not engaged in payment transactions as stipulated by Financial Services Authority Regulation Number 62/POJK.03/2020 about Rural Banks.The methods adopted by BPR and BPRS are fundamentally different. BPRS operates in the same way as an Islamic financial organization, that is, they operate under a zero-usury policy (Iqbal, 1997). This concept stipulates that no payment system in BPRS may involve interest. Islam prohibits interest, referred to as riba in Surah Al-Baqarah 1:275. Riba means "ziyadah" in Arabic which means increase. On the other hand, Saeed (1996) use expanding phase to define the term. Riba is defined as an extra profit on the luxury of vital goods (Chaudhry, 1999:4). According to the Fatwa of National Sharia Board No. 1 of 2004, the present form of commercial contracts at which contain Riba match the descriptions in Prophet Muhammad's stipulations. Consequently, numerous financial firms adhere to sharia (Majelis Ulama Indonesia, 2004).

BPRS is prohibited from providing consumers with additions on their credit, neither are they allowed to receive that form of loan. Instead, BPRS offers and accepts zero-interest loans, which are called charitable loans or qardh hasan. In contrast, a BPR arranges savings accounts with interest. In addition, BPR charges interest on the loans they give out to customers (Hidayat et al., 2012). BPR's commercial practice is outlawed in Islam, since usury is viewed as a form of unfairness. A payment system under which a creditor may receive interest payments as an addition to the principal amount is considered inequitable. On the other hand, a borrower should not necessarily generate returns (Ahmad et

al., 2011). BPRS employs many alternative transactions. To obtain funds, they offer deposit accounts and modaraba accounts. The former is known as wadiah yad ad-dhamanah. In this account, the bank has access to the deposited money as required for commercial purposes (Ajija et al., 2018). The Modaraba account offers profit sharing agreement to clients. Generally, in Indonesia, every BPRS utilizes profit sharing based on the proportion decided at the outset of the deal.

The account holders may incur losses from this profit and loss sharing arrangement. In other words, the customer's profit participation is contingent on the SRB's monthly income (Beck et al., 2010). Such condition obviously influences the rate of growth of savings account in Islamic banks. To compensate for this setup, BPRS has trade-based financing (Murabaha), equity-based financing (Mudharabah/Musharakah), or fee-based financing/lease (ijarah) (Amelia & Hardini, 2017). These trade-based contracts comprise most of BPRS commercial practice. This includes the prohibition of allocating funds to industries deemed unlawful or unethical, such as liquor, casinos, swine-related articles, obscenity, fake news or slanderous media, and other unethical industries (Ika & Abdullah, 2011).

1.2. Banking Efficiency

Farrell (1975) is credited with originating the concept of measuring efficiency. The measurement of efficiency comprises two components: technical efficiency (TE) and allocation efficiency. The output-to-inputs ratio is referred to as TE. In contrast, allocation efficiency refers to the business capacity to maximize inputs in accordance with its pricing system and production technology. Profit efficiency is another way to classify business performance.

Banks, much like any business, should consistently enhance their operational efficiency. Efficiency has been widely used as a gauging tool for bank performance. Efficiency measures the extent to which time, labor, and expertise are squandered (Archer, 2010). Silkman (1986) offers a broader definition of efficiency, that is the capacity to accomplish a task successfully. A more technical definition would say that efficiency is the computation of the proportion of generated output with respect to consumed input. An efficient business is possible to manufacture more output per unit of input than competing businesses.

The relationship between efficiency and performance in banking is reciprocal. Banks that exhibit a high level of efficiency are more likely to gain the trust of depositors and generate profitable outcomes. Depositors favor more efficient bank because they incur less transaction costs than less efficient banks. On the other hand, the government also benefit from efficient banks for their share in corporate taxes. Hence, there is an evident urgency for both the authority and the bank to maintain the efficiency of banks.

Profit efficiency is another way to classify bank performance. There is a variety of methods to increase efficiency, including by boosting microfinance institution concentration and profitability (Hartarska et al., 2013). In addition, increasing the

number of loans can increase efficiency (Bos & Millone, 2015). Furthermore, the efficiency of BPRs is affected by the profit component or the amount of margin they use (Amran et al., 2014). Operational efficiency can determine the survival of BPRs amidst a large number of banks present in poor communities (Nashihin & Harahap, 2014). Each country has microfinance institutions with a distinctive approach. For instance, microfinance institutions operating in the Middle East and North Africa region need technology-based innovations to increase financial inclusion among the poor (Bassem, 2014). Unfortunately, Islamic banks score considerably lower in terms of average cost efficiency than conventional banks (Zuhroh et al., 2015). This can be attributed to cost inefficiency and allocation failure. However, their technical efficiency surpasses conventional banks.

Much of their performance are the result of the income and ownership diversification. State ownership has little effect on the performance of microfinance institutions is minimally influenced by state ownership. However, privately owned banks in developing economies, privately owned banks tend to experience a higher level of efficiency following a crisis (Doan et al., 2018). Nowadays, microfinance institutions must balance two objectives: alleviating poverty and maximizing earnings (Kaur, 2016). Interestingly, poverty reduction is accompanied with reduced cost efficiency. Accordingly, a majority of MFIs have a high level of financial efficiency, as opposed to social efficiency (Abate et al., 2014).

1.3. Previous Study

This study was based on a review of various earlier studies that addressed the topic of banking efficiency and served as the foundation for further arguments and research. Previous studies have indicated that there is variation in the selection of input and output variables when assessing the efficiency of a financial organization. Aside from the variation in selecting different factors, previous studies examining the efficiency of financial institutions employed various research approaches. For instance, Jatmiko (2017) conducted a comparative study to assess the efficiency of people's credit banks and Islamic people's financing banks. The study used the Stochastic Frontier Analysis (SFA) approach to determine if ownership structure variables affect the efficiency of BPRs and BPRSs in Indonesia and discovered that efficiency disparities still exist among Islamic Rural Banks (BPRS) but not among their conventional counterparts (BPR).

The significance of this study's findings increased with time. Wasiaturrahma (2020) did research that yielded comparable results, albeit using a different methodology. According to the study, BPR and BPRS were inefficient intermediation but efficient in production. The paper argues that the capital and location of BPR and BPRS in Indonesia as variables affecting their efficiency. In a different study, Masrizal et al. (2022) explain the reasons for factors that may affect the efficiency of a BPRS, the level of economic freedom has a notable positive influence on the efficiency of Sharia BPRs. Financial intermediaries operating in less restricted environments tend to adopt competitive practices that lead to higher

operating rates and improved efficiency metrics.

In a study conducted by Nugrohowati (2019), the efficiency level of BPRS in Indonesia from 2012 to 2015 was analyzed based on regional zones. The findings revealed that the average efficiency of BPRS in each region had not yet attained the desired optimal level. Other studies conduct interregional comparisons. Anwar et al. (2021) conducted a study on the efficiency of 212 BPRs in West Java Province and 134 BPRs in Bali province. The research revealed that, during that period, the average efficiency of BPRs in Bali province surpassed that of BPRs in West Java Province.

Comparing the effectiveness of BPR and BPRS, Prayitno (2018) concludes that BPR is superior to Sharia BPR by 81.44 percent, whereas BPRS is inferior by 79.66 percent. In Hasbi & Apriyana's (2021) study, BPRs again demonstrated greater efficiency than BPRS during the Covid-19 pandemic, although BPRS obtained the highest efficiency.

Sadono (2017) conducted an assessment of technical efficiency and identified factors that influence technical inefficiency at Islamic People's Financing Banks (BPRS) in East Java Province, determines that CAR and NPF are the factors that influence BPRS inefficiency in East Java. In addition, the paper details the 90.12 percent technical efficiency of BPRS operations. This number indicates that 9.88 percent of the BPRS can still be improved to increase performance.

2. Methodology

The data utilized in this investigation are sourced from secondary data. These data are obtained from the quarterly financial reports of Rural Banks and Sharia Rural Banks in each province of Indonesia, which are publicly available on the website of the Financial Services Authority. The balance sheet and income statement are the financial statements that are examined. In addition, the paper contains information on several financial variables used as inputs and outputs in this investigation. This study's panel data covers 77 rural and 52 rural banks from all Indonesian provinces for 2016–2021.

Based on studies completed by Hadad et al. (2004) and Almas (2018a), this study employs identical input and output variables throughout its analysis. Operational Costs, Third-Party Funds, and Fixed Assets are the input variables utilized. Marketing, research and development, administration, and other operational expenses comprise operational costs. Then Third Party Funds consist of Mudharabah deposits, Wadiah Savings, and Mudharabah Savings, in addition to Fixed Assets calculated with depreciation charges. Finally, operational Income and Credit/Financing in Mudharabah, Murabahah, and Musyarakah financing for BPRS and all forms of credit financing for BPS are included as output variables.

This study utilizes Data Envelopment Analysis (DEA), a method using a quantitative descriptive approach that is non-parametric. DEA, devised in 1978 by Charnes, Cooper & Rhodes and refined in 1984 by Banker, Charnes & Rhodes,

can be used to gauge the productivity and efficiency of business units. According to Hadini & Wibowo (2021), the advantage of employing Data Envelopment Analysis (DEA) is that it can test cases with a complex relationship between input and output that other analytical approaches cannot solve. In addition, the Data Envelopment Analysis (DEA) approach can calculate an organization's efficiency utilizing variable inputs and variable outputs. In light of this, Hadad et al. (2004) assert that DEA provides more precise results than financial ratio analysis.

The mathematical equations commonly used to measure the efficiency with the DEA method are as follows, where m= different inputs; p= different outputs; xi= amount of input i produced by DMU; and yk = the number of k outputs produced by the DMU.

$$Efficiency\ of\ DMU = \frac{\sum_{k=1}^{p} \mu_k \gamma_{k0}}{\sum_{i-1}^{m} v_i x_{i0}} \quad (1)$$

According to a study by Sharma et al. (2013), the DEA method is applied to gauge technical efficiency, including the efficiency of financial institutions. In addition, the DEA method is able to determine which decision-making units (DMUs) are inefficient in their usage of inputs and which factors contribute to these inefficiencies. The DEA method can identify the values of input or output variables that need to be met or adjusted in order to achieve the highest level of efficiency.

Developed to incorporate the Constant Return to Scale (CRS) assumption, the Charnes, Cooper, and Rhodes (CCR) model is one of the two essential models in the DEA approach. It is assumed that the production function and the changes in output value of the resulting Decision-Making Unit (DMU) remain constant. In addition, the Banker, Charnes, and Rhodes (BCR) model was created to account for the Variable Return to Scale (VRS). In this second model, it is assumed that each alteration in the output value of the Decision-Making Unit (DMU) is independent of any change in the value of a particular input. Consequently, it may be asserted that not all inputs will result in the same output value. In this study, a comparison is made between the CRS (Constant Returns to Scale) and VRS (Variable Returns to Scale) models to evaluate the level of banking efficiency as an indication of banking operations.

This study focuses on the efficiency of banks. A bank's efficiency can be determined by comparing the costs incurred by several banks to generate the same output level. If the market has optimal competition, inefficient businesses will be removed. Only an efficient company can survive in the marketplace. Similarly, only powerful banks can successfully compete in the financial industry (Ascarya & Yumanita, 2009). Based on Bauer et al.'s research (1998), the efficiency limit of financial institutions is assessed by benchmarking their performance against the top-performing institutions in the industry, with the proviso that all financial institutions must encounter identical market conditions.

3. Result and Analysis

3.1. Descriptive Statistics of BPR and BPRS in Indonesia

Table 1 and 2 present the input and output variables, along with descriptive statistics, pertaining to the input and output of Rural Banks (BPR) and Islamic Rural Banks (BPRS) used in this study for the period between 2016 and 2020.

Table 1: Descriptive Statistics of BPRs in Indonesia

Variable	Mean	Min	Max	Std.Dev
Input				
Fixed Assets	Rp3,728,084.04	Rp1,306.00	Rp118,391,073.00	Rp12,937,197.90
Operational Costs	Rp28,388,822.76	Rp92,447.00	Rp861,639,294.00	Rp83,962,776.41
Third Party Funds	Rp169,362,308.99	Rp136,420.00	Rp3,953,758,691.00	Rp442,117,471.41
Output				
Financing	Rp243,776,575.79	Rp81,743.00	Rp7,410,491,345.00	Rp808,265,615.77
Operating Income	Rp39,279,429.42	Rp66,235.00	Rp1,150,486,337.00	Rp116,305,031.35

Table 2: Descriptive Statistics of BPRS in Indonesia

Variable	Mean	Min	Max	Std.Dev
Input				
Fixed Assets	Rp3,939,909.80	Rp1,518.00	Rp85,360,753.00	Rp10,606,634.18
Operational Costs	Rp7,624,253.07	Rp92,984.00	Rp103,212,106.00	Rp13,260,848.73
Third Party Funds	Rp60,127,274.92	Rp671,460.00	Rp738,515,357.00	Rp99,163,392.87
Output				
Financing	Rp26,727,029.44	Rp0.00	Rp387,753,587.00	Rp61,041,305.99
Operating Income	Rp12,197,066.06	Rp20,972.00	Rp157,589,095.00	Rp21,508,266.18

3.2. BPR and BPRS Efficiency per Year

Using the DEA method, the annual efficiency of BPR and BPRS in Indonesia has been assessed, employing a common frontier. Table 3 presents the average Technical Efficiency (TE), Pure Technical Efficiency (PTE), and Scale Efficiency (SE) of BPR and BPRS across different years, including 2017 (Panel A), 2018 (Panel B), 2019 (Panel C), 2020 (Panel D), 2021 (Panel E), and the entire year (Panel F).

Table 3 illustrates that BPR had the lowest average Technical Efficiency (TE) score in 2017 and 2018, which amounted to 0.511. Moreover, according to BPRS, it is 2018 (0.478). The highest average TE score in BPR was then in 2019 (0.534), and in BPRS it was in 2017 (BPRS) (0.526). On average, the Pure Technical Efficiency (PTE) of BPR reached its highest level in 2016 (0.610) and its lowest level in 2018 (0.580). Similarly, the highest PTE for BPRS was observed in 2017 (0.580), whereas the lowest was recorded in 2020 (0.552). Based on these findings, it can be concluded that the efficiency level of BPR and BPRS in Indonesia tends to vary from year to year, and that neither BPR nor BPRS has reached its maximum efficiency.

Table 3: Summary of Statistics of Efficiency Score (TE, PTE, and SE) per Year

Years/Type of Efficiency	Mean		Min		Max		Std.Dev	
	BPR	BPRS	BPR	BPRS	BPR	BPRS	BPR	BPRS
Panel A (2016)								
TE	0.530	0.481	0.224	0.063	1.000	1.000	0.197	0.181
PTE	0.61	0.557	0.229	0.173	1.000	1.000	0.212	0.188
SE	0.878	0.879	0.373	0.063	1.000	1.000	0.127	0.152
Panel B (2017)								
TE	0.511	0.526	0.080	0.093	1.000	1.000	0.193	0.209
PTE	0.592	0.58	0.100	0.108	1.000	1.000	0.210	0.207
SE	0.871	0.903	0.471	0.628	1.000	1.000	0.123	0.104
Panel C (2018)								
TE	0.511	0.478	0.070	0.160	1.000	1.000	0.184	0.194
PTE	0.580	0.556	0.071	0.165	1.000	1.000	0.206	0.219
SE	0.893	0.869	0.515	0.421	1.000	1.000	0.115	0.119
Panel D (2019)								
TE	0.534	0.501	0.040	0.022	0.945	1.000	0.187	0.209
PTE	0.603	0.572	0.041	0.023	1.000	1.000	0.205	0.223
SE	0.894	0.876	0.501	0.622	1.000	1.000	0.111	0.105
Panel E (2020)								
TE	0.533	0.483	0.267	0.217	1.000	1.000	0.190	0.214
PTE	0.607	0.552	0.268	0.244	1.000	1.000	0.205	0.217
SE	0.885	0.869	0.503	0.571	1.000	1.000	0.122	0.109
Panel F (All Years)								
TE	0.524	0.494	0.040	0.022	1.000	1.000	0.190	0.203
PTE	0.599	0.563	0.041	0.023	1.000	1.000	0.208	0.212
SE	0.884	0.879	0.373	0.063	1.000	1.000	0.120	0.120

3.3. BPR and BPRS Efficiency Scores in Indonesia

According to Table 4, there is no BPR in Indonesia that has attained optimal efficiency based on the CRS assumption (1,000). BPR Hasa Mitra Makasar, BPR Eka Bumi Arta, and BPR Palu Lokasdana Utama have, according to the VRS, already obtained the optimal level of efficiency (1,000) Then, assuming CRS and VRS, it is known that BPR Makassar City Perseroda has a minimum efficiency value of 0.199 and a maximum efficiency value of 1. (0.210). Furthermore, for the greatest CRS value obtained by BPR Hasa Mitra Makasar. In addition, the overall average efficiency of BPRs based on the CRS and VRS assumptions is 0.524 and 0.599 respectively, and the standard deviation has values of 0.161 and 0.174 (see attachment Table A1: Average of BPR's Efficiency Score in Indonesia).

Table 4: Statistical Summary of BPR and BPRS Efficiency Scores in Indonesia

Model	MAX		MIN		MEAN		ST.DEV	
	BPR	BPRS	BPR	BPRS	BPR	BPRS	BPR	BPRS
CRS	0.976	0.977	0.199	0.150	0.524	0.494	0.161	0.169
VRS	1.000	0.985	0.210	0.158	0.599	0.564	0.174	0.176
SE	0.992	0.993	0.574	0.615	0.884	0.879	0.101	0.099

Table 4 provides a comprehensive breakdown of the average efficiency scores

of BPRS in Indonesia throughout the five-year observation period, no BPRS in Indonesia has attained ideal efficiency (1,000). Nevertheless, based on the degree of efficiency value for each BPRS, the North Penajam Paser Benefit Sharia BPRS, assuming that CRS and VRS have the lowest efficiency value compared to other BPRS (0.150) and BPRS, has the lowest efficiency value (0.158). Meanwhile, the East Lampung BPRS had the best efficiency, with values of (0.977) and (0.985). Then, for BPRS the average efficiency based on CRS and VRS is 0.494 and 0.564, while for the standard deviation it is 0.169 and 0.176 (see attachment Table A2: Average of BPR's Efficiency Score in Indonesia).

3.4. Comparison of BPR and BPRS Efficiency Trends in Indonesia

Based on Figure 1, which depicts the BPR efficiency trend in Indonesia over the 2016–2020 observation period, it can be stated that the BPR efficiency in Indonesia fluctuates. For example, considering the Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) assumptions, the efficiency of BPRs in Indonesia experienced a decline in 2018 and then increased again until 2020. Exciting findings emerge from the figure, particularly a similar trend between the CRS and VRS hypotheses. According to CRS (constant returns to scale), there is no benefit to expanding the size of production does not provide any advantages since the connection between input and output remains constant in production. Efficiency is described in this context as the proportion of output to input. Since the production scale is expected to be constant when measuring efficiency under the CRS assumption, expanding production has no effect. Because the VRS assumption accounts for potential advantages of expanding production scale, the efficiency number estimated with this assumption is typically lower than the VRS assumption.

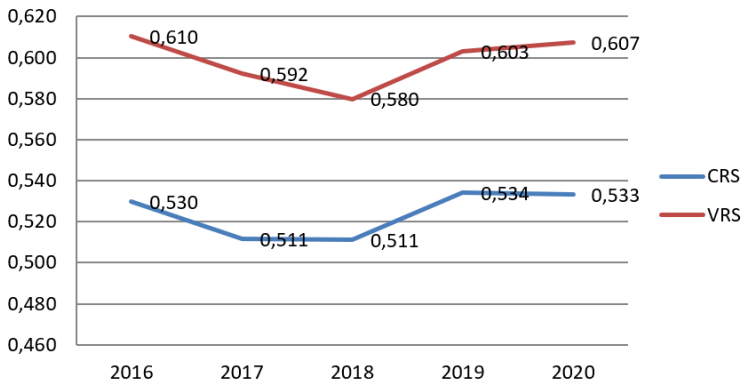

Figure 1: Trends in BPR Efficiency in Indonesia

The trend of BPRS efficiency in Indonesia based on CRS and VRS assumptions is depicted in the following graph (see Figure 2). Figure 2 depicts the BPRS efficiency trend in Indonesia for the 2016–2020 observation period. Indonesia's BPRS effectiveness differs from year to year. As an example, the efficiency of BPRS in Indonesia witnessed an improvement in 2017, but this efficiency declined in 2018. In addition, the effectiveness of BPRS increased once again in 2019. However, the tendency reversed in 2020, presumably due to Indonesia's massive spread of the Covid-19 epidemic. However, significant conclusions can be derived from the graph, particularly highlighting a similar pattern between the Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) hypotheses.

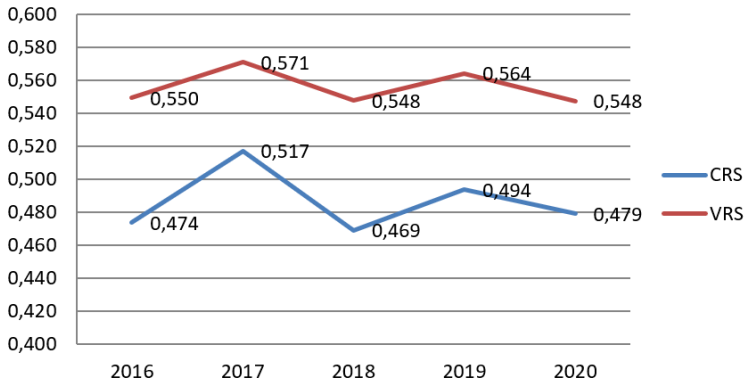

Figure 2: Trends in BPRS Efficiency

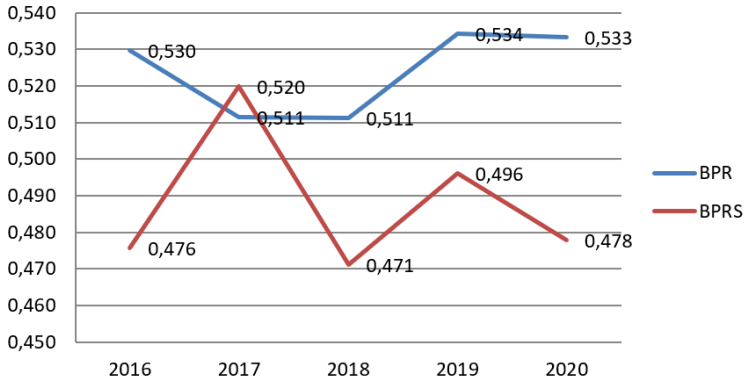

Figure 3: Comparison of BPR and BPRS Efficiency Trends in Indonesia

Figure 3 is a comparison of the effectiveness of BPR and BPRS in Indonesia. The CRS efficiency score is employed for five research periods in this comparison.

Figure 3 demonstrates that the efficiency of BPRs in Indonesia surpasses that of BPRS. However, from year to year, the BPRS's effectiveness fluctuates. Notably, in 2018, the efficiency of BPRS in Indonesia witnessed a substantial dip, followed by a rise, before falling again in 2020. In the meantime, the efficiency of BPR declined in 2017–2018 and climbed in 2019–2020.

3.5. Comparison of BPR and BPRS Efficiency Levels in Indonesia During the Covid-19 Pandemic

The banking industry was significantly affected by the emergence of the Covid-19 pandemic towards the end of 2019. Figure 4 showcases the impact of Covid-19 on BPRs and BPRS in Indonesia, considering the Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) assumptions, while also comparing the performance of the two bank types.

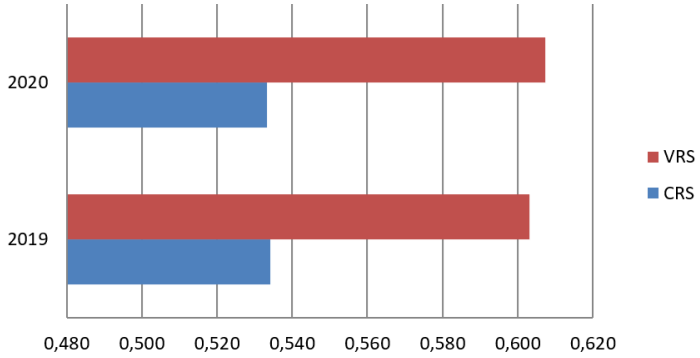

Figure 4: BPR Efficiency in Indonesia During the Covid-19 Pandemic

Figures 4 and 5 demonstrate the impact of CRS and VRS on the effectiveness of BPR and BPRS during the epidemic. Figure 4 illustrates that the efficiency level of BPR has increased from 2019 to 2020, as indicated by both the CRS and VRS analyses. In the meantime, as seen in Figure 5, the BPRS's efficiency level has declined. This behavior suggests that the efficiency of BPRS in Indonesia has been impacted by the Covid-19 pandemic.

3.6. Potential Improvement

The DEA approach can generate potential improvements to identify values that must be enhanced to attain ideal levels of efficiency. Implementing this potential improvement will determine which factors must be enhanced to reach maximum efficiency. An analysis of prospective improvement utilizing the final year of research, 2020, is then assessed individually from earlier years to provide an

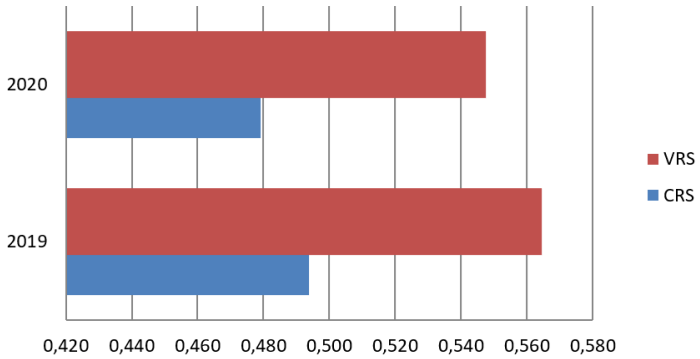

Figure 5: Efficiency of BPRS in Indonesia During the Covid-19 Pandemic

overview of the required value. Below are the outcomes of evaluating possibilities for enhancement (Figure 6).

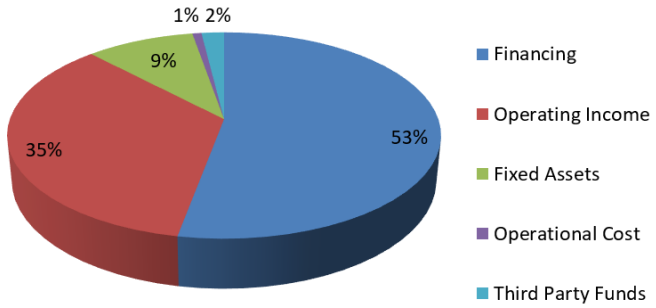

Figure 6: Potential Improvement of BPR

The graph depicts general information regarding input and output variables that contribute to inefficiency in Indonesian BPRs. The input variables that contribute to inefficiency include fixed assets, operating expenses, and third-party funds, while the output variables measured are financing and operating income. Figure 6's examination of potential improvement reveals that in order for the BPR to achieve the ideal level of efficiency, the financing and operating income variables must be increased by 53% and 35%, respectively. In contrast, the input variables, particularly fixed assets, should be cut by 9%, while operating expenses and third-party funds should be lowered by 1% and 2%, respectively.

Figure 7 is an analysis of the possibilities for BPRS improvement in Indonesia. Similar to BPRs, the potential improvement of BPRS in Indonesia is believed to require a 96 percent increase in financing and a 4 percent rise in operating income

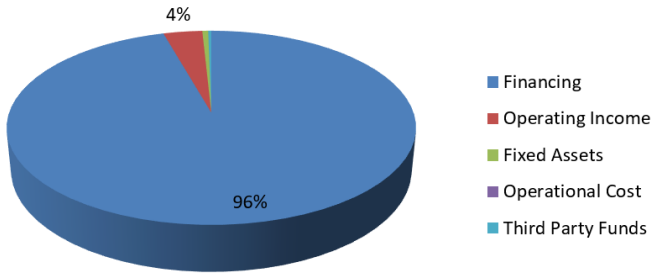

Figure 7: Potential Improvement of BPRS

to achieve ideal efficiency. A significant finding depicted in this diagram is that the output variable is the sole contributor to inefficiency in the case of BPRS in Indonesia.

3.7. Benchmarking BPR and BPRS in Indonesia

Figure 8 outlines benchmarking, demonstrating that the BPR or BPRS in Indonesia is the standard for other BPRs and BPRS, especially for banks that have not yet attained the desired level of efficiency. According to the frontier analysis, it was determined that the East Lampung BPRS became the bank with the most referrals in 2019, with 470 banks, including BPR and BPRS, receiving the most referrals. Then, BPR Telaga Sinarcahaya in 2016 as many as 299 banks. Following BPR Palu Lokada with 563 bank referrals from 2016 to 2018 is BPRS Dinar Ashri City of Mataram, BPRS Al Ihsan Bandung in 2016, and BPR Ronabasa in 2017. This condition explains that the 2016–2019 efficiency condition of BPR and BPRS is superior to the 2020 efficiency condition.

3.8. Findings

Based on the findings of research concerning the effectiveness of BPR and BPRS in Indonesia from 2016 to 2020, some findings have been uncovered that can be utilized by banking management, regulators, and academics for other policy decisions, banking enhancements, and additional research.

The initial discovery of the study is derived from the analysis of CRS and VRS scores presented in tables and graphs, which illustrate the annual average growth of BPR and BPRS efficiency in Indonesia from 2016 to 2020. Based on the efficiency score table of BPR and BPRS in Indonesia, the efficiency level of the two banks varies yearly. As depicted by the graphs of CRS and VRS efficiency ratings, the BPR graph in Indonesia witnessed a reduction in efficiency in 2018, followed by an improvement in 2019 and a modest increase in 2020. Then, between 2016 and 2020, the efficiency graph swings annually in BPRS in Indonesia. In 2017, for instance, the effectiveness of the BPRS increased. In 2018, the efficiency of the

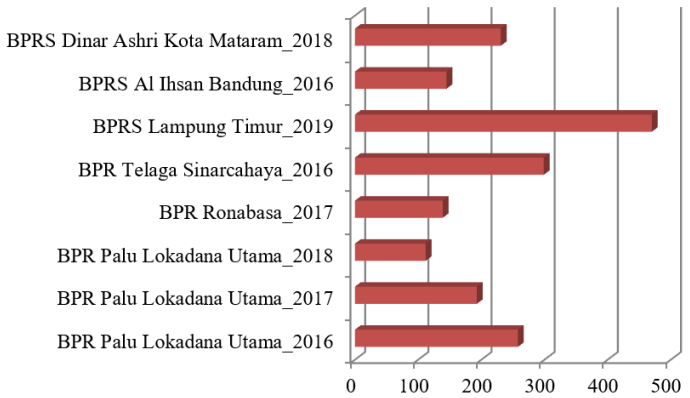

Figure 8: Benchmarking BPR dan BPRS in Indonesia

BPRS declined, only to come back up again in the following year. Lastly, in 2020, the efficiency of the BPRS decreased once more.

Consequently, when comparing the levels of efficiency of BPR and BPRS in Indonesia, the efficiency of BPR surpasses that of BPRS in Indonesia. This research confirms Almas's (2018b) assertion that BPR is more effective than BPRS. BPR has average effectiveness of 99.63 percent, whereas BPRS is 98.57 percent. Likewise, Hadini & Wibowo (2021) found that conventional banks exhibit higher efficiency compared to Islamic commercial banks based on their analysis. Additionally, Islamic banks have less experience than BPR or conventional banks. Furthermore, BPR favors conventional financings that carry less risk than Islamic financing, such as working capital loans, unsecured loans, and small business loans. It should be emphasized, though, that Indonesia's BPRS is still in its development and has the potential to improve in the future. Given the growth of the halal sector globally, particularly in the area of Islamic finance, BPRS in Indonesia still has chances to improve efficiency through the use of technology, expanding the scope of operations, and creating more cutting-edge and competitive goods.

The second discovery concerns the onset of the Covid-19 pandemic at the end of 2019. According to the findings, the level of efficiency in BPR increased during the Covid-19 pandemic, starting in 2019 and showing continued improvement until 2020. Meanwhile, the Covid-19 efficiency of BPRS reduced. This pattern illustrates how the Covid-19 epidemic has affected BPRs, particularly BPRS. According to the study conducted by Setyono et al. (2021), the efficiency of Islamic banks declined during the Covid-19 pandemic, indicating that the pandemic had a negative impact on bank efficiency. During the pandemic, economic conditions may have been turbulent, necessitating banks to use more effort to attain their goals, particularly in musyarakah and mudharabah funding. In addition, the drop in income from financing and fund-raising contributes to a decrease in BPRS

efficiency and a considerable rise for BPR. Moreover, banking operational costs continue to rise to satisfy the banks' daily operational needs. Notalin et al. (2021) describe a similar phenomenon in which the efficiency of Islamic Commercial Banks has reduced due to a decline in financing income, which hinders third-party investment.

In addition, Hasbi & Apriyana (2021) stated that West Java's Covid-19 pandemic affected BPRs and BPRS. Moreover, to overcome this obstacle, banks must keep adequate cash to continue operating during the economic chaos caused by the epidemic. Therefore, banking management is necessary to sustain performance, particularly optimizing banking resource output (Sholihah, 2021).

In addition, the regulator's responsibility is required to mitigate the harmful effects of the Covid-19 epidemic. In this situation, the regulator might design a policy or rule that encourages the development of BPR and BPRS to maintain banks' financial stability and achieve economic recovery at the national level. Pratomo & Ramdani (2021) illustrate the significance of the role of regulators in optimizing economic policies, particularly concerning financing, to stimulate and boost the economy. In addition, Tahliani (2020) recommended that banks adopt new strategies, innovate, and adapt to the circumstances to identify possibilities and address existing issues. For example, they were altering business patterns through digitizing financial services, funding or raising capital, and developing new banking products. Sumadi (2020) said that the obstacles to leveraging digital technology in the current era of digitalization transformation extend beyond simply delivering online and mobile banking services. Innovation that integrates digital technology and customer engagement is required.

In addition, the Islamic banking sector must adapt to present technology advancements. The presence of digitalization in the banking industry necessitates the renewal of services, particularly for Islamic banks and BPRs or BPRS, given that the experience of traditional banks transitioning to digital can improve the efficiency of their processes and the quality of customer care. In addition, banks have made long-term investments in the future through digitizing, and it is anticipated that digital services will become one of the primary drivers of the banking industry's sustainable growth (Sumadi, 2020).

The third result of the DEA analysis analyzes the potential for enhancement. Our findings reveal the level of Slack, which represents the variance between the actual values in the data and the predicted efficiency values. Through Slack, it is possible to determine the origins of inefficiencies in both types of banks. If a variable tends to be low, BPR and BPRS are not efficient because inputs can be decreased without affecting output. If the BPR wishes to attain maximum efficiency, the financial variables and operating income must be increased by 53% and 35%, respectively, based on examining potential improvements. As for the variable input, fixed assets decreased by 9 percent. Then, the financing supplied for BPRS must be increased by 96%, and operating income must be increased by 4%. In this instance, the only cause of BPRS inefficiency is the output variable. Consequently, it can be stated that the BPRS could not optimize the supplied

funding factors.

Conversely, the BPRS is highly cautious when offering client financing. Thus the given financing is not optimal. The findings of this study align with research undertaken by those who explain that conventional banks have more extensive variable total deposits than Islamic commercial banks. This condition might be related to interest rates at conventional banks, while Islamic Commercial Banks utilize a profit-sharing arrangement. In addition, according to a study by Yasin & Fisabilillah (2021) published in BPR, credit distribution is declining, resulting in less-than-maximum revenues. Furthermore, the research conducted by Mardhiyaturrositaningsih & Mahfudz (2020) revealed that the banking sector experienced a decline in fund collection and financing during the Covid-19 pandemic. This downturn had a negative effect on the efficiency of banks.

Drawing from the analysis of the potential enhancement of BPR and BPRS, it can be deduced that the primary cause of inefficiency in both types of banks lies in the output variables, specifically customer financing and operating income. Banking is essential to the nation's economy. As a result, banking has become one of the most important institutions for the revival of the national economy due to its role as an intermediary. The bank intermediation function, particularly in the finance routed by BPR or BPRS to the community, particularly low-income individuals and MSMEs in Indonesia, can be used to enhance and promote MSMEs. Moreover, those with a low living level might use the financing they get to raise their standard of living. Consequently, people's salaries can rise and contribute to attempts to revive the national economy.

Alternatively, in the current digital world, banks must rejuvenate banking digitalization. During this epidemic, numerous activities are becoming computerized. Banking products and services are dominated by digital services (Pratama & Fadillah, 2021). Consequently, BPR and BPRS must perform the same function. BPRs and BPRS can boost their competitiveness and compete with other banks through digitization. Salam Dz (2018) explains the significance of optimizing innovation in the banking industry to close service gaps through the strategic implementation of information and communication technology (ICT) and the digitalization of services, so that the relationship between banks and customers or the community becomes more effective, faster, less expensive, and more intimate.

The fourth finding refers to BPR and BPRS benchmarking in Indonesia. Some BPRS in Indonesia receive the most referrals from both BPR and other BPRS. In this instance, the East Lampung BPRS is the most frequently cited bank. In 2019, it was cited by as many as 470 banks, BPR and BPRS combined. Then, BPR Telaga Sinarcahaya in 2016 as many as 299 banks. Next is BPR Palu Lokada with 563 bank referrals from 2016–2018. Following BPRS Dinar Ashri City of Mataram in 2016 were BPRS Al Ihsan Bandung and BPR Ronabasa. In addition, benchmarking revealed that the effectiveness of BPR and BPRS in 2016–2019 was greater than its effectiveness in 2020. This is unquestionably a challenge for the bank to be more professional, accountable, and consistent in managing its inputs and outputs, as Ilhamsyah (2018) research demonstrates that professionalism

positively and significantly impacts the quality of internal audits in the banking sector. For this reason, banks are obligated to disclose their findings openly and without bias when communicating with relevant parties. Additionally, this is necessary to increase public confidence in the financial industry.

4. Conclusion and Implication

4.1. Conclusion

This study employs the Data Envelopment Analysis (DEA) technique to evaluate and quantify the efficiency of Rural Banks (BPR) and Sharia Rural Banks (BPRS) in Indonesia. Additionally, it aims to compare the efficiency levels between these two types of banks from 2016 to 2020. Several conclusions can be made based on the research findings. Specifically, the effectiveness of BPR and BPRS in Indonesia varies annually. In Indonesia, BPR is more effective than BPRS compared to its efficiency levels. Moreover, according to the CRS and VRS analyses, BPR efficiency decreased in 2018, increased in 2019, and then moved consistently in the subsequent year.

Meanwhile, the movement of graphs of CRS and VRS scores varies annually for the BPRS. Moreover, during the Covid-19 pandemic, BPRs and BPRSs performed exceptionally well. In contrast, there is no improvement in BPR efficiency and a drop in BPRS efficiency.

The study investigates the potential improvement of BPR and BPRS in Indonesia's 2021 data set. If BPR wishes to attain ideal efficiency, the graph of potential improvements indicates that the financing variables and operating income must be increased by 53% and 35%, respectively. However, the input variable, fixed assets, was lowered by 9 percent. In addition, the money supplied for BPRS must be expanded by 96 percent, and operating income must increase by 4 percent. In addition, comparative benchmarking revealed that Lampung Timur BPRS in 2019, Telaga Sinarcahaya BPR in 2016, and Palu Lokada BPR from 2016–2018 had the most referrals compared to other banks. The benchmarking analysis reveals another noteworthy finding. The efficiency of BPR and BPRS in 2016–2019 is superior to that of BPR and BPRS in 2020. This condition is supported by the number of referrals for each BPR and BPRS between 2016–2019.

4.2. Implications

The authors propose several recommendations for stakeholders: (1) The management of BPR and BPRS is anticipated to continue enhancing their efficiency, recognizing the output variable as the source of inefficiency; (2) BPRs and, more specifically, BPRS must be more daring when offering client finance. Because, as demonstrated by our findings, funding is crucial in Islamic banking. To maximize financing revenues, rural banks should enhance their fee-based revenue; (3) BPRs and BPRS must consider strategies and innovations in the digital era, such as reinvigorating digitalization in their banking products, developing their fintech,

or cooperating with fintech firms. It is envisaged that BPR or BPRS will develop their banking offerings more in order to attract clients; and (4) BPR and BPRS should perform market research on customer satisfaction to enhance service quality.

The authors propose several implications of study for government/regulators: (1) The OJK should assist BPR and BPRS in enhancing their professionalism, customer trust, and attention to the quality of their human resources; and (2) OJK must streamline BPR and BPRS. This arrangement is possible by combining BPR and BPRS. Similar to this is territorial constraints. If a district or province has multiple BPRs and BPRSs, the BPRs and BPRSs must merge. The objective is to lessen business competition, increase capital, and facilitate business expansion. Thus, BPR and BPRS consumption can be optimized.

The authors propose several academic implications of the study. Academics are expected to update relevant research by, for instance, increasing the research variables and employing methods, approaches, or other analytical tools pertinent to the research, such as stochastic frontier analysis. In addition, additional research can assess the efficiency of BPR and BPRS in Indonesia and investigate the root causes of their inefficiency. With this, it is intended that the conversation regarding the effectiveness of BPR and BPRS would be more extensive and in-depth, which will aid in the growth of BPR and BPRS in Indonesia.

References

[1] Abate, G. T., Borzaga, C., & Getnet, K. (2014). Cost-efficiency and outreach of microfinance institutions: Trade-offs and the role of ownership. *Journal of International Development, 26*(6), 923-932. doi: https://doi.org/10.1002/jid.2981.

[2] Abduh, M., & Chowdhury, N. T. (2012). Does Islamic banking matter for economic growth in Bangladesh. *Journal of Islamic Economics, Banking and Finance, 8*(3), 104-113.

[3] Abduh, M., & Azmi Omar, M. (2012). Islamic banking and economic growth: the Indonesian experience. *International Journal of Islamic and Middle Eastern Finance and Management, 5*(1), 35-47. doi: https://doi.org/10.1108/17538391211216811.

[4] Agustina, D., Sholihin, M., & Fithria, A. (2019). The efficiency of Indonesian Islamic rural banks: a stochastic frontier analysis. *International Journal of Islamic Economics and Finance (IJIEF), 1*(2), 229-248. doi: https://doi.org/10.18196/ijief.1212.

[5] Ahmad, A., Kashif-ur-Rehman, & Humayoun, A. A. (2011). Islamic banking and prohibition of Riba/interest. *African Journal of Business Management, 5*(5), 1763-1767. doi: https://doi.org/10.5897/AJBM10.723.

[6] Ajija, S. R., Hudaifah, A., Wasiaturrahma, Sulistyaningsih, L., A'yun, K. Q., ... & Azzizah, U. A. (2018). *Koperasi BMT: Teori, aplikasi dan inovasi*. Inti Media Komunika.

[7] Almas, B. (2018a). Analisis perbandingan efisiensi BPR konvensional dan BPR syariah di Provinsi Jawa Timur. *Al-Amwal: Jurnal Ekonomi dan Perbankan Syari'ah, 10*(2), 169-184. doi: 10.24235/amwal.v10i2.3264.

[8] Almas, B. (2018b). Perbandingan efisiensi BPR konvensional dan BPR syariah Provinsi Jawa Timur dengan pendekatan non-parametrik. *IQTISHADIA Jurnal Ekonomi & Perbankan Syariah, 5*(2), 188-206. doi: https://doi.org/10.19105/iqtishadia.v5i2.1929.

[9] Amelia, E., & Hardini, E. F. (2017). Determinant of mudharabah financing: A study at Indonesian Islamic rural banking. *Etikonomi, 16*(1), 43-52. doi: 10.15408/etk.v16i1.4638.

[10] Amran, A. M., Rahman, R. A., Yusof, S. N. S., & Mohamed, I. S. (2014). The current practice of Islamic microfinance institutions' accounting information system via the implementation of mobile banking. *Procedia-Social and Behavioral Sciences, 145*, 81-87. doi: https://doi.org/10.1016/j.sbspro.2014.06.013.

[11] Anwar, M., Rahman Nidar, S., Komara, R., & Layyinaturrobaniyah, L. (2021). A comparative analysis of rural banks' efficiency between Bali and West Java provinces in Indonesia. *Journal of Sustainable Finance & Investment, 11*(4), 330-350. doi: https://doi.org/10.1080/20430795.2020.1735220.

[12] Archer, T. S. (2010). *The efficiency theory: Improving society by eliminating wasteful programs, restructuring the economy, and fixing education*. CreateSpace Independent Publishing Platform.

[13] Ascarya, & Yumanita, D. (2009). *Intermediation efficiency analysis of Islamic rural banks in Indonesia: Two stage DEA approach*.

[14] Bahlous, M., & Mohd. Yusof, R. (2014). International diversification among Islamic investments: is there any benefit. *Managerial Finance, 40*(6), 613-633. doi: https://doi.org/10.1108/MF-08-2013-0225.

[15] Bassem, B. S. (2014). Total factor productivity change of MENA microfinance institutions: A Malmquist productivity index approach. *Economic Modelling, 39*, 182-189. doi: https://doi.org/10.1016/j.econmod.2014.02.035.

[16] Bauer, P. W., Berger, A. N., Ferrier, G. D., & Humphrey, D. B. (1998). Consistency conditions for regulatory analysis of financial institutions: a comparison of frontier efficiency methods. *Journal of Economics and Business, 50*(2), 85-114. doi: https://doi.org/10.1016/S0148-6195(97)00072-6.

[17] Beck, T., Demirgüç-Kunt, A. & Merrouche, O. (2010). Islamic vs conventional banking: business model, efficiency and stability. *Policy Research Working Paper, 5446*. The World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/482731468333056240/islamic-vs-conventional-banking-business-model-efficiency-and-stability.

[18] Bos, J. W., & Millone, M. (2015). Practice what you preach: Microfinance business models and operational efficiency. *World Development, 70*, 28-42. doi: https://doi.org/10.1016/j.worlddev.2014.12.018.

[19] Chaudhry, M. S. (1999). *Fundamentals of Islamic economic system*. Burhan Education and Welfare Trust.

[20] Devi, A., & Firmansyah, I. (2018). Solution to overcome the bankruptcy potential of islamic rural bank in Indonesia. *Journal of Islamic Monetary Economics and Finance, 3*, 25-44. doi: https://doi.org/10.21098/jimf.v3i0.750.

[21] Diana, S., Sulastiningsih, S., & Purwati, P. (2021). Analisis kinerja keuangan perbankan syariah Indonesia pada masa pandemi Covid-19. *Jurnal Riset Akuntansi dan Bisnis Indonesia, 1*(1), 111-125. doi: https://doi.org/10.32477/jrabi.v1i1.327.

[22] Doan, A. T., Lin, K. L., & Doong, S. C. (2018). What drives bank efficiency? The interaction of bank income diversification and ownership. *International Review of Economics & Finance, 55*, 203-219. doi: https://doi.org/10.1016/j.iref.2017.07.019.

[23] Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society: Series A (General), 120*(3), 253-281. doi: https://doi.org/10.2307/2343100.

[24] Furqani, H., & Mulyany, R. (2009). Islamic banking and economic growth: Empirical evidence from Malaysia. *Journal of Economic Cooperation & Development, 30*(2), 59–74.
[25] Grassa, R., & Gazdar, K. (2014). Financial development and economic growth in GCC countries: A comparative study between Islamic and conventional finance. *International Journal of Social Economics, 41*(6), 493-514. doi: https://doi.org/10.1108/IJSE-12-2012-0232.
[26] Hadad, M. D., Santoso, W., Besar, D. S., Rulina, I., Purwanti, W., & Satria, R. (2004). Fungsi intermediasi bank asing dalam mendorong pemulihan sektor riil di Indonesia. *Biro Stabilitas Sistem Keuangan Research Paper, 6/18*. Direktorat Penelitian dan Pengaturan Perbankan Bank Indonesia. https://www.bi.go.id/id/publikasi/kajian/Documents/936ea85e3dca41e3b7646580da6972d1BankAsing.pdf.
[27] Hadini, M. L., & Wibowo, D. (2021). Komparasi efisiensi bank konvensional dan bank syariah di Indonesia berdasarkan Data Envelopment Analysis (DEA). *Jurnal Ilmu dan Riset Akuntansi (JIRA), 10*(1), 1-25.
[28] Hartarska, V., Shen, X., & Mersland, R. (2013). Scale economies and input price elasticities in microfinance institutions. *Journal of Banking & Finance, 37*(1), 118-131. doi: https://doi.org/10.1016/j.jbankfin.2012.08.004.
[29] Hasbi, S., & Apriyana, M. (2021). Tingkat efisiensi BPR dan BPRS di Jawa Barat pada masa pandemi COVID-19. *Nisbah: Jurnal Perbankan Syariah, 7*(1), 1-7. doi: https://doi.org/10.30997/jn.v7i1.4287.
[30] Hidayat, W. Y., Kakinaka, M., & Miyamoto, H. (2012). Bank risk and non-interest income activities in the Indonesian banking industry. *Journal of Asian Economics, 23*(4), 335-343. doi: https://doi.org/10.1016/j.asieco.2012.03.008.
[31] Hosen, M. N., & Muhari, S. (2013). Efficiency of the sharia rural bank in Indonesia lead to modified camel. *International Journal of Academic Research in Economics and Management Sciences, 2*(5), 34-53. doi: https://doi.org/10.6007/IJAREMS/v2-i5/298.
[32] Ika, S. R., & Abdullah, N. (2011). A comparative study of financial performance of Islamic banks and conventional banks in Indonesia. *International Journal of Business and Social Science, 2*(15), 199-207.
[33] Ilhamsyah, F. (2018). Pengaruh kompetensi, profesionalisme, dan pengalaman kerja auditor terhadap kualitas audit internal pada perbankan. *Jurnal Akuntansi, 6*(3).
[34] Iqbal, Z. (1997). Islamic financial systems. *Finance and Development, 34*, 42-45. https://www.findevgateway.org/sites/default/files/publications/files/mfg-en-paper-islamic-financial-systems-1997.pdf.
[35] Jatmiko, W. (2017). Efficiency and ownership structure: evidence from rural banks in Indonesia. *International Journal of Economics, Management and Accounting, 25*(2), 355-380.
[36] Kaur, P. (2016). Efficiency of microfinance institutions in India: are they reaching the poorest of the poor?. *Vision, 20*(1), 54-65. doi: https://doi.org/10.1177/0972262916628.
[37] Majelis Ulama Indonesia. (2004). *Bunga (Interest/Fa'idah)*. https://mui.or.id/produk/fatwa/1011/bunga-interestfaidah/.
[38] Mardhiyaturrositaningsih, & Mahfudz, M. S. (2020). Dampak pandemi covid-19 terhadap manajemen industri perbankan syariah: analisis komparatif. *POINT: Jurnal Ekonomi dan Manajemen, 2*(1), 1-10. doi: https://doi.org/10.46918/point.v2i1.576.
[39] Masrizal, Sukmana, R., Fianto, B. A., & Gultom, R. Z. (2022). Does economic freedom fosters Islamic rural banks efficiency? Evidence from Indonesia. *International Journal of Productivity and Performance Management*, (ahead-of-print). doi:

https://doi.org/10.1108/IJPPM-11-2021-0660.
[40] Nashihin, M., & Harahap, L. (2014). The analyis of the efficiency of BPR-S: production function approach vs financial ratios approach. *Procedia-Social and Behavioral Sciences, 115*, 188-197. doi: https://doi.org/10.1016/j.sbspro.2014.02.427.
[41] Notalin, E., Afrianty, N., & Asnaini, A. (2021). Dampak Covid-19 terhadap tingkat efisiensi kinerja keuangan bank umum syariah di Indonesia menggunakan pendekatan Data Envelopment Analysis (DEA). *Jurnal Ilmiah Akuntansi, Manajemen dan Ekonomi Islam (JAM-EKIS), 4*(1), 169-178. doi: https://doi.org/10.36085/jam-ekis.v4i1.1262.
[42] Nugrohowati, R. N. I. (2019). Measuring the efficiency of Indonesian sharia rural banks: two stage approach. *Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi dan Pembangunan, 20*(1), 28-49. doi: 10.23917/jep.v20i1.6692.
[43] Pratama, A. P. R., & Fadillah, F. K. (2021). Penguatan digitalisasi perbankan dalam pelayanan costumer service nasabah secara digital di masa Covid-19. *Simbur Cahaya, 28*(2), 312-322. doi: http://dx.doi.org/10.28946/sc.v28i2.1443.
[44] Pratomo, D., & Ramdani, R. F. (2021). Analisis pertumbuhan kinerja keuangan perbankan syariah dan konvensional di era pandemi Covid 19. *Derivatif: Jurnal Manajemen, 15*(2), 260-275. doi: 10.24127/jm.v15i2.654.
[45] Prayitno, D. (2018). *Perbandingan tingkat efisiensi BPR konvensional dan BPR syariah dengan pendekatan Data Envelopment Analysis (DEA) di Indonesia periode 2012-2017* (Skripsi, Fakultas Ekonomi Dan Bisnis UIN Syarif Hidayatullah). https://repository.uinjkt.ac.id/dspace/handle/123456789/40321.
[46] Sadono, E. D. (2018). Efficiency of Islamic Rural Banks (BPRS) in East Java Province, Indonesia. *Tazkia Islamic Finance and Business Review, 11*(1), 1-14. doi: https://doi.org/10.30993/tifbr.v11i1.103.
[47] Saeed, A. (1996). *Islamic banking and interest: a study of the prohibition of riba and its contemporary interpretation*. Brill Academic Publishers.
[48] Salam Dz, A. (2018). Inklusi keuangan perbankan syariah berbasis digital-banking: optimalisasi dan tantangan. *Al-Amwal: Jurnal Ekonomi dan Perbankan Syari'ah, 10*(1), 63-80. doi: 10.24235/amwal.v10i1.2813.
[49] Setyono, F., Istiqomah, Y. N. A., Ilmundhita, S., & Mujib, A. (2021). Analisis efisiensi perbankan syariah pada masa pandemi Covid-19 Menggunakan Data Envelopment Analysis (DEA). *I-Finance: A Research Journal on Islamic Finance, 7*(1), 11-30. doi: https://doi.org/10.19109/ifinance.v7i1.8434.
[50] Sharma, D., Sharma, A. K., & Barua, M. K. (2013). Efficiency and productivity of banking sector: A critical analysis of literature and design of conceptual model. *Qualitative Research in Financial Markets, 5*(2), 195–224. doi: https://doi.org/10.1108/QRFM-10-2011-0025.
[51] Sholihah, E. (2021). Efisiensi kinerja keuangan sektor perbankan Indonesia di masa pandemi Covid-19. *JRMSI-Jurnal Riset Manajemen Sains Indonesia, 12*(2), 287-304. doi: https://doi.org/10.21009/JRMSI.012.2.06.
[52] Silkman, R. H. (1986). *Measuring efficiency: An assessment of data envelopment analysis*. Jossey-Bass,.
[53] Sumadi, S. (2020). Menakar dampak fenomena pandemi Covid-19 terhadap perbankan syariah. *Jurnal Hukum Ekonomi Syariah, 3*(2), 145-162. doi: 10.30595/jhes.v0i1.8761.
[54] Tahliani, H. (2020). Tantangan perbankan syariah dalam menghadapi pandemi Covid-19. *Madani Syari'ah, 3*(2), 92-113. doi:

https://doi.org/10.51476/madanisyari'ah.v3i2.205.
[55] Wasiaturrahma, Sukmana, R., Ajija, S. R., Salama, S. C. U., & Hudaifah, A. (2020). Financial performance of rural banks in Indonesia: A two-stage DEA approach. *Heliyon*, *6*(7), e04390. doi: https://doi.org/10.1016/j.heliyon.2020.e04390.
[56] Yasin, A., & Fisabilillah, L. W. P. (2021). Analisis komparasi kinerja keuangan Bank Perkreditan Rakyat (BPR) sebelum dan pada pandemi Covid-19. *EQUILIBRIUM: Jurnal Ilmiah Ekonomi dan Pembelajarannya, 9*(2), 142-152. doi: http://doi.org/10.25273/equilibrium.v9i2.10011.
[57] Zuhroh, I., Ismail, M., & Maskie, G. (2015). Cost efficiency of islamic banks in Indonesia–a Stochastic frontier analysis. *Procedia-Social and Behavioral Sciences, 211*, 1122-1131. doi: https://doi.org/10.1016/j.sbspro.2015.11.150.

Appendix

Table A1: Average of BPR's Efficiency Score in Indonesia

DMU	CCR Model	BCC Model	
	CRS	VRS	Scale
BPR Bali Dewata	0.779	0.797	0.978
BPR Bank Jogja (PD) Kota Yogyakarta	0.396	0.581	0.688
BPR Bank Tulungagung (Perseroda)	0.446	0.567	0.786
BPR Dana Mandiri Bogor (PT) Bogor	0.601	0.945	0.638
BPR Hariarta Sedana Kota Tenggerang	0.536	0.697	0.770
BPR Harta Swadiri (PT) Pasuruan	0.571	0.741	0.772
BPR Hasa Mitra Makasar	0.976	1.000	0.976
BPR Inti Dana Sentosa	0.594	0.791	0.765
BPR Karya Remaja (PD) Indramayu	0.424	0.610	0.703
BPR Mitra Jaya Mandiri (PT) Jember	0.603	0.686	0.885
BPR Prima Riau Sentosa Pekan Baru	0.644	0.669	0.952
BPR Sejahtera Artha Sembada (PT) Kota Pekalongan	0.468	0.615	0.765
PD BPR NTB Mataram	0.557	0.583	0.955
Perumda BPR Bank Solo	0.372	0.453	0.821
Perumda BPR Khatulistiwa Pontianak	0.530	0.586	0.904
Perumda BPR Marunting Sejahtera	0.442	0.464	0.950
PT Bank Perkreditan Rakyat Central Pitoby	0.397	0.452	0.870
PT BPR Aceh Utara	0.390	0.400	0.983
PT BPR Anugrah Swakerta	0.359	0.364	0.979
PT BPR Artha Aceh Sejahtera	0.374	0.412	0.913
PT BPR Artha Karya Perdana	0.761	0.770	0.988
PT BPR Artha Mlatiindah Sleman	0.411	0.544	0.757
PT BPR Asia Sejahtera	0.449	0.502	0.896
PT BPR Bank Bapas 69 (Persoda)	0.427	0.629	0.679
PT BPR Barelang Mandiri	0.332	0.419	0.795
PT BPR Bepede Kutai Sejahtera	0.425	0.594	0.716
PT BPR BKK Purwodadi (Perseroda) Grobogan	0.440	0.596	0.739
PT BPR Bosnik Intsia Papua	0.732	0.814	0.900
PT BPR Cahaya Artha Bali	0.467	0.487	0.961
PT BPR Cempaka Mitra Nagari	0.572	0.576	0.989
PT BPR Central Artha Kota Tegal	0.490	0.563	0.875
PT BPR Central Dana Mandiri	0.583	0.628	0.931
PT BPR Central Niaga Abadi	0.542	0.555	0.977
PT BPR Cipta Dana Mulia	0.338	0.346	0.979
PT BPR Danapermata Lestari	0.413	0.426	0.970
PT BPR Daramandiri Palopo	0.303	0.351	0.858
PT BPR Dassa Kota Tanggerang	0.477	0.518	0.913
PT BPR Dian Binarta	0.517	0.534	0.971
PT BPR Duta Bali	0.463	0.469	0.984
PT BPR Eka Bumi Artha	0.574	1.000	0.574
PT BPR Guna Rakyat	0.409	0.425	0.963
PT BPR Intidana Sukses Makmur Jakarta Barat	0.634	0.712	0.888
PT BPR Jambi Citra Sahabat	0.438	0.452	0.965
PT BPR Kota Makassar Perseroda	0.199	0.210	0.954
PT BPR Lingga Sejahtera	0.530	0.761	0.723
PT BPR Malifut Danatama	0.516	0.548	0.953
PT BPR Martapura Banjar Sejahtera	0.404	0.425	0.950
PT BPR Menara Cendrawasih Papua	0.485	0.512	0.955

continued...

Table A1 – Lanjutan

DMU	CCR Model	BCC Model	
	CRS	VRS	Scale
PT BPR Mitra Arta Mulia	0.311	0.472	0.678
PT BPR Mitra Central Dana	0.370	0.376	0.985
PT BPR Mitradana Madani	0.481	0.498	0.962
PT BPR Modern Express	0.854	0.960	0.889
PT BPR Mukomuko Makmur	0.603	0.623	0.965
PT BPR Multi Tata Perkasa	0.913	0.925	0.986
PT BPR Mustaqim Sukamakmur	0.518	0.589	0.870
PT BPR Nusa Utara	0.431	0.450	0.956
PT BPR Palu Lokadana Utama	0.942	1.000	0.943
PT BPR Parasahabat Bekasi	0.735	0.908	0.808
PT BPR Parasari	0.492	0.543	0.912
PT BPR Pelangi	0.857	0.899	0.955
PT BPR Pondok Meja Indah	0.400	0.510	0.789
PT BPR Prabumegah Kencana	0.346	0.423	0.819
PT BPR Prima Multi Makmur	0.816	0.866	0.940
PT BPR Ronabasa	0.742	0.747	0.992
PT BPR Sarimadu (Perseroda)	0.560	0.578	0.967
PT BPR Sejahtera Batam	0.672	0.738	0.910
PT BPR Sejahtera Kendari	0.639	0.701	0.914
PT BPR Sentral Mitra Sejahtera	0.433	0.441	0.980
PT BPR Sulawesi Karya Sentosa	0.281	0.513	0.763
PT BPR Sulawesi Mandiri	0.352	0.452	0.775
PT BPR Telaga Sinarcahaya	0.551	0.563	0.960
PT BPR Tilatang Kamang	0.333	0.3780	0.880
PT BPR Tjandra Artha Lestari	0.571	0.600	0.955
PT BPR Ukabima Lestari	0.597	0.656	0.904
PT BPR Universal Kalbar	0.423	0.496	0.852
PT BPR Yaspis Dana Prima	0.714	0.722	0.989
PT BPR Yustima	0.620	0.682	0.911

Table A2: Average of BPR's Efficiency Score in Indonesia

DMU	CCR Model	BCC Model	
	CRS	VRS	Scale
BPRS Al Mabrur Babadan (PT) Ponorogo	0.304	0.340	0.893
BPRS Al Salaam Amal Salman (PT) Kota Depok	0.562	0.758	0.732
BPRS Amanah Bangsa (PT) Simalungun	0.317	0.356	0.882
BPRS Arta Leksana (PT) Banyumas	0.292	0.354	0.824
BPRS Artha Amanah Ummat (PT) Semarang	0.214	0.244	0.883
BPRS Asad Alif (PT) Kendal	0.352	0.367	0.952
BPRS Bahari Berkesan (PT) Kota Ternate	0.395	0.440	0.896
BPRS Gala Mitra Abadi (PT) Grobogan	0.568	0.572	0.993
BPRS Insan Cita Artha Jaya (PT) Bogor	0.380	0.412	0.915
BPRS Manfaatsyariah (PT) Penajam Paser Utara	0.150	0.158	0.956
BPRS Mitra Cahaya Indonesia (PT) Sleman	0.515	0.581	0.874
BPRS PNM Patuh Beramal (PT)Kota Mataram	0.440	0.489	0.901
BPRS Pudu Arta Insani (PT) Deli Serdang	0.355	0.386	0.914
BPRS Rahmania Dana Sejahtera (PT) Aceh Jeumpa/Bireuen	0.596	0.604	0.984
BPRS Tanmiya Artha (PT) Kota Kediri	0.397	0.417	0.957
BPRS Unisia Insan Indonesia (PT) Kota Yogyakarta	0.263	0.343	0.771
PT BPRS Al Washliyah Medan	0.320	0.350	0.912
PT BPRS AlMasoem Bandung	0.531	0.672	0.792
PT BPRS Artha Surya Barokah semarang	0.433	0.508	0.832
PT BPRS Bahari Berkesan Kota Ternate Maluku Utara	0.551	0.620	0.893
PT BPRS Barkah Gemadana Kab. Banjar Kalsel	0.342	0.399	0.862
PT BPRS Barokah Dana Sejahtera Yogyakarta	0.417	0.653	0.638
PT BPRS Bina Finansia kota semarang	0.418	0.466	0.898
PT BPRS Dana Hidayatullah Yogyakarta	0.619	0.642	0.962
PT BPRS Fajar Sejahtera Bali Kab. Badung Bali	0.443	0.455	0.975
PT BPRS Gebu Prima Medan	0.432	0.522	0.849
PT BPRS Hijra Alami Jakarta Selatan	0.832	0.839	0.991
PT BPRS Hikmah Wakilah Aceh	0.509	0.722	0.707
PT BPRS Lampung Timur	0.977	0.985	0.992
PT BPRS Mitra Amanah Palangkaraya Kalteng	0.569	0.583	0.972
PT BPRS Mitra Harmoni Kota Semarang	0.692	0.698	0.991
PT BPRS Mitra Harmoni Yogyakarta	0.638	0.658	0.967
PT BPRS Patuh Beramal Kota Mataram NTB	0.681	0.755	0.904
PT BPRS Rahmah Hijrah Agung Aceh	0.442	0.525	0.843
PT BPRS Taman Indah Darussalam Aceh	0.720	0.780	0.917
PT. BPRS Al Ihsan Bandung	0.810	0.828	0.977
PT. BPRS Amanah Rabbaniah Bandung	0.588	0.673	0.874
PT. BPRS Baktimakmur Indah Sidoarjo	0.828	0.873	0.942
PT. BPRS Barakah Nawaitul Ikhlas Solok	0.432	0.443	0.972
PT. BPRS Bobato Lestari Kota Tidore Kepulauan Maluku Utara	0.364	0.580	0.755
PT. BPRS Dinar Ashri Kota Mataram NTB	0.646	0.859	0.750
PT. BPRS Harta Insan Karimah Bekasi	0.310	0.455	0.681
PT. BPRS Harta Insan Karimah Parahyangan	0.497	0.805	0.615
PT. BPRS Harta Insan Karimah Tangerang	0.471	0.657	0.717
PT. BPRS Karya Mugi Sentosa Surabaya	0.473	0.490	0.967
PT. BPRS Lantabur Tebuireng	0.536	0.646	0.829
PT. BPRS Metro Madani Kota Metro Lampung	0.478	0.572	0.835
PT. BPRS Mitra Harmoni Kota Malang	0.661	0.676	0.981
PT. BPRS Muamalah Cilegon	0.613	0.619	0.989
PT. BPRS Musyarakah Ummat Indonesia Tangerang	0.547	0.568	0.958
PT. BPRS Suriyah	0.266	0.342	0.779

this page intentionally left blank