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The Efficiency of Islamic Commercial Banks in Indonesia uses the Super Efficiency Concept

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ABSTRACT: Measuring the effectiveness of sharia banking organizations is now even more crucial due to the expanding popularity of sharia banking worldwide and in Indonesia in particular. The ability of banking organizations to maximize the resources under their control will undoubtedly be determined by the efficiency measurement. In other words, a company's productivity will increase with increased efficiency. The Data Envelopment Analysis (DEA) idea, which measures business efficiency, has evolved into the super efficiency notion. This study intends to rate Islamic Commercial Banks in Indonesia according to their efficiency level. This kind of study employs panel data and is quantitative. Six Islamic Commercial Banks that were registered with the Financial Services Authority for the years 2017 through 2019 made up the sample. Purposive sampling was used in this study's sample process. According to the study's findings, three banks have improved their efficiency while the others have not. With a score of 111.97%, Bank Syariah Mandiri has the highest efficiency rating. Bank BCA Syariah is second with a score of 111.80%, and Bank BRI Syariah is third with a score of 111.10%.

KEYWORDS: Islamic banking, efficiency, super efficiency

INTRODUCTION

The measuring of Islamic banks' efficiency is necessary given the rapidly expanding Islamic banking market in Indonesia today. This measurement is considered important if it is associated with the main role of Islamic banking as an intermediary institution. The existence of this efficiency measurement will be useful to determine the level of a bank's ability to optimize all controlled resources, which can ultimately provide greater benefits for Islamic banking stakeholders (Pambuko, 2016).

As sharia banks expand both globally and in Indonesia in particular, the rivalry in the banking industry is becoming more intense, making it crucial to measure the effectiveness of sharia banking. The importance of measuring the efficiency level follows the opinion of Berger & Humphrey (1997), that since the 1990s studies related to measuring the efficiency and productivity of banking companies have become very important. This statement further shows that measurement to determine a banking company's level of efficiency is indeed important. Considering that the more efficient a bank is in carrying out its work, will impact productivity, better price competition and better and better quality of service quality for customers (Berger et al., 1993).

Efficiency is a term used to measure the ability to manage or utilize production assets (Noor, 2007). While in Islamic banking, efficiency is a sign of a bank's viability and ability to compete in Indonesia's banking market. (Puspitasari et al., 2018). Thus, efficiency is a measurement indicator used to see the bank's ability to manage assets which will later be used as a form of bank defence against competition.

Measuring the level of efficiency of banking organizations has been the subject of numerous past studies. According to the findings of these research, Islamic Commercial Banks have not yet attained the highest level of efficiency, which in this case would require a score of 100%, despite having a reasonably decent average score. Research by Afrisal & Pihartiningtias (2013), Firdaus & Hosen (2014), Karimah et al. (2016), Putri & Mulazid (2017), and Farandy et al. is among the studies that support this claim (2017). Research by Rusydiana (2018) and Cahya (2015), on the other hand, showed that the majority of the Islamic commercial banks surveyed had attained maximum efficiency scores. These investigations, which were done from 2007 to 2016, all took a non-parametric approach and employed the Data Envelopment Analysis (DEA) technique.

In addition to these four studies, other studies that employed the Data Envelopment Analysis (DEA) method and provided comprehensive results regarding the efficiency grouping of each Islamic Commercial Bank in Indonesia also existed. That research is the research of Puspitasari et al. (2018), which revealed differences in efficiency scores at each bank that was the object of his research. Furthermore, more detailed research reveals groupings based on the level of efficiency of each Islamic Commercial Bank in Indonesia (Rusydiana et al., 2018; Rusydiana & Hasib, 2020).

However, it turns out that the DEA method still has drawbacks, namely the difficulty in determining the best ranking of the Decision-Making Unit (DMU) or decision-making unit, which in this case is a banking company as the object of observation, if several DMU units appear with the same value of 1 (Rusydiana & Hasib, 2020). That is, if there are two or more DMUs with a value of 1, then among the DMUs with a value of more than one, it is not known which one is superior to another. Because of these problems, the super-efficiency concept by (Andersen & Petersen, 1993), namely the development of the DEA model where the super-efficiency concept will allow if the observed DMU efficiency has a value greater than 1 or 100%.

Research by Pambuko (2016), Rusydiana et al. (2018), and Rusydiana & Hasib are all mentioned in this study (2020). Data Envelopment Analysis (DEA), a non-parametric methodology, will also be used in this study as a research tool. The updated version of this study uses Data Envelopment Analysis (DEA) as a research methodology and Islamic Commercial Banks as the Decision-Making Unit for the 2017–2019 period (DMU). The choice of Islamic Commercial Banks as DMUs is because Islamic Commercial Banks are currently domiciled as owners of the largest percentage of total assets on a national scale, according to Islamic banking statistics published by the OJK in February 2020. By comparing the results of the super-efficiency analysis of DEA and the basic DEA test, it is hoped that the reader will be better able to understand the findings and the differences between the two. The goal of this study is to determine the level of efficiency of Islamic Commercial Banks (BUS) in Indonesia and to determine their ranking.

LITERATURE REVIEW

Islamic Banking

According to Ismail (2010), Islamic banking is a bank that does not use an interesting system as a form of reward profits received by the bank, and those provided by the bank to customers come from profit sharing, the implementation of which will be adjusted according to the contract agreed between the customer and the bank at the beginning of the transaction.

The definition of Islamic banks follows the goals to be achieved by themselves, namely as a medium of socialization and preaching of Islamic principles and traditions in the fields of finance, banking, and the wider economic field (Arifin, 2009).

Banking Efficiency

The definition of bank efficiency is similar to efficiency in general. Efficiency is used to measure and determine a company's performance, which is also included in banking companies (Abidin, 2009; Hadad et al., 2003). Furthermore, Shahid et al. (2010) also explained that banking efficiency is a comparison of input and output variables that can be observed from optimal input and output variables. So, it can be said that a bank that has achieved efficiency is one that has reached a score of 1 or 100% (maximum), while a bank that has not been efficient or inefficient is a bank that has not reached a value of 1 or 100%.

Super Efficiency Concept of DEA

DEA is a method based on linear programming and is a non-parametric deterministic methodology. The unit to be evaluated, both the input needed, and the output generated by the unit, is identified by DEA. Additionally, these inputs determine the value of the productivity of the units that are not included in the efficiency frontier and build the efficiency frontier for the available data set. When compared to the highest performing units in the studied data set, DEA can also determine which units need to utilise inputs more effectively. To achieve an optimal level of efficiency, each unit tends to have a pattern of giving a high weight to the input that is used a little and to the output that is produced a lot. Weight does not merely describe an economic value but is a quantitative quantity to maximize the efficiency of the unit concerned.

The fundamental DEA model divides decision-making units (DMUs) into two main categories: efficient units and inefficient units. The value of efficient units is 1, or 100%, while the value of inefficient units is less than one. The basic DEA model's disadvantage is that it will require more time to rank DMUs when several units inside a single DMU have the same value of 1.

The idea of super-efficiency was then presented by Andersen & Petersen in 1993. The fundamental idea behind super efficiency is to take into account observed DMU efficiencies that are higher than 1 or 100%. Only units considered to be efficient with the limit removed are impacted by super efficiency. Inefficient units, on the other hand, are unaffected because their efficiency is below 1. The ability of effective units to categorize supervised DMU units is measured by super efficiency.

RESEARCH METHOD

This form of research employs panel data or time series and is quantitative. Time series data and cross sections or junctions are combined to create panel data. From 2017 to 2019, the Decision-Making Unit (DMU) or data is utilized. The focus of this study is the Indonesian Islamic Commercial Banks (BUS) that are registered with the Financial Services Authority (OJK) and have posted their annual financial reports for the years 2017 through 2019 on their official websites. The selection of Islamic Commercial Banks (BUS) as DMU is because BUS currently has the largest percentage of total assets on a national scale, according to sharia banking statistics published by the OJK in February 2020.

The sampling technique used is a purposive sampling technique. Analysis of the data used in this study is to use quantitative analysis with a non-parametric frontier approach. This approach is measured using the Data Envelopment Analysis (DEA) method or, more specifically, the Super Efficiency Concept of DEA. The data processing in this study uses the help of Efficiency Measurement System (EMS) software version 1.3 and Microsoft Excel 97-2003 as a tool for manual data processing.

The criteria used in sampling are as follows:

1. It is a banking company registered with Bank Indonesia based on Sharia Banking Statistics data published by the Financial Services Authority (OJK) as of February 2020.
2. Banking companies that consistently do not experience changes in form business entities during the 2017-2019 period.
3. Publish the company's financial statements for the 2017-2019 period. 4. Financial reports contain the data needed by researchers.

Based on the sampling criteria above, the Islamic Commercial Banks (BUS) taken as samples for this study are:

Table 1. Research Sample

No	Name of Islamic Commercial Bank	No	Name of Islamic Commercial Bank
1.	Bank Muamalat Indonesia	5.	Bukopin Syariah
2.	Bank BRIS Syariah	6.	Bank BCA Syariah
3.	Bank BNI Syariah		
4.	Bank Syariah Mandiri		

RESULT AND DISCUSSION

Efficiency is generally interpreted as comparing the output or output produced and the input or input used (Lipsey et al., 1997). The efficiency level of Islamic Commercial Banks in this study is calculated using the super efficiency concept, which is a development of the Data Envelopment Analysis (DEA) method. The period studied is from 2017 to 2019, using five variables divided into two parts, namely input and output variables, each consisting of three input and two output variables. Input variables include Third Party Funds (DPK), fixed assets, and operational costs. At the same time, the output variables consist of financing and investment in securities.

The difference between the super efficiency concept DEA and the basic DEA model lies in the value of efficiency. In the super-efficiency concept, if DMUs or research objects have an efficiency of more than 1 or 100%, then they will be left alone; this aims to find out the ranking of each DMU that has been declared efficient. The following are the results of the super efficiency concept of the DEA test:

Table 2. Result of the Super Efficiency Concept Test

No	Bank Name	Period	Score
1	Bank Muamalat Indonesia	2017	82.53
		2018	87.43
		2019	92.83
2	Bank BRI Syariah	2017	91.41
		2018	98.62
		2019	143.29
3	Bank BNI Syariah	2017	86.42
		2018	104.09
		2019	97.54
4	Bank Syariah Mandiri	2017	96.17

		2018	114.3
		2019	125.45
5	Bank Syariah Bukopin	2017	86.71
		2018	96.07
		2019	101.66
6	Bank BCA Syariah	2017	118.11
		2018	116.95
		2019	100.36

Based on Table 2, it can be seen that Bank Muamalat Indonesia has experienced a growth in its efficiency score every year. The highest efficiency score was in 2019, with a score of 92.83%, in 2018 and 2017, respectively, obtaining scores of 87.43% and 82.53%.

Bank BRI Syariah continued to experience efficiency increases to its peak in 2019; Bank BRISyariah's efficiency reached 143.29%, which is also the first year that Bank BRISyariah reached an efficient point. The efficiency scores in 2017 and 2018 were respectively 91.41% and 98.62%, which means that it continues to increase, so it is possible that in 2019 BRI Syariah reached an efficiency point.

Bank BNI Syariah had the lowest efficiency in 2017, 86.42%. Meanwhile, the highest efficiency in 2018 was 104.09%. Then after achieving efficiency, in 2019, Bank BNI Syariah experienced a significant decrease in efficiency; the decrease almost reached 8%, which was at 97.54%.

Bank Mandiri Syariah has experienced an increase in efficiency every year, so the highest efficiency is in 2019, which is 125.45%. Then the lowest efficiency was in 2017, which was 96.17%, the score in 2017 was also the only one that did not reach the efficient point. In 2018 Bank Mandiri Syariah also achieved efficiency; the score obtained was 114.3%.

Bukopin Sharia Bank achieved the highest score and, at the same time, achieved efficiency in 2019; the score obtained was 101.66%. The lowest score was in 2017, which was 86.71%, then in 2018, it managed to increase to 96.07%. Bukopin Sharia Bank has increased its efficiency every year.

Bank BCA Syariah, as a whole, experience a decrease in its efficiency score every year. It can be seen that the highest efficiency score was in 2017, which was 118.11%. The second-highest score was in 2018, at 116.95%. Then the lowest score was in 2019, which was 100.36. Even though it has decreased every year, Bank BCA Syariah remains safe because it is still at an efficient point.

Efficiency Level Analysis using Super Efficiency Concept of Data Envelopment Analysis (DEA)

To calculate the efficiency level of Islamic Commercial Banks in Indonesia in the 2017-2019 period, in this study, researchers used the help of the Efficiency Measurement System (EMS) software as an automatic data processing tool and Microsoft Excel 97-2003 as a manual data processing tool.

The results of the super efficiency test are also illustrated in the following diagram:

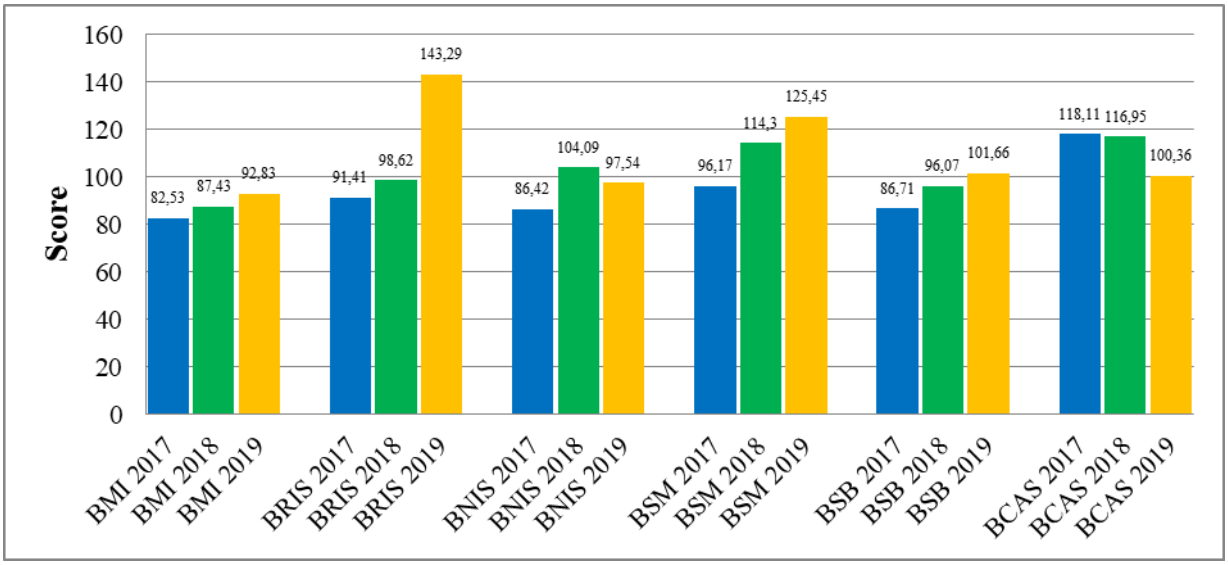

Figure 1. Results of the Super Efficiency Test for Islamic Commercial Banks for the 2017-2019 period

The Efficiency of Islamic Commercial Banks in Indonesia uses the Super Efficiency Concept

In 2017, only one bank reached an efficient point, namely Bank BCA Syariah. Furthermore, in 2018, it increased to three banks: Bank BNI Syariah, Bank Mandiri Syariah, and Bank BCA Syariah. In 2019, the number of banks that have been able to reach efficiency points increased, namely four banks: Bank BRI Syariah, Bank Mandiri Syariah, Bank Syariah Bukopin and Bank BCA Syariah.

Overall, the average efficiency of each bank continues to increase every year. This can be seen in Figure 1, which shows that four banks always experience an increase in their efficiency score every year. On the other hand, no bank continues to dominate by achieving the highest position every year. It can be seen that even the highest efficiency in 2017 and 2018 was obtained by Bank BCA Syariah, with scores of 118.11% and 116.95%, respectively. However, in 2019, Bank BRI Syariah, with a score of 143.29%, was able to win the highest position to replace Bank BCA Syariah.

This proves that competition in the world of Islamic banking is getting tougher from year to year. According to Islamic banking statistical data from the Financial Services Authority (OJK), the growth of Islamic Commercial Banks in Indonesia has continued to increase from year to year, indicated by the continued increase in total assets, number of offices, and number of employees. Following the opinion of Puspitasari et al. (2018), Pambuko (2016) and Berger & Humphrey (1997), the Islamic banking sector in Indonesia is currently experiencing quite rapid development from year to year, so this measurement is considered important when associated with the main role of sharia banking as an intermediary institution. The existence of this efficiency measurement will be useful to know the measurement of a bank's ability to optimize all controlled resources, which in turn can provide greater benefits for stakeholders.

Rating According to the Efficiency Level of Islamic Commercial Banks for the 2017-2019 period using Data Envelopment Analysis (DEA)

Based on the results of the super-efficiency test described above, overall results can be obtained which describe the ranking of Islamic Commercial Banks during the 2017-2019 period based on their level of efficiency, as follows (Rusydiana & Hasib, 2020):

Table 3. Efficiency rating of Islamic Commercial Banks based on the Super Efficiency

No	Bank Name	Score	Rank
1	Bank Muamalat Indonesia	87.59667	6
2	Bank BRI Syariah	111.1067	3
3	Bank BNI Syariah	96.01667	4
4	Bank Syariah Mandiri	111.9733	1
5	Bank Syariah Bukopin	94.81333	5
6	Bank BCA Syariah	111.8067	2

Efficiency in banking is one aspect used as a benchmark for bank performance (Hadad et al., 2003). In this study, efficiency measurement was carried out in an input-oriented manner so that if the same input produces less than the standard output, it is declared inefficient or inefficient. Then if the output achieved is the same as the standard, it is called normal. However, if the output produced from the same input is more than standard, it is called efficient (Tanjung & Devi, 2013).

Based on Table 4, it can be seen that the Islamic bank that has the highest efficiency is Bank Syariah Mandiri, with an efficiency score of 111.97%. Obtaining the highest total efficiency score also shows that Bank Mandiri Syariah is in the first rank and has the best efficiency among Islamic Commercial Banks in Indonesia in the 2017-2019 period. The second rank is Bank BCA Syariah, with an efficiency score of 111.80%. In third place Bank BRI Syariah, with an efficiency score of 111.10%. The three banks with the highest rating are Islamic Commercial Banks, achieving efficiency in the 2017-2019 period.

Apart from the three banks mentioned, it can be seen in Table 4 that the other three banks have yet to achieve efficiency or are called inefficient. These banks include BNI Syariah Bank, in fourth place with an efficiency score of 96.01%. Furthermore, in fifth place is Bukopin Sharia Bank, with an efficiency score of 94.81%. In the last or sixth rank, there is Bank Muamalat Indonesia, with an efficiency score of 87.59%. These banks have not been called efficient because they have not achieved a score of ≥1 or ≥100%, so they are said to be inefficient (Naufal & Firdaus, 2017).

Judging from the development of the variables used, Bank Syariah Mandiri, Bank BRI Syariah and Bank BNI Syariah, as banks with the top three ranking positions, tend to experience an increase in variables every year, in contrast to the three banks with the lowest ranking which has variable developments every year. Tends to fluctuate. This certainly greatly affects the results of the efficiency of each bank.

In addition, Bank Syariah Mandiri and Bank BRI Syariah have efficiency scores that continue to increase from 2017 to 2019; these three banks always make performance improvements every year. The exception was Bank BNI Syariah, which

experienced a decrease in its efficiency score from 2017 to 2019, but even so, throughout the year, Bank BCA Syariah was still able to maintain its efficiency.

Comparison between the Basic DEA Test and the Super Efficiency DEA

When compared, the efficiency test using the super efficiency method and the basic DEA method has a very clear difference from the DEA test conducted using the same data; the following results are obtained in Table 4.

Table 4. Comparison between Basic DEA Test and DEA Super Efficiency Test (in per cent)

No	Bank Name	Period	Super Efficiency Score	Basic DEA Score
1	Bank Muamalat Indonesia	2017	82,53	82,53
		2018	87,43	87,43
		2019	92,83	92,83
2	Bank BRI Syariah	2017	91,41	91,41
		2018	98,62	98,62
		2019	143,29	100
3	Bank BNI Syariah	2017	86,42	86,42
		2018	104,09	100
		2019	97,54	97,54
4	Bank Syariah Mandiri	2017	96,17	96,17
		2018	114,3	100
		2019	125,45	100
5	Bank Syariah Bukopin	2017	86,71	86,71
		2018	96,07	96,07
		2019	101,66	100
6	Bank BCA Syariah	2017	118,11	100
		2018	116,95	100
		2019	100,36	100

Efficiency measurement using the basic DEA method has a drawback, namely when un If the decision maker or Decision-Making Unit (DMU) tested has reached an efficient point of 1 or 100%, the efficiency score will stop at this maximum number. Therefore, if several DMUs are equally efficient in a study, it will be difficult for the researcher to determine a ranking based on the efficiency of the DMU.

As shown in Table 3, when the efficiency score using the basic DEA shows a score of 100%, then the score cannot exceed a maximum of 100%. With the lack of measuring efficiency using this DEA method, (Andersen & Petersen, 1993) introduced the super efficiency concept. The basic concept of super efficiency is to allow for observed DMU efficiencies greater than 1 or 100%. Superefficiency only affects units that are considered equally efficient with the constraints removed. Meanwhile, inefficient units are not affected because efficiency is less than 1.

Following the opinion of Rusydiana et al. (2018) and Rusydiana & Hasib (2020), the problem of scoring efficiency can be resolved by measuring efficiency using super efficiency. In Table 3, in the super efficiency, it can be seen that the score of Bank BRI Syariah in 2019, which was originally worth 100% when using basic DEA, changed to 143.29 when tested using super efficiency. Knowing the actual efficiency score makes it possible to rank according to efficiency at Islamic Commercial Banks in Indonesia.

The results of research on Islamic Commercial Banks conducted by this researcher have similarities with several previous studies. Among them is the research by Firdaus & Hosen (2014), who conducted research related to the efficiency of Islamic Commercial Banks in Indonesia during the second quarter of 2010 to the fourth quarter of 2012 and research by Naufal & Firdaus (2017), who conducted research on Islamic Commercial Banks for the period 2015-2016, that during the study period stated that the sample as a whole had a fluctuating efficiency level. This means that no Islamic Commercial Bank has a fixed efficiency score from each year of measurement. In this study, it is also seen that no Islamic banks have the same efficiency

score every year; some banks have experienced increases, and some banks have experienced decreases. Furthermore, Pambuko (2016) states that Islamic banks with smaller assets can be more efficient than large ones. The size of these assets can be seen in the annual financial reports, that the assets owned by the three banks that obtain the highest efficiency tend to be smaller than those in the bottom three of the efficiency rating, which have larger total assets.

CONCLUSION AND SUGGESTION

Based on the results of data analysis and discussion regarding the level of efficiency in Islamic Commercial Banks in Indonesia using the super efficiency concept method, it can be concluded that the results of the super efficiency test stated that the efficiency level of Islamic Commercial Banks in Indonesia continued to increase during the 2017-2019 period. Evidenced by the average efficiency score, which continues to increase every year.

In addition, the ranking results according to the efficiency level of Islamic Commercial Banks in Indonesia for the 2017-2019 period stated that the bank that received the highest rating during the research period was Bank Syariah Mandiri, with an efficiency score of 111.9733%. Then in second place, namely Bank BCA Syariah, with an efficiency score of 111.8067%. In third place Bank BRI Syariah, with an efficiency score of 111.1067%. In the fourth, fifth and sixth ranks, respectively, obtained by Bank BNI Syariah with a score of 96.01667%, Bank Syariah Bukopin with a score of 94.81333%, and Bank Muamalat Syariah with a score of 87.59667%, which means, the three banks with The bottom three ranks are still in an inefficient status.

Based on the results of this study, it is hoped that this research can be useful, both for readers in general, as additional knowledge, as a banking company, and as evaluation material for related Islamic Commercial Banks so that they continue to improve the efficiency of banking companies that are being managed, as well as for future researchers who are expected to can be used as a reference and reference for conducting studies related to the analysis of measurement of banking efficiency levels. However, this research could be better due to the small number of research periods and variables used. Therefore, for better research, further research is expected to increase the research period, which aims to find out the longer track record of DMU. In addition, it is also recommended to add research variables so that the efficiency score obtained can cover more aspects.

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