Research Paper

Analysis of Efficiency and Productivity of Sharia Commercial Banks in Indonesia

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ABSTRACT

This study aims to analyze the efficiency and productivity of Sharia commercial banks in Indonesia. Efficiency and productivity analysis using the nonparametric Data Envelopment Analysis (DEA) method based on the intermediation approach assuming Constant Return to Scale (CRS). The results of the analysis of 12 Sharia commercial banks in Indonesia during 2014-2017 showed that the average efficiency level of Sharia commercial banks increased initially by 82.4% in 2014 to 84.9% in 2015, then to 90.1% in 2016, then to 99.6% in 2017. The trend of increasing efficiency however is not directly proportional to the trend of increasing productivity. Productivity of Sharia commercial banks in 2014-2015 increased by 8.5%, and continued in 2015-2016 at 14.1%, but decreased in 2016-2017 by 8%. On average, the productivity of Sharia commercial banks in Indonesia during 2014-2017 was still low at 4.4% originating from an increase in technical efficiency of 7.2% and a decrease in technological change by 2.6%.

Key words: Sharia Commercial Banks in Indonesia, Data Envelopment Analysis (DEA), Intermediation Approach, Constant Return to Scale (CRS)

PREFACE

Enactment of Law No. 21 of 2008 concerning Sharia banking has increased the number of Sharia banks after 2008. Based on data from the Financial Services Authority (OJK) until December 2017, the number of Sharia Commercial Banks (BUS) in Indonesia as many as 13, Sharia Business Units (UUS) as many as 21, and Sharia Rural Banks (BPRS) were 167.

Table 1 Development of Sharia commercial banks in Indonesia during 2014-2017

Indicator	Year			
	2014	2015	2016	2017
Number of Banks	12	12	13	13
Total Asset (billion rupiahs)	204.961	213.423	254.184	288.027
Deposit (billion rupiahs)	170.723	174.895	206.407	238.225
Loan (billion rupiahs)	147.944	153.968	177.482	189.789

Source: Financial Services Authority (OJK, 2019)

Table 1 shows the number of banks, total assets, deposit, and loan of Sharia commercial banks in Indonesia during 2014-2017 experiencing rapid growth, but the market share of Sharia commercial banks is still small. The total assets of Sharia commercial banks in 2017 amounted to Rp 288,027 billion, while national banking assets amounted to Rp 7,387,144

billion, meaning that the market share of Sharia commercial banks was only 3.9%. Current strategic issues of Sharia banking in Indonesia include, in terms of input, funding, Sharia banks face competition in obtaining low cost funds. In terms of output in the form of loan, loan contracts are less varied so product innovation needs to be done. Measurement of financial ratios provides important information about financial performance, but has not been able to provide comprehensive information for management in order to improve performance (Darwis 2004). One alternative measure of bank performance is the measurement of bank efficiency (Singh and Fida 2015). Baten and Kamil (2010) argue that measurement of efficiency is very important for investors before deciding to invest. Efficiency is also a major factor for Sharia banks to be able to compete with conventional banks (Hasan 2004). Kablan (2007) states that the financial sector, especially Sharia banking, has an important role in the economy of a country.

The development of Sharia banking needs to be studied, one of which is in terms of efficiency, considering that Sharia banking in Indonesia has been established for more than three decades and Indonesia as a country with the largest muslim population in the world has a huge growth potential in Sharia banking.

Research Gap

Several studies related to the efficiency of Sharia banking in Indonesia have been carried out by Havidz and Setiawan (2015), Firdaus and Hosen (2013), Pratikto and Sugianto (2011), Afiatun and Wiryono (2010), and Ascarya and Yumanita (2006). These studies used data from 2013 and before. The existence of the 2017-2019 Indonesian Sharia finance development roadmap from the OJK which aims to continue to develop the Sharia financial industry attracted the attention of the authors to examine data from all Sharia commercial banks except the Aceh bank because it just converted into a Sharia commercial bank in 2016. This study will combine efficiency and productivity by using the latest data to be more relevant and can contribute as one of the references to the results of efficiency measurement of Sharia commercial banks in the context of future Sharia banking development according to the intended roadmap.

### Research purposes

The objectives of this study are:
1. Analysing the efficiency of Sharia commercial banks in Indonesia during 2014-2017
2. Analysing the productivity of Sharia commercial banks in Indonesia during 2014-2017

Previous research

Havidz and Setiawan (2015) concluded that some banks are inefficient because of bad bank functions & waste and inefficiency of bank managers because they cannot optimize resources. Firdaus and Hosen (2013) show that in general ten Sharia banks in Indonesia have not achieved optimum efficiency. Pratikto and Sugianto (2011) concluded that the efficiency of Sharia banking before & after the global crisis was generally included as efficient. Afiatun and Wiryono (2010) concluded that the average efficiency of Sharia banks in 2004-2009 periods was lower than conventional banks. Ascarya and Yumanita (2006) concluded that in the intermediation approach, only 4 Sharia banks operate on an efficient scale. The rest have varied scale inefficiencies. In the production approach, there are 5 scalable Sharia banks and the other 5 are inefficient. The results of the overall efficiency analysis show that in general Sharia banks are not yet efficient.

Framework

The performance of Sharia commercial banks in Indonesia after being analyzed using Data Envelopment Analysis (DEA) will produce an efficiency score. This score is used to compare the performance of each bank in a given year. Another thing that will be produced is the Malmquist Productivity Index (MPI) which will be used to see changes in bank performance between years.
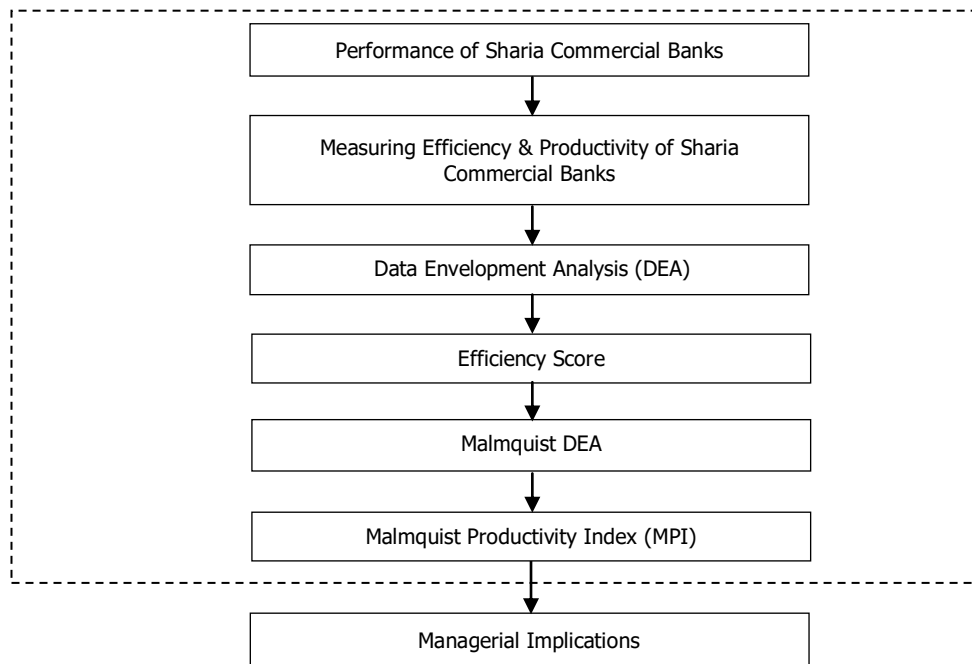
-----: Research Coverage
Figure 1 Research Framework

RESEARCH METHODS

Types and Data Sources

In this study researchers used the types and sources of data as follows:

1. Secondary data in the form of Sharia Banking Statistics and Indonesian Banking Statistics 2014-2017, obtained from the website of the Financial Services Authority.
2. Secondary data in the form of annual reports of 12 Sharia banks in 2014-2017, obtained from the sites of each Sharia commercial bank.

Research Samples

The samples of this study are Bank Muamalat Indonesia (BMI), Bank Victoria Syariah (VICS), Bank BRI Syariah (BRIS), Bank Jabar Banten Syariah (BJBS), Bank BNI Syariah (BNIS), Bank Syariah Mandiri (BSM), Bank Mega Syariah (MEGAS), Bank Panin Dubai Syariah (PANS), Bank Syariah Bukopin (BSB), Bank BCA Syariah (BCAS), Maybank Syariah Indonesia (MAYS), Bank Tabungan Pensiunan Nasional Syariah (BTPNS).

Data Analysis and Processing Method

The method used in this research is Data Envelopment Analysis (DEA) with an intermediation approach to the Constant Return to Scale (CCR Model) assumption. DEA is a linear programming technique used to evaluate how decision making units (DMUs), in this case Sharia commercial banks, operate relatively with other Sharia commercial banks in the sample. Furthermore, the process will form a frontier line formed from efficient banks which are then compared with inefficient banks to produce their respective efficiency values. The efficiency value will be between zero and one. An efficient bank will have a value of one. However, in the sense that the most efficient bank does not mean providing the maximum output among the existing sample of Sharia commercial banks, it provides an overview of the best practices of output among other Sharia commercial banks. According to Hadad et al. (2003), the intermediation approach explains the actual activities of banking as an intermediary institution. The efficiency value of the CCR model is the value of overall technical efficiency that reflects technical efficiency and scale efficiency at the same time. DEA general equation:

$$Efficiency\ of\ DMU_0 = \frac{\sum_{k=1}^{p} \mu_k\ y_{k0}}{\sum_{i=1}^{m} v_i\ x_{i0}}$$

whereas, n = The DMU that will be evaluated; m = different inputs; p = different outputs; x_{i0} = the amount of input i consumed by DMU_0; y_{k0} = the number of k output produced by DMU_0.

The analysis tool used in this study is DEAP Ver. 2.1.

DEA Input and Output Specifications

The input and output variables used in this study refer to the variables used in the study of Yudistira (2004), which is also used by Ascarya and Yumanita (2006).

Table 2 Input and output specifications used in the study

Periods	Input	Output
	Labor costs (LC)	Other Operating Income (OOI)
2014-2017	Fix assets (FA)	Current assets (CAS)
	Third-party funds (Deposit)	Financing (Loan)

RESULTS

Descriptive statistics

Variable data, amount of data, minimum value, maximum value, mean and standard deviation in this study are presented in table 3.

Table 3 Descriptive statistics for research data

Variable	n	Min (Rp juta)	Max (Rp juta)	Mean (Rp juta)	Std (Rp juta)
OOI	72	969	1.285.625	204.023	312.799
CAS	72	308.076	26.463.894	5.006.363	6.345.953
Loan	72	485.353	60.694.912	13.482.654	16.742.469
LC	72	26.233	1.599.262	407.126	436.869
FA	72	626	2.653.439	394.167	692.798
Deposit	72	561.510	77.896.821	15.809.739	20.512.089

Sources: Sharia banks Annual Report (2019)

The results of the testing of descriptive statistics in table 3 show that the minimum value of Deposit is 561,510 million rupiahs and the maximum value is 77,896,821 million rupiahs. This shows that the amount of Deposit in this study sample ranged from 561,510 million rupiahs to 77,896,821 million rupiahs with an average of 15,809,739 million rupiahs at a standard deviation of 20,512,089 million rupiahs. The average value is smaller than the standard deviation which means that the distribution of the value of Deposit is not good. Descriptions for other variables can also be explained like Deposit variables.

Efficiency Calculation Results

The efficiency score results are shown in table 4. Efficiency scores ranged from 0–1. the score that is closer to 1 (one) indicates that Islamic commercial banks are increasingly efficient.

The data in table 4 shows that in 2014 as many as 8 banks experienced inefficiencies. In 2015, 7 banks experienced inefficiencies. In 2016, 8 banks experienced inefficiency, and in 2017, 1 bank experienced inefficiency. Efficient banks during 2014-2017 were Panin Bank Dubai Syariah and Maybank Syariah Indonesia.

Table 4 The level of efficiency of Sharia banks in Indonesia in 2014-2017 periods

DMU	2014	2015	2016	2017
BMI	0,759	0,773	0,947	1,000
VICS	0,642	0,709	1,000	1,000
BRIS	0,642	0,800	0,900	1,000
BJBS	1,000	0,900	1,000	1,000
BNIS	0,691	0,568	0,754	0,947
BSM	1,000	0,842	0,788	1,000
MEGAS	0,976	1,000	0,863	1,000
PANS	1,000	1,000	1,000	1,000
BSB	0,903	1,000	0,977	1,000
BCAS	0,687	1,000	0,891	1,000
MAYS	1,000	1,000	1,000	1,000
BTPNS	0,593	0,590	0,696	1,000
Mean	0,824	0,849	0,901	0,996

Sources: Output DEA (2019, *processed*)

Table 5 shows that in 2014 Bank Muamalat Indonesia, Bank Victoria Syariah, Bank BRI Syariah, Bank Syariah Bukopin, and Bank BCA Syariah were inefficient on fixed asset input variables and on all output variables (other operating income, current assets and loan). Bank Mega Syariah and Bank Tabungan Pensiunan Nasional are inefficient on all input-output variables except the input variables of Deposit. Bank BNI Syariah is inefficient on all input-output variables except for fixed asset input variables. In 2015 Bank Muamalat Indonesia and Bank Victoria Syariah were inefficient on fixed asset input variables and on all output variables. Bank BRI Syariah & Bank Syariah Mandiri are inefficient on the

input variables of Deposit and on all output variables, while Bank BNI Syariah & Bank Tabungan Pensiunan Nasional are inefficient on all variables except the input variables of Deposit. In 2016 Bank Muamalat Indonesia, Bank Syariah Mandiri, Bank Mega Syariah, Bank Syariah Bukopin, and Bank BCA Syariah were inefficient on fixed asset input variables and on all output variables. Bank BRI Syariah is inefficient

on the input variables of Deposit and on all of its output variables, while Bank Tabungan Pensiunan Nasional is inefficient on all variables except the input variables of Deposit. In 2017, banks that have not achieved a 100% efficiency score are Bank BNI Syariah. Inefficiency occurs in all output variables (other operating income, current assets and loan).

Table 5 Variable & Potential Improvement banks that are inefficient for 2014-2017

DMU	2014	2015	2016	2017
	Variabel (Potential Improvement)	Variabel (Potential Improvement)	Variabel (Potential Improvement)	Variabel (Potential Improvement)
BMI	OOI (24,08%), CAS (24,92%), Loan (24,08%), FA (496,51%)	OOI (22,67%), CAS (22,67%), Loan (22,67%), FA (405,86%)	OOI (5,32%), CAS (39,67%), Loan (5,32%), FA (459,25%)	
VICS	OOI (35,76%), CAS (56,80%), Loan (35,76%), FA (26,69%)	OOI (73,09%), CAS (37,47%), Loan (29,09%), FA (67,57%)		
BRIS	OOI (35,79%), CAS (60,72%), Loan (35,79%), FA (28,50%)	OOI (19,99%), CAS (19,99%), Loan (34,85%), Deposit (16,91%)	OOI (9,96%), CAS (9,96%), Loan (9,96%), Deposit (21,37%)	
BJBS		OOI (10,00%), CAS (14,95%), Loan (10,00%), FA (53,89%)		
BNIS	OOI (30,90%), CAS (57,88%), Loan (30,90%), LC (43,34%)	OOI (43,19%), CAS (55,20%), Loan (43,19%), LC (3,26%), FA (22,85%)	OOI (24,74%), CAS (47,82%), Loan (24,60%),	OOI (5,29%), CAS (20,04%), Loan (5,29%),
BSM		OOI (15,77%), CAS (15,77%), Loan (20,09%), Deposit (14,15%)	OOI (21,16%), CAS (28,33%), Loan (21,16%), FA (16,76%)	
MEGAS	OOI (2,43%), CAS (33,63%), Loan (5,31%), LC (114,06%), FA (41,10%)		OOI (13,72%), CAS (64,93%), Loan (13,72%), FA (233,59%)	
BSB	OOI (9,70%), CAS (12,69%), Loan (9,70%), FA (73,63%)		OOI (2,32%), CAS (2,32%), Loan (7,47%), FA (96,46%)	
BCAS	OOI (46,77%), CAS (38,32%), Loan (31,25%), FA (68,30%)		OOI (21,37%), CAS (15,79%), Loan (10,85%), FA (21,11%)	
BTPNS	OOI (51,89%), CAS (57,03%), Loan (40,74%), LC (435,39%), FA (948,86%)	OOI (68,74%), CAS (49,06%), Loan (40,95%), LC (407,85%), FA (1412,36%)	OOI (89,12%), CAS (65,25%), Loan (30,36%), LC (190,78%), FA (465,41 %)	

Source: Output DEA (2019, *processed*)

Table 6 *Benchmark for banks that are inefficient for 2014-2017*

DMU	2014	2015	2016	2017
	Benchmark (Lambda)	Benchmark (Lambda)	Benchmark (Lambda)	Benchmark (Lambda)
BMI	MAYS (12,723), PANS (6,781), BJBS (0,760)	MAYS (14,763), PANS (4,157), BSB (1,108), MEGAS (0,299)	MAYS (12,074), PANS (4,727), BJBS (0,124)	BMI (1,000)
VICS	MAYS (0,841), PANS (0,032), BJBS (0,032)	MAYS (0,629), PANS (0,094)	VICS (1,000)	VICS (1,000)
BRIS	MAYS (12,753), PANS (0,474), BJBS (0,269)	MAYS (14,194), BSB (0,720), MEGAS (0,106)	MAYS (10,124), PANS (1,000), BJBS (0,043), VICS (3,054)	BRIS (1,000)
BJBS	BJBS (1,000)	MAYS (0,989), PANS (0,527), MEGAS (0,242)	BJBS (1,000)	BJBS (1,000)
BNIS	MAYS (10,764), BSM (0,082)	MAYS (19,564), MEGAS (0,219)	MAYS (15,735), PANS (1,714), VICS (0,938)	MAYS (4,126), PANS (1,548), VICS (9,338), MEGAS (0,212)
BSM	BSM (1,000)	MAYS (20,647), BSB (6,401), MEGAS (1,051)	MAYS (19,337), PANS (7,646), BJBS (0,619)	BSM (1,000)
MEGAS	BJBS (1,272)	MEGAS (1,000)	MAYS (2,169), PANS (0,148), BJBS (0,441)	MEGAS (1,000)
BSB	MAYS (0,500), PANS (0,522), BJBS (0,178)	BSB (1,000)	MAYS (0,509), PANS (0,687), BJBS (0,062)	BSB (1,000)
BCAS	MAYS (1,351), PANS (0,183)	BCAS (1,000)	MAYS (1,145), PANS (0,438)	BCAS (1,000)
BTPNS	MAYS (2,596)	MAYS (4,058)	MAYS (7,538)	BTPNS (1,000)

Sources: Output DEA (2019, *processed*)

Table 6 shows inefficient banks in 2014-2017. These banks are expected to refer to banks that have been efficient. Banks that are used as a reference for banks that are inefficient are called references, while lambda is the input-output weight that should be used to achieve a 100% efficiency level. In 2014 the Bank Mumalat Indonesia should use 12,723 input-output from Maybank Syariah Indonesia, 6,781 input-output from Bank Panin Dubai Syariah, and 0,760 input-output from Bank Jabar Banten Syariah. Furthermore, for other banks it can be explained like an explanation at Muamalat Indonesia Bank.

Malmquist Productivity Index (MPI)

Table 7 *Total factor productivity change*

Years	Catch-UpEffect	Frontier Shift Effect	TFP Change
2014-2015	1,031	1,052	1,085
2015-2016	1,075	1,061	1,141
2016-2017	1,112	0,827	0,920
Mean	1,072	0,974	1,044

Sources: Output DEA (2019, *processed*)

Table 7 shows that during 2014-2015 changes in total factor productivity increased by 8.5%. This change came from an increase in changes in technical efficiency (catch-up effect) of 3.1% and an increase in technological change (frontier shift effect) of 5.2%. In 2015-2016 changes in total factor productivity increased by 14.1%. This change came from an increase in changes in technical efficiency (catch-up effect) of 7.5% and an increase in technological change (frontier shift effect) of 6.1%. Meanwhile in 2016-2017 the total factor factor changes decreased by 8%. This change came from an increase in changes in technical efficiency (catch-up effect) of 11.2% and a decrease in technology change (frontier shift effect) of 17.3%. The average increase in total productivity of 4.4% came from an increase in changes in technical efficiency (catch-up effect) of 7.2% and a decrease in technological change (frontier shift effect) of 2.6%.

Comparison of the level of efficiency and productivity of Sharia Commercial Banks in Indonesia in 2014-2017 is shown in Figure 2.
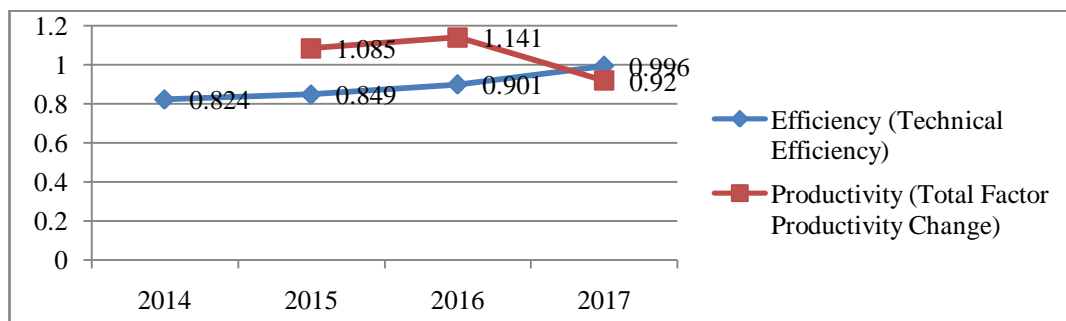

Figure 2 Comparison of the level of efficiency and productivity of Sharia banks in Indonesia in 2014-2017

Figure 2 shows that the increase in efficiency of Sharia commercial banks is not followed by an increase in productivity. The efficiency level of Sharia commercial banks in Indonesia during 2014-2017 experienced an increasing trend each year, amounting to 0.824 in 2014, 0.849 in 2015, 0.901 in 2016, and by 0.996 in 2017. The level of productivity of Sharia banks in 2014-2015 increased by 8.5%, then increased again in 2015-2016 by 14.1%, but decreased in 2016-2017 by 8%.

DISCUSSION

During the study period from 2014-2017, as many as 10 of the 12 Islamic banks in general have not achieved 100% efficiency, namely Bank Muamalat Indonesia, Bank Victoria Syariah, Bank BRI Syariah, Bank Jabar Banten Syariah, Bank BNI Syariah, Bank Syariah Mandiri, Bank Mega Syariah Bank, Bank Syariah Bukopin, Bank BCA Syariah, Bank Tabungan Pensiunan Nasional Syariah.

During 2014-2017, the most dominant cause of Bank Muamalat

Indonesia's inefficiency was the fixed asset variable indicated by the highest potential improvement value. Other variables that cause inefficiencies are other operating income, current assets, and loan. The causes of Bank Victoria Syariah inefficiencies tend to vary, namely other operating income, current assets, loan and fixed assets. The relatively dominant cause of inefficiency of Bank BRI Syariah is the current assets variable. The cause of Bank Jabar Banten Syariah inefficiency in general is fixed assets. The most dominant cause of Bank BNI Syariah inefficiency is the current assets variable. The causes of Bank Syariah Mandiri inefficiencies tend to vary, namely other operating income, current assets, loan and Deposit. The most dominant causes of the inefficiency of the Bank Mega Syariah are fixed assets and labor costs. The most dominant cause of Bank Syariah Bukopin's inefficiency is fixed assets. The dominant cause of the inefficiency of Bank BCA Syariah is fixed assets. The most dominant causes of inefficiency of the Bank Tabungan Pensiunan Nasional Syariah are fixed assets and labor costs. In general, as an industry, the most dominant causes of Sharia commercial banks inefficiencies are variable fixed assets, labor costs and current assets.

The inefficiency of several banks in accordance with the research of Havidz and Setiawan (2015) occurs because Sharia banks have not been able to optimize resources (input and / or output). The results of this study also provide results similar to those of Firdaus and Hosen (2013), Afiatun and Wiryono (2010) and Ascarya and Yumanita (2006) which state that in general Sharia banks in Indonesia have not achieved optimum efficiency.

Based on the Malmquist Productivity Index (MPI), changes in bank productivity other than those derived from changes in technical efficiency (catch-up effects), also come from technological changes (frontier shift effects). Changes in technology can be realized by product innovation, such as digital banking. One of the digital banking concept strategies,

namely branchless banking, serves to capture market segments that have not been exploited or expand existing markets. The concept will be able to reduce operating expenses such as rental costs and labor costs. Customers will also get the convenience of banking services and banks will increase efficiency. The technology change will also increase other operating income (fee based income).

Managerial Implications

The results of the calculation of Data Envelopment Analysis (DEA) can be used by the management of Sharia banks in Indonesia in order to improve efficiency and productivity. The inefficiencies contained in each bank have been determined and analyzed. In this case, each bank has different factors causing the occurrence of inefficiencies. Analysis of the dominant causal factors will help each bank to find out the bank's biggest problem. The problem is then analyzed to help improve the efficiency of each bank. Based on the research that has been done, the managerial implications that can be conveyed are:

1. Actual financing is smaller than the specified target. Improvements that need to be done are creating attractive and varied financing products and not dominated by financing with murabahah contracts. Funding can be done by direct means or by partnering (linkage programs) with other financial institutions (BPRS / cooperatives / multi-finance). Linkage programs can be implemented through channeling, executing, or join financing schemes. Islamic commercial banks need to reduce the financing margin for productive financing to attract people to apply for financing so that the target can be achieved while increasing market share.

2. Actual current assets are smaller than the specified target. Improvements need to be made are increasing the portfolio of current assets such as placements at Bank Indonesia, current accounts and placements at other banks, investing in

securities, securities that purchased with agreements to resell and so on.

3. Actual other operating income is smaller than the specified target. Other operational income increases can be achieved by increasing fee-based income through the provision of banking services including account management services, financing administration services, ATM services, other transaction services, and optimization of digital banking.

4. Actual Deposit are greater than the target set. Islamic commercial banks must increase the proportion of CASA or low-cost funds more than time deposits, for example by increasing the proportion of Hajj funds. Other improvements are by allocating excess Deposit to productive assets, such as securities such as Bank Indonesia Syariah Certificates (SBIS), etc. Allocation of liquid assets must also consider the ability of banks to mitigate risks and sufficient composition for the distribution of funds in the form of financing to customers so as not to disrupt the banking intermediation function.

5. Actual assets remain larger than the specified target. The improvement that needs to be done is to reduce the purchase of fixed assets through self-procurement and be replaced with a leasing system.

6. Actual labor costs are greater than the specified target. Improvements that can be made are by closing down unproductive branch offices, the existence of internal rules of the bank to use the system of employment contracts for its employees and collaborating with universities in terms of providing qualified and competent human resources.

7. Efficiency efforts that can be carried out by inefficient Sharia commercial banks are by referring to an efficient bank (benchmark) in accordance with the results of the measurement of the Data Envelopment Analysis (DEA) method. Basically an adjustment effort is made to increase the value of each variable (output maximization / input minimization), so that the inefficient Sharia bank knows the real target that must be achieved to get the optimum level of efficiency.

CONCLUSIONS AND SUGGESTIONS
Conclusions
The conclusions of this study are as follows:
1. The level of efficiency of Sharia Banks in Indonesia during 2014-2017 experienced an increasing trend, but most Sharia Banks in Indonesia have not yet reached their optimum efficiency level. in 2014 the number of inefficient banks was 8 banks (66.67%), in 2015 the number of inefficient banks was 7 banks (58.33%), in 2016 the number of inefficient banks was 8 banks (66.67%), and in 2017 the number of inefficient banks is 1 bank (8.33%).
2. The results of the study show that the increase in efficiency is not followed by an increase in productivity. On average, the productivity growth of Sharia banks in Indonesia during 2014-2017 was still low at 4.4% originating from an increase in technical efficiency of 7.2% and a decrease in technological change by 2.6%.

Suggestions
This study uses a nonparametric Data Envelopment Analysis (DEA) method based on the Intermediation approach. Further research is suggested to use other methods and approaches to enrich the reference. More and more references from research results are expected to be used for the advancement of Sharia Banks in Indonesia.

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